

ANALYZING THE IMPACT OF SET AND SETTING ON PSYCHADELIC EXPERIENCES: A CASE STUDY

Jana Cibulková – Šimon Trčka

Abstract

Psychedelics induce diverse effects on perception, cognition, and mood, as evidenced by various reports and controlled studies on compounds such as psilocybin, LSD, and MDMA. Assessing the subjective effects of psychedelics is essential, as many studies suggest a link between the characteristic psychedelic experience and a positive effect on the symptomatology of some psychiatric illnesses. The effects of psychoactive drugs can vary significantly among individual users across societies, cultures, and subcultures. However, we still lack a solid working theory of how and why this occurs. This study examines the impact of set and setting on the psychedelic experiences of individuals. Analyzed data were obtained from our survey with standardized questions. Hierarchical cluster analysis was employed to analyze the effect of set and setting on a psychedelic experience. The case study contributes to understanding the nuanced interplay between external conditions and subjective experiences, addressing an area that has been insufficiently investigated.

Key words: set, setting, psychedelic experience, data analysis.

JEL Code: C38, I12.

Introduction

Most human civilizations, whether ancient or modern, possess some form of drug culture that relies on psychoactive substances for recreational, ritualistic, and/or medicinal purposes. Psychedelic compounds (such as psilocybin, LSD, and MDMA) began to be widely used in the 1950s and 1960s among psychologists and psychiatrists in both research and clinical practice (e.g., in the treatment of depression). Psychedelics represent a specific subgroup of psychoactive substances. These substances have the ability to alter perception, thinking, and emotions, potentially leading to profound changes in consciousness. To what extent are the effects of psychoactive drugs fixed and predictable, and to what extent are they shaped by societal and cultural factors?

The idea that non-pharmacological factors influence the effects of psychedelics was studied by several LSD researchers in the mid-twentieth century (Dimascio, A., Klerman, G. L., 1960. Von Felsinger, J. M., et. al, 1955). During that time, research was conducted specifically examining the effect of the environment, which, over the course of three years, modified the study design and changed the behavior of the staff from normal to friendly, and then to cold and impersonal. The research indicated that patients who took the drug alone experienced more negative reactions than those who took it in groups. Patients who were expected to perform specific tasks or undergo tests experienced more negative effects, whereas those who could choose their environment and activities had more positive experiences (Hyde, R. W., 1960). The aim of this paper is to examine the impact of the environment (set and setting) on an individual's psychedelic experience. In the practical part of this work, data collected from users of psychedelic substances through an online questionnaire are analyzed using hierarchical cluster analysis.

1 Psychedelics, set and setting

Psychoactive substances affect the central nervous system and alter mood, perception, behavior, or cognitive functions. These substances can be legal (e.g., caffeine, alcohol, nicotine) or illegal (e.g., heroin, cocaine). The history of drug use consistently reminds us that the effects of drugs have not always been separate from their social and cultural context. In fact, considerations of non-drug variables have been an integral part of the use of psychotropic substances since the prehistory of medicine.

1.1 Psychedelics

Psychedelics are a specific subgroup of psychoactive substances. It is believed that psychedelics act on certain types of cells and specific areas of the brain, with this selectivity being determined by the complex expression patterns of serotonin receptors. The psychedelic experience is dramatically different from the states induced by other types of psychoactive substances. Unlike other substances, where the effects are relatively straightforward (such as the stimulation of energy by stimulants or the suppression of pain and perception by opioids), psychedelic substances tend to produce profound changes in consciousness. These changes can be characterized by intense and unusual experiences at the sensory, emotional, and cognitive levels.

Psychedelics can be classified into four categories based on their neuropharmacological profile (Reiff, C. M., et. al; 2021):

- *Classical psychedelics*
 - serotonin 2A [5-HT_{2A}] receptor agonists,
 - include LSD, Psilocybin/Magic Mushrooms, DMT, Mescaline, and 2-CB.
- *Empathogens or entactogens*
 - mixed serotonin and dopamine reuptake inhibitors and releasers,
 - include MDMA, MDA.
- *Dissociative anesthetics*
 - N-methyl-D-aspartate [NMDA] antagonists,
 - include Ketamine, Salvia Divinorum, and Ibogaine.
 - *Atypical hallucinogens*, which affect multiple neurotransmitter systems.

1.2 Set, setting

The introduction of the concept of set and setting is commonly attributed to Timothy Leary, the controversial Harvard psychologist, who played a key role in bringing psychedelics into the cultural discourse of 1960s America. The term was first published in a paper presented at the annual meeting of the American Psychological Association on September 9, 1961 (Leary, T., 1961). The common hypothesis about set and setting essentially argues that the effects of psychedelic drugs primarily depend on the set (the individual's personality, preparation, expectations, and intentions) and the setting (the physical, social, and cultural environment in which the experience takes place) (Hartogsohn, I., 2015).

