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The Temporal Trajectory of the Psychedelic Mushroom Experience Mimics the Narrative Arc of the Hero's Journey

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Abstract

Psychedelic therapy has the potential to become a revolutionary and transdiagnostic mental health treatment, yielding enduring benefits that are often attributed to the experiences that coincide with peak psychedelic effects. However, there may be an underrecognized temporal structure to this process that helps explain why psychedelic and related altered states of consciousness can have a initially distressing but ultimately a distress-resolving effect. Here we present a qualitative analysis of the self-reported ‘comeup’ or onset phase, and ‘comedown’ or falling phase, of the psychedelic experience. Focusing on psilocybin or psilocybin-containing mushrooms, we show that the comeup is more often characterized by negatively valenced feeling states, while the comedown phase is more often characterized by positively valenced feeling states of the sort often observed following recovery from illness or adversity. In this way, the temporal trajectory of the psychedelic experience could be seen to mimic the narrative arc of the monomythical ‘Hero’s Journey’.

Introduction

Studies have shown that classic serotonin 2A receptor agonist psychedelics are promising treatments for anxiety and depressive disorders, obsessive compulsive disorder, and substance use disorders [1], but the mechanism of action (MoA) mediating the transdiagnostic therapeutic effects of these agents is not yet agreed on. Evidence is strong that the acute subjective effects of psychedelics play a role in moderating outcomes [2,3], while others argue, mostly based on rodent research, that conscious experience may be secondary or peripheral to the therapeutic effects of these agents [4].

Here we ask whether there is something particular about the phenomenological trajectory of the psychedelic experience that explains why users often report a lasting sense of relief after a single dose of these agents. While a great deal of attention has been paid to the mystical [5,6,7], insightful [8] or emotional breakthrough [9] experiences that occur during peak psychedelic experiences, comparatively little attention has been directed towards the states that precede or follow these peak experiences.

In accordance with recent theoretical proposals that psychedelic-like altered states of consciousness reflect compensations against various stressors [10, 11, 12, 13], we anticipate that the psychedelic comeup or onset phase can resemble illness-like discomfort or stress that often characterize psychological crisis states – such as can occur in incipient psychotic or trauma disorders or trigger spiritual experiences [14,15,16,17,18] – and that the psychedelic comedown phase is akin to a state of relief.

An alternative but compatible view is that the trajectory of psychedelic experiences mimics the trajectory of the so-called ‘Hero’s Journey’ [19]. Those familiar with Joseph Campbell’s idea of the ‘monomyth’ and psychedelic phenomenology may recognize a similarity

between the peak of a psychedelic experience and the climactic experiences described in many myths and stories. Joseph Campbell argued that countless historical stories or myths allude to a universal, and cross-cultural, ‘mono-myth’; a consistent ‘archetypal story’ - of meeting and overcoming challenge - that is fundamental to the human condition. The proposal is that there is a meaningful analogy between the narrative arc that occurs within the psychedelic ‘journey’ as well as the archetypal human life journey more generally. The former being a temporally condensed version of the latter. Both contexts should be understood as psychological: “the incidents [occurring in these heroic stories] are [often] fantastic and ‘unreal’: they represent psychological, not physical, triumphs” [19].

Method

Phenomenological Analysis

A phenomenological analysis of experience reports from Erowid Experience Vaults (<https://erowid.org/experiences/>) was conducted to identify common experiential themes of the (psilocybin) mushroom comeup and comedown. All Experience Reports were selected for publication, reviewed, categorized, and lightly edited for readability by the Erowid crew. We chose to focus exclusively on psilocybin mushroom experiences due to the large number of available reports (N = 2343), familiarity with the time-course of the psilocybin experience, and relevance to clinical trials. Advanced Search of Erowid Experience Vaults (<https://erowid.org/experiences/search>) for published self-reported ‘mushroom’ experiences, filtered to exclude concurrent use of other substances, yielded N = 53 reports that contained the search terms ‘comeup’ or ‘come-up’ and N = 90 reports that contained the search term ‘comedown’ or ‘come-down’. Despite filtering out concurrent use of other substances, some reports still included reference to the use of cannabis, and we chose to include these accounts in

our analysis, as it would be difficult to systematically remove these reports, and use of cannabis appeared common and vaguely reported (see also limitations section). A secondary search within the text body of each relevant mushroom experience report yielded smaller text fragments that described the comeup or comedown. Reports that did not describe the comeup or comedown were removed leaving N=47 and N=83 text fragments for analysis, respectively. Each textual account of the mushroom comeup and comedown was read through once to identify common themes. A second read through was done to extract quotes relating to themes previously identified. Excerpts from these reports are presented at length below. In general, we erred towards including longer quotes in order to convey a gestalt (holistic) sense of interrelated experiential themes, rather than dissecting each text fragment (see results section: phenomenology).

Thematic Content Analysis

Thematic content analysis of textual descriptions of the comeup (N=47) and comedown (N=83) was conducted. Codes were derived from themes found via phenomenological analysis as well as novel themes suggested by word frequency analysis (see below). Author AB hand coded all passages referring to explicitly the comeup (N=47) and comedown (N=83). A second independent coder (JB) coded a subset of text fragments for the comeup (N=22) and comedown (N=25) to test for intercoder reliability. Codes with $\geq 75\%$ percentage intercoder agreement and Cohen's Kappa (K) ≥ 0.15 on first coding attempt were included in analysis. Percentage of text fragments describing the comeup and comedown expressing relevant themes are presented below in Figure 2.

