

Similarities in Beneficial Effects on Personal Development and Well-being Between Psychedelic States and Dream States

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ABSTRACT

The aim of this study was to determine how perception, sense of self, emotion activation, cognitive processes and mystical experiences influenced by psychedelic experiences and dream states enhance people's psychological well-being and personal development and evaluate what are similarities in beneficial effects in those states. My main research questions was: 'What are similarities in beneficial effects on personal development and psychological well-being between dream states and psychedelic experiences?'. The research was mainly based on narrative literature. The content based on psychological and neurophysiological materials allowed me to compare and make correlations between changes induced by psychedelic drugs and dreams on psychological and neurological fields. The results of the study show that dreams and psychedelic states show similarities on neurophenomenological and psychological fields. The perception altered by dreams or psychedelic states may expand perspective on events, create positive changes in behaviors or attitudes and influence one's approaches and reactions. Both states cause changes in emotive responses to threat and facilitate extinction of conditioned fear memory. Dreams states and psychedelic experiences also contribute to the problem-solving abilities and creativity which have impact on process of learning. Furthermore, both states influence metacognitive abilities and cognition of self-awareness which affects understanding of the self and emotions which may cause changes in psychological well-being and enhance the sense of purpose which is an important part of self-development. Therefore, my study could be a starting point for a deeper research with the use of comparable, direct data, focused on methods which use psychedelic states to achieve psychological well-being and self-development.

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INTRODUCTION

Dreams and psychedelic experiences accompanied people from their origins. Ancient civilizations saw these altered states of consciousness as a source of the knowledge about their roots, understanding of surrounding world and sacred realm and tools allowing communication with the spiritual world.^{1 2 3} Dreams and psychedelic states inspired development of culture for thousands of years and since decades have been researched by professionals on anthropological, philosophical, psychological and neurophysiological fields.⁴

Sleep consists of separate phases which differ in terms of brain activity patterns and other physiological parameters.⁵ There are two major types of sleep: rapid eye movement (REM) sleep and non-rapid eye movement sleep (NREM) sleep.⁶ Dreaming is a mental activity present in all stages but majority of dreams occur during REM sleep. Dreams are altered states of consciousness characterized by internally-generated verbal, cognitive, emotive and sensory occurrences which may evolve in actions developing imaginary plots.⁷ Dreaming is a universal human phenomenon, but there are differences in frequency of recalled dreams. Usually more vivid visual images and more complex storylines appear in REM phase than in NREM sleep.⁸

There are many approaches to understanding dreams, and the explanations about dream activity differ depending on the approach. The role of dreaming in shamanism originates at least at the beginning of the Upper Paleolithic 40 000 years ago. Literature regarding the meaning of dreams dates back to 2000 B.C. in Egypt, and to 700 B.C. in Assyria.⁹ Official

¹ Ben Sessa, "From Sacred Plants to Psychotherapy: The History and Re-Emergence of Psychedelics in Medicine", *European Neuropsychopharmacology*, 2006, 17, 2. https://www.rcpsych.ac.uk/docs/default-source/members/sigs/spirituality-spsig/ben-sessa-from-sacred-plants-to-psychotherapy.pdf?sfvrsn=d1bd0269_2 (accessed: 19.05.2020)

² Sessa, "From Sacred Plants to Psychotherapy", 2.

³ J. Donald Hughes, "Dream Interpretation in Ancient Civilizations", *Dreaming*, March 2000, 10(1), 7, 8. https://www.researchgate.net/publication/227247381_Dream_Interpretation_in_Ancient_Civilizations (accessed: 19.05.2020)

⁴ Rainer Kraehenmann, "Dreams and Psychedelics: Neurophenomenological Comparison and Therapeutic Implications", *Curr Neuropsychopharmacol.*, October 2017, 15(7), 1032. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5652011/> (accessed: 03.12.2019)

⁵ James W. Kalat, *Biologiczne podstawy psychologii*, trans. Marek Binder, Anna Jarmocik, Michał Kuniecki, Wydawnictwo Naukowe PWN, Warsaw, 2006, 273.

⁶ Kalat, *Biologiczne podstawy psychologii*, 273.

⁷ APA Dictionary of Psychology, American Psychological Association, <https://dictionary.apa.org/dream> (accessed: 12.12.2019)

⁸ Kalat, *Biologiczne podstawy psychologii*, 274.

⁹ Maurice R. Green, Montague Ullman, Edward S. Tauber, "Dreaming and Modern Dream Theory", *Modern Psychoanalysis*, ed. by Judd Marmor, Basic Books. Inc., 1968, 8.

inscription from early civilizations shows the importance of dreams in religion, government and daily life. The cultures in ancient history lent great weight to dreams, connecting them with spiritual or religious functions.¹⁰ They manifested certain understanding of the world and the human existence and were seen as meaningful source of information, full of symbols and guidelines.¹¹ Different cultures had different interpretations of dreams but most societies saw them as messages from the word of spirits, gods and other supernatural beings. Therefore, dreams have been an important part of religious consciousness and practices of traditional people from centuries.¹² They have played significant role as spiritual events in communication, as shamans from various cultures contacted spirits and supernatural creatures via dream states which allowed transformation of the self.^{13 14} By the use of dreams, shamans were able to enter an altered world in which they could meet the souls of humans and other beings, heal and bring back lost souls.¹⁵ Ancient civilizations also believed that dreams were the source of power in healing, hunting or warfare.¹⁶ Shamans' activity was based on the ability of working in altered states of consciousness like dreams.¹⁷ Among the Tungus people or the Paviotso, American Plateau Shoshonean, and Bororo from Brazil dreams are the source of shamanic calling.¹⁸ In many traditions it is also believed that dreams are produced by spirits and may include important information about past or future events, warning or spiritual power.¹⁹ Many societies from South America, Asia, Africa, Oceania or Aboriginal Australia consider them as an explicit indication of spirit realm.²⁰ They treat dreams as a source of religious theories and ideas of their gods and supernatural creatures. Many tribal people, such as the Mehinku Indians or Parintintin Indians from Brazil, believe that during dreams the soul of the person wanders outside of the body and communicates with gods, spirits or other

https://siivola.org/monte/papers_grouped/copyrighted/Dreams/Dreaming_and_Modern_Dream_Theory.htm
(accessed: 16.03.2020)

¹⁰ Green et al., "Dreaming and Modern Dream Theory", 7.

¹¹ Angela Sumegi, "Shamanism and Dreams", in *Dreamworlds of Shamanism and Tibetan Buddhism*, State University of New York Press, 2008, 11. <https://www.sunypress.edu/pdf/61625.pdf> (accessed: 17.03.2020)

¹² Patrick McNamara, Kelly Bulkeley, "Dreams as a source of supernatural agent concepts", *Front Psychol.*, 2015, 283(6), 1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4365543/> (accessed: 16.03.2020)

¹³ McNamara, Bulkeley, "Dreams as a source of supernatural agent concepts", 1.

¹⁴ McNamara, Bulkeley, "Dreams as a source of supernatural agent concepts", 1.

¹⁵ Hughes, "Dream Interpretation in Ancient Civilizations", 13, 14.

¹⁶ Hughes, "Dream Interpretation in Ancient Civilizations", 10.

¹⁷ Sumegi, "Shamanism and Dreams", 11.

¹⁸ Charles D. Laughlin, Adam J. Rock, "What can we learn from shamans' dreaming? A cross-cultural exploration", *Dreaming*, 2014, 24(4), 237, 238. <https://psycnet.apa.org/record/2014-55916-001>. (accessed: 17.03.2020)

¹⁹ Michael Harner, "A core shamanic theory of dreams", *Journal of the Foundation for Shamanic Studies*, December 2010, 23, 3. <https://www.shamanism.org/articles/pdfs/ShamanicTheoryDreams3-11.pdf> (accessed: 17.03.2020)

²⁰ McNamara, Bulkeley, "Dreams as a source of supernatural agent concepts", 1.

supernatural creatures.²¹ Polynesian Tikopia also consider dreams as a communication device between the dreamer and spirit being. South American Jívaro believe that spirits inhabit dreams.²² In Zuni and Quiché Maya beliefs dreams are tools for communicating with sacred ancestors. Also Melanesian people use dreams to communicate with their ancestors, access the power and predict future.²³ San Bushman shamans, who are often lucid dreamers, protect their community in their dreams.²⁴ Shamans of Sambia people from Papua New Guinea communicate spirits via dreams to gain knowledge necessary to help their community.²⁵ Daribi people, also living in New Guinea and the Asurini do Tocantins from Amazonia believe that one can access power through dreams.²⁶ Moreover, many cultures all over the world including the Otomi Indians of Central Mexico, the Arawak from Peruvian Amazonia, the Maracopa Indians and other Yuman peoples of southern Arizona, the Mambila of Nigeria, the Manus people of the Admiralty Islands or the people of Gawa Island and the Mekeo, located near Papua New Guinea consider dreams as a magical device to produce and heal illnesses.²⁷ Furthermore, the Bible, Roman mythology and Homer's work mention dreams as a communication from the Divine.²⁸ In the antient times dreams were used in temples of Aesculapius and by Hippocrates to help with diagnosis of diseases.²⁹ Ancient Greek physician, Herophilus, believed that some dreams may fulfill wishes. Aristoteles, likewise Adler, Jung and Fromm, suggested that they may give new perspective and contain the problem-solving potentiality. Dreams were also simply seen as worries, hopes and representations of feelings. On the other hand, sometimes they were seen as meaningless products. In the middle ages and early modern times dreams were often considered messages from God or the Devil.³⁰

Contemporary research on interpretation of dreams started in early twentieth century. Psychoanalysts started paying attention to interpretation of dreams and its functions. The most

²¹ Thomas A. Gregor, "Far far away my shadow wandered..." the dream theories of the Mehinaku Indians of Brazil", *Am. Ethnol.*, November 1981, 8, 710.

<https://anthrosource.onlinelibrary.wiley.com/doi/abs/10.1525/ae.1981.8.4.02a00030>. (accessed: 16.03.2020)

²² McNamara, Bulkeley, "Dreams as a source of supernatural agent concepts", 1.

²³ Laughlin, Rock, "What can we learn from shamans' dreaming?", 238.

²⁴ Laughlin, Rock, "What can we learn from shamans' dreaming?", 237.

²⁵ Laughlin, Rock, "What can we learn from shamans' dreaming?", 238.

²⁶ Laughlin, Rock, "What can we learn from shamans' dreaming?", 239.

²⁷ Laughlin, Rock, "What can we learn from shamans' dreaming?", 243.

²⁸ Green et al., "Dreaming and Modern Dream Theory", 8.

²⁹ Green et al., "Dreaming and Modern Dream Theory", 8.

³⁰ Green et al., "Dreaming and Modern Dream Theory", 8.

popular theories suggested that dreams are related to the problems from waking life, the truth about mental condition and help one understand emotions and inner conflicts.

In the field of psychology Freudian psychoanalysis as the first drew attention to the importance of dreams. Freud believed that dreams allow to understand the unconscious activities of the mind, the psyche of the person – he saw them as ‘the royal road to unconscious’.³¹ ³² He claimed that they are manifestations of unrealized urges, desires and mental conflicts, usually internal suffering and unspoken sexual drive.³³ Freud held that dreams are linked with the present experiences or experiences of the recent or far past and are influenced by external and internal stimuli. He claimed that dreams can be explained and even though they may seem to be random, nonsensical plots, they contain great significance as they represent unconscious wishes which may create guilt or anxiety. In dreams the desires take form of the symbols and are admitted to consciousness.³⁴ Therefore, unacceptable urges are transformed into acceptable dreams which prevents the feeling of guilt and anxiety.³⁵ The Freudian theory was used as a part of the process of psychoanalytic dream interpretation. Freud’s theory had impact on many psychologists and psychoanalysts, including Alfred Adler and Carl Jung.³⁶ Nevertheless, many theorists put more emphasis on current problems in dreams than repressed urges and sexuality than Freud. Even though they disagree with Freud, they acknowledge his ideas about the dreams.

One of the Freud’s followers who added to the theory of dreams was Alfred Adler but finally he broke off with him. Adler believed that dreams are significant devices to master control over one’s waking life and that they serve as problem-solving instruments.³⁷ He suggested that they are concerned with present and future events and that dreaming and waking states are connected with one’s mental life. According to Adler the process of dreaming is motivated by adaptive needs. The moods and feelings present in the dreams and dreams-instigated moods which are transferred into waking life may have an adaptive function.³⁸ His view on dreams included notion that they are the window on one’s true

³¹ Dreaming II: Theories and Research, 289.

³² <https://www.ocf.berkeley.edu/~jfkilstrom/ConsciousnessWeb/Farthing/Chapter12.pdf> (accessed: 20.05.2020)

³² Tomasz Trzeciński, “Twoje sny to ty”, *Instytut Psychologii Zdrowia Polskiego Towarzystwa Psychologicznego*. <http://www.psychologia.edu.pl/czytelnia/50-artykuly/207-twoje-sny-to-ty.html> (accessed: 13.03.2020)

³³ Trzeciński, “Twoje sny to ty”.

³⁴ Dreaming II: Theories and Research, 290.

³⁵ Dreaming II: Theories and Research, 290.

³⁶ Dreaming II: Theories and Research, 293.

³⁷ Anthony Shafton, *Dream Reader: Contemporary Approaches to the Understanding of Dreams*, State University of New York Press, 1995, 132.

³⁸ David Foulkes, “Adler’s Dream Theory”, <https://www.dreamresearch.ca/pdf/adler.pdf> (accessed: 22.05.2020)

thoughts, emotions, desires and impulses and mental imagery is the expression of one's character and personality.³⁹ Adler believed that dreams are tools which can give better understanding of problems by realizing the emotions and feelings of the dreamer which push them towards the solution of a problem or that solutions to the problems from waking life are presented symbolically in dreams.⁴⁰ He suggested that dreams are like 'a bridge that connects the problem which confronts the dreamer [the exogenous factor] with his goal of attainment.'⁴¹ The theory about problems-solving function of dreams was supported by some scholars including Cohen⁴², Jones⁴³ and Cartwright⁴⁴. Furthermore, Adler's theory was accepted and supported by Hall⁴⁵ and French⁴⁶.

Another psychiatrist and psychoanalyst, Carl Jung, who firstly aligned with Freud's theories about dreams but eventually broke off with him, contributed to the theory of dreams in many ways. Jung considered dreams to be a resultant of the total psyche, expression of unconscious processes which represent the current mental condition of a dreamer.⁴⁷ He saw them as 'impartial, spontaneous products of the unconscious psyche, outside the control of the will. They are pure nature; they show us the unvarnished, natural truth, and are therefore fitted, as nothing else is, to give us back an attitude that accords with our basic human nature when our consciousness has strayed too far from its foundations and run into an impasse.'⁴⁸ He held that the function of dreams is omnifarious. Jung believed that dreams are compensations for the conscious attitude, hence compensation⁴⁹ is one of the purposes of dreams.⁵⁰ He associated dreams with self-regulatory processes which react to the certain mental problems, restore one's psychological balance and present the alternative perspective on possible future events.⁵¹ Jung saw dreams as a part of the process of development and

³⁹ Foulkes, "Adler's Dream Theory".

⁴⁰ Shafton, *Dream Reader*, 133.

⁴¹ Jane Griffith, Robert L. Powers, *The Lexicon of Adlerian Psychology: Fifty-nine Terms Associated with the Individual Psychology of Alfred Adler*, The Americas Institute of Adlerian Studies, 1987, 25.

⁴² D. B. Cohen, *Sleep and Dreaming: Origins, Nature and Functions* Pergamon Press, New York: Pergamon Press, 1979.

⁴³ Richard M. Jones, *The New Psychology of Dreaming*, New York: Grune & Stratton, 1970.

⁴⁴ R. D. Cartwright, *Night life: Explorations in dreaming*, Upper Saddle River, NJ: Prentice-Hall, 1977.

⁴⁵ Calvin S. Hall, *The meaning of dreams*, New York: McGraw-Hill, 1966.

⁴⁶ Thomas M. French, *The integrative process in dreams*, Chicago: University of Chicago Press, 1954.

⁴⁷ Robert J. Hoss, Katja Valli, Robert P. Gongloff, *Dreams: Understanding Biology, Psychology, and Culture*, Greenwood, 2019, 440.

⁴⁸ Hoss et al., *Dreams: Understanding Biology, Psychology, and Culture*, 440.

⁴⁹ Compensation is summarized in three different ways: an opposition to the tendency of the conscious mind, a satisfaction with slight alterations and a parallel or a coincidence.

⁵⁰ Caifang Zhu, "Jung on the Nature and Interpretation of Dreams: A Developmental Delineation with Cognitive Neuroscientific Responses", *Behav Sci (Basel)*, 2013, 3(4), 665.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4217604/> (accessed: 25.05.2020)

⁵¹ Hoss et al., *Dreams: Understanding Biology, Psychology, and Culture*, 440.

achievement of the self-actualization – individuation, in which person’s conscious and unconscious lives are integrated in harmonious and healthy way.⁵² He believed that by the use of symbols and images which are sent through dreams the unconscious communicates important things to the conscious mind of a dreamer.⁵³ In that way conscious and unconscious mind can develop a relationship, unite and the person may complete the process of individuation and achieve the realization of the whole personality.⁵⁴ In dreams, the unconscious seeks to improve unbalanced or deficient conscious experience.

The second half of the twentieth century resulted in many new and original views on the nature and meaning of dreams.⁵⁵ Erich Fromm suggested that dreams are important and meaningful expressions of mental activity which occurs during sleep where present and past, fantasy and real life become one.⁵⁶ He believed that they may be a reflection of the most irrational but at the same time the most valuable functions of people’s minds, their morality and reason.⁵⁷ He also suggested that by approaching dreams as a totality, it is possible to understand the unconscious life of a dreamer and therefore what constitutes their productiveness and happiness.⁵⁸ It shows the motivation of the person and goals they have to set for themselves to achieve happiness. That is why dreams may reveal hidden potential of the person.⁵⁹ Additionally, Fromm also emphasized the problem-solving tendencies of dreams.

Psychoanalyst Montague Ullman, who built upon Adler’s theory, claimed that dreams reflect one’s emotional states and try to communicate important adaptive functions to the dreamer through images and visual metaphors.⁶⁰ He believed that dreams allow understanding of phenomena which one does not understand and confront one with overwhelming situations and emotions from the waking life. Ullman suggested that dreams by the use of symbols represent the connection between past experiences, present problems, and emotions which

⁵² Hoss et al., *Dreams: Understanding Biology, Psychology, and Culture*, 440.

⁵³ Janet Dallett, “Theories of Dream Function”, *Psychological Bulletin*, 1973, 79(6), 412.

⁵⁴ Dallett, “Theories of Dream Function”, 414.

⁵⁵ Tomasz Trzeciński, “Twoje sny to ty”, *Instytut Psychologii Zdrowia Polskiego Towarzystwa Psychologicznego*, <http://www.psychologia.edu.pl/czytelnia/50-artykuly/207-twoje-sny-to-ty.html> (accessed: 13.03.2020)

⁵⁶ Erich Fromm, *The Forgotten Language. An Introduction to the Understanding of Dreams, Fairy Tales and Myths*, New York Rinehart and Co., 1951, 25.

⁵⁷ Lawrence J. Friedman, *The Lives of Erich Fromm: Love's Prophet*, Columbia University Press, New York, 2013. 127.

⁵⁸ Friedman, *The Lives of Erich Fromm: Love's Prophet*, 128.

⁵⁹ Green et al., “Dreaming and Modern Dream Theory”, 13.

⁶⁰ Montague Ullman, “Dreams as Exceptional Human Experiences”, *The American Society for Psychological Research, Inc.*, 18(4). <http://www.aspr.com/ullm.htm> (accessed: 27.05.2020)

allows a better understanding and assessment of the problem.⁶¹ Moreover, Ullman believed that while asleep we get rid of façade that we put on ourselves in our waking lives and we are in emotional nudity. In dreams people are truly who they are, they do not pretend anything. ‘In a sense it is a privileged portrait of intrinsic value to a dreamer in search of a more honest self-concept’⁶² which gives opportunity to get to know ourselves better.

In the 1980s Crick and Mitchison proposed a reverse learning model as a neurobiological theory of dreams.⁶³ According to this model, the function of dreaming involves the process of ‘unlearning’ or ‘reverse learning’ which is the way of brain to get rid of unnecessary information which at the same time allows the most important information to survive.^{64 65} Crick and Mitchison’s theory contains the idea that humans’ memory is like a simple model of associative nets. When there is too much information stored in neural network and it becomes overloaded, it starts creating a content with the use of combination of random associations. The number of this random content grows rapidly in comparison to the number of information stored intentionally. Eventually the amount of unnecessary content completely dominates the network and the stored memories cannot be recalled.⁶⁶ Crick and Mitchison have suggested that dreaming may involve a reverse-learning mechanism by which the brain lessens the number of parasitic information by ‘unlearning’ them. According to their theory, the brain processes every random signal from the brain-stem until it reaches the attractor and then unlearns it. This process prevents the overloading and improves the performance of the network and its effectiveness.⁶⁷ Hopfield et al.⁶⁸ based their research on reverse learning theory and have shown that the reverse learning reduces the amount of unnecessary information and facilitates the retrieval of stored memories which was also confirmed by Keinfeld and Pendergraft⁶⁹.

⁶¹ Ullman, “Dreams as Exceptional Human Experiences”.

⁶² Ullman, “Dreams as Exceptional Human Experiences”.

⁶³ M. Shepherd, “Sleeping and dreaming”, *Br Med J (Clin Res Ed)*, August 1983, 287(6391), 512. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1548456/> (accessed: 17.03.2020)

⁶⁴ F. Crick, G. Mitchison, “The function of dream sleep”, *Nature*, July 1983, 304(5922), 111. <https://www.nature.com/articles/304111a0> (accessed: 17.03.2020)

⁶⁵ Crick, Mitchison, “The function of dream sleep”, 111.

⁶⁶ George A. Christos, “Investigation of the Crick-Mitchison Reverse-learning Dream Sleep Hypothesis in a Dynamical Setting”, *Neural Networks*, 1996, 9(3), 427. <https://www.sciencedirect.com/science/article/abs/pii/0893608095000720> (accessed: 20.05.2020)

⁶⁷ Christos, “Investigation of the Crick-Mitchison Reverse-learning Dream Sleep Hypothesis”, 427.

⁶⁸ J. J. Hopfield, D. I. Feinstein, R. G. Palmer, “Unlearning’ has a stabilizing effect in collective memories”, *Nature*, 1983, 304. <https://pubmed.ncbi.nlm.nih.gov/6866109/> (accessed: 20.05.2020)

⁶⁹ D. Keinfeld, D. B. Pendergraft, “Unlearning’ increases the storage capacity of content addressable memories”, *Biophysical Journal*, 1987, 51. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1329862/> (accessed: 20.05.2020)

Lastly, the neurocognitive model describes dreaming as the product of high-level mental imagery which creates embodied simulations of the real world.⁷⁰ It has been suggested that the simulation of reality is supposed to prepare a dreamer for integrative functions in waking state including learning and higher-order consciousness.^{71 72} The neurocognitive model of dreaming is supported by the studies showing that brain areas supporting sensory processing are activated during mental imagery in the absence of perceptual inputs and the research indicating that lesions in the temporo-parieto-occipital junction influence dreaming and mental imagery during waking state.^{73 74}

All above mentioned psychologists, psychoanalysts and many others used and still use dreams in the psychotherapy.⁷⁵ They help one to recall content and feelings which occurred in dreams to analyze and examine the content which may allow finding a latent sense which then enables understanding traumas and getting to know oneself better. The techniques and interpretations of dreams vary depending on the approach but in general they help people to connect with their unconscious which can improve their functioning and well-being. Freud listened to the dream and the patient's associations to certain images, and suggested an interpretation using his knowledge of the dreamer and symbols which appeared in the dream.⁷⁶ Jung did not specified procedures for dream work but he encouraged therapists' working with dreams to use whatever was most useful for the dreamer. Jung himself often used associations, depiction of dreams through artistic manifestations, and interpretation of dreams via archetypes and myths.⁷⁷

⁷⁰ G. William Domhoff, Kieran C. R. Fox, "Dreaming and the Default Network: A Review, Synthesis, and Counterintuitive Research Proposal", *Conscious Cogn.*, May 2015, 33, 343.