The terms "set and setting" were used to explain the noticeable rise and fall in the number of adverse reactions to LSD in the late 1960s, depending on the different methodologies and study designs. This observation may also explain why research on LSD from the 1950s is filled with many contradictory accounts. Some studies claimed that LSD is primarily an anxiety-inducing substance, while others pointed out that it creates a sense of wholeness (Bunce, R. 1979).

2 Survey and questionnaire

The questionnaire consists of two parts:

1. questions about set, setting and demography;
2. questions from standardized Challenging Experience Questionnaire about the negative psychedelic experience.

2.1 Data collection for the survey

The questionnaire was initially distributed through connections at the National Institute of Mental Health in Czechia. Distribution also took place with the assistance of the Czech Psychedelic Society and on social media. Records of psychedelic experiences analyzed in this study were collected continuously from November 2023 to May 2024. This way, we obtained data about 65 respondents, who experienced at least one negative psychedelic experience.

2.2 Questions about set, setting and demography

When designing the questionnaire, the primary goal was to achieve the highest level of informational value through the efficient use of time and resources, allowing for the collection of comprehensive and valuable information with minimal burden on the respondents.

- In creating the *demographic questions*, three basic categories were selected:
 - gender (Male, Female),
 - age, (10-19, 20-29,30-39,40-49,50-59)
 - education (Primary, Secondary, Post-secondary).
- Additionally, respondents were asked to select the *type of psychedelic substance* they administered during a negative experience. There were three options:
 - classical psychedelics,
 - empathogens,
 - dissociative anesthetics.
- *Social context* of the psychedelic experience:
 - alone,
 - under the supervision of a sitter/therapist,
 - small group (2-4 people),
 - larger group (more than 4 people),
 - festival/party.
- *Environment* in which a significant part of the experience took place:
 - indoor (within a residential space),
 - urban,
 - natural,
 - clinical (part of research or therapy).
- *Time* of the experience:
 - during the day,
 - at night.

These questions aimed to clarify how many people might have influenced the respondent's experience, whether they were in a specific environment for an extended period, or whether the experience occurred at a time that could have affected it.

2.3 Challenging Experience Questionnaire

The Challenging Experience Questionnaire (CEQ) is a specialized tool used to assess the challenging psychological experiences that can occur during the acute effects of psilocybin and other similar psychedelics.

The CEQ consists of 26 items that are rated on a 5-point Likert scale, ranging from 1 ("None") to 5 ("Extreme.") The items are designed to capture various challenging aspects of the psychedelic experience. These aspects are categorized into several domains, such as:

- Fear (e.g., feelings of fear or terror),
- Grief (e.g., feelings of sadness or grief),
- Physical Distress (e.g., physical discomfort or pain),
- Insanity (e.g., fear of going insane or losing control),
- Isolation/Alienation (e.g., feelings of loneliness or alienation),
- Death (e.g., fear of death or dying),
- Paranoia (e.g., feelings of paranoia or mistrust).

3 Analysis and results

The questionnaire was processed into a dataset in a form of a data matrix ($\mathbf{X} \in R^{n \times p}$), where $n = 65$ is the number of observations and $p = 26$ is the number of variables. Observation \mathbf{x}_i corresponds to i -th respondent. Variables represent questions of CEQ. Respondents are divided into groups based on their answers to CEQ about their negative psychedelic experience by utilizing hierarchical cluster analysis (complete linkage method in combination with Euclid distance) (Gan, G., et al. 2021)

The *complete linkage* method considers a dissimilarity between two clusters as the dissimilarity between two farthest objects from the g -th and h -th clusters. This between-cluster distance usually provides compact clusters with approximately equal diameters. It can be expressed by the formula

