

Turn On, Tune In, Drop In: Psychedelics, Creativity and Entrepreneurship

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There is a long history of psychedelic use throughout history. A great deal of research was conducted on the possible benefits of psychedelics until LSD and psilocybin became street drugs in the 1960s with reported negative effects. Declared illegal in the late 1960s, research slowed on the benefits of such drugs. A new version of the “street” use of psychedelics has emerged in the form of microdosing, particularly by entrepreneurs and Silicon Valley engineers. This paper reviews the history of psychedelics, possible benefits for creativity and openness for entrepreneurs, and how the issue should be addressed in an entrepreneurship classroom.

Keywords: psychedelics, creativity, entrepreneurship, pedagogy

INTRODUCTION

Albert Hofmann first synthesized lysergic acid diethylamide, known as LSD, in 1938. In 1943 Hofmann accidentally ingested some LSD and had the first known LSD trip. He lay down on the couch in his office in Switzerland and, according to his account, “perceived an uninterrupted stream of fantastic pictures, extraordinary shapes with intense, kaleidoscopic play of colors” (Hofmann 1983, p. 40-47). Several days later Hofmann decided to perform an experiment on himself and intentionally took a dose of LSD. This was the first known “bad trip.” Hofmann told his lab assistant that he felt ill and was going home. Due to wartime restrictions on the use of automobiles, Hofmann rode his bicycle home and had his lab assistant summon a doctor. To this day, proponents of LSD celebrate on April 19 of each year, Bicycle Day (Pollan 2018). Despite the bad trip, Hofmann was convinced that LSD had a great future in psychiatry and especially in the treatment of schizophrenia.

Before and since Hofmann, psychedelics (e.g., psilocybin, LSD, ergot, ayahuasca) have been used in religious ceremonies, and as treatment for depression, addiction, schizophrenia, anxiety, and other mental disorders. After a hiatus in research when the U. S. Government declared LSD illegal in the late 1960s, interest in psychedelic research has resumed. In addition to formal research at such places as Johns Hopkins and the Imperial College of London, Silicon Valley entrepreneurs and technology firm employees are experimenting with microdoses of LSD to increase creativity and focus. A microdose is one-twentieth to one-tenth of a recreational dose.

The purpose of this paper is to explore the claims of some that microdosing increases creativity, the Big Five personality trait of openness and the state of flow. Additionally, given the hype about microdosing and the possible positive effects of microdosing, how should we, as educators, approach the subject with students or should we approach the subject at all?

The paper is organized as follows. First, we will look at what psychedelics have been used throughout history, who has used them and what early psychedelic research found. We will then look at several self-reports of people who tout the benefits of microdosing and the current academic research. The authors will then summarize the research to date and explore the ethics and epistemological questions of discussing microdosing with entrepreneurship students. Finally, a conclusion and ideas for pedagogical approaches in the classroom are presented.

HISTORY OF PSYCHEDELICS

The word psychedelic is also known as entheogen from the Greek word that means “the divine within.” Psychedelic is a Greek word meaning “mind manifesting.” Ancient Greeks also use the term *ecstasis* or “stepping outside oneself” (Kotler & Wheel, 2017). In the Americas, the Aztecs called psychedelic substances *teonanamacatl* or “flash of the Gods” (Pollan, 2018). Reports of the use of psychedelics in Europe extend back to the ancient Greeks and Spanish explorers found psychedelics being used by Native Americans when the Spanish arrived in the new world.

One anecdote from ancient Greece illustrates the use and importance of psychedelics. On a Friday night in Athens, around 415 BCE, a prominent Greek general and politician named Alcibiades, threw a party. Dressed in the stolen robes of a high priest, Alcibiades made a dramatic entrance, recited a forbidden incantation, and, from an ornate decanter, poured a single-shot of a purple liquid into each guest’s

According to the historian Plutarch, a guest at the party, the effects of the drink took hold. He recounts that “fears, terrors, quivering, mortal sweats and lethargic stupor come and overwhelm us. But as soon as we were out of it, we pass into delightful meadows, where the purest air is breathed, where sacred concerts and discourses are heard; where, in short, one is impressed with celestial visions.” By morning, all visions had faded (Mylonas, 1961). The drug Alcibiades had stolen from the temple was *kykeon*, the sacred elixir

As previously noted, when the Spanish conquerors came to the New World, they found Native Americans using psilocybin, the hallucinogenic chemical in magic mushrooms. Natives of the Amazon basin used ayahuasca, a vine that develops psychoactive properties when brewed in a tea. While in the East, there is little evidence of psychedelics, cannabis was apparently widely used. Since cannabis works on the brain in a different way, it is not technically a psychedelic. Neither is 3, 4-methylenedioxy-methamphetamine [also known as MDMA, Ecstasy, and Black Molly] (Kotler and Wheel 2017; Pollan 2018). It is apparent, from the history, that psychedelics have been around for thousands of years and have aided those who sought an altered state of consciousness.