<https://pubmed.ncbi.nlm.nih.gov/25723600/> (accessed: 29.05.2020)

⁷¹ Kieran C. R. Fox et al., "Dreaming as Mind Wandering: Evidence From Functional Neuroimaging and First-Person Content Reports", *Front Hum Neurosci.*, July 2013, 30(7), 12.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3726865/> (accessed: 29.05.2020)

⁷² J. Allan Hobson, "REM Sleep and Dreaming: Towards a Theory of Protoconsciousness", *Nat Rev Neurosci.*, November 2009, 10(11), 803. <https://pubmed.ncbi.nlm.nih.gov/19794431/> (accessed: 29.05.2020)

⁷³ M. Solms, "Dreaming and REM Sleep Are Controlled by Different Brain Mechanisms", *Behav Brain Sci.*, December 2000, 23(6), 846. <https://pubmed.ncbi.nlm.nih.gov/11515144/> (accessed: 29.05.2020)

⁷⁴ N. H. Kerr, D. Foulkes, "Right Hemispheric Mediation of Dream Visualization: A Case Study", *Cortex.*, December 1981, 17(4), 603. <https://www.sciencedirect.com/science/article/abs/pii/S0010945281800664> (accessed: 29.05.2020)

⁷⁵ Clara E. Hill, Sarah Knox, "The Use of Dreams in Modern Psychotherapy", *International Review of Neurobiology*, 2010, 92, 2.

https://publications.marquette.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1130&context=edu_fac (accessed: 28.05.2020)

⁷⁶ Hill, Knox, "The Use of Dreams in Modern Psychotherapy", 3.

⁷⁷ Hill, Knox, "The Use of Dreams in Modern Psychotherapy", 3.

Unlike scholars mentioned in previous paragraphs, some scientists believe that dreams are a result of random brain activity and are meaningless. Hobson and McCarley's activation-synthesis theory is a neurobiological approach which states that in REM phase the pons – the PGO waves⁷⁸ – in the brain-stem are activated which is followed by activation of the limbic system engaged in emotions, sensations, and memories.⁷⁹ The brain interprets this activity and tries to compose meaningful content, which results in dreams. Therefore, according to Hobson and McCarley, dreams are byproducts of neurophysiological processes which occur during REM sleep. According to this theory, the process happens automatically and the content of dreams remains unexplained.

Another biological notion about the origin of dreams is a clinico-anatomical hypothesis, which suggests many similarities to the activation-synthesis theory. In both theories, it is believed that dreams originate in arousing stimuli generated within the brain, mixed with the information received from the senses and recent memories.⁸⁰ However, the clinico-anatomical hypothesis puts less emphasis on the pons and PGO waves. Its supporters believe that dreams are thought processes which occur in abnormal conditions.⁸¹ As during sleep the senses are highly suppressed, the brain may create images without limitations and interference. Moreover, during sleep prefrontal cortex, which is important for working memory and processes responsible for the use of knowledge, is also less active so the brain is free to create content not possible in waking life.⁸²

Finally, according to Foulkes' cognitive theory, dreams have their origins in dispersed, random stimulation of semantic and episodic memory during sleep. He suggested that dreams are involuntary symbolic acts which involve thinking, especially in visual mental images, and which result from random mnemonic activation during sleep.⁸³ Foulkes' theory states that all images in dreams are based on the knowledge and experiences which one gathered through their life as well as their personality.⁸⁴ According to Foulkes, dreaming is a creative act in which people combine different aspects of reality and symbols are mental events which

⁷⁸ Ponto-geniculo-occipital waves or PGO waves are phasic field potentials that occur during the transition from NREM to REM sleep or during REM sleep. They are distinctive wave forms of activity between the pons, lateral geniculate nucleus, and occipital lobe. PGO waves are a fundamental process of REM sleep and their activity is associated with learning and memory consolidation.

⁷⁹ Kalat, *Biologiczne podstawy psychologii*, 273.

⁸⁰ Kalat, *Biologiczne podstawy psychologii*, 273.

⁸¹ Kalat, *Biologiczne podstawy psychologii*, 289.

⁸² Kalat, *Biologiczne podstawy psychologii*, 289.

⁸³ Dreaming II: Theories and Research, 303, 308.

⁸⁴ Dreaming II: Theories and Research, 304.

represent imagined external world. He saw dreams as world analogs which means that the reality of the dream is the copy of world from waking experience with all the shapes, people, objects and spatial structures. However, Foulkes did not assigned any meaning nor psychological motivation to dreams.⁸⁵ He also argued that dreams do not have any adaptive function.⁸⁶

Like dreams, psychedelic states have been suggested to help people in understanding their inner world. Psychedelics (serotonergic hallucinogens) are powerful psychoactive substances which cause alteration of perception and mood and influence various cognitive processes.⁸⁷ They are substances which bind to serotonin 5-hydroxytryptamine 2A receptors in the brain (agonist or partial agonist).⁸⁸ 5-HT_{2A} receptors are expressed throughout the cortex, and occur most densely in high-level association cortical areas correlated with cognitive and perceptual processing.⁸⁹

Psychedelics have been used in traditional societies for thousands of years in a medical, religious, ritual or sociocultural context. The word *psychedelic* was first used by the psychiatrist Humphrey Osmond in 1957. It derives from Greek words *psyche* which means ‘soul’ or ‘mind’ and *delein* which means ‘to manifest’, hence psychedelic means ‘soul-manifesting’ or ‘mind-manifesting’.⁹⁰ Psychedelic experience is an impermanent altered state of consciousness caused by the consumption of psychedelic drugs, which is said to expose aspects of mind that are usually hidden. There are several physiological characteristics which can be ascribed to psychedelic experience, which are changes in visual perception, synesthesia, intensification of external stimuli and psychotherapeutic experiences which may lead to personal development and mystical experiences.

Another term closely connected with psychedelics is the entheogen. It was introduced in 1979 and means vision-producing drugs which occur in shamanic or religious rituals.⁹¹ The word was created by the combination of the ancient Greek *entheos* which means ‘inspired’,

⁸⁵ Dreaming II: Theories and Research, 307.

⁸⁶ Dreaming II: Theories and Research, 308.

⁸⁷ David E. Nichols, “Psychedelics”, *Pharmacol Rev.*, April 2016, 68(2), 268, 269.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4813425/>. (accessed: 11.02.2020)

⁸⁸ Kraehenmann, “Dreams and Psychedelics”.

⁸⁹ Raphaël Millière, “Looking for the Self: Phenomenology, Neurophysiology and Philosophical Significance of Drug-Induced Ego Dissolution”, *Front. Hum. Neurosci.*, May 2017, 245(11), 5.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5441112/> (accessed: 11.02.2020)

⁹⁰ Brant Cortright. *Psychotherapy and Spirit: Theory and Practice in Transpersonal Psychotherapy*, State University of New York Press, New York, 1997, 183.

⁹¹ Mark Hoffman, Carl A. P. Ruck, “Entheogens (psychedelic drugs) and shamanism”, 2004, 111.
https://www.academia.edu/31667047/Entheogens_Psychedelic_Drugs_and_Shamanism (accessed: 18.03.2020)

‘deity’ or ‘animate’ and the verbal root in genesis which means ‘becoming’, hence signifies ‘something that causes the divine to reside within one’⁹² or ‘God-containing’/ ‘God-enabling’.⁹³ The most popular hallucinogenic entheogens are: ayahuasca, peyote, psilocybin, LSD or iboga, therefore the substances which can be also called psychedelics.⁹⁴ Entheogens are substances which produce altered state of consciousness and may facilitate achieving spiritual experience. In many cultures it is believed that the ingestion of entheogen has a power to unite one with a deity and provide a communion between the person and the divine. In shamanism entheogens were and still are used to achieve the altered state of consciousness, communicate with spirit world or ancestors, diagnose or cure diseases, gain power, wisdom or control over natural phenomena. Many scholars believe that entheogens were fundamental for the development of shamanism.⁹⁵ Moreover, those psychedelic plants were worshiped and treated as plant teachers which contain hidden knowledge and access to metaphysical realms or worlds.⁹⁶ The effects produced by the entheogenic plants gave their practitioners the basis of knowledge about the spiritual world with its entities and the cognitive capacities.⁹⁷ The archeological evidence has shown that entheogens were used by people all around the world since antiquity. The earliest evidence of the shamanic use of entheogenic plants comes from the petroglyphs of the Tassili plateau in the southern Algeria and dates from between about 20,000 to 7,000 years ago.⁹⁸ The use of psychedelic plants has been proven ‘from the 4,000-year old mescal beans (*Sophora secundiflora*) found along the Rio Grande river basin and the cache of ancient peyote cacti (*Lophophora williamsii*) found in Texas to the mushroom stones (and related ceramics) of Mesoamerica, China, and Paleolithic Old Europe and the so-called mead-drinking Venus of Laussel, dating from the Upper Paleolithic.’⁹⁹ The use of entheogens in shamanic and religious rituals is still valid in modern world in many places including ‘Siberian and Central Asian tribes, such as the Koryak, Chukchi, Ostyak, and Kamchadal; the Huichol of central Mexico; the cultures of Lower Mexico, Amazonia, and Peru; the ancestral

⁹² Hoffman, Ruck, “Entheogens (psychedelic drugs) and shamanism”, 111.

⁹³ William A. Richards, “Entheogens in the study of mystical and archetypal experiences”, in *Research in the Social Scientific Study of Religion, Volume 13*, Leiden, 2002, 144, 378.

⁹⁴ Ralph Metzner, “Entheogenic rituals, shamanism and green psychology”, *European Journal of Ecopsychology*, 2013, 4, 67, 68.

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.869.7698&rep=rep1&type=pdf> (accessed: 18.03.2020)

⁹⁵ Hoffman, Ruck, “Entheogens (psychedelic drugs) and shamanism”, 113.

⁹⁶ Metzner, “Hallucinogenic Drugs and Plants in Psychotherapy and Shamanism”, 337.

⁹⁷ Hoffman, Ruck, “Entheogens (psychedelic drugs) and shamanism”, 114.

⁹⁸ Hoffman, Ruck, “Entheogens (psychedelic drugs) and shamanism”, 113.

⁹⁹ Hoffman, Ruck, “Entheogens (psychedelic drugs) and shamanism”, 113.

Bwiti cult of west-central Africa; and the Native cultures of North America'.¹⁰⁰ They are still used to contact spiritual forces, expand consciousness, deepen spiritual insight, diagnose or treat physical diseases and psychological problems, for divination and to maintain or enhance social solidarity.¹⁰¹

Entheogens have been adapted by the contemporary culture and are still used in religious context by people who look for self-understanding and mind-expanding experiences as they enable expansion of consciousness and access to transcendent, religious or transpersonal dimensions of consciousness.¹⁰² Sometimes they may cause sudden changes in perception and behavior.¹⁰³ Peyote, which contains mescaline, was used by Mexican indigenous people, including the Chichimeca, Huichol, and Tarahumara tribes and is still used by the Native American Church for religious purposes.¹⁰⁴ Humphrey Osmond describes his experience with it: 'Peyote enables expansion one's self to all that exists and enhancement of the empathy and in-feeling. The self is dissolved and enriched at the same time'.¹⁰⁵ Psilocybin has also been and is still used in ceremonial context in Mexico. R. Grodon Wasson describes his experience saying that '[...] your soul is free, loses all sense of time, alter as in never was before [...] you know what the ineffable is, and what ecstasy means. For the Greek ekstasis meant the flight of the soul from the body.'¹⁰⁶ Ayahuasca which contains DMT has also been used for its ceremonial purposes from the pre-Columbian times. Currently it is used by syncretic churches União de Vegetal, Santo Daime, and Barquinha.

The first wave of the investigation of psychedelics, specifically mescaline, started at the end on XIX century.¹⁰⁷ Second wave started shortly after Albert Hoffman as the first person

¹⁰⁰ Hoffman, Ruck, "Entheogens (psychedelic drugs) and shamanism", 115.

¹⁰¹ G.H. Shepard Jr., "Psychoactive botanicals in ritual, religion, and shamanism", in: *Ethnopharmacology*, ed. by E. Elisabetsky, N. Etkin, Oxford, UK: UNESCO/Eolss Publishers, 2005, 2.

https://www.researchgate.net/publication/263735111_PSYCHOACTIVE_BOTANICALS_IN_RITUAL_RELIGION_AND_SHAMANISM (accessed: 18.03.2020)

¹⁰² Ralph Metzner, "Hallucinogenic Drugs and Plants in Psychotherapy and Shamanism", *Journal of Psychoactive Drugs*, 1998, 30(4), 334. <https://pubmed.ncbi.nlm.nih.gov/9924839/> (accessed: 19.03.2020)

¹⁰³ Frederick S. Barrett, Roland R. Griffiths, "Classic Hallucinogens and Mystical Experiences: Phenomenology and Neural Correlates", *Curr Top Behav Neurosci.*, 2018, 36, 393.

<https://www.ncbi.nlm.nih.gov/pubmed/28401522> (accessed: 20.02.2020)

¹⁰⁴ Barrett, Griffiths, "Classic Hallucinogens and Mystical Experiences", 36.

¹⁰⁵ H. Osmond, "Peyote Night" in *Psychedelics: The Uses and Implications of Hallucinogenic Drugs*, edited by B. Aronson & H. Osmond, Garden City: Anchor Books, 1970, 84.

¹⁰⁶ R. G. Wasson, A. Hofman, C. A. P. Ruck, *The Road to Eleusis: Unveiling the Secret of the Mysteries*, Los Angeles: Hermes Press, 1998, 31.

¹⁰⁷ Link R. Swanson, "Unifying Theories of Psychedelic Drug Effects", *Front Pharmacol.*, March 2018, 172(9), 1. <https://www.frontiersin.org/articles/10.3389/fphar.2018.00172/full> (accessed: 11.02.2020)

synthesized and learnt of the psychedelic effects of LSD in 1943.¹⁰⁸ The pharmaceutical companies distributed the substance to many researchers who started conducting studies on a big scale. In the 1950s and 1960s the research was expanded to drugs like DMT and psilocybin.¹⁰⁹ The changes in brain chemistry in relation to subjective experiences including altered perception, emotions, cognition, and sense of self amazed scientists which led to research on chemotherapeutic and psychotherapeutic fields. Supporters believed that psychedelic drugs promoted psychoanalytical processes and could bring great benefits by changing one's value system and personality structures. In those two waves of investigation of psychedelics scientists focused on three themes regarding the substances. They noticed that psychedelic drugs share symptoms similar to psychosis which was a basis for creation a model psychoses theory which was driven by questions concerning the relationship between 'psychoactive drugs and endogenous neurochemicals'.¹¹⁰ By the use of psychedelic drugs scientists wanted to gain first-person knowledge about the development and dissolution of symptoms and psychotic phenomenology. The second theme was based on observation that psychedelic drugs seem to influence perceptual, emotional, cognitive, and self-referential experience which formed basis of filtration theory.¹¹¹ Osmond and Huxley argued that psychedelics hide a mind-manifesting potential and may be a tool which could introduce other world into the consciousness.¹¹² Huxley believed that biological and psychological selection processes keep consciousness narrow and block a subconscious material and psychedelic drugs may unblock it.¹¹³ Osmond and Huxley believed that expansion of feelings, escalation of perceptual stimuli, vivid mental imagery, atypical thoughts and dissolving sense of self may help with understanding the range of psychedelic effects, their connection with psychotic symptoms and their role in psychedelic-assisted therapies.¹¹⁴ A third theme, psychoanalytic theory, refers to expansion of mental phenomena and elements of similarities to mental psychosis.¹¹⁵ The scientist noticed the close similarity between effects caused by psychedelics and primary processes¹¹⁶. The influence that psychedelic drugs have on ego 'were found to be

¹⁰⁸ Steven J. Novak, "LSD before Leary. Sidney Cohen's critique of 1950s psychedelic drug research", *Isis, Journal of the History of Science Society*, 1997, 88(1), 90.

<https://www.journals.uchicago.edu/doi/pdfplus/10.1086/383628> (accessed: 23.05.2020)

¹⁰⁹ Swanson, "Unifying Theories of Psychedelic Drug Effects", 1.

¹¹⁰ Swanson, "Unifying Theories of Psychedelic Drug Effects", 7.

¹¹¹ Swanson, "Unifying Theories of Psychedelic Drug Effects", 8.

¹¹² Swanson, "Unifying Theories of Psychedelic Drug Effects", 8.

¹¹³ Swanson, "Unifying Theories of Psychedelic Drug Effects", 9.

¹¹⁴ Swanson, "Unifying Theories of Psychedelic Drug Effects", 2.

¹¹⁵ Swanson, "Unifying Theories of Psychedelic Drug Effects", 9.

¹¹⁶ In Freudian psychology primary processes are modes of functioning governed by the pleasure principles and id-driven desires based on instincts and urge of fulfillment.

a great tool in psychotherapy because of their capacity to perturb ego and allow primary processes phenomena to emerge.’¹¹⁷ Throughout the 1960s, the use of psychedelic drugs by the general public caused restrictions of the studies. Many countries banned research of psychedelic substances and made them illegal to use for all purposes.

A third wave started in early 2000s when the amount of the clinical studies of psychedelic drugs increased due to the new technology and changes in political attitude towards these substances. The development of cognitive neuroscience allowed deepen neurodynamic processes underlying changes in human perception, emotion, cognition, and consciousness under the influence of psychedelic drugs. The main theories about psychedelics in cognitive neuroscience are based on the notion that psychedelic drugs affect ‘the integrity of neurobiological information-processing constraint mechanisms’.¹¹⁸ Recent neuroscientific theories include entropic brain theory, integrated information theory, and predictive processing.¹¹⁹

The interest in the use of psychedelics in therapy started in 1950s and 1960s.¹²⁰ It was believed that there were two main sources of therapeutic involvement. First one was focused on testimonies of experimental subjects that after ingesting psychedelic drugs they felt less depressed, anxious, angry and guilty and experienced self-acceptance, tolerance and alteration of senses.¹²¹ Second interest was based on belief that experience of abreaction, regression and intense transference induced by psychedelic drugs could be a powerful tool used in psychedelic assisted therapy.¹²² As a result, two forms of LSD-supported therapy emerged. One was focused on mystical and conversion experience and its effects and the other one emphasized psychoanalysis of the unconscious.¹²³ Different forms of psychoanalysis were used to understand and interpret the problems.¹²⁴ Also nowadays, some places offer psychedelic assisted therapy. There are three phases of experience: preparation, the acute psychedelic experience, and integration.¹²⁵ The preparation includes many aspects like adjusting diet, psychotherapy in which a person is guided how to stay open to psychedelic

¹¹⁷ Swanson, “Unifying Theories of Psychedelic Drug Effects”, 9.

¹¹⁸ Swanson, “Unifying Theories of Psychedelic Drug Effects”, 11.

¹¹⁹ Swanson, “Unifying Theories of Psychedelic Drug Effects”, 11, 12, 13, 14.

¹²⁰ Lester Grinspoon, James B. Bakalar, “The Psychedelic Drug Therapies”, *Current Psychiatric Therapies*, 1981, 20, 275. <http://www.psymon.com/psychedelia/articles/grin-bak.htm#Ref1> (accessed: 28.05.2020)

¹²¹ Grinspoon, Bakalar, “The Psychedelic Drug Therapies”, 275.

¹²² Grinspoon, Bakalar, “The Psychedelic Drug Therapies”, 275.

¹²³ Grinspoon, Bakalar, “The Psychedelic Drug Therapies”, 275.

¹²⁴ Grinspoon, Bakalar, “The Psychedelic Drug Therapies”, 275.

¹²⁵ “WHAT IS PSYCHEDELIC-ASSISTED THERAPY?”, *Mind Medicine Australia*, <https://mindmedicineaustralia.org/what-is-psychedelic-assisted-therapy/> (accessed: 28.05.2020)

experience, do not avoid challenging occurrences and take the best out of it and at the same time avoid ‘bad trip’. ‘Set’ and ‘setting’ are important parts of psychedelic experience. Set refers to the mindset of the person which includes expectations, mood, past experiences and personality. Setting refers to the physical space and the relationships with therapists who are present and assist in creating a new thinking patterns and life framework concentrated on individual responsibility to change.¹²⁶ During the therapy patients are encouraged to focus on interpretations of drug-generated visions and symbols, regression or discharge of tension. By staying intellectually altered they become aware of ego defenses, as they notice the act of creating them and may consciously influence their choices.¹²⁷ Therapists support the participants in emerging process, offer assistance and guidance if needed, listen and respond to the person by giving an analysis of the material.¹²⁸ The process of integration immediately follows the psychedelic session. With the assistance of therapist the person processes, makes sense of and analysis the experience to give a meaning to it.

Even though dream states and psychedelic experiences and its effects on human’s psychological well-being and development have been studied by many researchers, these phenomena were hardly compared. Rainer Kraehenmann¹²⁹ created a neurophenomenological comparison of psychedelic states and dreams. His study has shown that the phenomena show similarities and suggested that it is highly possible that positive effects of dreaming can be also applied to psychedelics. Nevertheless, Kraehenmann’s comparison is focused mainly on neurophenomenological area and I think that psychological-based comparison could add to the discussion and create a base for psychologist and psychiatrist to incorporate interpretations and methods in which psychedelics, like dreams, could help with understanding our inner world, emotional and psychological processes. Neurophysiology is concerned with the study of the nervous system, therefore in relation with the studies of psychedelic drugs it explains the changes in nervous system caused but these substances. On the other hand, psychology studies human behaviors, thoughts, personality, emotion and development. In my study I will focus on this discipline and check how all above mentioned aspects change when influenced by psychedelic substances.

The hypothesis that I am going to examine in this study is that there are similarities in beneficial effects of psychedelic experiences and dream states on personal growth and

¹²⁶ Grinspoon, Bakalar, “The Psychedelic Drug Therapies”, 275.

¹²⁷ Grinspoon, Bakalar, “The Psychedelic Drug Therapies, 275”.

¹²⁸ “WHAT IS PSYCHEDELIC-ASSISTED THERAPY?”.

¹²⁹ Kraehenmann, “Dreams and Psychedelics”.

psychological well-being. I focused on the group of serotonergic psychedelics and in the study I am going to refer to them as psychedelics or psychedelic drugs. By conducting this research I want to show that experiences similar to natural, self-healing processes which occur in human's body during dreaming can be also produced by the use of psychedelic substances which are considered as harming by many people. Personally, I think that psychedelic drugs, despite public opinion and its legal status, if used properly and reasonably, may create an amazing, fascinating experience. If one has the ability to incorporate this experience with self-awareness and conscious deeds they may discover beneficial side of the psychedelic substances. Conducting this research allows me to show the good side of psychedelic drugs. Moreover, the interpretation of dreams has been used in the psychotherapy so it is possible that if those two phenomena show similarities, psychedelic experiences may also be beneficial in this field. If there are similarities in beneficial effects and personal growth between psychedelic states and dreaming, the debate about it could be a good starting point for expanding the subject and possibly creating helpful tools which could be used to enhance people's life satisfaction, psychological well-being or spirituality. If I confirm my hypothesis, it may be a base for further studies which could contribute to the enhancement of the effectiveness of the psychological treatments.

My main research question is 'What are similarities in beneficial effects on personal development and psychological well-being between dream states and psychedelic experiences?'. Well-being is a state of contentment with overall good physical and mental health and good life quality.¹³⁰ Scholars still debate on defining psychological well-being. Bradburn was one of the first who attempted to define psychological well-being. He claimed that the person has good psychological well-being when they have an excess of positive affect over negative affect.¹³¹ Diener and Suh believed that 'subjective well-being consists of three interrelated components: life satisfaction, pleasant affect, and unpleasant affect. Affect refers to pleasant and unpleasant moods and emotions, whereas life satisfaction refers to a cognitive sense of satisfaction with life.'¹³² The Six-factor Model of Psychological Well-being created by Carol Ryff includes self-acceptance, positive relationships with others, autonomy,

¹³⁰ APA Dictionary of Psychology, American Psychological Association, <https://dictionary.apa.org/well-being> (accessed: 12.05.2020)

¹³¹ N. Bradburn, *The structure of psychological well-being*, Chicago: Aldine, 1969, 9.

¹³² E. Diener, E Suh, "Measuring quality of life: Economic, social, and subjective indicators", *Social Indicators Research*, 1997, 40(1-2), 189. <https://link.springer.com/article/10.1023/A:1006859511756> (accessed: 12.05.2020)

environmental mastery, a feeling of purpose and meaning in life, and personal growth.¹³³ Personal development in clinical professions is often used alternately with terms ‘personal growth’ or ‘self-awareness’.¹³⁴ According to Johns it is ‘a consistent and continual striving for self and other awareness, knowledge, understanding and acceptance.’¹³⁵ Wilkins defines it as a process of recurrent and continuing integration.¹³⁶

In my research I chose to describe phenomena of perception, sense of self, emotion activation, cognitive processes and mystical experiences as they may influence personal development and psychological well-being.