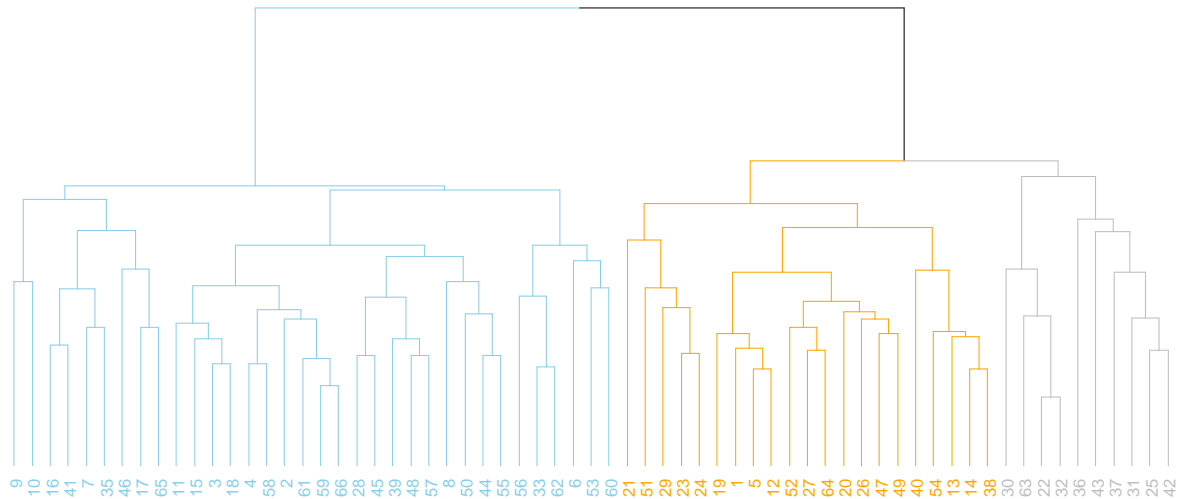
$$D_{CO}(C_g, C_h) = \max_{\mathbf{x}_i \in C_g, \mathbf{x}_j \in C_h} D(\mathbf{x}_i, \mathbf{x}_j). \quad (1)$$

The *Euclid distance* between two observations x_i and x_j is defined as:

$$D_{EUCLID} = \sqrt{b + c}. \quad (2)$$

Figure 1 represents outcome of cluster analysis on dendrogram. We identified 3 clusters of respondents (each represented by different color).

Fig. 1: Identified cluster of respondents



Source: Authors

Tab. 1: Summary of identified clusters

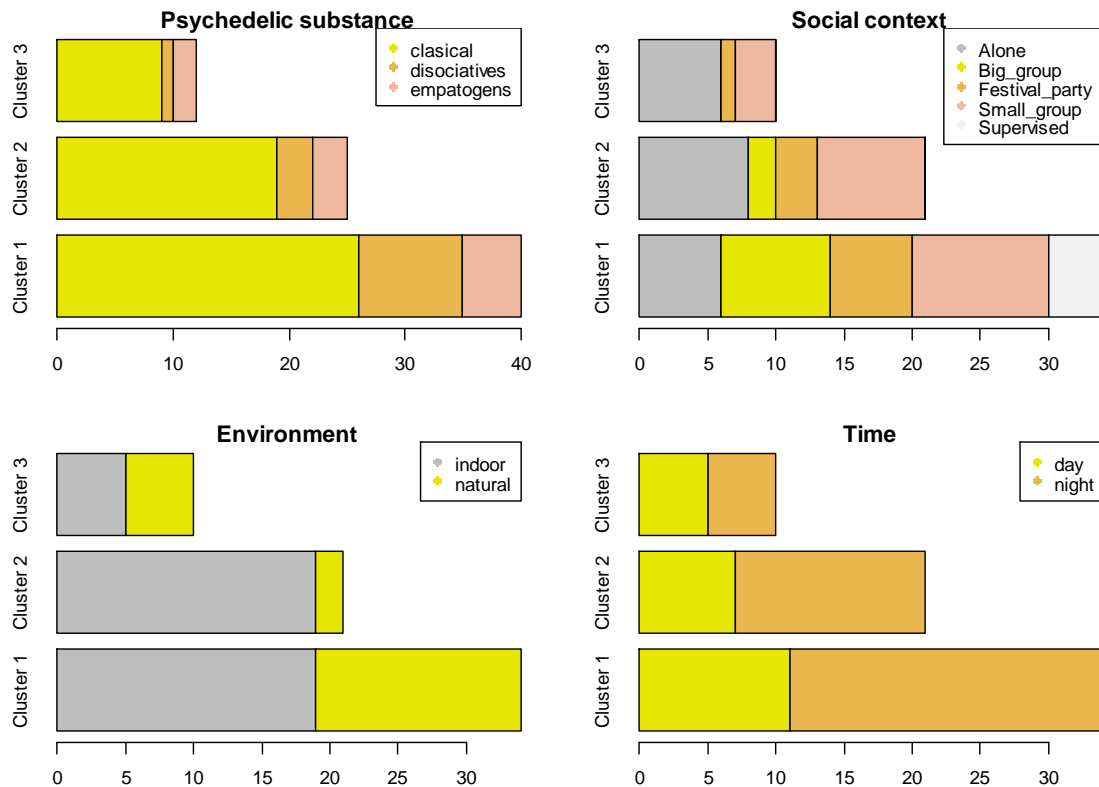
Cluster	No. of respondents	Average score across CEQ	Top 5 negative effects of psychedelics
1	34	3.54	<ol style="list-style-type: none"> 1. Experience of fear 2. I experienced a decreased sense of sanity 3. I felt isolated from everything and everyone
2	21	2.32	<ol style="list-style-type: none"> 1. Sadness 2. Experience of fear 3. Feelings of grief
3	10	1.95	<ol style="list-style-type: none"> 1. I felt shaky inside 2. Pressure or weight in my chest or abdomen 3. I felt isolated from everything and everyone

Source: Authors

Further exploratory data analysis revealed several differences among the clusters, summarized in Table 1. Respondents in the third cluster primarily experienced physical distress, with their

negative experiences being relatively mild. Respondents in the second cluster generally reported slightly stronger negative effects, which were predominantly emotional, such as experiencing mild fear, grief, or sadness. Participants in the first cluster endured the most severe negative psychedelic experiences among all groups, with strong effects across multiple domains, including fear, insanity, paranoia, and isolation.