Uses of Psychedelics

One use of psychedelics is as a religious sacrament. In the story of Alcibiades, the stolen *kykeon* came from the Temple. In fact, Alcibiades had to flee for his life because his actions had insulted the gods. Psilocybin is used in Native American religious rituals as is ayahuasca. While psychedelic drugs may or may not bring one closer to God, they are not addictive and can be used by priests, mystics, and congregants without fear of becoming dependent on them.

In addition to religious rituals, psychedelics or other hallucinogenic drugs have been used by some famous people who believed the drugs were of great benefit. William James, often referred to as the father of modern psychology used nitrous oxide (laughing gas) to experience altered states of consciousness. It was his use of nitrous oxide that led to his book, *Varieties of Religious Experience* that contained the quote that begins this paper (Pollan, 2018).

Bill Wilson, the cofounder of Alcoholics Anonymous, credited an experience he had in 1934 with belladonna, a plant-derived alkaloid with hallucinogenic properties, for his sobriety. In 1956 Wilson took LSD several times under the direction of psychologists from UCLA. Although Wilson thought LSD therapy was essential to sobriety, he was unable to convince his board to incorporate it into the AA program (Pollan 2018).

The famous author, Aldous Huxley, also experimented with psychedelics. His first was an experiment with mescaline in 1953. The experience led to his book, *The Doors of Perception*. Afterwards, he tried LSD and wrote, “What came through the closed door was the realization...the direct, total awareness, from the inside, so to say of Love as the primary and fundamental cosmic fact” (Pollan 2018).

Perhaps the best known proponent of LSD use was the Harvard psychologist, Timothy Leary. Leary and his colleagues conducted numerous experiments using LSD in the 1950s and 1960s. While much of the research was promising, Leary felt that LSD was so important to the world (because of its mystical qualities) that everyone should take it. In fact, he believed that if world leaders took LSD, there would be no more war. His enthusiasm caught on with the counterculture movement of the 1960s and LSD, although still legal, became a street drug. There were reports of bad trips, people trying to fly off buildings, and flashbacks. The problem was not LSD, per se, but its use. LSD is not to be taken by people who have any form of psychosis or who are on certain drugs such as anti-depressants. Moreover, LSD should not be taken unless the trip is under the guided supervision of a psychologist or psychiatrist trained in its use. Widespread use, as in the 1960s, discredited Leary and ultimately resulted in the Nixon administration passing laws to

More relevant to this paper, Steve Jobs contended that his use of LSD was among the most important experiences of his life (Pollan 2018). Author and investor, Tim Ferris pointed out that once Jobs and other successful people began using psychedelics for creative problem solving, it became much more acceptable in Silicon Valley and other high-pressure environments (Kotler and Wheel, 2017). The idea of healthy individuals microdosing either LSD or psilocybin in order to enhance creative problem solving has led to renewed interest in research on psychedelics. Below is a discussion of the types of research being conducted and what researchers have found so far.

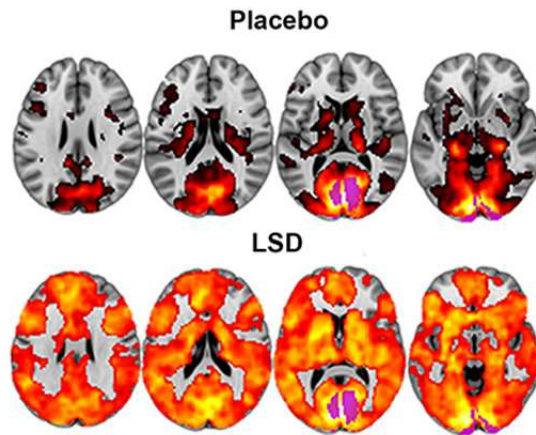
CURRENT RESEARCH

Research on the effects and possible benefits of psychedelics is being conducted by academic researchers and by individuals experimenting with microdosing. First, we will discuss how psychedelics affect the brain. Then we will discuss a sample of articles and self-reports on microdosing and follow with a sample of academic research articles.