Word frequency analysis of timestamped Mushroom reports

To check the results of our phenomenological analysis against a larger sample of reports, a word frequency analysis was conducted on mushroom reports from Erowid.org that were timestamped by reporters. Timestamps (eg 'T+0.00', '0:30 minutes', 't+1 hour' 'at 15:20') are used by reporters to detail the progression of their experiences. Excluded from our analysis were reports with less than two timestamps, reports including use of other substances (except for cannabis, alcohol and tobacco/nicotine), and reports of multiple doses of mushrooms taken more than an hour apart. Doses below 0.5g dried mushrooms were also excluded from analysis. All doses of fresh mushrooms were included. Out of a total 2343 reports, N = 279 were extracted for analysis.

All timestamped reports were then separated into 30-minute time-segments in an excel spreadsheet (rows = individual reports, columns = time-segments). All text following a timestamp was included in the relevant time-segment only if the next timestamp was an hour or less later. Otherwise, only the paragraph immediately following the timestamp was included. There was a significant attrition of reporting for later time-segments, so all results of word frequency analysis are presented as percentages of reports per time-segment that contain relevant terms. The number of reports that contained timestamps per time-segment are as follows: 0+min (N=258), 30+min (N=235), 60+min (N=222), 90+min (N=165), 120+min (N=167), 150+min (N=98), 180+min (N=112); 210+min (N=73), 240+min (N=87), 270+min (N=51), 300+min (N=52), 330+min (N=31), 360+min (N=60). See directly below for an example of a segmented time-stamped report.

0+min (0-0.5h)	30+min (0.5-1h)	60+min (1-1.5h)	90+min (1.5-2h)	120+min (2-2.5h)	150+min (2.5-3h)
T = 00 Three of my housemates and I ate 3.5 grams of dried mushrooms each and washed them down with cheese-it and orange juice. No sitter was present.	T = :40 Effects were felt. I felt a nervous, flighty "pink" energy in my arms and legs, and felt like stretching. When I looked at my hands they appeared sparkly and a long distance from my face. The lights and the computer screen dispensed lights and moods.	T = 1:20 My roommates came outside and, again, I was disappointed in their banter. I talked to them for a short time then went upstairs into my room and turned on some favorite music.	T = 1:30 I felt the emotions of the music strongly and sat down with my back against my dresser and cried. My roommates, A and T, eventually came and found me again, and this time I wasn't annoyed. They took on the mood of the room, but without crying themselves.	T = 2:00 A left and T stayed. I started dancing in the middle of the room, while he sat against a wall and watched. Dancing like this has been a lifelong hobby and it didn't feel at all out of the ordinary. A very happy song came on and I danced like a fool. I reached out and touched T's finger with my finger, and it felt like a jolt of light. It was the most sublimely happy I've ever been.	T = 2:30 We walked around incoherently in the upstairs, and we were generally more afraid. A started talking about the sky and looked at me frightened saying, "this is not what is supposed to happen!?"
T = :15 We smoked a couple bowls together and listened to music	T = :50 I grew tired of the conversation of my roommates, it seemed as if they were repeatedly being amazed, which seemed worthless to me. I left them and went outside on the patio. It was night out, and a little cold, but I couldn't resist the urge to take off my shoes and socks and pants and shirt. I touched my toes and saw faint ribbons of rainbow colors traveling up my calves.				

Note that each time-segment captures experiences within the next 30 minutes (eg 0+min refers to experiences that occur between 0 and 30 minutes). The only exception is 360+ minutes which contains all further descriptions of the experience. Searching within each time-segment (each column of our excel spreadsheet) for terms referring to the comeup ('comeup', 'come-up', 'coming-up') and the comedown ('comedown', 'come-down', 'coming down') verified that reference to these terms matches onto the temporal progression of the mushroom experience.