Perception is a process or result of internal recognition, interpretation and response to sensory information.¹³⁷ Often it is described by psychologists and psychiatrists as abstraction or sensation, something subjective. Forgas and Melamed define it as ‘the process of information extraction on cognitive structures and the processes that determine how humans interpret their surroundings.’¹³⁸ Stewart, Tubbs, and Sylvia Moss agree that it is an active and subjective process in which person perceives, organizes and interprets their experience. Interpretation is based on one’s experiences, gained knowledge and information, assumptions, current moods, desires and expectations.¹³⁹ Perception allows to organize stimuli and makes it into something meaningful which creates person’s attitudes and opinions and allows one to interact with environment. Sense of self, which is a part of perception, is a complex concept which includes the way a person identifies and feels about themselves, sees their roles, attributes, behaviors, and associations with the world.¹⁴⁰ Sense of self and perception have a great impact on how people perceive surroundings and how they feel about themselves which may influence their overall mood, state of mind and interactions with the world.¹⁴¹

¹³³ C. D. Ryff, “Happiness is everything, or is it? Explorations on the meaning of psychological well-being”, *Journal of Personality and Social Psychology*, 1989, 57(6), 1069.

<https://pdfs.semanticscholar.org/0b7c/bc0e7b5946b39778784a2167019eebd53e52.pdf> (accessed: 12.05.2020)

¹³⁴ Jan Hughes, Sheila Youngson, *Personal Development and Clinical Psychology*, British Psychological Society and Blackwell Publishing, 2009, 26.

¹³⁵ Hughes, Youngson, *Personal Development and Clinical Psychology*, 26.

¹³⁶ Hughes, Youngson, *Personal Development and Clinical Psychology*, 26.

¹³⁷ APA Dictionary of Psychology, American Psychological Association, <https://dictionary.apa.org/perception> (accessed: 06.05.2020)

¹³⁸ R. H. Forgas, L. E. Melamed, *Perception: A cognitive-stage approach*, New York: McGraw: Hill Book Company, 1976, 7.

¹³⁹ L. Stewart, Tubbs., M. Sylvia, *Human communication ibook*, New York United States: Mc Graw-Hill Inc., 1990, 7.

¹⁴⁰ Viktor Gecas, “The Self-Concept”, *Annual Review of Sociology*, 1982, 8(1-33), 1.

<https://pdfs.semanticscholar.org/7084/62cec3bd3049351946692dc3cd207ad97125.pdf> (accessed: 06.05.2020)

¹⁴¹ Shaun Gallagher, Andrew N. Meltzoff, “The earliest sense of self and others: Merleau-Ponty and recent developmental studies”, *Philosophical Psychology*, 1996, 9(2), 211.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3845406/> (accessed: 17.03.2020)

Emotive processes refer to proceeding and reduction of significant emotional responses over time.¹⁴² According to Rachman they are processes ‘whereby emotional disturbances are absorbed, and decline to the extent that other experiences and behaviour can proceed without disruption.’¹⁴³ Therefore, emotive processes allow one to cope with difficult past events and help with healing from emotional trauma which increases life satisfaction.

Cognitive processes are mental functions, in which already existing knowledge is used to operative effectively.¹⁴⁴ These processes usually consist of at least a minimal level of one of following processes: attention, perception, learning, emotion, intentionality, problem-solving, self-representation, rationality and decision-making.¹⁴⁵ Newen defines them as processes of transmission of information in which external stimuli and informational inputs are connected to create a cognitive system. Cognitive processes have impact on how people receive the world around them, create their behaviors and develop their abilities.¹⁴⁶ Therefore, they allow self-development and creating healthy attitudes based on the process of cognition which may increase mental and emotional well-being.

By the definition of Stace ‘mystical experiences include the experience of profound unity with all that exists, a felt sense of sacredness, a sense of the experience of truth and reality at a fundamental level (noetic quality), deeply felt positive mood, transcendence of time and space, and difficulty explaining the experience in words.’¹⁴⁷ Watts defines them as altered states of consciousness in which the person experiences the feeling of unity with higher power, God, Universe, or whatever name they may use to describe this greater figure.¹⁴⁸ Mystical experiences are often linked with sense of self, emotive and cognitive processes and

¹⁴² APA Dictionary of Psychology, American Psychological Association, <https://dictionary.apa.org/emotional-processing-theory> (accessed: 06.05.2020)

¹⁴³ S. Rachman, “Emotional processing”, *Behaviour Research and Therapy*, 1980, 18(1), 51. <https://www.sciencedirect.com/science/article/abs/pii/0005796780900698> (accessed: 06.05.2020)

¹⁴⁴ APA Dictionary of Psychology, American Psychological Association, <https://dictionary.apa.org/cognitive-process> (accessed: 06.05.2020)

¹⁴⁵ Albert Newen, “What are cognitive processes? An example-based approach”, *Synthese*, July 2015, 194(11), 4257. <https://www.semanticscholar.org/paper/What-are-cognitive-processes-An-example-based-Newen/ce6054398fdb0fe6293d5a7484afe69040abaa4d> (accessed: 06.05.2020)

¹⁴⁶ Alice M. Isen, “Positive Affect, Cognitive Processes, and Social Behavior”, *Advances in Experimental Social Psychology*, 1987, 20, 204. <https://www.sciencedirect.com/science/article/pii/S0065260108604153?via%3Dihub> (accessed: 17.03.2020)

¹⁴⁷ Frederick S. Barrett, Matthew W. Johnson, Roland R. Griffiths, “Validation of the revised Mystical Experience Questionnaire in experimental sessions with Psilocybin”, *Journal of Psychopharmacology*, 2015, 29(11), 1182.

¹⁴⁸ Alan Watts, “Psychedelics and Religious Experience”, *California Law Review*, January 1968, 56(1), 74, 75. <https://www.jstor.org/stable/3479497?seq=1> (accessed: 24.02.2020)

may enhance general consciousness.¹⁴⁹ They may widen one's perspective and enable personal growth.

By describing the changes and influence that psychedelic drugs and dream states have on above listed aspects, it will be possible to relate two phenomena and examine if there are similarities in positive effects which they have on personal development and psychological well-being. A correlation analysis will show whether the relationship is significant or not.

The sub-question which I am going to use is 'How do dreams and psychedelic substances influence perception, mental imagery, emotion activation, cognitive processes and mystical experiences?'. By answering this question I want to examine if those aspects of dreams and psychedelic experiences show similarities and if the effects on human psyche that they create are positive.

Method

My study takes the form of a narrative literature research. I chose this method because I intend to create a content based on psychological and neurophysiological materials to describe the psychedelic experiences and dream states so it was necessary for me to use narrative literature which describes those phenomena. I have decided to base my knowledge on the studies done by professionals who were able to analyze the results in terms of psychological and neurophysiological fields. I used the studies from different fields to make correlations between the changes in different parts of the brain and nervous system under the influence of psychedelics and during dream states and the psychological alterations that they cause and check if those alterations have the same source.

The study is divided into three main parts – introduction, main part and conclusions. The main part of the work will be divided into three chapters. The first chapter will be devoted to the description of the theory concerning how dreams affect perception, sense of self, emotion activation, cognitive processes and mystical experiences. In the second chapter I am going to write about the psychedelics and psychedelic experiences. Analogically, I am going to

¹⁴⁹ Michael A. Thaibourne, Peter S. Delin. "Transliminality: Its Relation to Dream Life, Religiosity, and Mystical Experience", *The International Journal for the Psychology of Religion*, 1999, 9(1), 45. https://www.tandfonline.com/doi/abs/10.1207/s15327582ijpr0901_6 (accessed: 17.03.2020)

describe how they influence perception, mental imagery, emotive processes, cognitive processes and mystical experiences. The third chapter has a comparative character and includes conclusions. I am going to relate in it a phenomenon of dream state to psychedelic experience and describe the impact they have on humans in above-mentioned fields. I will present the results of the research and briefly answer the research questions presented in the introduction. At the end, I will discuss implications of my study for future research and describe its limitations.

I used academic studies done on the subject of psychedelic substances and dreams, particularly focusing on their relation to perception, mental imagery, emotive and cognitive processes and mystical experiences. I applied available data created after 1950 written or translated into English. The databases I used were Google Scholar and SmartCat with keywords: ‘psychedelic’, ‘psilocybin’, ‘ayahuasca’, ‘mescaline’, ‘LSD’, ‘Lysergic acid diethylamide’, ‘DMT’, ‘5-HT_{2A} receptor agonists’, ‘dreams’, ‘lucid-dreaming’, ‘ego-death’, ‘ego-dissolution’, ‘perception’, ‘sense of self’, ‘mystical experience’, ‘cognitive processes’, ‘emotive processes’. I focused mainly on psychological studies but also used neurophenomenological researches to briefly present how the processes of dreams and psychedelic experiences are created and influence perception, mental imagery, emotive and cognitive processes. I analyzed materials by grading particular aspects of the studies to assess their reliability (see Table 3). I used the studies and compared results to find similarities in how those two states influence above mentioned fields.

Finally, I have to mention that in the research I focus mostly on positive effects of psychedelic drugs. Nevertheless, it is important to remember that those substances can also be dangerous and may have negative effect on states of being of the person who takes them. Moreover, by no means do I intend to encourage anyone to treat their emotional or psychological problems with psychedelic drugs without consulting a specialist.

DREAMS

Perception and Sense of Self

Dreams can take form of vivid hallucinatory experiences which alter perception. Sense of body and self is changed and the dreamer may experience depersonalization, derealization, out-of-body experience and other phenomena which may have long-term effects on emotive and cognitive processes.

‘Dreams are highly visual, in full color, rich in shapes, full of movement, and incorporate typical wakefulness categories such as people, faces, places, objects, and animals.’¹⁵⁰ According to activation-synthesis theory the activation of the primary visual and somatosensory cortex results in hallucinations. Some lesions, particularly the ones in the medial prefrontal cortex, the anterior cingulate cortex and the basal forebrain, are linked with heightened frequency and vividness of dreams.¹⁵¹ Strong activation of the occipito-temporal-parietal junction is linked with the creation of vivid visuospatial mental imagery.¹⁵²

In dreams sense of self and body are altered. Deactivation of the parietal lobe and precuneus is responsible for changes in the sensation of the body and causes loss or reduction in the sense of the body. Mostly, the dream-self is an active participant of events (71% of dreams¹⁵³). In 11% of the cases the participant is present but is not active and unable to make any decisions¹⁵⁴. In other 18% the dreamer is totally uninvolved or absent¹⁵⁵. People often experience perspective which shifts, detaches and transforms. Mismatch of character and discontinuity of narrative sequence are also common during dreaming.

Usually the dreamers are observers and see themselves from an external perspective ‘but the visual or visuospatial perspective of the dream experience does not coincide with what

¹⁵⁰ Yuval Nir, Giulio Tononi, “Dreaming and the brain: from phenomenology to neurophysiology”, *Trends Cogn Sci.*, February 2010, 14(2), 88. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2814941/>. (accessed: 11.02.2020)

¹⁵¹ Nir, Tononi, “Dreaming and the brain: from phenomenology to neurophysiology”, 88.

¹⁵² Jonathan Jenkins Ichikawa, “Dreaming and Imagination”, *Mind and Language*, 2009, 24(1), 111. <https://www.taylorfrancis.com/books/e/9781315657905/chapters/10.4324/9781315657905-24>. (accessed: 11.02.2020)

¹⁵³ Melanie Rosen, John Sutton, “Self-Representation and Perspectives in Dreams”, *Philosophy Compass*, 2013, 8(11), 1043, <https://onlinelibrary.wiley.com/doi/abs/10.1111/phc3.12082>. (accessed: 11.02.2020)

¹⁵⁴ Rosen, Sutton, “Self-Representation and Perspectives in Dreams”, 1043.

¹⁵⁵ Rosen, Sutton, “Self-Representation and Perspectives in Dreams”, 1043.

would be the perspective of the self or the protagonist in the dream.’¹⁵⁶ This phenomenon is often described as an ‘out-of-body’ experience. Rosen and Sutton¹⁵⁷ suggest three main features of the observer perspective in dreams. Firstly, the dreamer sees their body. Secondly, the dreamer assumes that this body represents them or character representing the dreamer. Finally, there is explicit visual or visuospatial perspective from which the dreamer observes events.

In some cases, the dreamer does not experience visual nor visuospatial perspective. In others, fluidity in visuospatial perspective takes place. A unique case is lucid dreaming in which person realizes that they are dreaming, has access to their memories and tries to influence the content of a dream when the dream continues. Lucid dreams are often linked with dissociative elements akin to depersonalization and derealization. ‘Insight, control, and dissociation represent the defining criteria of lucid dreams.’¹⁵⁸ Insight which in case of lucid dreams means that a dreamer has awareness that they are dreaming is considered to be a crucial criterion, whereas control and dissociation are not always a part of lucid dreams. The importance of insight is based on the fact that without it one cannot experience lucid dreaming. Two other criteria, on the other hand, may appear in lucid dreaming but are dependent on understanding that one is dreaming. Depersonalization means that a person may see themselves from the outside or experiences a dream as an observer. This dissociation is associated with extremely selective rises in gamma band activity in fronto-temporal areas of the brain.¹⁵⁹

The dream self can also be experienced ‘either by way of embodiment-in or identification-with other characters or even objects’.¹⁶⁰ Rosen and Sutton describe this experience as a vicarious dream which is rare. In this type of dream, the perspective in a dream is the one of protagonist but the dreamer does not identify themselves as a protagonist. Each protagonist may be connected with the dreamer or other protagonist from the dream. Sometimes the participant in the dream sees through their own eyes. The self in the dream is the figure which embodies the dreamer who takes central position in the dream such that the setting and events are experienced from their point of view.¹⁶¹

¹⁵⁶ Rosen, Sutton, “Self-Representation and Perspectives in Dreams”, 1044.

¹⁵⁷ Rosen, Sutton, “Self-Representation and Perspectives in Dreams”.

¹⁵⁸ Ursula Voss et al., “Insight and Dissociation in Lucid Dreaming and Psychosis”, *Front. Psychol.*, November 2018, 1. <https://www.frontiersin.org/articles/10.3389/fpsyg.2018.02164/full>. (accessed: 11.02.2020)

¹⁵⁹ Voss et al., “Insight and Dissociation in Lucid Dreaming and Psychosis”, 3.

¹⁶⁰ Rosen, Sutton, “Self-Representation and Perspectives in Dreams”, 1047.

¹⁶¹ Rosen, Sutton, “Self-Representation and Perspectives in Dreams”, 1043.

In the case of lucid dreaming, there are two theories about aims of the sense of the self and its self-monitoring processes which differentiate between the self-produced sensations of imagination and the externally-produced sense of perception.¹⁶² According to Johnson's theory¹⁶³ in lucid dreams the self is a side-effect of mechanism of monitoring of reality based on interference of this activity. It differentiates perceptually-generated content from self-produced information.¹⁶⁴ Johnson suggests that self as a creator seems to be more similar to the self as an agent than the self as a subject. This theory was also supported by Georgieff and Jeannerod¹⁶⁵. Contrarily, Kahan and LaBerge¹⁶⁶ claim that the self in lucid dreams is an illusory self as a subject. That would mean that the dreamer gains the ability to monitor their sensations and be more objective about reactions to them by distancing themselves from these stimulus. This may lead to emotional stability and therefore, enhanced emotional well-being. On the other hand, Kunzendorf's theory of source monitoring denies this idea. Kunzendorf¹⁶⁷¹⁶⁸ claims that during lucid dreaming a dreamer may experience sense of self as an agent and self as an object. He argues that lucid dreamers do not have direct self-awareness that they are dreaming, but they assume that the sensory contents of their dreams is not compatible with perceptual knowledge or personal memory.

'The perspective from which people imagine or tend to imagine future actions can have definite and lasting effects on cognition, emotion, and action.'¹⁶⁹ Activity in inferior parietal regions contribute to representation of the self and others. That is why the dreamer can take part in their dreams as participant but also as an observer. Those incorporations may facilitate solving the problems by preparing person to reacting to threats. Recent research suggests that

¹⁶² Robert G. Kunzendorf et al., "The Sense of Self in Lucid Dreams: "Self as Subject" vs. "Self as Agent" vs. "Self as Object", *Cognition and Personality*, 26(4), 304.

https://www.academia.edu/37853739/THE_SENSE_OF_SELF_IN_LUCID_DREAMS_SELF_AS_SUBJECT_vs._SELF_AS_AGENT_vs._SELF_AS_OBJECT. (accessed: 11.02.2020)

¹⁶³ M. K. Johnson, "Reflection, reality monitoring, and the self" in *Mental imagery*, edited by R. G. Kunzendorf, New York: Plenum, 1991.

¹⁶⁴ Kunzendorf et al., "The Sense of Self in Lucid Dreams: "Self as Subject" vs. "Self as Agent" vs. "Self as Object", 305.

¹⁶⁵ N. Georgieff, M. Jeannerod, "Beyond consciousness of external reality: A "who" system for consciousness of action and self-consciousness", *Consciousness and Cognition*, 1998, 7, 465.

¹⁶⁶ T. L. Kahan, S. LaBerge, "Lucid dreaming as metacognition: Implications for cognitive science", *Consciousness and Cognition*, 1994, 3, 246.

¹⁶⁷ R. G. Kunzendorf, "Self-consciousness as the monitoring of cognitive states", *Imagination, Cognition and Personality*, 1987-1988, 7.

¹⁶⁸ R. G. Kunzendorf, "Individual differences in self-conscious source monitoring: Theoretical, experimental, and clinical considerations" in *Individual differences in conscious experience*, edited by R. G. Kunzendorf & B. Wallace, Amsterdam: John Benjamins, 2000.

¹⁶⁹ Rosen, Sutton, "Self-Representation and Perspectives in Dreams", 1044.

the prefrontal theta electroencephalographic activity during REM sleep also has indications in consolidation of emotional memories.¹⁷⁰

Emotion Activation and Fear Memory Extinction

As many psychoanalysts believe, ‘dreaming represents a fascinating experience linked to emotional processes. So much so, to be considered as a key to “access” in the human inner world.’¹⁷¹ Dreams in REM sleep play a crucial role in processing of emotional experiences, consolidation of emotional memories and adaptation to the waking life.¹⁷² Nevertheless, dreams in NREM sleep phase also contain emotional content, especially at the end of the night, and may contribute to the processing of emotions.

In relation to perspective of the dreamer, some clinicians and psychologists suggest that experiencing events in dreams as an observer is a defense instrument related to continuing or escalating negative psychological symptoms, while the implementation of a field perspective may block or reduce such symptoms. Others claim that external perspective can possibly be beneficial and may enable to see different emotional and evaluative perspectives on one’s own past experiences.¹⁷³ On the other hand, there is evidence that memories recalled in dreams from ‘own-eyes’ perspective contain more information about emotive states than the ones from observer perspective.¹⁷⁴ ‘Thus, dreaming might have an adaptive function by facilitating the consolidation of relevant, new information into preexisting knowledge and neural networks, and by promoting the reorganization of cortical networks to maintain a psychological well-being and individuality despite potentially unfavorable influences arising during waking experiences.’¹⁷⁵ Even though the specialists are still divided about which perspective during dreaming may be more beneficial, many of them suggest that it is

¹⁷⁰ Gaétane Deliens, Médhi Gilson, Philippe Peigneux, “Sleep and the processing of emotions”, *Experimental Brain Research*, January 2014, 232(5), 1410. <https://www.ncbi.nlm.nih.gov/pubmed/24449011>. (accessed: 11.02.2020)

¹⁷¹ Chiara Bartolacci et al., “The Functional Role of Dreaming in Emotional Processes”, *Front Psychol.* March 2019, 459(10), 1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6428732/>. (accessed: 06.12.2019)

¹⁷² Bartolacci et al., “The Functional Role of Dreaming in Emotional Processes”, 1.

¹⁷³ Rosen, Sutton, “Self-Representation and Perspectives in Dreams”, 1043.

¹⁷⁴ Bartolacci et al., “The Functional Role of Dreaming in Emotional Processes”, 2.

¹⁷⁵ Martin Desseilles et al., “Cognitive and emotional processes during dreaming: A neuroimaging view”, *Consciousness and Cognition*, 2011, 20(4), 1000. <https://www.ncbi.nlm.nih.gov/pubmed/21075010>. (accessed: 11.02.2020)

important for understanding, reflecting and dealing with emotions which is significant for maintaining good coping mechanism and emotional and psychological well-being.

In general, dream content, particularly in REM, involves more negative than positive emotions. Hall and Van de Castle¹⁷⁶ analyzed 500 dreams from females and 500 dreams from male college students. Over 700 emotions were expressed in reports and about 80% of them were negative. Participants mainly stated about feelings like fear, sadness, anger and confusion. Snyder¹⁷⁷ collected over 600 dreams reports and noted that two-third of emotions were negative. The most frequently mentioned ones were fear and anger. Another research conducted by Strauch and Meier¹⁷⁸ in which they analyzed reports from 44 subjects showed the same results. It is highly possible that negative emotions in dreams reflect the struggles and emotive problems from waking life. According to some scholars including Jung¹⁷⁹, Ullman¹⁸⁰, Hartmann¹⁸¹ and Levis and Nielsen¹⁸², the appearance of negative emotions in dreams has an adaptive function as dreaming helps with processing and regulating these emotions and its extinction, therefore allows one to cope with difficult feelings which supports maintaining psychological well-being.

Negative emotions can be seen then as part of adaptive processes which enhance fitness in difficult and threatening situations. Reprocessing of emotions in dreams is a part of simulation theory which posits that dreams act as a defense mechanism. Hartmann claimed that dreams are guided by the emotions of a dreamer.¹⁸³ He argued that dreams deal with people's emotional problems and concerns by creating picture metaphors of traumatic events which helps with adapting to stress and problems from life.¹⁸⁴ He suggested that dreams decrease the intensity of emotional distress by associating trauma with other events from person's life which creates new, less stressful context and makes events less unique and extreme. Moreover, the dreamer gains the advantage in the situation when stress or trauma comes back

¹⁷⁶ Calvin S. Hall, Robert L. Van De Castle, *The content analysis of dreams*, Century Psychology Series, New York: Appleton-Century-Crofts, 1966.

¹⁷⁷ F. Snyder, "The Phenomenology of Dreaming" in *The Psychodynamic Implications of the Physiological Studies on Dreams*, ed. by L. Madow, L.H. Snow, Charles S Thomas, Springfield, 1970.

¹⁷⁸ Inge Strauch, Barbara Meier, *In Search of Dreams: Results of Experimental Dream Research*, ed. by Martin Ebon, SUNY Press, 1996.

¹⁷⁹ Hoss et al., *Dreams: Understanding Biology, Psychology, and Culture*.

¹⁸⁰ Ullman, "Dreams as Exceptional Human Experiences".

¹⁸¹ Ernest Hartmann, *Dreams and Nightmares : The New Theory on the Origin and Meaning of Dreams*, New York: Plenum Trade, 1998.

¹⁸² Ross Levin, Tore Nielsen, "Nightmares, Bad Dreams, and Emotion Dysregulation A Review and New Neurocognitive Model of Dreaming", *Current Directions in Psychological Science*, 2009, 18(2). <https://journals.sagepub.com/doi/10.1111/j.1467-8721.2009.01614.x>. (accessed: 11.02.2020)

¹⁸³ Hartmann, *Dreams and Nightmares*.

¹⁸⁴ Hartmann, *Dreams and Nightmares*.

because they are able to look at it from different perspective.¹⁸⁵ Hartmann identified dreams as a safe place where one can process and deal with traumatic events and stressors from waking life which calms the mind. Therefore, he suggested that dreams with their adaptive function increase the chance of survival and well-being.¹⁸⁶

Levis and Nielsen¹⁸⁷ claim that one of the main functions of dreaming is facilitating fear-memory extinction which is a result of memory-element activation, memory-element recombination, and emotional expression.¹⁸⁸ The first process is connected with enhanced availability of variety of memory elements during dreaming. In dreams episodic memories are deconstructed and isolated into elements which by the use of the process of recombination are juxtaposed into coherent flow of a dream imagery. Levis and Nielsen suggest that this organization creates a new context for emotional memory elements which are rendered into virtual simulations. ‘The new representations are then recombined to introduce contextual elements that are incompatible with existing fear memories, thus facilitating emotional processing by providing novel contexts for fear that reinforce the development of new extinction memories.’¹⁸⁹ The dreamer is exposed to fear, but in an alternative, more secure reality without harmful consequences, which leads to activation of cognitive mechanisms and familiarizing with threat, which then leads to the extinction of fear. The third process, emotional expression, increases the contribution of neural structures to ensure the fitting deployment of attentional resources in order to regulate negative emotional arousal.¹⁹⁰ All the processes, working together help creating coping mechanisms and regulating emotions which help maintaining peace of mind, stability and emotional welfare.