How Psychedelics Affect the Brain

In 2001, Marcus Raichle, a neurologist then at Washington University, and his colleagues published a paper about the default mode network (DMN). Until this time, the term was not known to brain science. The DMN is a part of the brain that links parts of the cerebral cortex to older structures of the brain typically involved in emotion and memory. In short, it acts like a switching system for old analog telephones. A message comes in, is sent to the DMN and the DMN sends the message to the part of the brain that needs to receive the message (Raichle et al. 2001). Some researchers have suggested that the DMN acts as an individual's ego. That is, the DMN regulates what our responses should be to incoming messages by routing that message to the right part of the brain (Carhart-Harris, et al., 2012). Psychedelics disable the DMN and allow the different parts of the brain to communicate directly. Figure 1 shows the difference between a brain on LSD and one on a non-psychedelic placebo. The brain on LSD lights up significantly more in an fMRI than the brain on the placebo.

FIGURE 1
fMRI IMAGES OF A BRAIN ON A PLACEBO AND A BRAIN ON LSD



Adapted from Albayrak (2019)

Popular Articles on Microdosing

Many of the claims of the benefits of microdosing are discussions of the potential of psychedelics and self-reports in the popular press. Below, a summary of these reports is presented. The articles are shown in Table 1.

TABLE 1
SELECTED ARTICLES ON MICRODOSING IN POPULAR PRESS

Publication and Date	Title	Focus
Marine Corps Gazette (2019)	Microdosing: Improving Performance Enhancement in Intelligence Analysis	Argues the benefits of microdosing should be studied in the Marine Corps Intelligence, Surveillance, and Reconnaissance Enterprise (MCISRE) to help solve difficult problems.
Dana Foundation Blog (2019)	WSF19: The Promise of Psychedelics	Psychedelics offer the possibility of richer states of consciousness than we typically experience.
New Statesman (2018)	The New Science of Psychedelics	Instead of a continuous course of drugs to change the biochemistry of your brain (e.g., depression) psychedelic experience holds out the possibility of a single and lasting intervention.
Money.cnn.com (2015)	When Silicon Valley Takes LSD	Psychedelics taken by those who work in Silicon Valley to enhance creativity.
New Scientist (2017)	Leading the High Life	Presents self-reports on microdosing.
vox.com (2016)	Can Very Small Doses of LSD Make You a Better Worker? I Decided to Try It.	Personal story of the author experimenting with microdosing.
rollingstone.com (2019)	How LSD Microdosing Became the New Business Trip	Regular doses of acid lead to creativity
vice.com	A Brief History of Microdosing	A recent history of microdosing
psychologytoday.com	A New Review of Psilocybin Microdosing Cools the Hype	Despite the interest in the subject, there is no scientific consensus of what microdosing actually is.

One article suggests that despite all the interest in microdosing there is little to no scientific consensus of what microdosing actually is (Berland, 2019). As noted above, a microdose is commonly considered an amount of a psychedelic substance between one-twentieth and one-tenth of a recreational dose. The problem with this definition is that there is no common definition of a recreational dose. The best way to describe a microdose is its effect. The person who microdoses should not directly feel the effects of the drug, but will have increased focus, creativity, and problem solving skills (Pollan 2018). Another article suggests that a microdose is about 10-20 micrograms to be taken every four days. There should be no hallucinations and no traumatic experiences (Kobler, 2015).

Several articles report on people who microdose or are self-reports of microdosing by the author. Users report enhanced creativity (Fink, 2015; Leonard, 2015; Wong 2017). One Silicon Valley engineer in his 50s reported that he used LSD to help him solve work problems. For many who use psychedelics, it is just another tool in their arsenal to remain competitive. Other reported benefits included better sleep, improved athletic performance, and relief from pain caused by menstrual disorders and migraine headaches (Wong 2017).

Writer Baynard Woods tried microdosing to see what it was all about. He reports that he was having coffee with a friend and felt he was a better listener and exceedingly engaged with what his friend had to say. He did not feel high, but he did feel he had an enhanced sense of awareness and focus. Other positive aspects of his microdosing were an increased focus on work, more patience, and a reduced desire to check the internet as frequently as before (Woods, 2016).

Messana (2019) interviewed Alison Gopnik, Ph.D., professor of psychology and affiliate professor of philosophy at University of California, Berkeley. Gopnik noted that adult brains on psychedelics provide a much richer range of states of consciousness than we normally experience. Thus, psychedelics may provide more options for problem solving than people can access in the default state.

Academic Research on Psychedelics and Creativity

In addition to articles on microdosing and self-reports of the effects, there is an extensive amount of academic research on psychedelics. Since one of the purported reasons for taking microdoses of psychedelics is to enhance creativity, the focus of this literature review is on psychedelics and their relation to creativity, openness and reduced neuroticism.

In this section, a selected number of these studies are reviewed and summarized in Table 2.