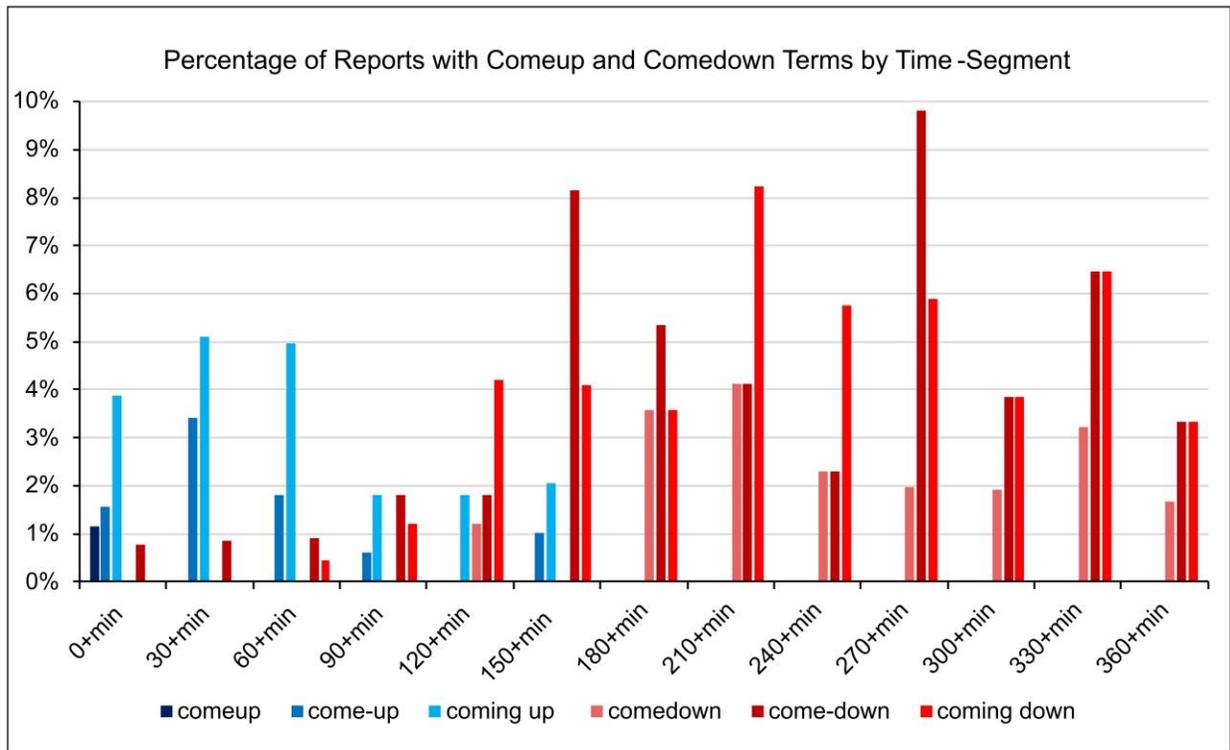


Fig. 1 Percentage of timestamped reports that reference the comeup ('comeup', 'come-up', 'coming up') and comedown ('comedown', 'come-down', 'coming down') at given timepoints. Despite low percentages of

timestamped reports that explicitly reference the comeup and comedown, the graph maps well onto first-person accounts, as well as the temporal relationships between plasma psilocin levels, 5-HT_{2A}R occupancies and subjective intensity ratings after psilocybin ingestion [20, 21].

Each time-segment was subsequently searched for word stems that reflect the emotional (eg anxiety; search stem ‘anxi’), cognitive (eg confusion; search stem ‘confus’) and physical (eg nausea; search stem ‘naus’) themes revealed by phenomenological analysis. Graphs of terms by time-segment, depicted as percentage of reports containing relevant word stems by time-segment, are presented below in Figures 3 and 4.

Results

Thematic content analysis of descriptions of the comeup (N=47) and comedown (N=83) revealed that individuals are more likely to experience aversive feelings in the comeup such as nausea (34%), anxiety (28%), restlessness (21%), confusion (17%), detachment (11%) as well as other physical sensations such as energy rushes (19%), tingling (15%), feeling cold (9%), heavy (9%) or uncoordinated (9%). Alternatively, the comedown is more likely to be described as a pleasant (34%), peaceful (22%), reflective (17%), insightful (17%), and socially enjoyable experience (16%).