Fig. 2: Set and setting properties for different clusters



Source: Authors

The final step of the analysis involves linking the clusters to set and setting attributes. From a demographic perspective (gender, age, education of the respondents), all three clusters are nearly identical. If we consider the average score across the CEQ (see Table 1) as an indicator of the set/setting impact on psychedelic experiences, several conclusions can be drawn. The choice of psychedelic substance does not seem to affect the users' experiences, as the proportions of different types of substances are similar across all three clusters.

The strongest negative psychedelic experiences (see Cluster 1) can occur in any social context. However, it is worth noting that the least severe negative experiences (see Cluster 3) tend to occur when individuals are alone, in small groups, or at parties. Lastly, users may experience

stronger negative effects when their psychedelic experience takes place at night and/or in a natural environment.

The entire analysis, including all computations and visualizations, was conducted using the R language and environment for statistical computing (R Core Team, 2024).

Conclusion

The terms "set and setting" were used to explain the noticeable rise and fall in the number of adverse reactions to LSD in the late 1960s, depending on the different methodologies and study designs. Research from this period presents conflicting views: some studies claimed that LSD primarily induces anxiety, while others suggested that it creates a sense of wholeness.

Despite its popularity and practical applicability, the concept of set and setting has never been fully integrated into the study of psychopharmacology. Incorporating these environmental and contextual variables into clinical drug research would present significant challenges for the pharmaceutical industry, which focuses on randomized controlled trials (RCTs) and has limited tolerance for introducing ambiguous social and cultural elements into its considerations. This is regrettable because a better understanding of set and setting could often reduce the harmful effects of drugs and enhance their potential benefits more effectively than searching for new molecules or outright banning substances.

In this article, we demonstrate the clear connections between set/setting and their influence on respondents' psychedelic experiences through a simple case study, specifically focusing on negative experiences. Data for the study were obtained via survey in a form of *Challenging Experience Questionnaire*. We first categorized a sample of 65 respondents into three groups (respondents with weak, moderate, and strong negative psychedelic experiences) using hierarchical cluster analysis. We then used descriptive statistics and data visualization to identify the connections between the intensity of negative experiences and set and setting.

Acknowledgment

The research was conducted with institutional support for the long-term conceptual development of science and research at the Faculty of Informatics and Statistics, Prague University of Economics and Business, and Project IGA F4/35/2024.

References

- Bunce, R. (1979). Social and political sources of drug effects: The case of bad trips on psychedelics. *Journal of Drug Issues*, 9(2), pp. 213–233.
- DiMascio, A., & Klerman, G. L. (1960). *Experimental human psychopharmacology: The role of non-drug factors*. The dynamics of psychiatric drug therapy. pp. 56–97.
- Gan, G., Ma, C., & Wu, J. (2021). *Data clustering: Theory, algorithms, and applications*. Society for Industrial and Applied Mathematics.
- Hartogsohn, I. (2017). Constructing drug effects: A history of set and setting. *Drug Science, Policy and Law*. 3.
- Hyde, R. W. Psychological and social determinants of drug action. *The dynamics of psychiatric drug therapy*. 1960, s. 297–315.
- Leary, T., Litwin, G. H., & Metzner, R., (1963). Reactions to psilocybin administered in a supportive environment. *The Journal of nervous and mental disease*, 137(6), pp. 561–573.
- R Core Team (2017). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.
- Reiff, C. M., & al. (2021) Psychedelics and Psychedelic-Assisted Psychotherapy. *FOCUS*. 19(1), pp. 95–115.
- Von Felsinger, J. M., Lasagna, L., & Beecher, H. K. (1955). Drug-induced mood changes in man: 2. Personality and reactions to drugs. *Journal of the American Medical Association*, 157(13), pp. 1113–1119.

Contact

Jana Cibulková

Prague University of Economics and Business

W. Churchill Sq. 4, 130 67 Prague 3, Czech Republic

jana.cibulkova@vse.cz

Šimon Trčka

Prague University of Economics and Business

W. Churchill Sq. 4, 130 67 Prague 3, Czech Republic

trcs00@vse.cz