TABLE 2
ACADEMIC RESEARCH ON PSYCHEDELICS AND CREATIVITY

Journal and Date	Title	Findings
<i>Science Direct</i> (1966)	Psychedelic agents in creative problem-solving: A pilot study	Professionally employed males (n=27) were given a single psychedelic experience. Findings indicate psychedelic agents seem to facilitate creative problem-solving.
<i>Journal of Psychopharmacology</i> (2011)	Mystical experiences occasioned by the hallucinogen psilocybin lead to increases in the personality domain of openness	Experimentally manipulated double-blind controlled study indicated psilocybin occasions personality changes including the Big Five personality trait of openness
<i>Journal of Psychoactive Drugs</i> (2016)	The association of naturalistic classic psychedelic use, mystical experience, and creative problem-solving	Subjects who reported classic psychedelic use concurrent with mystical experience (n=11) exhibited significantly faster times on the functional fixedness task than participants not reporting a concurrent mystical experience.
<i>Nordic Studies on Alcohol and Drugs</i> (2018)	Powerful substances in tiny amounts: An Interview study of psychedelic microdosing	Respondents tended to experiment with microdosing in phases, reporting improved mood, cognition, and creativity.
<i>Psychopharmacology</i> (2018)	Exploring the effect of microdosing psychedelics on creativity in an open-label natural setting	Both convergent and divergent thinking performance were improved after a non-blinded microdose
<i>Psychopharmacology</i> (2019)	Microdosing psychedelics: personality, mental health, and creativity differences in microdosers	Current and former microdosers scored higher on wisdom, open mindedness and creativity when compared to non-microdosing controls
<i>Journal of Psychoactive Drugs</i> (2019)	Sub-acute effects of psilocybin on empathy, creative thinking, and subjective well-being	Psilocybin enhanced convergent and divergent thinking as well as well-being.
<i>The International Journal on Drug Policy</i> (2019)	Narrative identity, rationality, and microdosing classic psychedelics	Participants describe their microdosing in the context of embracing traditional middle-class values.
<i>Psychopharmacology</i> (2019)	The effects of LSD on time perception: a randomized, double-blind, placebo-controlled trial	Results indicate that microdoses of LSD in older adults produce temporal dilation of suprasedond intervals in the absence of subjective alterations of consciousness.

One of the earliest studies concerning psychedelics and creativity was conducted in 1966 by Harman and his colleagues. Twenty-seven professionally employed men were given a single psychedelic experience. The drugs were given in small groups of three or four men. Results indicate that psychedelics did increase creative ability and that this enhanced creativity may last for several weeks (Harman, et al., 1966).

In 2011, a double-blind controlled study looked at the effects of psilocybin on personality. Subjects were given psilocybin under controlled conditions. Drug sessions lasted five to eight hours. Participants were given a personality inventory measuring the Big Five personality factors before the drug session, one to two months after the drug session, and 14 months after. Researchers found significant increases in the personality trait of Openness. Those subjects who also had a mystical experience during the drug session, demonstrated increased Openness as long as one year after the drugs were administered (MacLean, Johnson, and Griffiths, 2011).

Similarly, subjects who reported a mystical experience along with classic psychedelic use exhibited significantly better performance on the functional fixedness task (Duncker, 1945) than those who did not experience a mystical experience concurrent with a psychedelic experience (Sweat, Bates, and Hendricks, 2016). These two studies led to the possibility that creativity and psychedelic use may be effected by mystical experiences. However, this line of research has not been pursued.

Another study of the relationship between psychedelics and creativity was an interview of 21 respondents recruited via the Internet. Those recruited tended to experiment with microdosing and reported improved mood, cognition, and creativity (Johnstad, 2018). While similar to self-reports in the popular press, this study used a semi-structured interview process.

A more organized study of microdosing and creativity was conducted in the Netherlands in 2018. In this case, a microdosing event was organized by the Dutch Psychedelic Society. Subjects were administered the Picture Concept Task, which assessed convergent thinking, the Alternative Uses Task to assess divergent thinking and a shortened version of the Ravens Progressive Matrices task to assess fluid intelligence. These tests were administered before and after subjects took a microdose of psychedelic truffles. Findings show that fluid intelligence was unaffected by the microdose, but that both convergence and divergent thinking were improved (Prochazkova, et al. 2018).

Another study that looked at convergent and divergent thinking involved a psilocybin retreat in the Netherlands organized by the Psychedelic Society UK. This study involved 55 participants. Participants completed tests of convergent and divergent thinking as well as the satisfaction with life scale on three occasions; before taking psilocybin (n=55), the morning after (n=50), and seven days later (n=22). Findings were that psilocybin enhanced divergent thinking and empathy the morning after use. Improvements in convergent thinking and feelings of well-being persisted seven days after use (Mason, et al. 2019).