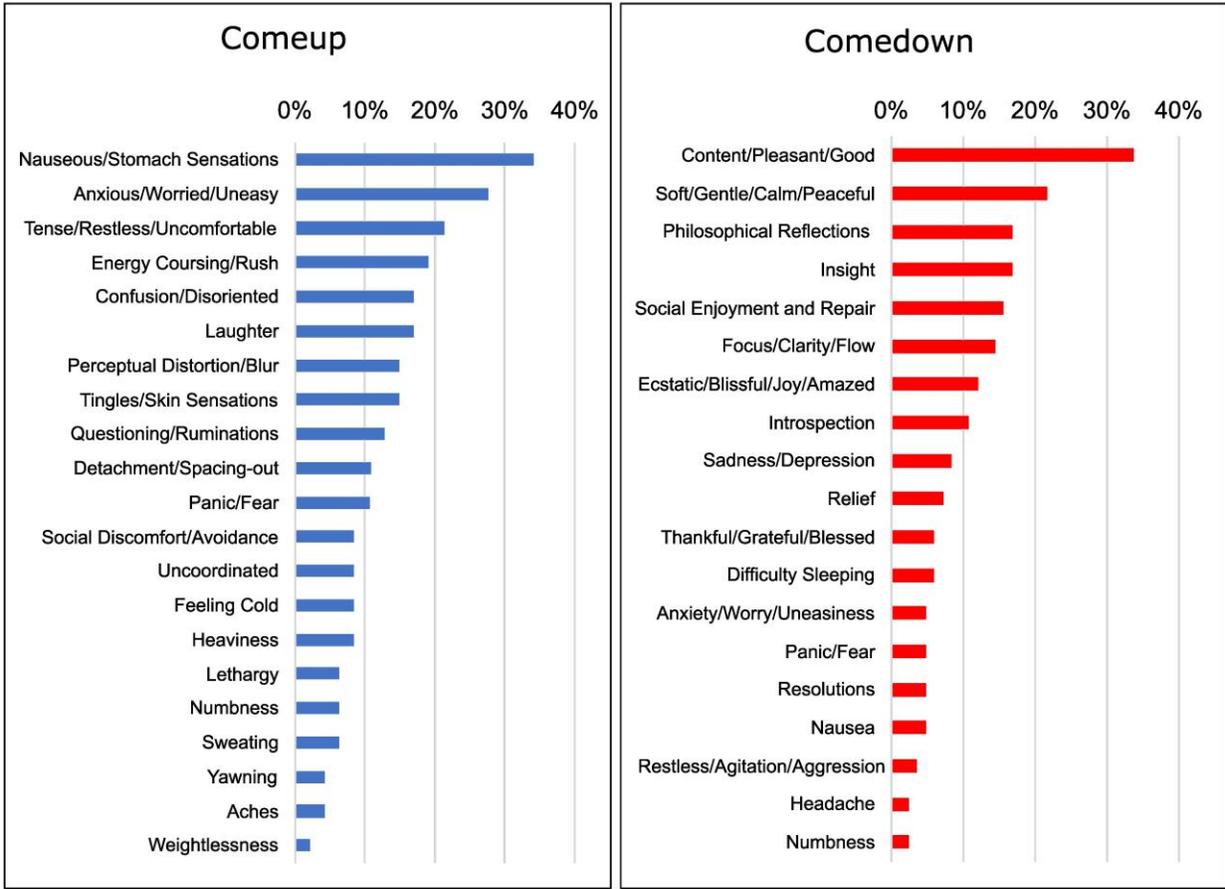


Fig 2. Percentage of text fragments expressing common themes of the comeup (N=47) and comedown (N=83).

Word frequency analysis confirmed that words referring to anxiety and nervousness were used more often to describe the first 60 minutes of the mushroom experience, while words referring to positive emotional states were used more often to describe latter phases of the mushroom experience (see fig 3). Increased reference to nausea, confusion, laughter, breathing, and distortion also characterizes descriptions of earlier phases of the mushroom experience (see fig 4).

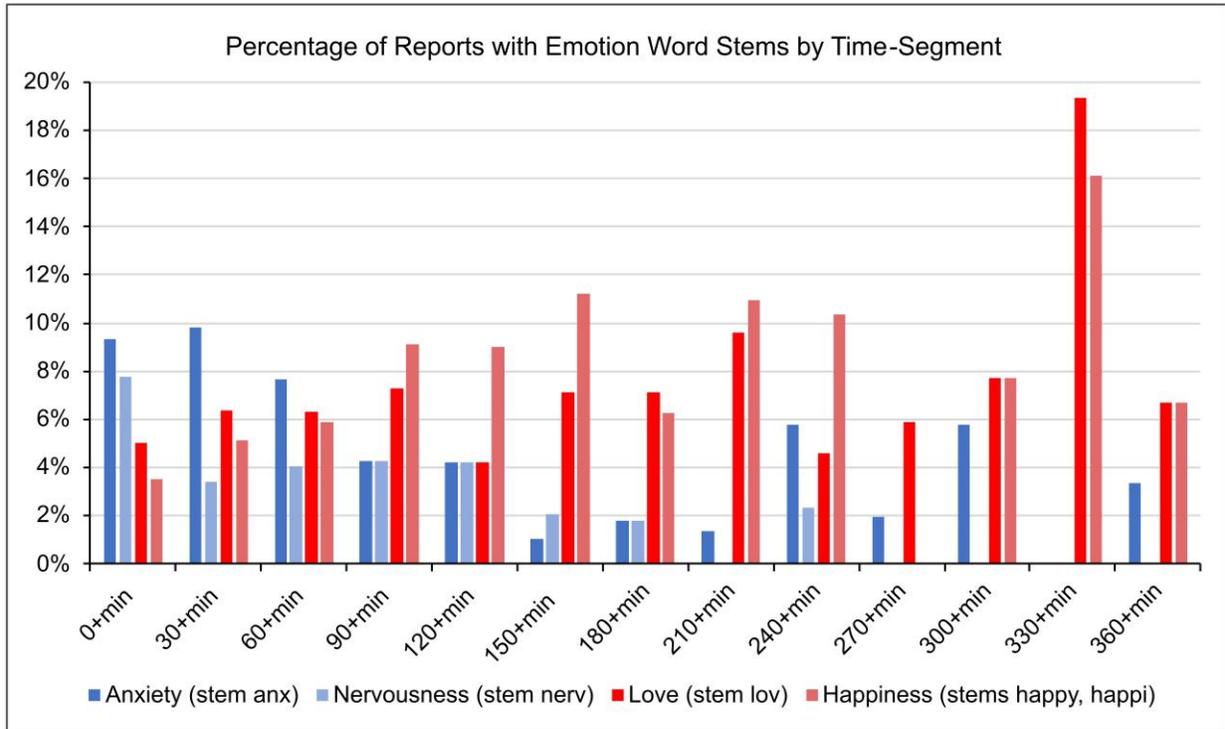


Fig 3. Percentage of timestamped reports containing stems for common emotion words by time-segment (N=279 total, N by time-segment varies).