Many regions involved in emotional memory encoding and consolidation are stimulated in REM sleep phase. The enhanced activity during REM sleep phase has been noted in pontine tegmentum, thalamus, basal forebrain, limbic and paralimbic structures including amygdaloid complexes, hippocampal formation, and anterior cingulate cortex¹⁹¹. Studies have proven that the neural activation of emotional-limbic and reward systems during REM phase supports

¹⁸⁵ Ernest Hartmann, “The Nightmare is the Most Useful Dream”, Tufts University School of Medicine, Newton-Wellesley Hospital, Boston, 6. http://ernesthartmann.com/files/The-Nightmare-is-the-Most-Useful-Dream_1999_Sleep-and-Hypnosis-1_199203.pdf (accessed: 26.05.2020)

¹⁸⁶ Hartmann, “The Nightmare is the Most Useful Dream”, 6.

¹⁸⁷ Levin, Nielsen, “Nightmares, Bad Dreams, and Emotion Dysregulation”.

¹⁸⁸ Levin, Nielsen, “Nightmares, Bad Dreams, and Emotion Dysregulation”, 84.

¹⁸⁹ Levin, Nielsen, “Nightmares, Bad Dreams, and Emotion Dysregulation”, 85.

¹⁹⁰ Levin, Nielsen, “Nightmares, Bad Dreams, and Emotion Dysregulation”, 85.

¹⁹¹ Deliens, Gilson, Peigneux, “Sleep and the processing of emotions”, 1410.

processing and regulation of emotions.¹⁹² The amygdala, part of the limbic system has been shown to perform a primary role in emotion regulation and processing of memory.¹⁹³ Amygdala not only regulates emotions but also coordinates responses to threat and danger. During sleep the activity of the limbic system responsible for emotional memories and the memory of fear increases.¹⁹⁴ Moreover, amygdala is responsible for predicting outcome of the situation, hence creates adaptive behaviors. It is also connected with hippocampus and they both mediate in processing and execution of fear memories. Both, amygdala and hippocampus are connected with prefrontal cortex which is engaged in identification and appraisal of emotion, its evaluation and introspection, which have a crucial role in the emotional processing.¹⁹⁵ Therefore, many parts of the brain involved in the process of dreaming perform important functions in processing and regulation of emotions, thus support stabilizing emotional and psychological well-being.

Recent research has shown that fear can be erased from memory by learning that is context dependent.^{196 197 198} Sleep makes extinguishing memories easier by deconstructing episodic memories, changing their context and creating new ones in a secure context. The ventral tegmental area and nucleus accumbens, which show increased activation during REM sleep, reprocess memories with high emotional and motivational importance. Scientists from Stanford University¹⁹⁹ conducted two independent experiments using fear conditioning in mice. The first experiment aimed to reinforce the fear memory and the second one to weaken it. Scientists used a fear-conditioning model in which the unconditioned stimulus was a footshock and the conditioned stimulus was a scent. Therefore, when the mice experienced odor in the new context, they expressed behavioral freezing which reflects the strength of the reactivated fear memory. The study shows that specific fear memories may be strengthened or

¹⁹² Bartolacci et al., “The Functional Role of Dreaming in Emotional Processes”, 2.

¹⁹³ C. Daniel Salzman, Stefano Fusi, “Emotion, Cognition, and Mental State Representation in Amygdala and Prefrontal Cortex”, *Annu Rev Neurosci.*, 2010, 33, 174.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3108339/> (accessed: 10.02.2020)

¹⁹⁴ Deliens, Gilson, Peigneux, “Sleep and the processing of emotions”, 175.

¹⁹⁵ Deliens, Gilson, Peigneux, “Sleep and the processing of emotions”, 177.

¹⁹⁶ Mark E. Bouton et al., “Contextual and Temporal Modulation of Extinction: Behavioral and Biological Mechanisms”, *Biological Psychiatry*, 2006, 60(4). <https://pubmed.ncbi.nlm.nih.gov/16616731/> (accessed: 24.05.2020)

¹⁹⁷ Mark E. Bouton, “Context, ambiguity, and unlearning: sources of relapse after behavioral extinction”, *Biological Psychiatry*, 2002, 52(10). <https://pubmed.ncbi.nlm.nih.gov/12437938/> (accessed: 24.05.2020)

¹⁹⁸ Mark E. Bouton, “Context and behavioral processes in extinction”, *Learning & Memory*, 2004, 11(5). <https://pubmed.ncbi.nlm.nih.gov/15466298/> (accessed: 24.05.2020)

¹⁹⁹ Damien Colas, H. Craig Heller, Luis de Lecea et al., “Sleep to forget: interference of fear memories during sleep”, *Mol Psychiatry.*, November 2013, 18(11). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5036945/> (accessed: 03.12.2019)

diminished during sleep by delivering conditioned stimulus. Memories are not completely removed from memory but new, positive memories are created. New memories are associated with safe context or even extended to include new associations. Research results confirmed the assumptions suggesting that manipulating fear memories in dreams may have therapeutic potential. On the other hand, the theory about the role of dreams in mood regulation is controversial. There is still little evidence about beneficial effects of dreams on emotive states. Moreover, access to specific memories during sleep is extremely difficult.

Nevertheless, according to previously recalled studies, dreams may strengthen the consolidation of memories with a great emotional weight and also contribute to the problem-solving abilities based on emotional coping strategies in simulation of the real world.²⁰⁰ Therefore, exposure to negative emotional stimuli in dreams leads to activation of cognitive processes.

Cognitive processes

Even though cognitive processes and emotive processes are related and emotions often influence cognitive processes, this section of the study contains description of processes focused on thinking patterns.

Revonsuo²⁰¹ in his research puts forward the hypothesis that the biological function of dreams is recreating frightening events in the alternative reality which prepares one for dealing with those threatening events or avoiding them in real life.²⁰² He claims that human ancestors' lives were full of threats and the advantage of dealing with them could increase the probability of survival and reproduction success. In dreams, the person deals with frightening waking events in various combination and therefore learns how to face them in real life. Consequently, 'repeated simulation of threat-avoidance behaviors should lead to enhanced threat-avoidance skills by increasing the efficiency of the programming and execution of

²⁰⁰ Bartolacci et al., "The Functional Role of Dreaming in Emotional Processes", 9.

²⁰¹ Antti Revonsuo, "The reinterpretation of dreams: An evolutionary hypothesis of the function of dreaming", *Behavioral and Brain Sciences*, 2000, 23. <https://www.ncbi.nlm.nih.gov/pubmed/11515147> (accessed: 24.02.2020)

²⁰² Revonsuo, "The reinterpretation of dreams", 877.

motor activity required in the responses to perceived threats.²⁰³ Revonsuo bases this theory on the studies which have shown that motor imagery and mental training may increase muscular strength²⁰⁴ and progress in gaining new motor skills²⁰⁵. It is believed that these effects are caused by the areas of the cortical programming levels of the motor system.²⁰⁶ In Yue and Cole's experiment subjects trained their left hypothalamic muscles. First group incorporated physical activities based on repeated contractions of the abductor muscles. Second group imagined producing the same contractions. Third group was a control group which did not include either physical or mental exercises. The average abduction force increased 30% in the first group and 22% in the second group after 4 weeks.²⁰⁷ Control group achieved 3,7% of increase.²⁰⁸ Yue and Cole suggest that increased strength may be attained without repeated muscle activation and link these effects with the practice of central motor programming/ planning.²⁰⁹ Yágüez and colleagues examined the effectiveness of motor imagery in the achievement of movement invariants in two trajectorial learning tasks. Participants were divided into two groups: an imagery group which went through a motor imagery training and the control group which practiced a control visuomotor task. The results show that only by the use of imagery training the subjects were able to significantly increase a movement isochrony and peak velocity toward the target.²¹⁰ After a practice both groups achieved improvement in the performance but the imagery group was considerably faster than the control group.²¹¹ Therefore, it is possible that increased activation of mental imagery in dreams may influence learning avoiding threatening behaviors and enhance skills to deal with them which has impact on personal development as one gains new abilities.

The potential function of dreams proposed by Revonsuo links with many theories, including Fromm's and Adler's, which connect dreams with enhanced problem-solving abilities and creativity. Problem-solving skills refer to abilities to handle difficult and unexpected situation or challenging circumstances by finding solutions to problems.²¹²

²⁰³ Revonsuo, "The reinterpretation of dreams", 890.

²⁰⁴ G. Yue, K.J. Cole, "Strength increases from the motor program: comparison of training with maximal voluntary and imagined muscle contractions", *J Neurophysiol.* May 1992, 67(5), 1114. <https://www.ncbi.nlm.nih.gov/pubmed/1597701> (accessed: 24.02.2020)

²⁰⁵ L. Yágüez et al., "A Mental Route to Motor Learning: Improving Trajectorial Kinematics Through Imagery Training", *Behavioural Brain Research*, 1998, 90(1), 95. <https://pubmed.ncbi.nlm.nih.gov/9520217/> (accessed: 25.05.2020)

²⁰⁶ Revonsuo, "The reinterpretation of dreams", 890.

²⁰⁷ Yue, Cole, "Strength increases from the motor program", 1114.

²⁰⁸ Yue, Cole, "Strength increases from the motor program", 1114.

²⁰⁹ Yue, Cole, "Strength increases from the motor program", 1114.

²¹⁰ Yágüez et al., "A Mental Route to Motor Learning", 95.

²¹¹ Yágüez et al., "A Mental Route to Motor Learning", 95.

²¹² Jerrold R. Brandell, *Theory and Practice in Clinical Social Work*, Simon and Schuster, 1997, 189.

According to De Rios and Janiger creativity is the ability to transform existing items by combining them in unusual ways to create a unique outcome.²¹³ Another definition presented by Sternberg and Lubart is ‘the ability to produce work that is both novel (i.e. original, unexpected) and appropriate (i.e. useful, adaptive concerning task constraints).’ In *On becoming a person*²¹⁴ Rogers suggests creation’s main purpose is to fulfill individual’s nature which is crucial for achieving healthy life.

Blagrove²¹⁵ examined the hypothesis that dreams’ function is active and creative problem-solving focused on finding solution to actual waking problems. He differentiated three types of dreams. First type refers to dreams which create new solution to waking problems in dream world. Second type involves the ones which create solution to the problems in dreams but are not helpful in solving problems in real life. The last type of dreams refers to dreams which contribute to the solution of the problem from waking life by referring to it in the dream and giving the new perspective or clue how to resolve it but the actual solution occurs in waking life. Blagrove claims that there is a few evidence for first type of problem-solving and most often other two types occur in dreams.

One of the first experiments which linked dreams and ability of problem-solving was conducted at the end of XIX century by Charles Child who asked 186 students if they had ever solved a problem in a dream. One-third of respondents said that they did. Almost 100 years later William Dement²¹⁶ conducted a study in which they told 500 students to try to solve brainteasers during the night and if they were not able to do that, go to another one, so that they fell asleep with unsolved problem in mind. Most of the students’ dreams were related to the issue and a few dreams solved one of the problems. Schatzman conducted similar research but on a larger scale.^{217 218 219} The results were similar to Dement’s. People gave him dreamt solutions of the brainteasers. Barrett²²⁰ also conducted a research in which he asked

²¹³ Marlene Dobkin de Rios, Oscar Janiger, *LSD, Spirituality, and the Creative Process: Based on the Groundbreaking Research of Oscar Janiger, M.D.*, Park Street Press, 2003, 76.

²¹⁴ Carl Rogers, Peter D. Kramer, *On Becoming a Person: A Therapist's View of Psychotherapy*, Mariner Books, New York, 1995.

²¹⁵ Mark Blagrove, “Dreams as the reflection of our waking concerns and abilities: A critique of the problem-solving paradigm in dream research”, *Dreaming*, 1992, 2(4).
https://www.researchgate.net/publication/232533084_Dreams_as_the_reflection_of_our_waking_concerns_and_abilities_A_critique_of_the_problem-solving_paradigm_in_dream_research. (accessed: 24.02.2020)

²¹⁶ William C. Dement, *Some must watch while some just sleep*, New York: Freeman, 1972.

²¹⁷ Morton Schatzman, “Solve your problems in your sleep”, *New Scientist*, 1983a, 9, 692–693.

²¹⁸ Morton Schatzman, “Sleeping on problems can really solve them”, *New Scientist*, 1983b, 11, 416–417.

²¹⁹ Morton Schatzman, “Dreams and problem solving”, *International Medicine*, 1984, 4, 6–9.

²²⁰ Deirdre Barrett, “An Evolutionary Theory of Dreams and Problem Solving”, in *The New Science of Dreaming, Volume III: Cultural and Theoretical Perspectives*, CT and London, Praeger Publishers, 2007, 141.

students to come up with their own ideas of the problem that they wanted to resolve. Half of the students dreamt about the problem which they wanted to solve and one-third dreamt a solution to it. Barrett noticed that problem-solving is dependent on difficulty of a problem and motivation of a dreamer. Therefore, it is possible that the problem has to be self-relevant to come up in dreams. He also suggested that sometimes problem-solving happens spontaneously and compared dreams to thinking or problem-solving in an altered biochemical state which occurs during sleep²²¹. Barrett described many examples of academic, scientists, architects, artists and other professionals who dreamt or got inspired by their dreams. He suggested that it is probable that while dreaming the brain is not focusing on dealing with real-world sensory stimuli and navigation and is more likely to pay more attention to finding solutions which have not been created yet in consciousness.²²²

Dreams are an unrestrained and uncontrolled but, at the same time, useful source of personal creativity advocating organizational change.²²³ Cognitive bizarreness is one of the dream's characteristics which means inconsistency, lack of continuity and other aspects of dreams that are difficult to understand. There are theories suggesting that the phenomenon is part of cognitive processing. Unconscious thoughts, mechanisms and visual images are less limited by logical reasoning, and at the same time more based on emotions. Dreams, by their cognitive advantages, enable creative insight – they create associative elements into new image-based patterns which lead to better understanding of problems and may help with solving them.²²⁴ 'Dreaming best reflects the development of a specific cognitive competence, indexed by certain kinds of tests of visual-spatial imagination, leading to the conclusion that such imagination must be a critical skill in dream-making.'²²⁵

Montangero²²⁶ conducted a study in which he examined six participants. Four of them were trying to solve formal problem and two of them, an intellectual problem linked to their profession. The elements of the problems appeared in dreams but no one dreamt a solution to the problem. However, the participants solved the problem in one hour after waking up but it

https://www.researchgate.net/publication/263735619_Barrett_D_L_An_Evolutionary_Theory_of_Dreams_and_Problem-Solving. (accessed: 11.02.2020)

²²¹ Barrett, "An Evolutionary Theory of Dreams and Problem Solving", 140.

²²² Barrett, "An Evolutionary Theory of Dreams and Problem Solving", 144.

²²³ Francesco Schiavone, "Dreams and the organization", *Journal of Organizational Change Management*, June 2013, 26(4). <https://www.emerald.com/insight/content/doi/10.1108/jocm.2013.02326daa.001/full/html>. (accessed: 03.12.2019)

²²⁴ Kraehenmann, "Dreams and Psychedelics".

²²⁵ Ichikawa, "Dreaming and Imagination", 110.

²²⁶ Jacques Montangero, "Dream, problem-solving, and creativity" in *Dreaming as cognition*, ed. by C. Cavallero, D. Foulkes, Harvester Wheatsheaf, 1993.

is not clear if dreams helped in problem-solving. Therefore, it is still unclear if dreams help with solving problems from waking life. Nevertheless, some studies suggest that they may help and inspire solution to the problems which may influence one's personal-growth by enhancing cognitive functions and appearance of creative answers to the problems. Moreover, this ability helps with maintaining emotional welfare as dreams may improve ability to deal with real life struggles.

Another important feature attributed to dreams is cognitive processing and memory consolidation. Stickgold et al.²²⁷ put forward a hypothesis that dreams play a role in learning and memory reprocessing. Similarly, Cipolli²²⁸ claims that dreams may play an important role in the processing of information and its consolidation. 'Offline reactivation of newly acquired information is thought to play a role in stabilizing labile memory traces into a more permanent form of long-term storage, while integrating new experience into existing cortical knowledge structures ("memory consolidation").'²²⁹ Therefore, dream content may reflect recent learning tasks and facilitate memorizing newly learned information, hence may help with personal development by increasing the abilities and competences of the person. Moreover, it allows reflection over one's actions and surroundings which may lead to enrichment of cognitive and spiritual insight and coping mechanism by noticing new context of situations by the use of new skills. Facilitating memorizing and learning is also an ability which makes person's life easier and less stressful as they have advantage in situations where they have to learn something and have bigger amount of skills and information to use.

Filevich et al.²³⁰ suggest that self-reflection and volitional control occur more often in lucid dreams which is associated with metacognition. The results of their experiment show common neural systems between lucid dreaming and metacognitive function, particularly in the area of thought monitoring.²³¹ Metacognition is the ability to reflect on one's own mental states, thinking about thinking. The increased metacognitive abilities may enable one to reflect on their mental and emotional states, behaviors, decisions or motivations and notice

²²⁷ R. Stickgold, J. A. Hobson, R. Fosse, M. Fosse, "Sleep, Learning, and Dreams: Off-line Memory Reprocessing", *Science.*, November 2001, 294(2), 1052. <https://www.ncbi.nlm.nih.gov/pubmed/11691983>. (accessed: 11.02.2020)

²²⁸ Carlo Cipolli, "Sleep, dreams and memory: an overview", *J. Sleep Res.*, March 1995, 4(1), 2. <https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1365-2869.1995.tb00143.x>. (accessed: 11.02.2020)

²²⁹ Erin J. Wamsley, Robert Stickgold, "Dreaming and Offline Memory Processing", *Curr Biol.*, December 2010, 20(23), R1011. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3557787/>. (accessed: 11.02.2020)

²³⁰ Elisa Filevich, Martin Dresler, Timothy R. Brick, Simone Kühn, "Metacognitive Mechanisms Underlying Lucid Dreaming", *The Journal of Neuroscience*, January 2015, 35(3), 1082. <https://www.jneurosci.org/content/jneuro/35/3/1082.full.pdf>. (accessed: 11.02.2020)

²³¹ Filevich, Dresler, Brick, Kühn, "Metacognitive Mechanisms Underlying Lucid Dreaming", 1082.

patterns which negatively affect one's well-being. They may help with developing new patterns which could influence positively one's state of being. Lucid dreaming allows to 'regain the reflective capabilities and become metacognitively aware of their current state of consciousness.'²³² Lucid dreams cause activation in prefrontal cortical regions which are linked with metacognitive abilities. Filevich et al. linked frontal cortex with organization of memory content, multitasking and self-reflection. Moreover, they suggest that the activation of hippocampus during lucid dreaming is connected with metamemory tasks.

Therefore, dreams may not only enable creativity and problem-solving skills but also metacognitive abilities which are largely based on self-awareness and can give knowledge about the inner self, spirituality and mysticism which has been contemplated by people from the origins.

Mystical experience

Sometimes dreams contain bizarre or abstruse content but may be substantial mystically for the dreamer. According to Stace and Watts' definition of mystical experiences the main determinants are linked with feelings and sensations. Therefore, I think that mystical dreams are not mystical inherently but ones' interpretation and feelings towards this dream create a mystical dream. As mentioned before, in many religious traditions, dreams are considered to be medium between divine beings and humans and the content of those dreams is viewed as a message from them. These religious dreams are often in conjunction or alongside with mystical dreams. Dwyer²³³ and Kuiken et al.²³⁴ suggest that mystical experiences may be highly significant for spiritual development or transformation. 'Currently, there is evidence

²³² Filevich, Dresler, Brick, Kühn, "Metacognitive Mechanisms Underlying Lucid Dreaming", 1082.

²³³ Graham Dwyer, "The consciousness of surrender and the surrendered consciousness: Ecstatic dreams of Lord Krishna", *Journal of Beliefs and Values*, 2004, 25(3), 330.

<https://www.tandfonline.com/doi/abs/10.1080/1361767042000306149>. (accessed: 22.02.2020)

²³⁴ T. L. Kahan, S. P. LaBerge, "Dreaming and waking: Similarities and differences revisited", *Consciousness and Cognition*, September 2011, 20(3), 504. <https://www.ncbi.nlm.nih.gov/pubmed/20933437> (accessed: 22.02.2020)

that each of the fundamental elements of (waking) mystical experience occur in some dreams.’²³⁵

Sears²³⁶ basing on the results of his study claims that mystical experiences in dreams are quite rare in the population. He suggests that experiencing aspects of mystical dreams may influence people’s attitudes. Sears implies that connections between timelessness and spacelessness and inner subjectivity indicate that as the person transcends the normal limits of time and space they also learn to discover life in all things. Therefore, the loss of time and space limitations could allow the development of one’s personal characteristics onto the surroundings, making them as if they were conscious or alive. These changes induced by mystical experiences may create new patterns of behaviors and attitudes in waking life as people start seeing differently their surroundings, all the creatures and objects, respecting them more and being appreciative towards all of them. Contemplation over one’s behaviors and motivation is important part of self-growth and may positively influence one’s actions and state of mind.

Gillespie who defines mystical experience as an evident experience of greater reality which appears by transcending to some degree, recognition of one’s physical and mental self and one’s physical surroundings, proposes understanding of it in terms of dreaming, especially lucid dreaming, based on his experiences.²³⁷ He suggests that mystical experience may develop out of lucid dreaming. According to Gillespie, ordinary dreams have a lot of characteristics similar to mystical experiences – ‘loss of perception of the external world, visions, locutions, loss of memory and rationality, spontaneous knowledge, and ineffability.’²³⁸ Lucid dreaming has slightly different characteristics like the “enlightenment” of knowing one is dreaming, the recognition that what one sees is part of oneself, transcending physical and mental self, out-of-body experience, fullness of light, and the feeling of energy which the author links with mystical-type experience.²³⁹

²³⁵ Robert E. Sears, “The Construction, Preliminary Validation, and Correlates of a Dream-Specific Scale for Mystical Experience”, *Journal for the Scientific Study of Religion*, 2015, 54(1), 135.
<https://onlinelibrary.wiley.com/doi/abs/10.1111/jssr.12169> (accessed: 23.02.2020)

²³⁶ Sears, “The Construction, Preliminary Validation, and Correlates of a Dream-Specific Scale”, 135.

²³⁷ George Gillespie, “Ordinary Dreams, Lucid Dreams and Mystical Experience”, *Lucidity Letter*, June, 1986, 5(1), 1.

²³⁸ Gillespie, “Ordinary Dreams, Lucid Dreams and Mystical Experience”, 2.

²³⁹ George Gillespie, “Lucid Dreaming and Mysticism: A Personal Observation”, *Lucidity Letter*, July, 1983, 2(3), 1.

Hewitt²⁴⁰ illustrates his ecstatic lucid dreams with the sense of exuberant escalation of consciousness. He describes the feeling of lightness, loss of sense of space and arousing ecstasy. By defeating feeling of fear and hardships, surrendering to the dream content, open-minded approach and with the use of the higher power²⁴¹ Hewitt experienced expansion of awareness and intensification of consciousness which are significant aspects of self-development.

Other testimony comes from Gebremedhin²⁴² who experienced lucid dreams with ecstatic feeling and deep consciousness. In her dreams she had a feeling of ecstatic balance which influenced her conscious development. During the dream she cleared her mind and felt like all her thoughts and emotions were in a right place. She claims that those experiences enabled her rethink the person she wanted and could be, both in waking life and dreams. Gebremedhin also describes the sense of something bigger than her, merging with a beautiful power which was out there. She mentions a feeling of vividness and joy accompanying her dreams. Therefore, Gebremedhin's dreams enabled her to find herself and created self-awareness which is a great tool in one's self-growth and maintaining well-being.