In yet another study that looked at microdosing and creativity experimentors recruited subjects from an online forum. Subjects self-reported via questionnaires the effects of their microdosing behavior. Results indicated increased open mindedness and creativity when compared to non-microdosing controls (Anderson, et al. 2019).

Semi-structured interviews of 30 people who had microdosed explored the use of psychedelics by people who self-identified as embracing traditional middle-class values. Subjects separated themselves socially from those who use drugs recreationally and reported they microdosed for rational and instrumental purposes. One major reason for microdosing was increase persistence (Webb, Copes and Hendricks (2019).

With all of this research on psychedelic use and creativity, it was not until 2018 that a randomized, double-blind, placebo-controlled study was conducted. The study contrasted oral administration of a placebo with three microdoses of LSD (5, 10, and 20 µg) in older adults. Results suggest that microdoses of LSD produces temporal dilation of suprasecont intervals in the absence of subjective alternations of consciousness. That is, the LSD modified the perception of time. There were no reports of changes in concentration or perception (Yanakieva, et al. 2019). Research on microdosing and its effects on healthy people will continue to be of interest to researchers (d'Angelo, Savulich, & Sahakian, 2017).

MICRODOSING AND THE ENTREPRENEURSHIP CLASSROOM

As noted in the previous sections of this paper, both microdosing by professionals to gain a competitive edge and legitimate scientific research into the possible enhanced creativity of psychedelics have increased in recent years. Yet, outside of government approved scientific research and some religious practices, psychedelics remain illegal in the United States. What, then, are the epistemological ethics of discussing microdosing in the entrepreneurship classroom?

There are reasons to address controversial issues in the classroom. First, we need to determine what constitutes a controversial issue. At its core, a controversial issue is one where there are competing values and interests. Controversial issues may also arouse emotions as people disagree about assertions or actions (“Teaching Controversial Topics, 2019).

One reason to approach these topics is because they are, as with microdosing, in the news. Therefore, controversial topics can be directly related to students’ lives.

Further, teaching controversial topics often offers information not found in academic or scholarly sources. Students are given the opportunity to explore the complexity of issues that defy a simple solution. Students are also able to develop critical thinking skills as well as develop their moral and ethical attitudes (“Teaching Controversial Topics, 2019).

Various pedagogical methods can be employed to address controversial subjects. These include case studies, student research papers, presentations, and book reports. The method used is always more effective if it is followed by a discussion, either in a face-to-face classroom or in an online discussion forum.

In summary, it is recommended that the reports of microdosing by entrepreneurs and other business professionals not be ignored by business school instructors. Appropriately designed assignments and respectful discussions will benefit students as they enter a very competitive and ever-changing work environment.

SUMMARY AND CONCLUSION

This paper presents the current state of psychedelic research on creativity and the personality dimension of openness as well as self-reports of healthy people who use small amounts of psychedelic substances to aid in creativity and focus. The paper also discusses the issues involved in addressing controversial issues, such as microdosing, in an entrepreneurship classroom.

The access to novel psychoactive substances (NPS) is increasing as is their use as cognitive enhancers by healthy people. Thus, the effective management of this type of use will continue to increase in importance (d’Angelo, et al., 2017). In fact, the research in the effects of psychedelics is shifting from full doses and supervised trips to microdosing (Rose, 2019). There is also promise of psychedelics aiding such disorders as depression, addiction, and post-traumatic stress (Martin, 2018).

Even the U. S. Marines are looking at microdosing. Emre Albayrak, a Marine Intelligence Officer for twelve years, recently suggested that LSD could help intelligence officers solve difficult intelligence problems by allowing the different parts of their brains to communicate by bypassing the default mode network (Albayrak, 2019). The fact that the idea of experimenting with microdosing appeared in the *Marine Corps Gazette* is indicative of how seriously microdosing is being taken.

Author and investor, Tim Ferris, recently helped raise funds for a new center for psychedelic research at Johns Hopkins Medical School. He has raised money for similar projects at Imperial College London and the University of San Francisco. Mr. Ferris believes psychedelic research “truly has the chance to bend the arc of history” (Carey, 2019, p. 6).

Whether psychedelics will “bend the arc of history” or not, the phenomenon is receiving widespread attention. The research will be carried out in medical schools and schools of clinical psychology. It will be incumbent upon instructors in business schools to stay informed on the research and find ways to discuss it with their students.

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