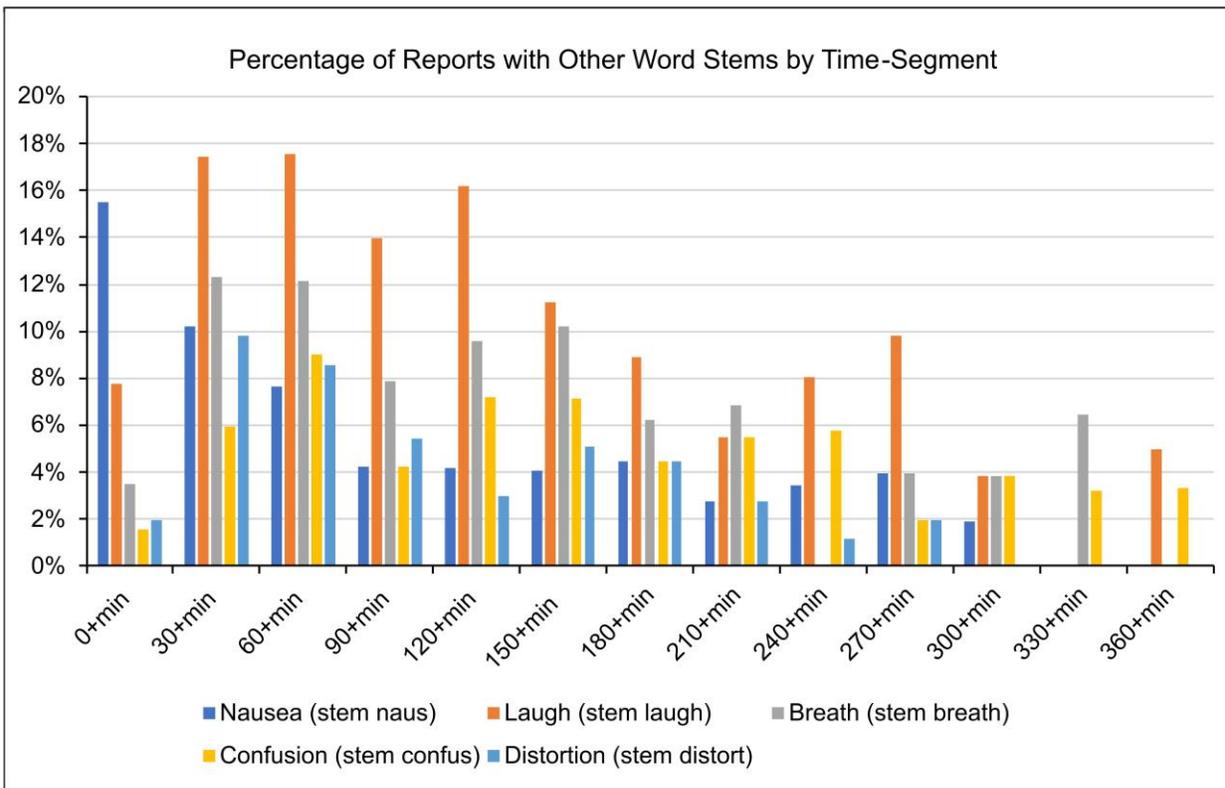


Fig 4. Percentage of timestamped reports containing stems for common physical and cognitive words by time-segment (N=279 total, N by time-segment varies).

A summary of the emotional, physical, cognitive-perceptual, and social features of the psilocybin mushroom comeup and comedown is presented below in Figure 5.



Fig 5. A summary of the trajectory of a typical psilocybin mushroom experience as derived from thematic content and word frequency analysis.

Phenomenology of the Comeup

Description of the mushroom comeup (derived from N=47 text fragments) is presented below. See Supplement 1 (link) for quotes referencing the following themes: struggling through (ignoring, avoiding, waiting out or dealing with) an unpleasant mushroom come-up (Supp 1; 1B); emotions of anxiety, nervousness and excitement (Supp 1; 1C); physical sensations of nausea, tension, skin tingling, rushing energy, shaking, cold, numbness, heaviness and lethargy (Supp 1; 1D); behavioral immobility and isolation (Supp1; 1E); and cognitive-perceptual distortion, disorientation, detachment, confusion (Supp 1; 1F) and rumination (Supp1; 1G).

First, consider two typical reports:

“I felt the familiar come-up of mushrooms, a slight queasiness in my tummy and waves of electric energy tingling through my body. Soon we all felt the need to lie down, and be close to the earth.... During the come up period I was quite restless and felt a level of anxiety in my body. I shifted and moved, but just couldn’t seem to get comfortable... At some point in time I felt the need to void my bowels. There was a rumbling, grumbling going on inside my intestines... [22].

“About 10-15 minutes after eating them we started feeling the effects. Lightheadedness, spacing out, anxiety, numbness, confusion” [23].

The unpleasantness of the mushroom comeup surprises a number of report authors, and comparison between mushroom and other drug experiences reveals a particular discomfort with the mushroom comeup (Supp 1; 1A).

References to waiting for or through the comeup are common. While some individuals are surprised by an unpleasant comeup, others expect it, and share strategies for avoiding a harsh comeup (Supp 1; 1B). Although peak drug effects often start to emerge within an hour after ingestion, this can vary (see Fig 1). Metabolic factors, dosage, dose form, administration method, and stomach contents can lead to variable onset latencies, and some individuals are taken aback by an unexpectedly slow or rapid onset.

Emotional changes during the comeup might best be described as anticipatory, with feelings of both anxiety/nervousness and excitement being common (Supp 1; 1C). Sometimes anxiety and excitement are felt simultaneously or in cycles. Anxiety and excitement during the comeup appear to precede self-reflective and therapeutic experiences on psychedelics (Supp 1; 1C).

Nausea is very common during the mushroom come-up (see fig 2 and 4; Supp 1D), as well as after oral ingestion of other classic psychedelic 5-HT_{2A}R agonists [24]. Individuals also report other bodily sensations including changes in perceived weight, tingles, energy, and feeling uncoordinated (Supp 1; 1D). Feeling cold, sweating and yawning are also mentioned (Supp 1; 1D).

Oftentimes these bodily sensations are accompanied by a desire for stillness. The desire for stillness during the come-up is accompanied by distortions in perception, as well as confusion and social discomfort, and individuals often become immobile. Solitude and stillness in turn bring feelings of relief (Supp 1; 1E).

Cognitive-perceptual distortions, disorientation, detachment and confusion are common during the mushroom comeup, as are experiences of altered cognition, and mental fragmentation (Supp 1; 1F). Anxious ruminations in the comeup often coincide with ensuing peak experiences in which problems begin to resolve. In one case, for example, a string of worries or anxieties precedes a sense of ‘otherness’ and then a realization that leads to peak experience (Supp 1; 1G).