Dwyer²⁴³ in his study examined the role of dreams in spiritual and devotional life of the devotees of Krishna. Interviewee Radha Mohan said that many sacred figures appeared in his dreams and that in one of them he experienced a divine light and a sense of being one with Krishna. 'Radha Mohan now could see nothing at all, the blackness that came, a blackness confounding all sight or vision, being the actual moment of transcendental union with God, the very moment, according to my informant, Krishna kissed him on the lips in a blissful embrace of divine rapture.'²⁴⁴ He stated to being given a true feeling of the divine element. Radha Mohan described this experience as one of the most impactful and significant in his spiritual life. Many dreams of Prabhupada and Krishna occurred at important moments of spiritual development of the informant and influenced his decisions.

Busink and Kuiken²⁴⁵ in their study examined participants' dreams to identify the types of meaningful dreams. Among others, there were transcendental dreams which were 'marked by feelings of ecstasy and awe, graceful and vigorous movement, magical

²⁴⁰ Daryl E. Hewitt, "Induction of Ecstatic Lucid Dreams", *Lucidity Letter*, June 1988, 7(1).

²⁴¹ Hewitt, "Induction of Ecstatic Lucid Dreams", 5.

²⁴² Elinor Gebremedhin, "Differences Between Lucid and Nonlucid Ecstatic Dreaming", *Lucidity Letter*, 1991, 10(1-2).

²⁴³ Dwyer, "The consciousness of surrender and the surrendered consciousness".

²⁴⁴ Dwyer, "The consciousness of surrender and the surrendered consciousness", 332.

²⁴⁵ Ria Busink, Don Kuiken, "Identifying Types of Impactful Dreams: A Replication", *Dreaming*, 1996, 6(2).

accomplishments, and enhanced awareness of spiritual possibilities'²⁴⁶. This type of dreaming was associated with intense feeling of joy, delight, ecstasy, and awe. Other aspects of those dreams include vitality and energy connected with sense of balance. Participants also described pleasant and uplifting body sensations and growing self-awareness. The last aspect of transcendental dreams concerned relative emotional stillness during dream endings. Moreover, those dreams may contain mysterious figures. Kuiken et al.²⁴⁷ in their studies present the influence of impactful dreams on self-perceptual depth and spiritual transformation. The results of another study show that transcendent dreams were followed by spiritual transformation. According to the outcomes of one experiment involving 145 Canadian undergraduate students, transcendent dreams constituted about 11% of dreams regarded as individuals' most impactful in a four- to five-week period. Participants stated that they started considering formerly disregarded spiritual possibilities and experienced spiritual release. The sense of renewal and liberation from everyday entanglements which enables self-development were among other common feelings. Another important aspect which was influenced by transcendent dreams was feeling of limitless sense of life in all the things. Kuiken et al. suggest that transcendent dreams may stimulate aspects of mystical self-transcendence. 'Impactful dreams gesture toward, without capturing, something "more"; they move the dreamer, with enlivened feeling, toward understanding; and, when that movement is disrupted, there nonetheless remains responsive care for a timeless and spaceless "more-than-can-be-understood."'”²⁴⁸

²⁴⁶ Busink, Kuiken, "Identifying Types of Impactful Dreams", 100.

²⁴⁷ Don Kuiken, Ming-Ni Lee, Tracy Eng, Terry Singh, "The Influence of Impactful Dreams on Self-Perceptual Depth and Spiritual Transformation", *Dreaming*, 2006, 16(4).

<http://content.ebscohost.com/ContentServer.asp?T=P&P=AN&K=2006-23055-003&S=L&D=pdh&EbscoContent=dGJyMNHX8kSeqLA4xNvgOLCmsEiep7BSs6u4TLsWxWXS&ContentCustomer=dGJyMPDr5VPr1%2BeGudvmh%2FHq> (accessed: 22.02.2020)

²⁴⁸ Kuiken, Lee, Eng, Singh, "The Influence of Impactful Dreams", 276.

PSYCHEDELICS

Perception and Sense of Self

Visual effects in psychedelic experience include perceptual intensification, general elementary, complex hallucination and mental imagery. Psychedelics interfere with information processing in inhibitory cortico-striato-thalamocortical feedback loops, leading to sensory overload of higher-level cortical areas and formation of hallucinations.²⁴⁹ Escalations of color saturation, light concentration, texture definition, contours, sound intensity, timbre variation, synesthesia and other perceptual characteristics are frequent.²⁵⁰ ²⁵¹People under influence of psychedelics describe the visual clarity, images seem to be more detailed and explicit.

Another common aspect of altered perception concerns movement and rapid shifts in sizes and shapes of the objects. In complex hallucinations the person under influence of psychedelic substance may experience geometric visuals and see multifaceted structural motifs. Biologically informed modeling posits that fluctuation within the primary visual cortex may help with the occurrence of geometric hallucinations through self-formed patterns of neural excitation.²⁵² Commonly, both elementary and complex hallucinations take place behind close eyelids. ‘Cortical alpha has been hypothesized to serve a general inhibitory function, filtering out “stimulus-irrelevant” information. Thus, reduced alpha power could have disinhibitory consequences, facilitating the release of anarchic patterns of excitation that manifest spontaneously and experientially as visual hallucinations.’²⁵³ Psychedelic perception is characterized by sensitivity to external and internal stimulants and can be triggered easily by verbal and musical stimuli (synesthesia). The feeling of time and cause-effect sequence is often disturbed. Short periods may be perceived as long but the time can be also condensed. All alterations of shapes, sizes and colors may become a source of inspiration and therefore

²⁴⁹ Franz X. Vollenweider, “Brain mechanisms of hallucinogens and entactogens”, *Dialogues Clin Neurosci.*, December 2001, 3(4), 265. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3181663/>. (accessed: 11.02.2020)

²⁵⁰ Swanson, “Unifying Theories of Psychedelic Drug Effects”, 3.

²⁵¹ Alan M. Hartman, Leo E. Hollister, “Effect of Mescaline, Lysergic Acid Diethylamide and Psilocybin on Color Perception”, *Psychopharmacologia*, 1963, 4(6), 441.

<https://link.springer.com/article/10.1007/BF00403349> (accessed: 24.02.2020)

²⁵² Robin L. Carhart-Harris et al., “Neural correlates of the LSD experience revealed by multimodal neuroimaging”, *Proceedings of the National Academy of Sciences (PNAS)*, April 2016, 113(17), 4856.

<https://www.ncbi.nlm.nih.gov/pubmed/27071089>. (accessed: 11.02.2020)

²⁵³ Carhart-Harris et al., “Neural correlates of the LSD experience”, 4856.

enhance creativity. In history there are many examples of artists who became influenced by psychedelic hallucinations which resulted in creation of unique work.²⁵⁴

Carhart-Harris et al.²⁵⁵ noticed relation between increased resting state functional connectivity, which estimates temporary correlation of spontaneous blood-oxygen-level-dependent imaging among different brain regions, in visual cortex and decreased alpha power and visual hallucinations caused by LSD. Those findings suggest that the intrinsic brain activity has bigger impact on visual processing under the influence of psychedelics. The same results have been noted in research on psilocybin. Carhart-Harris et al. link this with separation of bilateral parahippocampal seed from the retrosplenial cortex. In the research of ayahuasca it has been noted that vivid imagery is connected with the activation of several occipital, temporal, and frontal areas. The changes were observed mostly in visual cortex, BA30 and BA37, which are involved with episodic memory and the processing of contextual associations, and BA10 involved with intentional prospective imagination, working memory and the processing of information from internal sources.²⁵⁶ Kometer et al. observed that psilocybin reduced N170 visual-induced potentials which were linked with the presence of visual hallucinations.²⁵⁷ N170 is an element of the event-related potential (ERP) which reflects the neural processing of faces, familiar objects or words.²⁵⁸

Psychedelics also cause changes in perception, the sense of self and body boundaries. Freud put forward hypothesis that the organizational structure of ego leans on a basic perceptual schematic of the body and its environment.²⁵⁹ Perceptual signals are constantly attached and incorporated with the somatic boundaries of the ego. Savage²⁶⁰ suggested that changes in perception and ego effect are closely connected. He stated that constant correct perception is crucial to maintain ego feeling and ego boundaries because perception

²⁵⁴ J. Radenkova-Saeva, "Recreational Drugs and its Impact on Music Literature and Art", *Biotechnology & Biotechnological Equipment*, 2008, 22(2), 656. <https://www.tandfonline.com/doi/abs/10.1080/13102818.2008.10817530> (accessed: 03.06.2020)

²⁵⁵ Carhart-Harris et al., "Neural correlates of the LSD experience".

²⁵⁶ Draulio B. de Araujo et al., "Seeing With the Eyes Shut: Neural Basis of Enhanced Imagery Following Ayahuasca Ingestion", *Human Brain Mapping*, 2012, 33, 2550. <https://onlinelibrary.wiley.com/doi/full/10.1002/hbm.21381>. (accessed: 11.02.2020)

²⁵⁷ Michael Kometer et al., "Activation of Serotonin 2A Receptors Underlies the Psilocybin-Induced Effects on α Oscillations, N170 Visual-Evoked Potentials, and Visual Hallucinations", *The Journal of Neuroscience*, June 2013, 33(25), 10544. <https://www.ncbi.nlm.nih.gov/pubmed/23785166>. (accessed: 11.02.2020)

²⁵⁸ Bruno Rossion et al., "Early lateralization and orientation tuning for face, word, and object processing in the visual cortex". *NeuroImage*., November 2003, 20(3), 88. <http://psych.colorado.edu/~kimlab/rossion.etal.Nimage03.pdf>. (accessed: 11.02.2020)

²⁵⁹ Swanson, "Unifying Theories of Psychedelic Drug Effects", 9.

²⁶⁰ C. Savage, "Variations in ego feeling induced by D-lysergic acid diethylamide (LSD-25)", *Psychoanal Rev.*, January 1955, 42(1). <https://www.ncbi.nlm.nih.gov/pubmed/14371878> (accessed: 18.02.2020)

determinates ego boundaries. He claimed that LSD disrupts perception and makes it impossible for ego to combine the evidence of the senses and to coordinate the activities.²⁶¹ Klee²⁶² agreed with Savage and made correlation between the neurobiological mechanisms underlying Freudian ‘stimulus barrier’ and its dissolution under LSD. This barrier would probably consist of processes which restrict the spread of excitation between various areas of the brain.²⁶³ Klee suggested that LSD breaks down these stimulus barriers which influences integrative mechanisms within the central nervous system which are in charge of inflowing stimuli. These mechanisms under the influence of LSD are not able to control the spread of excitation in normal way. Therefore, LSD allows greater exchange of energy between particular systems that usually occurs without raising the level of excitation of all cortical and subcortical structures which influences the structure of ego.²⁶⁴

Effects on ego changes can be influenced by non-drug factors like personal predispositions, mood, suggestibility, environment or external stimuli and dosage of the drug. Many experiments analyzing the effects of mescaline^{265 266 267}, LSD^{268 269 270 271} and psilocybin^{272 273} were conducted and similar conclusion were reached. A person under the influence of psychedelic drugs may experience depersonalization, a sense of unreality of the body or its deformations, feelings of disembodiment, feelings of unity with the universe and changes in self-consciousness. The feeling of self-referential awareness is decreased. The psychedelic-generated change from a self-centered perspective to a selflessness-perspective

²⁶¹ Swanson, “Unifying Theories of Psychedelic Drug Effects”, 10.

²⁶² Gerard D. Klee, “Lysergic acid diethylamide (LSD-25) and ego functions”, *Arch Gen Psychiatry*. May 1963, 8(5), 465. <https://jamanetwork.com/journals/jamapsychiatry/article-abstract/488321>. (accessed: 18.02.2020)

²⁶³ Klee, “Lysergic acid diethylamide (LSD-25) and ego functions”, 465.

²⁶⁴ Klee, “Lysergic acid diethylamide (LSD-25) and ego functions”, 465.

²⁶⁵ W. Mayer-Gross, H. Stein, “Veränderte Sinnestätigkeit im Meskalinrausch”, *Deutsche Zeitschrift für Nervenheilkunde*, January 1926, 89. <https://link.springer.com/article/10.1007/BF01653856> (accessed: 18.02.2020)

²⁶⁶ Kurt Beringer, *Der Meskalinrausch: Seine Geschichte und Erscheinungsweise*, Julius Springer Berlin, 1927.

²⁶⁷ Aldous Huxley, *The Doors of Perception*, Chatto & Windus, United Kingdom, 1954.

²⁶⁸ E. W. Anderson, K. Rawnsley, “Clinical studies of lysergic acid diethylamide”, *Monatsschr Psychiatr Neurol*. July-August 1954, 128(1-2). <https://www.ncbi.nlm.nih.gov/pubmed/13203446>. (accessed: 18.02.2020)

²⁶⁹ C. Savage, “Variations in ego feeling induced by D-lysergic acid diethylamide (LSD-25)”.

²⁷⁰ Klee, “Lysergic acid diethylamide (LSD-25) and ego functions”.

²⁷¹ Walter N. Pahnke, William A. Richards, “Implications of LSD and experimental mysticism”, *Journal of Religion and Health volume*, 1966, 5(3). <https://link.springer.com/article/10.1007%2FBF01532646>. (accessed: 18.02.2020)

²⁷² W. Rümmele, F. Gnirss, “Untersuchungen mit Psilocybin, einer psychotropen Substanz aus Psilocybe Mexicana”, *Schweiz Arch Neurol Neurochir Psychiatr*. 1961, 87, <https://www.ncbi.nlm.nih.gov/pubmed/13537892>. (accessed: 18.02.2020)

²⁷³ Walter N. Pahnke, “Drugs and mysticism”, *International Journal of Parapsychology*, 1966, 8(2). <https://psycnet.apa.org/record/1967-11064-001> (accessed: 18.02.2020)

frequently enables a state of nondual perception or unity of consciousness. The individual's perspective is shifted towards the pre-reflective experience of the self.

This may generate a transpersonal self-perspective, including feelings of connectedness with people and environment, positive affective state, and reduced helplessness or anxiety when confronted with challenging memories or fantasies. This state of self has also been described as self-transcendence, where past experiences and present conflicts are seen with lucid awareness and without distortion coming from biological or social conditioning. (Kraehenmann, 2017)

Therefore, the effects of ego changes may enhance reflectiveness over one's motivations, attitudes and behaviors which may lead to transformation and self-development. Moreover, ego alterations may create positive mood states and decrease difficult sensations which improves life satisfaction.

Klüver²⁷⁴ noticed that under the influence of peyote the boundary of demarcation between the sense of feeling of 'object' and 'subject' seemed to be changed. The sense of the body, or the ego became somehow 'objective' and the objects became 'subjective.'²⁷⁵ This changes and shifts in perception of self and surroundings may open awareness, connect one with environment and others which may change their perspective on many life events and personal choices. All these changes are a part of transformation and self-growth.

The sense of self and ego is also dependent on dose of a psychedelic substance. With smaller doses, the ego is 'softened' and the person's insight in personal problems, behaviors and thinking processes is increased. On the other hand, bigger doses of psychedelic substances cause radical ego-effects, described as ego dissolution. The expression 'ego dissolution' emerged in the 1950s to describe these effects observed with LSD and mescaline^{276 277 278}. Alternative expressions came into use in late 1950s and early 1960s, such

²⁷⁴ H. Klüver, "Mescal Visions and Eidetic Vision", *Amer. Journ. of Psychol.*, October 1926, 37(4), 503, 504. <https://www.cambridge.org/core/journals/journal-of-mental-science/article/mescal-visions-and-eidetic-vision-amer-journ-of-psychol-october-1926-kluver-h/80D3458E12DEF56B86E25B56EE7A2CA9>. (accessed: 11.02.2020)

²⁷⁵ Swanson, "Unifying Theories of Psychedelic Drug Effects", 5.

²⁷⁶ H.C. Denber, "Studies on mescaline. VIII. Psychodynamic observations.", *Am J Psychiatry*. September 1958, 115(3). <https://europepmc.org/article/med/13571442>. (accessed: 18.02.2020)

²⁷⁷ D. J. Lewis, R. B. Sloane. "Therapy with lysergic acid diethylamide", *J Clin Exp Psychopathol*, January - March 1958, 19(1). <https://www.ncbi.nlm.nih.gov/pubmed/13525450> (accessed: 18.02.2020)

²⁷⁸ Sidney Cohen, "Lysergic acid diethylamide: side effects and complications", *J Nerv Ment Dis.*, January 1960, 130(1). <https://jamanetwork.com/journals/jama/article-abstract/327950> (accessed: 18.02.2020)

as ‘ego disintegration’^{279 280}, ‘ego loss’^{281 282 283} and ‘ego death’^{284 285 286}. This state is characterized by ‘dissolution of the sense of self and the loss of boundaries between self and world.’²⁸⁷ People describe the feeling of unity with the surrounding environment, loss of separation from the universe and their identity and the defeat of sense of bodily ownership. Other effects include the feeling of clarity, noticing the alternatives, seeing certain situations from perspective and seeing one’s dysfunctional behaviors which helps with creating new healthy patterns that influence overall well-being.

Grof²⁸⁸ argued that psychedelics affect the ego by reduction of abilities suppressing the primary processes and support the secondary processes²⁸⁹. ‘This ‘frees’ the primary process which then spills into conscious awareness, resulting in perceptual instability, wildly vivid imagination, emotional intensity, conceptual paradox, and loss of usual self-boundaries.’²⁹⁰

Ego dissolution can also be altered by external stimuli and may be experienced in positive or negative way. External and internal stimuli including past experiences, expectations, mood or environment also influence the experience. It is possible that environmental setting in which one takes psychedelic substance and the prior “psychology” of the person have impact on reception of an ego-dissolution and whether is experienced as something positive, or

²⁷⁹ B. G. Eisner, S. Cohen, “Psychotherapy with lysergic acid diethylamide”, *J. Nerv. Ment. Dis.* 1958, 127(6). <https://www.ncbi.nlm.nih.gov/pubmed/13621221> (accessed: 18.02.2020)

²⁸⁰ E. C. Kast, V. J. Collins, “Study of lysergic acid diethylamide as an analgesic agent”. *Anesth. Analg.*, May-June 1964, 43(3). <https://www.ncbi.nlm.nih.gov/pubmed/14169837> (accessed: 18.02.2020)

²⁸¹ R. Alnæs, “Therapeutic application of the change in consciousness produced by psycholytica (LSD, psilocybin, Etc.): the psychedelic experience in the treatment of neurosis”, *Acta Psychiatr. Scand.*, 1964, 39(S180). <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1600-0447.1964.tb04952.x> (accessed: 18.02.2020)

²⁸² Timothy Leary, Ralph Metzner, Richard Alpert, *The Psychedelic Experience: Manual Based on the Tibetan Book of the Dead*, London: Penguin Classics, 1964. <http://enlight.lib.ntu.edu.tw/FULLTEXT/JR-AN/an141555.pdf> (accessed: 18.02.2020)

²⁸³ W. N. Pahnke, A. A. Kurland, L. E. Goodman, W. A. Richards, “LSD-assisted psychotherapy with terminal cancer patients”, *Curr. Psychiatr. Ther.*, 1969, 9. <https://www.ncbi.nlm.nih.gov/pubmed/5348915> (accessed: 18.02.2020)

²⁸⁴ W. H. McGlothlin, “Hallucinogenic Drugs: A Perspective with Special Reference to Peyote and Cannabis”, Ft. Belvoir: Defense Technical Information Center, 1964. (accessed: 18.02.2020)

²⁸⁵ W. N. Pahnke, “The psychedelic mystical experience in the human encounter with death”. *Harv. Theol. Rev.*, January 1969, 62(1). <https://www.cambridge.org/core/journals/harvard-theological-review/article/psychedelic-mystical-experience-in-the-human-encounter-with-death/3EA09A9F82B0044C841C75F304046DC2> (accessed: 18.02.2020)

²⁸⁶ Stanislav Grof, “The use of LSD in psychotherapy”, *J. Psychedelic Drugs* 3, 1970.

<https://www.tandfonline.com/doi/abs/10.1080/02791072.1970.10471362> (accessed: 18.02.2020)

²⁸⁷ Swanson, “Unifying Theories of Psychedelic Drug Effects”, 5.

²⁸⁸ Stanislav Grof, *Realms of the Human Unconscious: Observations from LSD Research*, New York, NY: E.P. Dutton, 1976.

²⁸⁹ Secondary processes, in opposition to primary processes are more advanced processes which result from the development of the ego. They are systems of control and regulation, providing rational assessment based on the reality principle which create adaptive responses to environment.

²⁹⁰ Swanson, “Unifying Theories of Psychedelic Drug Effects”, 9.

threatening and negative.²⁹¹ The person with preexisting emotional and mental problems or personality disturbances may experience negative effects of the ‘trip’ as it is connected with mood and emotional background of the person.²⁹² Past traumatic experiences and unresolved problems may also come back and be present during the experience creating frightening sensations. Another important factors are motivation and initiation of the person as the psychedelic experience is fluid state in which the person is sensitive to their wishes and suggestions.²⁹³ Environment may have an impact on general course of experience as the person is vulnerable to external stimuli.²⁹⁴ Many studies on psychedelics, which I used in the research, were conducted in quiet, calm and aesthetic rooms, with the presence of psychiatrists or investigators.^{295 296 297 298 299} Additionally, participants were encouraged to listen to relaxing, usually classical music, and rest in beds.^{300 301} Some people describe ego dissolution as frightening experience and compare it to the feeling of dying. Nevertheless, many people report it as a positive event.

Lebedev et al. found that ego dissolution is substantially associated with reductions in interhemispheric connectivity and in functional coupling between the medial temporal lobes (MTL) and cortical regions.³⁰² Geyer and Vollenweider conducted research which suggests that, among others, ego dissolution ‘may result from gating deficits, based on the

²⁹¹ Matthew M. Nour et al., “Ego-Dissolution and Psychedelics: Validation of the Ego-Dissolution Inventory (EDI)”, *Front. Hum. Neurosci.*, June 2016, 10.

<https://www.frontiersin.org/articles/10.3389/fnhum.2016.00269/full> (accessed: 24.02.2020)

²⁹² Herbert H. Eveloff, “The LSD Syndrome—A Review”, *Calif Med.*, November 1968, 109(5), 372/373.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1503329/> (accessed: 27.05.2020)

²⁹³ Eveloff, “The LSD Syndrome—A Review”, 372.

²⁹⁴ Ralph Metzner, *Ayahuasca. Święte Pnącze Duchów*, Okultura, 2011, 90.

²⁹⁵ Patrick C. Dolder et al., “LSD Acutely Impairs Fear Recognition and Enhances Emotional Empathy and Sociality”, *Neuropsychopharmacology*, June 2016, 41, 2639.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5026740/> (accessed: 11.02.2020)

²⁹⁶ Yasmin Schmid et al., “Acute Effects of Lysergic Acid Diethylamide in Healthy Subjects”, *Biological Psychiatry*, October 2015, 78(8), 545. <https://www.ncbi.nlm.nih.gov/pubmed/25575620> (accessed: 11.02.2020)

²⁹⁷ Peter Gasser et al., “Safety and Efficacy of Lysergic Acid Diethylamide-Assisted Psychotherapy for Anxiety Associated With Life-threatening Diseases”, *J Nerv Ment Dis.*, July 2014, 202(7), 515.

<https://www.ncbi.nlm.nih.gov/pubmed/24594678> (accessed: 11.02.2020)

²⁹⁸ R. R. Griffiths et al., “Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance”, *Psychopharmacology*, July 2006, 269.

<https://www.ncbi.nlm.nih.gov/pubmed/16826400> (accessed: 11.02.2020)

²⁹⁹ R. L. Carhart-Harris et al., “The paradoxical psychological effects of lysergic acid diethylamide (LSD)”, *Psychological Medicine*, May 2016, 46(7), 1381. <https://www.ncbi.nlm.nih.gov/pubmed/26847689> (accessed: 11.02.2020)

³⁰⁰ Dolder et al., “LSD Acutely Impairs Fear Recognition and Enhances Emotional Empathy and Sociality”, 2639.

³⁰¹ Griffiths et al., “Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance”, 269.