Phenomenology of the Comedown

The duration of the mushroom comedown is longer than the comeup, but harder to define, as the effects and after-effects of psilocybin mushrooms taper off gradually. Additionally, while the general sense of relief expressed in the comedown is easy to distinguish from the comeup, the distinction between comedown and peak psychedelic experiences is more difficult to discern.

Psychometric constructs such as the ‘Mystical Experience Questionnaire’ capture both peak emotions (eg awe) as well as positive emotions that are common in the comedown (eg

feelings of peace, tranquility and gentleness) [25]. Moreover, the insights and resolutions reported as manifesting during peak experiences are often formulated, expressed and integrated after the session, when the intensity of the sense of ineffability and momentousness recede.

A description of the mushroom comedown (derived from N=83 reports) is presented below, but refer to Supplement 2 (link) for extensive quotes from first-person reports. However, the following description by bongd81 [26] offers a good general description of the psilocybin mushroom comedown, conveying the sense of calm, beauty, clarity and gratitude that we have identified as typifying a successful comedown.

“after a felt eternity (literally), this [peak] state somehow shook lose [sic] and my mental faculties gradually came back online again, which then lead [sic] to the last part of the trip, the comedown. T+5:30, I was anew sitting on the steps located at the entrance to the garden with a view of the lawn and a wide variety of flowers framing it. It was past 4:00 p.m. (I had plugged my earbuds back in and was carried by calm music) and the sunrays were flooding in more shallow and bathed everything in a golden friendly light... "It felt absolutely real." My mind was still blown by amazement by how all this is even possible, despite the fact that it was actually happening to me right in that particular moment. It was miraculous, but I also got quite emotional. I was filled with a strong sense of gratitude, that both my feet were on the ground again (figuratively speaking) and no apparent harm had occurred and even that there IS such a place 'to come back to', a somewhat stable looking baseline reality that we humans inhabit and share.” [26].

Calm, positive emotions predominate in the comedown. In contrast to the anxiety and excitement of the disorienting comeup, or the awe-inspiring peaks of psychedelic experience, the denouement of the psilocybin mushroom experience is often characterized by a sense of peace,

cathartic release, contentment and relaxation. Words such as ‘smooth’, ‘soft’, ‘mellow’, ‘comfortable’, ‘relaxed’, ‘nice’, ‘satisfied’, ‘joy’, ‘bliss’, ‘peace’, ‘pleasant’ and ‘playful’ can be found in case reports. Several individuals refer to a pleasant calming of an excited mind, and a sense of gratitude (implicit or explicit) is conveyed in a number of reports (Supp 2; 2A).

In keeping with our overarching theme; the temporal trajectory of the psychedelic experience, it is noteworthy how a number of individuals describe the comedown as a return from a challenging journey. A sense of victory and relief may be associated with this return to baseline, although the period of time that it takes to fully return and grow from a trip may far outlast the acute subjective effects of the mushroom experience. Several individuals acknowledge challenges but nevertheless desire further trips in the future (Supp 2; 2B).

The confusion that characterizes the mushroom comeup subsides in the comedown, yielding to a compensatory (or comparative) perceptual acuity and mental clarity. In some cases, a flow-state is described in conjunction with synchronous movement. Descriptions of highly enjoyable and beautiful perceptions abound, and individuals convey an appreciation of sensory details in their environment. Mundane habits and experiences are appreciated with a new sense of value and can seem more pleasurable than usual (Supp 2; 2C).

A feeling of enhanced social connectedness and a desire to engage in social repair are common in descriptions of the comedown (Supp 2; 2D). Individuals also report being unbothered by what would normally be aversive experiences (Supp 2; 2E).

Several individuals report an inspiration, insight or realization, or make resolutions for living better or how to approach psychedelic experiences in the future (Supp 2; 2F).

Philosophical musings and talkativeness are also common during comedown, and often

accompanied by elevated mood. Other writings reveal fast-paced thought accompanied by an elevated spiritual mood. In some reports, attention becomes focused on ideas of dubious value, and a lingering excitability and irritability can in some cases lead to difficult comedowns. Two individuals also report an absence of positive emotions following elevated states (Supp 2; 2G).

These reports do reveal some variability between mellow/calm comedowns and excited comedowns, and whether positive emotions (contentment and happiness) persist or are absent following peak experiences. We highlight the excited and negative nature of a small minority (7/83; 8%) of comedown reports (Supp 2; 2G), not because they are particularly representative of the average psychedelic experience, but because they do inform comparison to pathological (eg bipolar) states, as well as strategies for mitigating risks and increasing positive responses to psychedelics.

Discussion

Our results support the hypothesis that the comeup phase of a psilocybin mushroom experience (and likely other classic psychedelic experiences) can resemble an aversive illness-like state and that the comedown can resemble a state of relief. However, a post-hoc reinterpretation of the comeup as more akin to an acute stress reaction – which is relevant to but not isolated to illness-like states and symptoms – may capture the phenomenology of the comeup better.

Feelings of anxiety, irritability and excitement, energy coursing through the body, attention to heartbeat and breathing, numbness, nausea and detachment are common symptoms of a stress reaction or disorder and are associated with release of stress hormones and adrenaline [27, 28, 29, 30]. Psychedelics have been shown to elicit release of stress hormones and acutely

increase anxiety-like behaviors in rodents, a process which is positively associated with post-acute anxiolytic effects [31].

Understanding that the psilocybin mushroom experience often progresses from an initial stressful or aversive state to a state of relief has practical implications for use of psychedelics in clinical contexts and recommendations for psychedelic use in recreational contexts. Trip facilitators could consider creative ways to prepare for and support initial psychological struggle while also preparing for a psychologically lighter and more positive-mood-laden come down. Curation of a music playlist is one classic way in which the monomythical arc could be recognized and addressed [32], another might be the use of scent or other cues to catalyze ‘threshold crossing’ – out of periods of struggle. Indeed, terms like this, borrowed from Joseph Campbell and subsequent revisions of his monomyth [33] could be used to guide psychedelic facilitator training and perhaps informing the briefing of participants or patients ahead of a journey, as well as the integration process afterwards, where patient-described themes are interpreted as being resonant with Campbell-esque, Jungian or even Freudian themes e.g., meeting a male mentor figure during a journey may be seen as being resonant with the wise man archetype (Jung) – or a father-like figure (Freud). The sharing of such interpretations should, however, be done in a manner that is consistent with psychoanalytic training i.e., they should only be shared if and when it feels appropriate to do so, i.e., being mindful of (potential issues with) facilitator-induced reification of themes in the context of the hyper-suggestible individual. The ideal is that the interpretation comes foremost from the participant/patient themselves with little direction from the facilitator.

Recreational use of psilocybin mushrooms is common and increasing [34] but associated risks are not well understood. Understanding general trends in the trajectory of these experiences

could help individuals minimize risks. For example, acknowledging the possibility of an adverse comeup phase, individuals could plan places, contexts, and methods for the start of their trip that have successfully helped others traverse the discomfort of coming up such as a quiet environment conducive to quiet reflection, a comfortable place to lie down, a clean available restroom in case of gastro intestinal issues, and a trusted sober friend who can provide needed support. Of the few individuals who described an adverse comedown, some attributed it to being alone and not being able to share their experience with others. The presence of another person is likely to safeguard both phases therefore, but perhaps for different reasons.

In addition to pragmatic considerations, our findings offer theoretical insights into the antidepressant mechanism of action (MoA) of psychedelics. Aversive feelings in the comeup overlap to some extent with the adverse side effects of serotonin selective reuptake inhibitor (SSRI) antidepressants [35,36]; side effects that may occur before therapeutic effects are noticed.

However, additional dose-or-ligand-dependent effects of psychedelic 5-HT_{2A}R activation likely play a role in the unique therapeutic efficacy of psychedelics. For example, the unique subjective experience of emotional breakthrough [9] or psychological rebirth following an acute period of challenge or distress might exert therapeutic influences on individuals' views towards illness and healing. In some reports we noticed that fears, as objects of attention, were first elicited by aversive emotional states, but then drastically reinterpreted as negative emotions gave way to positive emotions. Consider the following passage.

“That fear, it turned out, was a fear of fanatical Islam. I realize I had been harboring a deep fear of radical Islam for some time, to the point of bordering on feelings of hatred. I had been rationalizing it and quietly suppressing it and not dealing with it. In that state, the shock of finding that fear was very intense and sad, and it appeared within my subconscious as a tangled

messy ball of black yarn-like strings, all bound up and tense and chaotic. I had to let it go, I had to surrender to love. I decided in that moment the only way forward was to love Islam and all Muslims as well, and forget fears of the future, and not to generalize.” [37].

Above we glimpse a psychotherapeutic process uniquely relevant to the temporal trajectory of the psychedelic experience (and related spiritual experiences). First, one may experience anxiety or fear, followed by visualizations or symbolic representation of fears. Subsequently, feelings of fear subside, leaving one to reinterpret objects of fear from an unusually non-reactive, accepting and even loving perspective.

Certainly, this process can occur outside contexts of psychedelic psychotherapy. However, the fact that psychedelics can elicit this trajectory in an amplified, short-duration and controlled manner is of immense therapeutic import. Note here that there is a tradition of psychoanalytic therapy conducted with low doses of psychedelics – referred to as psycholytic therapy [38] – that actively encourages patients to engage with symbolic representations of ‘subconscious’ conflicts or fears.

Aside from the pragmatic and theoretical relevance to psychedelic therapies, our results also inform understandings of psychopathological processes relevant to posttraumatic stress disorder (PTSD) and psychosis, respectively, as well as the potential overlap between these conditions [39].

The psilocybin mushroom comeup specifically bears resemblance to acute stress reactions/disorders that are implicated in the development of PTSD and other psychiatric disorders [40]. The mushroom comeup also bears resemblance to the psychotic prodrome, which is characterized by non-specific symptoms of anxiety and depression, social withdrawal, fatigue

or restlessness, unease, apprehension, and specific pre-psychotic changes in attention, perception and cognition [14,18].

In the context of psychiatric disorders, stress responses to specific trauma triggers or to general feelings of social anxiety and shame may elicit intrusive memories, flashbacks or hallucinations; with the phenomenology of hallucinated content being tied both to past experiences and the proximal triggers of the stress response [41,42,43].

However, depression, despair and illness are also some of the most common antecedents or triggers of spiritual experiences and visions [16,17], suggesting that common biological processes can contribute to post-traumatic disorder or growth [44], psychotic or spiritual experiences, and that contextual factors play an important role in determining both the outcome and phenomenology of naturally occurring psychedelic-like experiences [10].