³⁰² Chris Letheby, Philip Gerrans, “Self unbound: ego dissolution in psychedelic experience”, *Neuroscience of Consciousness*, June 2017, 2017(1), 7. <https://academic.oup.com/nc/article/2017/1/nix016/3916730> (accessed: 11.02.2020)

disintegration of information processing of internal and external stimuli within cortico–striato–thalamo-cortical (CSTC) feedback loops. This CSTC model suggests that the thalamus (Thal) plays a key role in controlling or gating information to the cortex and is thereby critically involved in the regulation of consciousness.³⁰³ The interference of activity of CSTC feedback loops is then one of the crucial elements which influence changes in general perception and sense of body and self in psychedelic experience. The authors suggest that alterations in thalamic gating of information cause overload of the cortex and may be responsible for ego dissolution. Numerous supplementary outcomes of studies by Carhart-Harris et al.³⁰⁴ have related the neurobiological effects of psychedelics to the default mode network. They suggest that increase in the functional connectivity between the default mode network and the task-positive network, and a decrease in alpha oscillatory activity in the posterior cingulate cortex may cause ego dissolution under the influence of psychedelics. They also link increased global functional connectivity and increased neural entropy with this experience.

Many researchers^{305 306 307 308 309} imply that ego-death, which is also a part of mystical experience, may be used as a tool in psychedelic-assisted psychotherapy due to effects it produces. Ego-death may occasion personal meaning and spiritual significance³¹⁰ which may produce positive changes in behavior and attitude³¹¹ and better results in addiction recovery³¹²

³⁰³ Katrin H. Preller et al., “Effective connectivity changes in LSD-induced altered states of consciousness in humans”, *National Academy of Sciences*, February 2019, 116(7), 2743. <https://www.pnas.org/content/116/7/2743>. (accessed: 11.02.2020)

³⁰⁴ Carhart-Harris et al., “Functional connectivity measures after psilocybin inform a novel hypothesis of early psychosis”, *Schizophrenia bulletin*, November 2013, 39(6).

³⁰⁵ Stanislav Grof, “LSD Psychotherapy”, Alameda, CA: Hunter House Publishers, 1980.

³⁰⁶ R.R. Griffiths et al., “Mystical-type experiences occasioned by psilocybin mediate the attribution of personal meaning and spiritual significance 14 months later”, *J. Psychopharmacol.*, August 2008, 22(6). <https://www.ncbi.nlm.nih.gov/pubmed/18593735> (accessed: 18.02.2020)

³⁰⁷ R.R. Griffiths et al., “Psilocybin occasioned mystical-type experiences: immediate and persisting dose-related effects”, *Psychopharmacology (Berl)*, December 2011, 218(4). <https://www.ncbi.nlm.nih.gov/pubmed/21674151> (accessed: 18.02.2020)

³⁰⁸ M. W. Johnson, W. Richards, R. R. Griffiths, “Human hallucinogen research: guidelines for safety”, *J. Psychopharmacol.*, August 2008, 22(6). <https://www.ncbi.nlm.nih.gov/pubmed/18593734> (accessed: 18.02.2020)

³⁰⁹ M. W. Johnson, A. Garcia-Romeu, M. P. Cosimano, R. R. Griffiths, “Pilot study of the 5-HT_{2A}R agonist psilocybin in the treatment of tobacco addiction”, *J. Psychopharmacol.*, November 2014, 28(11). <https://www.ncbi.nlm.nih.gov/pubmed/25213996> (accessed: 18.02.2020)

³¹⁰ Griffiths et al., “Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance”, 268.

³¹¹ Griffiths et al., “Mystical-type experiences occasioned by psilocybin”, 268.

³¹² R.L. Piedmont, “Spiritual transcendence as a predictor of psychosocial outcome from an outpatient substance abuse program”, *Psychol Addict Behav*, September 2004, 18(3), 213. <https://www.ncbi.nlm.nih.gov/pubmed/15482076> (accessed: 24.02.2020)

³¹³ ³¹⁴ ³¹⁵. Moreover, ego-dissolution may cause feeling of safety which diminishes fear, anxiety and depression³¹⁶. Ego-death is also important part of the cognition of self-awareness³¹⁷ which is helpful in understanding of emotions and processing them which may influence beneficially emotional health of the person.

Emotion Activation and Fear Memory Extinction

Evidence suggests that psychedelics may expand emotional experiences and influence memory fear extinction. ‘There is consistent evidence that psychedelics modulate neural processes related to anxiety and threat, especially in brain regions which are relevant for conditioned fear memory, such as amygdala, hippocampus, and ACC.’³¹⁸ Dolder et al.³¹⁹ conducted research on LSD and its influence on emotive processes in healthy subjects using the Face Emotion Recognition Task (FERT) and Multifaceted Empathy Test (MET). They concluded that LSD changed the processing of emotional information. ‘LSD produced feelings of happiness, trust, closeness to others, enhanced explicit and implicit emotional empathy on the MET, and impaired the recognition of sad and fearful faces on the FERT.’³²⁰ The results of Social Value Orientation test showed that LSD increased the prosocial behavior of the participants and the desire to be with other people. Those effects at the high dose of LSD were maintained up to 6–12 hour but also 6-8 hour after taking the drug. The same positive effects of LSD have been noted by Schmid et al.³²¹ Another study of mood effects of LSD on healthy humans has been conducted by Carhart-Harris et al³²². They also observed happiness, openness and general increase in optimism after two weeks of LSD ingestion.

³¹³ Christiana Coyle, Rosa M. Crum, Daniel E. Ford, “Associations between spirituality and substance abuse symptoms in the Baltimore Epidemiologic Catchment Area follow-up, 1993–1996”, 2006, *J Addict Dis*, 25(4), 125. https://www.tandfonline.com/doi/abs/10.1300/J069v25n04_12 (accessed: 24.02.2020)

³¹⁴ M. Galanter, “Spirituality and addiction: A research and clinical perspective”, *The American journal on addictions*, July-August 2006, 15(4), 286. <https://www.ncbi.nlm.nih.gov/pubmed/16867923> (accessed: 24.02.2020)

³¹⁵ K.M. Piderman et al., “Spirituality in alcoholics during treatment”, *The American journal on addictions*, May-June 2007, 16(3), 232. <https://www.ncbi.nlm.nih.gov/pubmed/17612829> (accessed: 24.02.2020)

³¹⁶ R.R. Griffiths et al., “Psilocybin occasioned mystical-type experiences”, 649.

³¹⁷ Letheby, Gerrans, “Self unbound”, 1.

³¹⁸ Kraehenmann, “Dreams and Psychedelics”.

³¹⁹ Dolder et al., “LSD Acutely Impairs Fear Recognition and Enhances Emotional Empathy and Sociality”, 41.

³²⁰ Dolder et al., “LSD Acutely Impairs Fear Recognition and Enhances Emotional Empathy and Sociality”, 41.

³²¹ Schmid et al., “Acute Effects of Lysergic Acid Diethylamide in Healthy Subjects”, 544.

³²² Carhart-Harris et al., “The paradoxical psychological effects of lysergic acid diethylamide (LSD)”.

Gasser et al.³²³ conducted a research concerning use of LSD on anxiety among patients with life-threatening diseases using State-Trait Anxiety Inventory. The research has shown decrease of anxiety. Moreover, a strong reduction tendency was noted in the more steady personality fundamental feature of anxiety proneness.³²⁴ The results remained stable over a 12 months period. In 1977 Richards and Berendes³²⁵ described the case of writer who underwent LSD-assisted psychotherapy. The writer suffered from depression and guilt which negatively influenced her creativity. After terminating the therapy, the patient obtained a promotion in work, improved relations with family and liberated her creative processes by diminishing the feeling of fear. Therefore, many studies show that LSD has potential to enhance well-being by creating positive feelings and decreasing negative emotional states.

Grob et al.³²⁶ examined how psilocybin influences anxiety in patients with advanced-stage cancer. The study has shown that the substance significantly decreased levels of stress and anxiety at 1 and 3 months and enhanced mood at 6 months after the treatment. Additionally, the Profile of Mood States identified mood improvement. Another study was conducted by Preller and colleagues who examined the influence of psilocybin on cognitive and emotional empathy using the Multifaceted Empathy Test. The emotional empathy has increased, although the cognitive empathy remained the same. Furthermore, an activity of brain region correlated with social pain was decreased after psilocybin ingestion. Komoter et al.³²⁷ also examined effects of psilocybin on mood states and goal-directed behaviors of healthy subjects. Psilocybin biased emotional processing towards positive and increased the mood and goal-directed behaviors of the participants. Finally, Polito and Stevenson³²⁸ in their research about microdosing of psychedelics discovered that depression and stress ratings reduced substantially. The central mechanism of the acute subjective effects of classical psychedelics, like psilocybin, is activation of 5-HT_{2A} receptors. At low to medium doses the substance mainly causes increased mood and visual disturbances. Additionally, psilocybin stimulates neuronal activity and neuroplastic effects in prefrontal limbic circuits linked with mood

³²³ Gasser et al., "Safety and Efficacy of Lysergic Acid Diethylamide-Assisted Psychotherapy".

³²⁴ Gasser et al., "Safety and Efficacy of Lysergic Acid Diethylamide-Assisted Psychotherapy", 518.

³²⁵ W. A. Richards, M. Berendes, "LSD-assisted psychotherapy and dynamics of creativity: A case report." *Journal of Altered States of Consciousness*, 1977-1978, 3(2). <https://psycnet.apa.org/record/1978-32087-001> (accessed: 05.06.2020)

³²⁶ Preller et al., "The Effect of 5-HT_{2A/1a} Agonist Treatment", 22.

³²⁷ Michael Komoter et al., "Psilocybin Biases Facial Recognition, Goal-Directed Behavior, and Mood State Toward Positive Relative to Negative Emotions Through Different Serotonergic Subreceptors", *Biol Psychiatry*, December 2012, 72(11). <https://www.ncbi.nlm.nih.gov/pubmed/22578254> (accessed: 11.02.2020)

³²⁸ Vince Polito, Richard J. Stevenson, "A systematic study of microdosing psychedelics", *PLoS ONE*, February 2019, 14(2), 1. <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0211023&type=printable> (accessed: 11.02.2020)

disorder. These discoveries indicate that psilocybin, which bioactive metabolite psilocin activates 5-HT_{2A}, 5-HT_{1A}, and serotonin 2C (5-HT_{2C}) receptors, may have enhancing mood effects and generate sustained antidepressant or anxiolytic effects.³²⁹ Studerus et al. in their research summarizing long-term effects of psilocybin note that most people experience positive effects, including changes in attitude and personality, more self-understanding, tolerance, less egocentricity, less materialistic and aggressive orientation, and more appreciation of music, art, and nature.³³⁰ Thus, above mentioned studies show that psilocybin, as LSD can have beneficial use in improving life satisfaction by enhancing positive emotions and decreasing negative mood-related states.

Recent studies have shown that psychedelics increase the activity in primary visual cortex and activation of mental imagery. Under influence of psychedelic drugs mental imagery is increased and intensified which is closely connected with emotional and cognitive effects. Pokorny et al.³³¹ examined the influence of psilocybin on empathy and moral decision-making. Psilocybin considerably enhanced explicit and implicit emotional empathy, compared with placebo due to 5-HT_{2A} and 5-HT_{1A} receptor systems activation. It increased compassion and understanding towards other people.³³² ‘Given that psilocybin increased neuronal activity as indexed by cerebral glucose metabolism or cerebral blood flow in frontomedial and frontolateral cortices including the anterior cingulate cortex (ACC), the temporomedial cortex, the insula, and the basal ganglia it is conceivable that psilocybin may increase emotional empathy via activation of frontal-temporal and subcortical structures.’³³³ On the other hand, it did not change cognitive empathy nor moral decision-making possibly due to the fact that even though emotional empathy and moral decision-making are interfered by overlapping networks, at the same time they have different neuronal correlates.³³⁴ Moreover, Shamay-Tsoory also stated that psilocybin and LSD decreased cognitive empathy associated with medial temporal lobe, dorsomedial and ventromedial prefrontal cortex.³³⁵

³²⁹ Komater et al., “Psilocybin Biases Facial Recognition, Goal-Directed Behavior, and Mood State”, 898.

³³⁰ Erich Studerus et al., “Acute, subacute and long-term subjective effects of psilocybin in healthy humans: a pooled analysis of experimental studies”, *Journal of Psychopharmacology*, November 2011, 25(11), 1447. <https://www.ncbi.nlm.nih.gov/pubmed/20855349> (accessed: 11.02.2020)

³³¹ Thomas Pokorny et al., “Effect of Psilocybin on Empathy and Moral Decision-Making”, *Int J Neuropsychopharmacol.* September 2017, 20(9). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5581487/> (accessed: 11.02.2020)

³³² Pokorny et al., “Effect of Psilocybin on Empathy and Moral Decision-Making”, 747.

³³³ Pokorny et al., “Effect of Psilocybin on Empathy and Moral Decision-Making”, 754.

³³⁴ Pokorny et al., “Effect of Psilocybin on Empathy and Moral Decision-Making”, 755.

³³⁵ Simone Shamay-Tsoory, “The neuropsychology of empathy: evidence from lesion studies”, *Revue de Neuropsychologie*, 2015, 7(4), 72. <https://www.cairn.info/revue-de-neuropsychologie-2015-4-page-237.htm#> (accessed: 17.03.2020)

Nevertheless, Pokorny et al. suggest that perhaps higher doses of psilocybin are needed to influence moral decision making and that it may take more time to manipulate cognitive empathy skills.

Moreover, recent research suggests that psychedelics may help extinction of conditioned fear memory, increase associative learning and memory consolidation which may result in the modification of memories related to fear, as in the case of dreams. The person by the use of psychedelic substance is faced with traumatic event and relearns that a threatening stimuli is no longer a danger. Antonio Inserra³³⁶ suggests that ayahuasca can be helpful in processing and healing traumatic memories including memory retrieval, memory reconsolidation and fear extinction³³⁷ and emotional processing. His hypothesis is based on evidence that ‘Ayahuasca ingestion (a) hyperactivates brain areas involved in the retrieval of memories (parahippocampal gyrus), regulation of emotional processing and perception of errors (anterior insula), regulation and processing of negative emotional stimuli (IFG) and emotional arousal (amygdala), and (b) boosts dopaminergic neurotransmission, an essential requisite for memory retrieval and reconsolidation.’³³⁸ Lindsay P. Cameron et al. also put forward the hypothesis that microdosing of DMT may have beneficial effects on mood, cognitive, social and memory processes. Research results conducted on mice have shown that, among others, long-lasting, intermittent, low doses of DMT facilitate fear extinction learning³³⁹. ‘Low doses of DMT increases the excitability of pyramidal neurons in the prefrontal cortex that project to the basolateral amygdala and dorsal raphe nucleus to decrease the expression of conditioned fear responses.’³⁴⁰ Catlow et al.³⁴¹ discovered that low doses of psilocybin may facilitate extinction of a hippocampus-dependent classically conditioned fear response. They link the ability of psilocybin to modify and control neural circuitry with accelerating fear extinction.

³³⁶ Antonio Inserra, “Hypothesis: The Psychedelic Ayahuasca Heals Traumatic Memories via a Sigma 1 Receptor-Mediated Epigenetic-Mnemonic Process”, *Front. Pharmacol.*, April 2018, 9(330), 3. <https://www.frontiersin.org/articles/10.3389/fphar.2018.00330/full>. (accessed: 11.02.2020)

³³⁷ Inserra, “Hypothesis: The Psychedelic Ayahuasca Heals Traumatic Memories”, 1.

³³⁸ Inserra, “Hypothesis: The Psychedelic Ayahuasca Heals Traumatic Memories”, 7.

³³⁹ Charlie J. Benson et al., “Chronic, Intermittent Microdoses of the Psychedelic N, N -Dimethyltryptamine (DMT) Produce Positive Effects on Mood and Anxiety in Rodents”, *ACS Chemical Neuroscience*, March 2019, 10(7), 3262.

https://www.researchgate.net/publication/331504154_Chronic_Intermittent_Microdoses_of_the_Psychedelic_N_N-Dimethyltryptamine_DMT_Produce_Positive_Effects_on_Mood_and_Anxiety_in_Rodents. (accessed: 03.12.2019)

³⁴⁰ Benson et al., “Chronic, Intermittent Microdoses of the Psychedelic N, N -Dimethyltryptamine (DMT) Produce Positive Effects on Mood and Anxiety”, 3266.

³⁴¹ Briony J. Catlow et al., “Effects of psilocybin on hippocampal neurogenesis and extinction of trace fear conditioning”, *Exp Brain Res*, June 2013, 228, 481. <https://www.ncbi.nlm.nih.gov/pubmed/23727882>. (accessed: 11.02.2020)

Even though in the studies mentioned above positive effects of psychedelic were in majority, negative short-term experiences have been noted as well, including temporary fear, paranoia, discomfort or psychotic symptoms ('bad trip' effects). Griffiths et al.³⁴² report that 11 of the 36 subjects experienced significant fear. Four participants reported symptoms of anxiety and dysphoria. 'Two of the eight volunteers compared the experience to being in a war and three indicated that they would never wish to repeat an experience like that again.'³⁴³ Studerus et al. in the research examined 110 people. One of them experienced emotional instability, anxiety, and depressive episodes, which lasted a few weeks and were serious enough for him to seek professional help. A few participants noted occasional mood changes, recurrence of old problems, 'excessive pensiveness and introversion, and memory and concentration problems' which lasted a few weeks after the sessions.³⁴⁴

To sum up, psychedelics may enhance positive feelings, emotional empathy and social learning. Moreover, they can help extinction of conditioned fear memory. The emotive effects caused by psychedelic experiences often allow cognitive processes like increased associative learning or memory consolidation.

Cognitive processes

Research shows that psychedelic drugs can improve cognitive function like creative problem-solving or associative reasoning. Psychedelic disruption of cortico-striato-thalamo-cortical loops which constrains the lower brain structures' sensory gating systems leads to increased accessibility of information normally oppressed by these systems.³⁴⁵ A lot of studies have been done on this subject, and at the same time many examples from the world of art or science have been reported. The theory regarding the influence of psychedelics on creativity is well known and has been developed from the end of the XVIII century.

³⁴² Griffiths et al., "Psilocybin can occasion mystical-type experiences", 278.

³⁴³ Griffiths et al., "Psilocybin can occasion mystical-type experiences", 279.

³⁴⁴ Erich Studerus et al., "Acute, subacute and long-term subjective effects of psilocybin in healthy humans".

³⁴⁵ Michael J. Winkelman, "The Mechanisms of Psychedelic Visionary Experiences: Hypotheses from Evolutionary Psychology", *Front. Neurosci.*, September 2017, 1448.

<https://www.frontiersin.org/articles/10.3389/fnins.2017.00539/full>. (accessed: 11.02.2020)

In *Toward a psychology of being*³⁴⁶ Maslow describes the relationship between self-actualization and creativity which leads to self-acceptance and lack of fear of unknown. Forgeard and Elstein share these observations. They claim that creative thinking may help to enhance psychological flexibility and therefore advance coping strategies. Moreover, it could accelerate adaptive future thinking.³⁴⁷ ‘According to a three-factor speculative model of creative drive the frontal lobes are involved in the generation of ideas, the temporal lobes evaluate and edit the information and, finally, limbic structures participate in goal-oriented behavior.’³⁴⁸ Working all together they enhance creative performance which is a part of a self-development process.

In 1966 Harman et al. conducted a study which confirmed the hypothesis proposed by Maslow, Forgeard and Elstein. Harman et al. examined 27 creative professionals to check how LSD and mescaline influence creative problem-solving abilities by the use of the Purdue Creativity Test, the Millar Object Visualization Test and the Witkin Embedded Figures Test. The results show that psychedelic substances had impact on increased creative process, especially during ingestion. Harman and colleagues concluded that the scores on a stable test can significantly increase under the influence of these drugs. This change increases ability of recognizing patterns, separating and reducing visual distractions, and maintaining visual memory despite confusing color and spatial forms.³⁴⁹ The authors suggested, likewise Maslow, that psychedelic substances may facilitate self-actualization and creative processes. Another experiment was conducted by Janiger and de Rios, who examined effects of LSD on creativity in late 1960s. Sixty professional artists created a drawing of Deer Kachina doll before and at the peak of LSD ingestion. The drawings were evaluated by a professor of art history who noticed significant, positive changes in various aspects of illustrations. Artists also evaluated their work created under the influence of LSD to be more aesthetically pleasant. The authors of the study categorized perceptual alterations caused by LSD which are: ‘relative size expansion, involution, alteration of figure/ground, alteration of boundaries,

³⁴⁶ Abraham Maslow, *Toward a psychology of being*, Third Edition, John Wiley & Sons, New York, 1999.

³⁴⁷ Fruzsina Iszaj, Zsolt Demetrovics, Mark D. Griffiths, “Creativity and Psychoactive Substance Use: A Systematic Review”, *International Journal of Mental Health and Addiction*, October 2017, 15(5), 1136. https://www.researchgate.net/publication/309328000_Creativity_and_Psychoactive_Substance_Use_A_Systematic_Review (accessed: 11.02.2020)

³⁴⁸ Ede Frecska et al., “Enhancement of Creative Expression and Entoptic Phenomena as After-Effects of Repeated Ayahuasca Ceremonies”, *Journal of Psychoactive Drugs*, August 2012, 44(3), 196. <https://www.ncbi.nlm.nih.gov/pubmed/23061318> (accessed: 11.02.2020)

³⁴⁹ M. T. Jones, “The creativity of crumb: research on the effects of psychedelic drugs on the comic art of Robert Crumb”, *Journal of Psychoactive Drugs*, September 2011, 39(3), 283. <https://www.ncbi.nlm.nih.gov/pubmed/18159782> (accessed: 11.02.2020)

movement, greater intensity of color and light, oversimplification, symbolic depiction, abstraction, fragmentation/disorganization and distortion.³⁵⁰ Another research was conducted in early 1970s by Fischer and Scheib³⁵¹. College volunteers' drawings and writings were examined before, during and after taking psilocybin. The authors stated that psilocybin stimulated the creative performance but they also noted that the effect of the drug only strengthened individual qualities and predispositions that were already present in the individual.

Landon and Fischer examined the effect of psilocybin on creative process. Two comparative linguists under the influence of psilocybin wrote texts which were analyzed on a semantic, syntactic, and rhetoric level. Research has shown that 'the more altered state of consciousness was, the more concrete the semantic orientation was.'³⁵² In 2007 Jones examined the cartoon illustrator, Robert Crumb whose work was created under influence of LSD. Crumb himself claimed that LSD liberated him and his creative processes.

I took this very weird drug, supposedly it was LSD but I had a really weird effect where it made my brain all fuzzy and the effect lasted for a couple of months and I started getting these images they were kind of like cartoon characters... that I'd never drawn before... I let go of trying to... have any... fixed idea about what I was doing and I have any started to be able to draw these... stream of consciousness comic strips ... All the characters that I used for the next several years I thought up during this... all came to me during this period. (Jones, 2001, 283)

The result has shown that the 'acid experience' described by Crumb enhanced his perceptual alteration techniques. Jones suggests that it can be assumed that even though Crumb's post-LSD work was not created under the direct influence of psychedelic drugs, he was still using perceptual changes caused by LSD to gain access to the plasticity of consciousness which enables blind variation and selective retention.³⁵³ Lastly, Krippner examined 180 artists who had at least one psychedelic experience. The most commonly used psychedelic drugs were LSD, DMT, mescaline, morning glory seeds, and psilocybin.³⁵⁴ More

³⁵⁰ Jones, "The creativity of crumb", 283.

³⁵¹ Russell Fischer, J. P. Scheib, "Creative performance and the hallucinogenic drug-induced creative experience or one man's brain-damage is another's creativity". *Confinia Psychiatrica*, January 1971, 14(3). <https://www.tandfonline.com/doi/abs/10.1080/02791072.1972.10471466> (accessed: 18.02.2020)

³⁵² Iszaj, Demetrovics, Griffiths, "Creativity and Psychoactive Substance Use", 1146.

³⁵³ Jones, "The creativity of crumb", 283.

³⁵⁴ Ede Frecska et al., "Enhancement of Creative Expression and Entoptic Phenomena as After-Effects of Repeated Ayahuasca Ceremonies", 192.

than 80% of participants claimed that they noticed inspirational, stimulating artistically influence and openness caused by psychedelic substances.

Frecka et al. characterized how ayahuasca influences creativity. Forty participants under influence of ayahuasca took part in various tasks which were assessed using the Torrance Test of Creative Thinking. The scores of participants who used drug were much higher compared to the control group. 'Repeated ingestion of ayahuasca in the ritual setting significantly increased the number of highly original solutions and phosphenic responses. However, participants in the ayahuasca ceremonies exhibited more phosphenic solutions already at the baseline, probably due to the fact that they had more psychedelic experiences within six months prior to the study than the comparison subjects did.'³⁵⁵ ³⁵⁶ Therefore, Frecka et al. suggest that ayahuasca itself may not contribute to enhanced creativity.³⁵⁷

In 1967 Zegans et al. conducted research in which they examined 30 graduate students to analyze relation between LSD and creativity. 'The battery of tests included a measure of remote associations, a test of originality for word associations, a test for ability to create an original design from tiles, a free-association test and a measure involving the ability to perceive hidden figures in a complicated line drawing.'³⁵⁸ The research has shown that participants who used LSD gained better scores in Rapaport Word Association Test and gained access to unique ideas. The authors determined that increased openness for creative actions may enhance creative thoughts during LSD ingestions, however the ingestion of LSD itself is not likely to improve the creative abilities.³⁵⁹ Therefore, it is still unclear if psychedelic substances themselves improve creativity or if they inspire and only enhance personal predispositions.

³⁵⁵ Ede Frecka et al., "Enhancement of Creative Expression and Entoptic Phenomena as After-Effects of Repeated Ayahuasca Ceremonies", 191.

³⁵⁶ Phosphene - visual sensations arising in special conditions that are independent of an external light source - their source is the human nervous system.

³⁵⁷ Ede Frecka et al., "Enhancement of Creative Expression and Entoptic Phenomena as After-Effects of Repeated Ayahuasca Ceremonies", 191.

³⁵⁸ Stanley Krippner, "The Psychedelic State, The Hypnotic Trance, and the Creative Act", *Journal of Humanistic Psychology*, January 1968, 8(1), 62.
https://www.researchgate.net/publication/232497326_The_Psychedelic_State_The_Hypnotic_Trance_And_the_Creative_Act. (accessed: 11.02.2020)

³⁵⁹ Stanley Krippner, "Psychedelic Drugs and Creativity", *Journal of Psychoactive Drugs*, October 1985, 17(4), 239. https://www.researchgate.net/publication/19075251_Psychedelic_Drugs_and_Creativity. (accessed: 11.02.2020)

This notion has been advocated by neurophenomenological research conducted by Harvey³⁶⁰ who examined the role of the serotonin 5-HT_{2A} receptor in the process of learning. He concluded that agonists at the increased activity of 5-HT_{2A} receptor in frontal cortex and hippocampus (including LSD) improved associative learning which constitutes part of gaining knowledge and development. Carhart-Harris et al.³⁶¹ also noticed that stimulation of 5-HT_{2A}R may enhance some aspects of learning and cognition, especially flexibility of cognition which may be linked with increased imagination and creative thinking. Harvey also stated that LSD may increase associative learning abilities, due to enhancing tonic activity of the 5-HT_{2A} and/or 5-HT_{2c} receptors³⁶² and cause deep alterations in cognitive states³⁶³. 5-HT_{2A} receptors modulate neuronal circuitry in medial prefrontal cortex and hippocampus involved in associative learning and other cognitive processes in humans.³⁶⁴ In another study Gimpl et al.³⁶⁵ also suggest that LSD may enhance the rate of acquisition (learning) but it is dependent on the right dosage.

The data indicate that LSD is more effective in the process of conditioned response acquisition as compared with its effect on formerly developed and well-established conditioned responses. Romano et al.³⁶⁶ indicated that LSD enhanced Pavlovian conditioning³⁶⁷ through an effect on 5-HT_{2A} receptors situated in the dorsal hippocampus. The slight, short-lived improvement of learning produced by LSD seems to be caused by the expansion of desensitization of the 5-HT_{2A} receptor within the hippocampus as an effect of repeated administration of LSD. ‘5-HT_{2A}R stimulation enhances the flexibility of cognition, which may be related to reports of enhanced imagination and creative thinking with

³⁶⁰ John A. Harvey, “Role of the Serotonin 5-HT_{2A} Receptor in Learning”, *Learn. Mem.*, 2003, 10. <http://learnmem.cshlp.org/content/10/5/355.full>. (accessed: 11.02.2020)

³⁶¹ R. L. Carhart-Harris et al., “The paradoxical psychological effects of lysergic acid diethylamide (LSD)”, 1386.

³⁶² John A. Harvey, “Serotonergic regulation of associative learning”, *Behavioural Brain Research*, December 1995, 73(1-2), 49. <https://www.sciencedirect.com/science/article/pii/016643289600068X> (accessed: 11.02.2020)

³⁶³ Harvey, “Role of the Serotonin 5-HT_{2A} Receptor in Learning”, 47.

³⁶⁴ Harvey, “Role of the Serotonin 5-HT_{2A} Receptor in Learning”, 47.

³⁶⁵ M. P. Gimpl, I. Gormezano, J. A. Harvey, “Effects of LSD on Learning as Measured by Classical Conditioning of the Rabbit Nictitating Membrane Response”, *The Journal of Pharmacology and Experimental Therapeutics*, October 1978, 208(2), 330. <https://www.ncbi.nlm.nih.gov/pubmed/762668> (accessed: 11.02.2020)

³⁶⁶ Anthony G. Romano et al., “Intrahippocampal LSD accelerates learning and desensitizes the 5-HT_{2A} receptor in the rabbit, Romano et al.”, *Psychopharmacology*, September 2010, 212, 441. <https://www.ncbi.nlm.nih.gov/pubmed/20827462>. (accessed: 11.02.2020)

³⁶⁷ Pavlovian conditioning also known as classical or respondent conditioning is learning through association, in which two stimuli are linked together and produce a new learnt response.

psychedelics.³⁶⁸ Williams et al.³⁶⁹ concluded that prefrontal 5-HT_{2A} receptors influence cognitive function of working memory. On the other hand, psychedelics temporarily weaken some aspects of cognition, such as the ability to focus and concentrate.³⁷⁰

Many case studies have shown that there is a relation between creativity and psychedelic substance usage, but some scholars remain skeptical. Most likely is that psychedelics enhance creativity, but only in case of people who are already creative. Substances increase sensitivity and loosen conscious processes which lead to the changes in creative outcome. Psychedelic drugs, when used correctly, allow artist to see phenomena from different perspective and enable them to stand apart from their culture.³⁷¹ Then, we can assume that psychedelics show another perspective, distanced from our mindset, which produce possibilities of creating new solutions. Nevertheless, it is difficult to formulate clear statement because of ‘extreme heterogeneity concerning the objectives, methodology, samples, applied measures, and psychoactive substances examined among the small number of studies.’³⁷² Moreover, creativity is a complex process. Furthermore, psychedelic experience is accompanied by diminished attentional abilities, expanded distractibility, and decreased spatial working memory.³⁷³ The information regarding relationship between psychedelic substances and creativity is quite rare and results are often questionable due to poor quality of measures.

Still, psychedelics can influence other cognitive processes. Polito and Stevenson³⁷⁴ reported enhanced focus, attention and involvement caused by microdosing of psychedelic substances. These skills may facilitate learning and life satisfaction by engagement and improving tools which can be used to deepening interests and gaining knowledge. Distractibility and neuroticism diminished and the authors have not noticed enhanced creativity. By decreasing neuroticism psychedelic drugs help maintaining emotional balance which influence emotional and psychological well-being. Pokorny et al.³⁷⁵ concluded that

³⁶⁸ R. L. Carhart-Harris et al., “The paradoxical psychological effects of lysergic acid diethylamide (LSD)”, 1386.

³⁶⁹ Graham V. Williams et al., “The Physiological Role of 5-HT_{2A} Receptors in Working Memory”, *The Journal of Neuroscience*, April 2002, 22(7), 2843 <https://www.jneurosci.org/content/jneuro/22/7/2843.full.pdf>. (accessed: 11.02.2020)

³⁷⁰ Williams, Rao, Goldman-Rakic, “The Physiological Role of 5-HT_{2A} Receptors in Working Memory”, 2843.

³⁷¹ Jones, “The creativity of crumb”, 284.

³⁷² Jones, “The creativity of crumb”, 284.

³⁷³ Kraehenmann, “Dreams and Psychedelics”.

³⁷⁴ Vince Polito, Richard J. Stevenson, “A systematic study of microdosing psychedelics”, 1.

³⁷⁵ Thomas Pokorny et al., “LSD acutely impairs working memory, executive functions, and cognitive flexibility, but not risk-based decision-making”, *Psychological Medicine*, September 2019, 1. https://www.researchgate.net/publication/330705008_LSD_impairs_working_memory_executive_functions_and_cognitive_flexibility_but_not_risk-based_decision_making (accessed: 11.02.2020)

LSD considerably decreased executive functions and working memory and weakened cognitive flexibility and executive functions on the Intra/Extra-Dimensional shift task. LSD led to a substantial rise in inaccuracy rates and increased latency in the Extra-Dimensional stage of the Intra/Extra-Dimensional shift task.

Winkelman suggests that the interruption of the top-down control of the brain usually interceded by the functions of the prefrontal cortex, collectively with the diminished self-referencing processes of the default mode network, results in the development of processes which are usually suppressed/controlled by lower level brain systems.³⁷⁶ He puts forward a hypothesis that psychedelic substances influenced evolution of human consciousness, culture and some aspects of social psychology. ‘Human cognitive evolution involved abilities to make symbolic interpretations of spontaneous images, using information acquired from normally unconscious processes for prediction of future conditions and responding to those challenges.’³⁷⁷ Alterations caused by psychedelics increase access to information which is usually unconscious by the use of visual symbolic processes that use image-schemas to integrate knowledge which may facilitate getting to know oneself and enable personal development.

Vollenweider³⁷⁸ ascribed the mechanisms of action of psychedelics to effects produced by the frontal-subcortical circuits which are main organizational systems, including neuronal linkages and feedback loops, of the frontal cortical areas with the thalamus. Psychedelic disruption of serotonergic inhibition of thalamic screening leads to a stream of information which can overpower the frontal brain with a range of usually repressed sensations that increase the accessibility of information controlled by these levels of the brain.³⁷⁹ According to the author, psilocybin and LSD may enhance understanding of many phenomena including mystical experiences, an identification with external divinity or of the divine within person, and general perception of sacredness. Psychedelics can include experience of ego dissolution which also may give the feeling of deep knowledge, beyond explanation yet somehow comprehensible. Likewise, Letheby and Gerrans³⁸⁰ argue that psychedelic ego death allows

³⁷⁶ Winkelman, “The Mechanisms of Psychedelic Visionary Experiences”, 12

³⁷⁷ Winkelman, “The Mechanisms of Psychedelic Visionary Experiences”, 4.

³⁷⁸ Franz X Vollenweider, “Advances and pathophysiological models of hallucinogenic drug actions in humans: a preamble to schizophrenia research”, *Pharmacopsychiatry*, July 1998, 31(2), 498.

https://www.researchgate.net/publication/13530837_Advances_and_Pathophysiological_Models_of_Hallucinogenic_Drug_Actions_in_Humans_A_Preamble_to_Schizophrenia_Research (accessed: 26.02.2020)

³⁷⁹ Michael J. Winkelman, “The Mechanisms of Psychedelic Visionary Experiences”, 5.

³⁸⁰ Letheby, Gerrans, “Self unbound”, 1.

one the cognition of self-awareness. In ego dissolution the self as a subject with the skills of interoception, cognition, perception and affection integrates the information and assigns resources to relevant information by the use of coordination of the salience and emotional processing systems.³⁸¹ Psychedelic experiences also allow people to experience cognition not bound by self-models³⁸². The feelings induced by those experiences may increase the sense of purpose and be significant for personal development.

Mystical experience

Mystical experience may give a person insight in basic existential values such as the meaning of life, deep and meaningful interpersonal relationships, and the prospect of personal behavior or attitude change. One of the participants of the study with the use of psilocybin describes the experience:

In my mind's eye, I felt myself instinctively taking on the posture of prayer in my head. I was on my knees, hands clasped in front of me and I bowed to this force. I wasn't scared or threatened in any way. It was more about reverence. I was showing my respect. I was humbled and honored to be in this presence. This presence was a feeling, not something I saw or heard. I only felt it, but it felt more real than any reality I have experienced. And it was a familiar place too. One I had felt before. It was when I surrendered to this, that I felt like I let go. I was gone...or I should say this earthly part of me was. It was still on the couch in some sort of suspended animation awaiting my return. I was in the void. This void had a strange and indescribable quality to it in that there was nothing to it but this feeling of unconditional and undying Love. It felt like my soul was basking in the feeling of this space. I have no idea how long this lasted. Time and space did not exist there ...it was all different manifestations of this Love feeling I found myself wrapped in. (Barrett, Griffiths, 2018, 36)

Watts³⁸³ describes the feelings and shifts in perception and attitude which he experienced under the influence of psychedelic drugs. He refers to those changes as mystical experiences which includes in them concentration in the present moment, awareness of polarity³⁸⁴, and

³⁸¹ Letheby, Gerrans, "Self unbound", 2.

³⁸² The self-model is the central concept in the theory of consciousness which comprises experiences from the first person perspective.

³⁸³ Alan Watts, "Psychedelics and Religious Experience".

³⁸⁴ Recognition that objects, states and events which are opposite are independent.

awareness of relativity³⁸⁵. For Watts the most important part of the experience that makes it mystical is the feeling of unity of all individuals and higher forms as one self. Another characteristic which he describes is awareness of eternal energy which often takes form of light and is one's own being. At the end, Watts mentions that this mystical exploration of spiritual inner world may be a dangerous adventure, like any other exploration. Second aspect is that psychedelic mystical experience is not always easy and one may feel lost, crazy or may experience quite negative emotions. Nevertheless, exploration of any kind allows self-growth as it enables gaining knowledge about oneself and reflections over one's behaviors and actions.

Pahnke³⁸⁶ conducted experiment in which he examined the impact of psilocybin on occurrence and character of mystical experiences. He examined seminary students in a private chapel on Good Friday. The participants evaluated effects of psilocybin on mystical experience right after it ended and after 6-months with the use of the model of mystical experience developed by Stace. 30-40% of participants achieved complete mystical experience. The participants stated that they noticed positive changes in their behaviors and attitudes caused by psilocybin-induced experience. In a 25-years follow up the interviewees confirmed statements according mystical experience given in the Good Friday experiment.

Griffiths et al.³⁸⁷ conducted a research in which they studied the influence of psilocybin on mystical-type experience by the use of the Hood Mysticism Scale and the Spiritual Transcendence Scale and the observations of family and friends of the participants to evaluate the changes in participants' attitude. In the study the authors noted that over 60% of participants experienced mystical-type experience. 22 of 36 people who took part in the study had complete mystical experience. Many participant stated that the experience was highly significant and one of the most intense in their lives. The positive changes in mood and behavior were observed 2 months after psilocybin experience. In a 14-month follow-up report, 58% and 67%, respectively, of participants stated that the psilocybin-induced experience was among one of the five most personally significant and among the five most spiritually meaningful experiences of their lives. 64% of volunteers testified that the experience improved their well-being or life satisfaction. 58% of subjects met requirements

³⁸⁵ Understanding that one is a piece in hierarchy of processes and beings.

³⁸⁶ Walter Pahnke, *Drugs and mysticism: An analysis of the relationship between psychedelic drugs and the mystical consciousness*. Cambridge, MA: Harvard University Press, 1963.

³⁸⁷ Griffiths et al., "Psilocybin can occasion mystical-type experiences".

for having had a complete mystical experience.³⁸⁸ The participants attributed the feeling of unity as the most significant part of the experience. In another study Griffiths et al.³⁸⁹ confirmed that psilocybin can cause mystical-type experiences which may have positive effects on attitudes, mood and behavior which influences overall well-being. 83% of participants assessed psilocybin sessions as most spiritually significant or one among the 5 most spiritually significant experiences of their lives. In the follow-up survey the number was even higher and reached 94%. One month after sessions, 94% of participants advocated that the experience improved their sense of well-being or life satisfaction, and 89% experienced positive changes in their behavior. At the 14-month follow-up, the ratings remained high.

In another study Griffiths et al.³⁹⁰ surveyed people about the phenomena, interpretation, and enduring changes assigned to their single most significant God encounter experience.³⁹¹ The authors have examined 809 people who did not use any drugs, 1184 participants who used psilocybin, 1251 who used LSD, 435 volunteer who used ayahuasca, and 606 participants who used DMT. The non-drug group was more likely to choose the term ‘God’ and mostly the others referred to ‘Ultimate Reality’. Even though there were differences between non-drug and the psychedelic users, as well as between the psychedelic groups, the similarities among them were remarkable. Most volunteers reported vivid images of the encounter experience which often contained the sense of communication with conscious, compassionate, intelligent, sacred, eternal, and omniscient being. Nearly half of the participants fulfilled criteria of complete mystical experience. More than 60% of participants who declared themselves as atheists before the experience, no longer identified themselves as atheists afterwards. The people who took part in the survey stated that these experiences were among the most personally significant and spiritually substantial experiences in their lives. They also noted slight to strong enduring positive changes in life satisfaction, purpose, and meaning credited to these experiences. ‘Among the four groups of psychedelic users, the psilocybin and LSD groups were most similar and the ayahuasca group tended to have the highest rates of endorsing positive features and enduring consequences of the experience.’³⁹²

³⁸⁸ Griffiths et al., “Mystical-type experiences occasioned by psilocybin mediate the attribution of personal meaning and spiritual significance 14 months later”, 621.

³⁸⁹ Griffiths et al., “Psilocybin occasioned mystical-type experiences”, 649.

³⁹⁰ Roland R. Griffiths et al., “Survey of subjective "God encounter experiences": Comparisons among naturally occurring experiences and those occasioned by the classic psychedelics psilocybin, LSD, ayahuasca, or DMT”, *PLoS One.*, 2019, 14(4). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6478303/> (accessed: 26.02.2020)

³⁹¹ God meaning God, Higher Power, Ultimate Reality, or an Aspect or Emissary of God etc.

³⁹² Griffiths et al., “Survey of subjective "God encounter experiences”, 1.

MacLean et al.³⁹³ in their study examined the effects of psilocybin-induced mystical experience on changes in behaviors and attitudes of the participants and assessed the results with the use of 30-item Mystical Experience Questionnaire. The authors suggested that spiritual experiences allow persons to ‘transcend their usual patterns of thinking, feeling, and acting, it is plausible that they could occasion changes in core dimensions of personality.’³⁹⁴ By transcending usual patterns one may reflect on their actions and change them with beneficial outcome. The results have shown that complete mystical experience caused by psychedelic increased openness which lasted over a year after the experiment. These findings show convergence with the results of studies about influence of psychedelics on creativity conducted by Forgeard and Elstein, Harman, Landon and Fisher and other researchers which I recalled in previous section.

Finally, Barrett and Griffiths³⁹⁵ link sensations and processes which accompany mystical experiences with alteration of neural activity in the medial prefrontal cortex (MPFC), posterior cingulate cortex (PCC) and parahippocampal cortex (PHC). The psychological processes assigned to the MPFC and PCC include self-referential processing involving mentalizing, internal dialogue, judgments about the self and autobiographical memory retrieval. The use of psychedelic substances decreases the activity of blood-oxygenation-level-dependent in these areas. ‘The PHC is involved in maintaining and recalling memories of self and self-relevant information’³⁹⁶ and the coding of episodic memory content. Psychedelics cause an increased connectivity in communication involving the PHC. Moreover, Kometer et al.³⁹⁷ suggested that decreased synchronization of cortical oscillations in the PCC and PHC correlates with a measure of spiritual experience. In their study the participants were given psilocybin to explain state of consciousness-related neuronal mechanisms in psilocybin-induced mystical experience. ‘Psilocybin decreased the current source density of neuronal oscillations within a neural network comprising the anterior and

³⁹³ Katherine A. MacLean, Matthew W. Johnson, Roland R. Griffiths, “Mystical Experiences Occasioned by the Hallucinogen Psilocybin Lead to Increases in the Personality Domain of Openness”, *J Psychopharmacol.*, November 2011, 25(11). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3537171/> (accessed: 21.02.2020)

³⁹⁴ MacLean, Johnson, Griffiths, “Mystical Experiences Occasioned by the Hallucinogen Psilocybin Lead to Increases in the Personality Domain of Openness”, 1453.

³⁹⁵ Barrett, Griffiths, “Classic Hallucinogens and Mystical Experiences”, 36.

³⁹⁶ Barrett, Griffiths, “Classic Hallucinogens and Mystical Experiences”, 36.

³⁹⁷ Michael Kometer, Thomas Pokorny, Erich Seifritz, Franz X. Volleinweider, “Psilocybin-induced spiritual experiences and insightfulness are associated with synchronization of neuronal oscillations”, *Psychopharmacology*, October 2015, 232(19), 3663. https://www.researchgate.net/publication/280602833_Psilocybin-induced_spiritual_experiences_and_insightfulness_are_associated_with_synchronization_of_neuronal_oscillations (accessed: 21.02.2020)

posterior cingulate cortices and the parahippocampal regions.³⁹⁸ Intensification of spiritual experiences was related to the lagged phase synchronization of delta oscillations between the retrosplenial cortex, the parahippocampus, and the lateral orbitofrontal area.

³⁹⁸ Kometer, Pokorny, Seifritz, Volleinweider, “Psilocybin-induced spiritual experiences and insightfulness are associated with synchronization of neuronal oscillations”, 3663.

SIMILARITIES AND DIFFERENCES BETWEEN DREAMS AND PSYCHEDELIC STATES

Table 1.

Summary of the findings on psychological effects of dreams and psychedelic states on visual effects, mental imagery, sense of body and self, emotion activation, fear memory extinction, cognitive processes including creativity and problem-solving and mystical experiences.

CATEGORY	DREAMS	SOURCE & ITS SCORE	PSYCHEDELIC STATES	SOURCE & ITS SCORE ⁱ
Visual effects	perceptual intensification full colors rich in shapes movement incorporate images of people, faces, places, objects, and animals	Nir, 2010.	perceptual intensification elementary or complex hallucination escalations of color saturation, light concentration, texture definition, contours and timbre variation decreased color discrimination movement and rapid shifts in sizes and shapes of the objects geometric visuals synesthesia relative size expansion, involution, alteration of boundaries, movement, oversimplification, symbolic depiction, abstraction, fragmentation/disorganization and distortion	Swanson, 2018. Hartman, 1963. (1,07) Jones, 2011. (1,17)

ⁱ Scores of the studies were added to show the level of evidence. I graded following criteria: specific objectives and hypotheses stated in introduction, study design, settings of the study, participants' selection, randomization and blinding, outcomes and exposures, sources and methods of assessment, efforts to address sources of bias, presence of the explanation of quantitative variables, statistical methods, characteristics of participant and limitations. I rated each category with a grade of 0-2, with 0 meaning 'absent', 1 meaning 'partially present' and 2 meaning 'fully present'. At the end I calculated the weighted average for each study. Studies with higher grade are more reliable.

Mental imagery	vivid visuospatial imagery fluidity in visuospatial perspective absence of visual or visuospatial perspective	Voss, 2018. Rosen, 2013.	intensified mental imagery	R. Swanson, 2018.
Sense of body and self	absent or reduced depersonalization derealization disembodiment perspective which shifts, detaches and transforms observer (external perspective) – out-of-body experience embodiment-in or identification- with other characters or objects	Rosen, 2013.	altered depersonalization derealization disembodiment deformations selflessness-perspective pre-reflective experience of the self dissolution of the sense of self and the loss of boundaries between self and world	Mayer-Gross, 1926. Beringer, 1954. Huxley, 1954. Anderson, 1954. Savage, 1955. Klee, 1963. Pahnke, 1966. Rümmele, 1961. (1,36) Klüver, 1926. Swanson, 2018.
Emotion Activation	processing of emotional experiences consolidation of emotional memories presence of mostly negative emotions adaptive processes	Bartolacci, 2019. Desseilles, 2011. Hall, 1966. Snyder, 1970. Strauch, 1996. Cartwright, 1996. Hartmann, 1998.	processing of emotional information memory consolidation presence of mostly positive emotions 'bad trip' → presence of negative emotions	Dolder, 2016. (1,36) Schmid, 2015. (1,36) Gasser, 2014. (1,71) Preller, 2015. (0,64) Kometer, 2012. (1,21) Polito, 2019. (1,71) Studerus, 2011. (1,5)

				Pokorny, 2017. (1,14)
Fear Memory Extinction	exposure to fear in simulation of reality defense mechanism emotional coping strategies	Bartolacci, 2019. Desseilles, 2011. Hartmann, 1998. Levin, 2009. Deliens, 2014. Colas, 2013.	processing and healing traumatic memories memory retrieval memory reconsolidation	Inserra, 2018. Benson, 2019. (1,23)
Cognitive processes	increased cognitive bizzariness repeated simulation of threat-avoidance behaviors which leads to enhanced threat- avoidance skills processing of information and its consolidation	Revonsuo, 2000. Yue, 1992. (0,86) Hall, 1992. Ichikawa, 2009. Stickgold, 2001. Cipolli, 1995. Wamsley, 2010.	enhanced creative problem- solving advance in coping strategies improved associative learning flexibility of cognition diminished attentional abilities expanded distractibility decreased spatial working memory	Iszaj, 2017. Jones, 2011. (1,17) Harvey, 1995. Harvey, 2003. Gimpl, 1978. (1) Williams, 2002. Polito, 2019. (1,71)
Creativity / problem- solving abilities	useful source of personal creativity advocating organizational change	Colas, 2013. Blagrove, 1992. Dement, 1972. Schatzman, 1983a. Schatzman, 1983b. Schatzman, 1984. Barrett, 2007. Schiavone, 2013. Kraehenmann, 2017.	increased creative processes enhanced ability of recognizing patterns, separating and reducing visual distractions and maintaining visual memory enhanced perceptual alteration techniques enhanced focus, attention and involvement decreased focus and concentration	Jones, 2011. (1,17) Fischer, 1971. Iszaj, 2017. Frecska, 2012. (0,78) Kraehenmann, 2017.
Mystical experiences	metacognitive skills	Filevich, 2015. (1,14) Dwyer, 2004.	metacognitive skills spiritual development personal growth	Griffiths, 2006. (1,43)

spiritual development or transformation escalation of consciousness expansion of awareness ecstatic feelings sense of renewal and liberation from everyday entanglements unity with ‘the greater power’ insight into existential values	Kahan, 2011. Sears, 2015. (1,29) Hewitt, 1988. Gebremedhin, 1991. Busink, 1996. Kuiken, 2006. (1)	enhanced self-consciousness ecstatic feelings insight into existential values and the prospect of personal behavior or attitude change improved well-being or life self-transcendence unity of consciousness feelings of unity with the universe satisfaction expansion of consciousness access to transcendent, religious or transpersonal dimensions of consciousness	Griffiths, 2008. (1,61) Piedmont, 2004. (1,36) Coyle, 2006. (1,38) Galanter, 2006”. Piderman, 2007. (1,29) Griffiths, 2011. (1,57) Vollenweider, 1998. (1,86) Letheby, 2017. Metzner, 1998. Barrett, 2018. Wasson, 1998. Watts, 1968. Pahnke, 1966. (1,36) Pahnke, 1963. MacLean, 2011. (1,36)
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Table 2.

Summary of the findings on neurobiological effects of dreams and psychedelic states on visual effects, mental imagery, sense of body and self, emotion activation, fear memory extinction, cognitive processes including creativity and problem-solving and mystical experiences.

CATEGORY	DREAMS	SOURCE & ITS SCORE	PSYCHEDELIC STATES	SOURCE & ITS SCORE
Visual effects	increased activation of the primary visual and somatosensory cortex changes in lesions in the medial prefrontal cortex, the anterior cingulate cortex and the basal forebrain	Nir, 2010. Ichikawa, 2009.	inhibitory cortico-striato-thalamocortical feedback loops overload of higher-level cortical areas increased resting state functional connectivity in visual cortex separation of bilateral parahippocampal seed from the retrosplenial cortex increased activation of several occipital, temporal, and frontal areas	Vollenweider, 2001. Carhart-Harris, 2016. (1,14) Araujo, 2012. (0,86) Kometer, 2013. (0,93)
Mental imagery	strong activation of the occipito-temporal-parietal junction	Ichikawa, 2009.	increased activation of primary visual cortex	Carhart-Harris, 2016. (1,14)
Sense of body and self	deactivation of the parietal lobe and precuneus rises in gamma band activity in fronto-	Voss, 2018. Rosen, 2013.		

	temporal areas of the brain increased activation of inferior parietal regions			
Emotion Activation	increased activation of prefrontal cortex, pontine tegmentum, thalamus, basal forebrain, limbic and paralimbic structures including amygdaloid complexes, hippocampal formation, and anterior cingulate cortex increased activation of emotional-limbic and reward systems	Deliens, 2014.	increased activation of prefrontal limbic circuits, frontal-temporal and subcortical structures increased neuronal activation of frontomedial and frontolateral cortices including the anterior cingulate cortex, the temporomedial cortex, the insula, and the basal ganglia	Kometer, 2012. (1,21) Pokorny, 2017. (1,14) Shamay-Tsoory, 2015.
Fear Memory Extinction	increased activation of amygdala and hippocampus prefrontal theta electroencephalographic activity increased activation of the ventral tegmental area and nucleus accumbens	Deliens, 2014.	modulation of neural processes in hippocampus, amygdala and anterior cingulate cortex hyperactivity in parahippocampal gyrus increased activation of anterior insula and amygdala increased excitability of pyramidal neurons in the prefrontal cortex	Kraehenmann, 2017. Benson, 2019. (1,23) Catlow, 2013. (0,79)

Cognitive processes	increased activation of frontal cortex	Filevich, 2015. (1,14)	increased activation of frontal lobes, temporal lobes, limbic structures increased activation of 5-HT2A receptor in frontal cortex and hippocampus	Winkelman, 2017. Frecska, 2012. (0,78) Harvey, 2003. Carhart-Harris, 2016. (1,14) Harvey, 1995. Romano, 2010. (1,29) Vollenweider, 1998. (1,86)
Creativity / problem-solving abilities	increased activation of frontal cortex	Filevich, 2015. (1,14)	increased activation of frontal cortex	Winkelman, 2017. Carhart-Harris, 2016. (1,14)
Mystical experiences	increased activation of hippocampus	Filevich, 2015. (1,14)	reductions in interhemispheric connectivity and in functional coupling between the medial temporal lobes (MTL) and cortical regions gating deficits, based on the disintegration of information processing of internal and external stimuli within cortico-striato-thalamo-cortical (CSTC) feedback loops alterations in thalamic gating decrease in alpha oscillatory increased activation of the posterior cingulate cortex	Letheby, 2017. Preller, 2019. (1,5) Carhart-Harris, 2013. (1,36) Vollenweider, 1998. (1,86) Barrett, 2018. Kometer, 2015. (1,71)

increased neural
entropy
increased
activation of the
medial prefrontal
cortex, posterior
cingulate cortex
and
parahippocampal
cortex

Similarities between dreams and psychedelic states

The comparison of dreams with psychedelic states (see Tables 1 and 2) shows that both altered states of consciousness share some similarities.

First, both states are characterized by perceptual intensification including vivid and colorful visual effects and enhanced mental imagery. Both states escalate color saturations, are rich in shapes and often contain geometric visuals in case of lucid dreams and psychedelic experiences. Furthermore, objects are full of movement and rapid shifts. In both states the changes in primary visual cortex influence the creation of hallucinations. Another common element concerns the activation of occipital and temporal areas of the brain which influence the vivid mental imagery. The underlying neurobiological processes are still quite unclear, especially in the case of dream states, but there is evidence that visual experiences in these states share some aspects of bottom-up perception and top-down mental imagery.⁴⁰⁰ In both states visual or visuospatial perspective may change and may become intensified. All those changes in perception and mental imagery may influence one's creativity and inspire them which may have positive impact on personal development and self-growth.

In both states the sense of self and the body is altered. The similarities mostly remain in lucid dreams and psychedelic states. Often characteristics include depersonalization and derealization. Perspective frequently shifts, detaches and transforms. In lucid dreams and

⁴⁰⁰ Kraehenmann, "Dreams and Psychedelics".

psychedelic experiences selflessness-perspective may be present. Often people experience embodiment or identification with other objects or characters and lose sense of boundaries between self and the surroundings. In REM dreams and psychedelic states boundary between self-representation and object-representation is decreased. The exception is lucid dreaming where self of sense and body is increased. Unity of consciousness is present in lucid dreaming and psychedelic experiences, but remains unchanged in other REM dreams. From neurobiological perspective, in both states rises in activity in fronto-temporal areas of the brain influence sense of body and self. The alterations in sense of body, shifts and lose of sense of boundaries between self and the environment may cause changes in perspective and enable to see certain events or patterns from another point of view. This gives opportunity to reflection and afterwards making changes in negative patterns in one's life.

Second, both states activate emotional memories, change mood states, and often influence processing of fear memory. In both states, the emotion activation, processing of emotional experiences and consolidation of emotional memories are increased. In dreams and psychedelic states, the processes responsible for the extinction of conditioned fear memory and consolidation of memory are also activated. Both states may result in modification of memories related to fear and threat. Traumatic memories are faced from different perspective and reprocessed. It is related to confronting difficult events from waking life which contain negative emotional baggage in simulation of the real world and relearning that the traumatic event is no longer a danger which makes easier to cope with trauma. It also allows seeing problems from different perspective, in different context which makes them less frightening. Therefore, both dreams and psychedelic experiences help with creating coping mechanism and processing traumatic emotions, hence promote emotional stability and calmness which positively influence overall well-being. On the other hand, both states can influence emotions negatively by recurring nightmares or 'bad-trips'. In both states changes in prefrontal cortex, amygdala and hippocampus which perform role in emotional regulation, processing of memory and responses to threat and danger are present. Moreover, both states include activation of anterior cingulate cortex.

Third, cognition in dreams and psychedelic states may both cause decrease in logical thinking and increase in associative reasoning. Moreover, both states may influence positively problem-solving and creative thinking. Dreams and psychedelic experiences can be useful source of creative skills which may inspire, advance coping strategies and facilitate creating ideas and solutions to the problems. Because of that psychedelic states and dreams may help

with developing creativity, facilitate learning and gaining new skills which improves self-growth and may enhance life satisfaction. Both states include changes in frontal cortex involved in associative learning and other cognitive processes in humans.

Lastly, both states can cause mystical-type experiences which may influence expansion of awareness and intensification of consciousness. They may have impact on one's spiritual life, show events from different perspectives, change attitude and become a meaningful part of development of the person. Both states improve metacognitive skills and create ecstatic feelings including unity with universe, deities or other greater power. Moreover, due to insight into existential value, both states may facilitate understanding of existential problems which allows reflecting on them and changing them which enhances life satisfaction. The resemblance is mostly seen between lucid dreams and psychedelic experiences as in those states clarity of consciousness and metacognitive abilities are increased. One has access to current and past events from their lives, their relationships and circumstances which facilitates dealing with traumatic or difficult events. The part of mystical experience is ego dissolution which appears in mystical experiences in dreams and psychedelic states and is related to increase in hippocampus activation. In both cases it may expand self-development by changes in perception of self and surroundings.

Differences between dreams and psychedelic states

Although there are similarities between dreams and psychedelic states, there are also differences (see Tables 1 and 2).

First, in the dreams the whole dreamt world is a hallucination. In psychedelic experiences with open eyes elementary or complex hallucinations occur but they only alter the surroundings, sometimes create visuals but do not create whole reality. On the other hand, occasionally a full hallucinated world can be created with the use of psychedelics with eyes closed. Moreover, people under the influence of psychedelics often experience synesthesia which was not noted in the descriptions of dream states. Dreams always occur in eyes-closed conditions and the person is detached from external stimuli and generates intrinsic simulations of the world and the body-self. In psychedelic states external stimuli influence experience. In

dreams, the person may not be able to influence their actions or is totally absent, although the exception is lucid dreaming. Furthermore, people often see themselves from external perspective (out-of-body experiences) which usually do not accompany people during psychedelic states, especially with open eyes.

Second, dreams do not enhance positive emotions by themselves. Most of emotions which occurs in dreams are related to fear, aggression or anxiety. Dreams help with processing negative or traumatic emotions and that is why they may influence beneficially overall mood and state of mind. On the other hand, psychedelics, especially in the moment of ingestion, often increase emotions like happiness, trust, closeness to others, empathy, and openness. They may produce more self-understanding, tolerance, less egocentricity and materialistic and aggressive orientation. Psychedelics may also decrease stress levels and anxiety. These processes help with extinction of fear memory and allow one to free themselves from trauma, fear and anxiety caused by past experiences and influence state of mind which may become more peaceful and calm which influences the emotional and psychical well-being of the person.

Third, even though both states may enhance the problem-solving abilities, in dreams the focus is on preparing one in the simulation of the real world to the events from waking life. Psychedelic experiences and the effect they create may facilitate and inspire the person to creating solution of the problem by showing different perspective. The outcome may be similar but the processes behind it are different.

In most of the studies which I used the specific objectives and hypothesis were clearly stated. In some of them setting of the study and selection of the participant was not described fully which, especially in the case of psychedelic drugs, make unclear for how long the effects induced in the study lasted and how the location and setting of the study influenced the altered state of consciousness. Moreover, often participants were representatives of the specific groups which excluded majority of the population from the study and showed results only applicable for this specific group. In most of the studies the outcomes and predictions were stated clearly which allowed me to relate and compare results of specific studies. Sources, methods and quantitative variables were described in most of the studies which made them more reliable. On the other hand, in many studies the limitations were missing which made an impression of lack of the critical approach by the authors.

Moreover, the studies are not comparable. The methods, participants, settings and other aspects are different for each research, therefore it is difficult to come up with the reliable comparison. Conclusions based on those studies also loose on reliability due to those differences.

Conclusions

The purpose of this research was to examine how perception, sense of self, emotion activation, cognitive processes and mystical experiences influenced by psychedelic experiences and dream states may enhance people's psychological well-being and personal development and study what are similarities in beneficial effects on personal development and well-being in those states. The hypothesis that I put forward was that there are similarities in beneficial effects of psychedelic experiences and dream states on personal growth and psychological well-being.

The results of the study show that dreams and psychedelic states show similarities on neurophenomenological and psychological fields. Neurological processes underlying aspects of psychedelic experiences and dreams state overlap and create similar response to perception, sense of self, emotional processes, cognition and mystical experiences. The perception influenced by dreams or psychedelic states may give one the opportunity to expand their perspective on events, their behaviors or attitudes and change their future approaches and reactions. Moreover, visual alterations may inspire and enhance creativity. In the case of psychedelics, the phenomenon of ego-death may occasion spiritual significance which may create positive changes in attitude and behavior caused by reflection over one's actions and motivations. Moreover, it may decrease fear or anxiety. Both states cause changes in emotive responses to threat and facilitate extinction of conditioned fear memory as they may enhance coping strategies. Psychedelics during ingestion may increase general positive feelings. Dreams states and psychedelic experiences also contribute to the problem-solving abilities and creativity which is strictly connected with the process of learning like associative learning. Moreover, both states have impact on metacognitive abilities and cognition of self-awareness which influence understanding of the self and emotions which may cause changes

beneficial to psychological well-being and enhance the sense of purpose which is important part of self-development.

Both, dream states and psychedelic states may influence well-being and enhance personal development but to gain benefits fully one has to reflect on them and incorporate conscious changes in their thinking patterns and actions. Neurophenomenological processes underlying fear memory extinction, processing and regulation of emotions, cognitive processes, creativity, problem-solving abilities, experiences linked with sense of self and perception or mystical experiences in my opinion seem to be direct as they cause changes in the brain chemistry and nervous system. On the other hand, I see psychological effects as indirect. Changes induced by dream states and psychedelic experiences in above-listed aspects are great tools which can be used to maximize their potential but they need reflection and engagement to be beneficial for well-being and self-growth. I suggest that they can be a good base for working on development and improving mental and emotional state of being. Changes which dreams and psychedelic experiences evoke may be an inspiration and enhance one's creativity by showing surrounding as intensified, vivid image full of shapes and textures. Changes in the sense of self or ego dissolution may change one's perspective on their behaviors and attitudes, past experiences reactions or emotion. In the case of ego-death, it may influence attitude towards surroundings and living beings. Moreover, both altered states of consciousness may influence positively emotions and help with dealing with traumas. Psychedelics may increase openness, tolerance and happiness but only with the engagement and work of the person these benefits can be permanently incorporated in one's life. Another frequently possible beneficial effect of dreams states and psychedelic experiences, which is problem-solving ability, is contradictory subject. Some scholars claim that the altered states of consciousness described in this paper may enhance this capacity. On the other hand, some disagree. I think that it is likely that dreams and psychedelic experiences may inspire solutions of the problems or create new ideas. All those alterations may cause reflection over one's life and have impact on their motivations and future behaviors. Both dreams and psychedelic experiences have been used in therapy but it is not enough to experience these altered states of consciousness to gain beneficial effects. In both cases, it is necessary to process, reflect and draw conclusions from them to enhance well-being and self-growth. Therefore, I think that dreams and psychedelics may indeed be beneficial for emotional and mental well-being and self-development. Nevertheless, they are just tools which one may expand to achieve these benefits.

DISCUSSION

LIMITATIONS

The findings of this study have to be seen in light of some limitations. The major limitation of the study is that it relies only on pre-existing data which causes heterogeneity of the study. The studies were not undertaken in the same way, the authors used different methods, different substances (in the case of studies about psychedelic drugs) and the outcomes were defined differently. Therefore, it is difficult to compare the studies and create reliable answer about the similarities and differences between two alter states of consciousness. Nevertheless, I included the assessment of the studies (see Table 3) which I used to estimate the reliability of the studies. On the other hand, assessment is subjective so the grading of the studies is biased as well.

Another limitation is that I focused on positive sides of psychedelic experiences which shows this phenomenon in a good light but psychedelic experiences also may have negative effects.

In my study I used a research done on most popular hallucinogen psychedelics. There is a lot of research done on the psychedelic drugs such as psilocybin, LSD or DMT but the list of serotonergic psychedelics includes more substances which have not been studied.

Lastly, I used neurobiological data to explain what stands behind the changes caused by dream states and psychedelic experiences but neuroscience is not my field, so my approach to these data is less critical.

IMPLICATIONS

Due to the limitations including limitations of pre-existing data and restriction to only most popular psychedelics I suggest that further research should focus on studying the effects of various psychedelic drugs and creating solid, methodologically strong data which would be a reliable source of information if psychedelic drugs indeed could be used to enhance

psychological well-being and self-growth. The studies should use direct comparison to create reliable outcomes about similarities and differences between dreams and psychedelic experiences.

As the results of the study show that there are similarities in perception, sense of self, emotional processes, cognitive processes and mystical experiences which influence psychological changes including enhanced well-being and increased possibilities of self-growth, there is a possibility that the therapists, psychologists and psychiatrists could use drug induced states as a cognitive part of therapy in which the patient could work on their problems. Many psychoanalysts focus on dreams and their interpretations and their importance in understanding processes and notions underlying humans' behaviors and conditions. Since there are similarities in dream states and psychedelic states and dreams are already used in therapies, there might be possibility that psychedelic states could be used in the same way. Therefore, my study could be a starting point for deeper research focused on methods which use psychedelic states to achieve psychological well-being and self-development.

Table 3.

The assessment of the studies used in the research. I graded following criteria: specific objectives and hypotheses stated in introduction, study design, settings of the study, participants' selection, randomization and blinding, outcomes and exposures, sources and methods of assessment, efforts to address sources of bias, presence of the explanation of quantitative variables, statistical methods, characteristics of participant and limitations. I rated each category with a grade of 0-2, with 0 meaning 'absent', 1 meaning 'partially present' and 2 meaning 'fully present'. Studies with higher grade are more reliable.

Study: First author & year of publication	Specific objectives and hypotheses stated in introduction	Study design is specified (e.g., experiment, cross-sectional observational study, longitudinal observational study etc.)	Setting is described (e.g., setting, locations, period of recruitment, period of exposure the experimental condition, period of follow-up, and period of data- collection)	Participant selection is described, also of control group if applicable (e.g., eligibility criteria, sources & methods of selection, methods of follow-up)	In the case of an experiment, randomization and blinding are described	Outcomes, exposures, predictors, confounders, etc. are clearly defined.	Sources and methods of assessment of all variables of interest are described	Efforts to address sources of bias are addressed	Study (i.e., sample) size is reported and explained	It was explained how quantitative variables were handled (i.e., calculated)	All statistical methods are described, incl. how missing data were addressed and any group analyses	Characteristics of participants and reasons for non- participation are reported	Participants are representative of the general population	Limitations of the study are discussed	Average
Filevich, 2015	2	0	0	1	2	2	2	2	1	1	1	2	0	0	1,14
Yue, 1992.	1	0	2	0	1	2	1	0	1	2	2	0	0	0	0,86
Sears, 2015	2	0	1	1	0	2	2	1	1	2	1	1	2	2	1,29
Bulkeley, 2009	2	0	0	1	0	1	1	0	2	1	0	1	1	0	0,72
Kuiken, 2006	1	0	0	1	0	2	2	2	2	1	1	1	1	0	1
Hartman, 1963	2	1	0	0	1	2	2	1	1	2	1	0	1	1	1,07
Griffiths, 2006	2	2	1	2	1	1	2	1	2	2	1	2	0	1	1,43
Griffiths, 2008	2	2	1	2	not applicable	2	2	0	2	2	2	2	0	2	1,61
Griffiths, 2011	1	2	1	2	1	2	2	1	2	2	1	2	2	1	1,57
Dolder, 2016	2	2	1	1	0	2	2	0	2	1	2	2	0	2	1,36
de Araujo, 2012	1	0	1	0	0	2	2	1	0	2	1	1	1	0	0,86
Schmid, 2015	1	2	1	1	0	2	2	1	1	2	1	2	1	2	1,36
Carhart- Harris, 2016	2	2	1	0	0	2	2	1	1	1	0	1	1	2	1,14
Carhart- Harris, 2016	2	0	1	0	1	2	2	1	1	2	1	0	1	2	1,14
Preller, 2019	2	2	1	1	0	2	2	1	2	2	1	2	1	2	1,5
Carhart- Harris, 2012	2	2	1	2	1	2	1	1	1	2	1	2	1	0	1,36
Kometer, 2013	2	0	1	1	0	2	2	0	1	1	1	1	1	0	0,93
Gasser, 2014	1	2	2	2	1	2	2	1	2	2	2	2	1	2	1,71
Preller, 2015	2	2	0	0	0	2	1	1	1	0	0	0	0	0	0,64
Vollenweider, 2010	1	2	2	2	1	2	2	2	2	2	2	2	2	2	1,86

Kometer, 2015	2	2	2	2	2	2	2	2	2	2	2	1	2	1	0	1,71
Kometer, 2012	1	2	1	1	2	2	2	0	1	2	1	1	1	1	0	1,21
Polito, 2019	2	2	2	2	1	2	2	2	1	2	0	2	2	2	2	1,71
Studerus, 2011	1	2	2	2	1	2	2	1	2	2	1	1	0	2	2	1,5
Pokorny, 2017	2	2	1	1	0	2	2	0	1	2	1	1	1	1	0	1,14
Benson, 2019	1	0	2	1	2	2	2	0	1	2	2	1	1	not applicable	0	1,23
Catlow, 2013	1	0	1	0	0	2	2	1	0	2	2	0	0	0	0	0,79
Frecska, 2012	1	0	1	1	0	2	2	1	1	1	0	1	0	0	0	0,78
Jones, 2011	2	1	1	1	not applicable	2	1	0	2	1	1	2	2	not applicable	0	1,17
Romano, 2010	1	0	2	2	1	2	2	0	2	2	2	1	1	1	0	1,29
Studerus, 2010.	2	2	1	2	0	2	2	2	2	2	1	2	1	1	2	1,64
Gimpl, 1978	1	0	2	2	1	2	2	0	1	1	0	0	0	2	0	1
Pokorny, 2019	2	2	2	2	1	2	2	2	1	1	2	2	2	0	2	1,64
Pahnke, 1966	1	2	2	2	1	1	2	1	2	1	1	2	1	1	0	1,36
Griffiths, 2019	0	1	1	2	0	2	2	1	2	2	0	2	0	2	2	1,21
MacLean, 2011	2	1	2	2	0	2	2	1	2	2	0	2	1	1	0	1,36
Carbonaro, 2018	1	1	2	1	1	2	1	1	2	1	1	2	2	2	0	1,29
Coyle, 2008	2	0	1	2	0	2	2	1	2	1	2	1	1	1	2	1,38
Piedmont, 2004	1	0	1	2	0	2	2	2	2	1	1	1	2	2	2	1,36
Piderman, 2007	2	0	2	1	0	2	2	0	2	2	2	1	2	2	0	1,29
Liechti, 2016	2	2	2	1	0	2	2	0	1	1	0	2	0	0	0	1,07

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