The impetus for analyzing the temporal trajectory of the psilocybin mushroom experience comes from recent theoretical attempts to reconcile psychedelics, as therapeutic agents, with a broader psychotomimetic perspective [11]. Brouwer and colleagues propose that transient psychotomimetic compensation elicited by illness, injury, social threat or loss, depression, anxiety or panic is generally neuroprotective and energizing, and promotes learning and behavioral reengagement, while psychotomimetic sensitization over time in response to recurrent intense stress or repeated drug use can sensitize an individual to psychotic disorder [11].

A phenomenological analysis of the psilocybin mushroom comeup and comedown is an important first step in describing the temporal trajectory of the mushroom experience. To our knowledge, no research has parsed the psychedelic comeup or comedown and likened it to an

aversive/challenging state and recovery from it. Our approach could therefore inspire future work on this theme, including more formal hypothesis testing.

Limitations and Future Considerations

The choice to focus exclusively on psilocybin mushroom experiences is a limitation of the current analysis as it limits our ability to extrapolate to other classic psychedelics; however, it was motivated by clinical interest in psilocybin, and a desire to privilege rich descriptions over broader scope. Focusing specifically on textual descriptions of the mushroom comeup (N = 47) and comedown (N = 83) likewise provided us with an easily manageable number of reports, allowing us to carefully read and extract quotes from the text at our discretion, without fear of misrepresenting our sample.

The large number of mushroom reports available at Erowid.org also provided an adequate sample size of timestamped reports (N = 279) for conducting a meaningful word frequency analysis. Word frequency analysis and visualization (Fig 3-4) increased our confidence in the generalizability of our qualitative analysis.

One possible limitation of the current study, and indeed a critique that is often levied against qualitative analyses, is that a priori assumptions lead to biases in interpreting data. We acknowledge this limitation and encourage interested readers to explore the primary source material at Erowid's Experience Vaults (<https://erowid.org/experiences/search>), as well as to reflect upon their own experiences and ask whether they resonate with our interpretations. Good phenomenological research is characterized verisimilitude – the appearance of being true or real – and the value of the current analysis will age accordingly.

An a priori focus on illness and relief related themes is, in our view, more of a strength than a limitation, as post hoc identification of meaningful themes presents an opportunity for bias and error inherent in the search for explanations. Moreover, formulating clear hypotheses allowed us to question whether emergent themes fit with our preconceived notions. One finding that challenged us in this regard; laughter was more commonly referenced in descriptions of the comeup than in descriptions of the comedown. A quick review of background literature, however, helped make sense of this association.

For while laughter may indicate a positive emotional state, it is also associated with anxiety and uncertainty [45,46], and a signaling of ‘playfulness’ or ‘non-threat’ to others during arousing or potentially uncomfortable, uncertain or threatening scenarios [47]. Uncertainty is an expected feature of the onset of psychedelic experiences, and fits with theoretical propositions that psychedelics increase brain entropy [48,49] and lead to a temporary relaxation of priors [50].

Future research is still needed to ascertain whether the trajectory of the mushroom experience reported here is generalizable to psychedelic experiences that occur in clinical contexts, that are elicited by different routes of administration (smoked, insufflated, intravenous), or are elicited by psychedelics other than mushrooms and/or psilocybin. While we expect some variability regarding these factors, note a similar trajectory in the first LSD experience ever recorded. Albert Hofmann writes...

[Comeup] “4/19/43 16:20: 0.5 cc of 1/2 promil aqueous solution of diethylamide tartrate orally = 0.25 mg tartrate. Taken diluted with about 10 cc water. Tasteless. 17:00: Beginning dizziness, feeling of anxiety, visual distortions, symptoms of ataxia, desire to laugh.” [51].

[Peak] [Experience with demon] [51].

[Comedown] *“Slowly I returned from a weird, unfamiliar world to my reassuring everyday reality. The horror softened and gave way to a feeling of great fortune and immense gratitude; more normal perceptions and thoughts returned, and I became more confident that the danger of insanity was decidedly past. Now, little by little, I could begin to enjoy the unprecedented colors and plays of shapes that persisted behind my closed eyes”* [51]

Questions regarding the context-dependency of psychedelic experiences is another a key matter for future research. The reports analyzed here were written by people using psilocybin mushrooms outside of controlled settings – and some of our findings may not translate to clinical or experimental contexts.

For example, individuals might be less likely to mention paralysis or immobility during the comeup, or express “socially inappropriate” reactions like uncontrolled laughter, when lying on a couch in a clinical trial or in a therapist’s office. Likewise, concentration difficulties, perceptual distortions and social discomfort may be more noticeable in contexts that require concentration, perceptual acuity and social interaction.

Our findings may also not be generalizable to all psychedelic users. Individuals motivated to submit their mushroom experience reports to Erowid.org may differ in some general ways from other populations of users (eg in level of education), just as the demographic and psychological characteristics of individuals in clinical trials may differ from the average psychedelic user.

Relating to variables unique to our sample, use of cannabis appeared very common in conjunction with use of psychedelics. Additionally, our search criteria did not filter out some reports in which cannabis was, or was likely to have been, used. Cannabis has been shown to

potentiate the psychedelic experience, albeit in a non-linear dose-dependent way [52] and so might also influence descriptions of the mushroom comeup and comedown as described here.

Another set of limitations applies to analysis of unstructured experience reports. Our analysis does not capture what percentage of individuals experienced nausea or anxiety during the comeup, or what percentage of individuals felt content during the comedown. We were only able to capture the relative prevalence of themes that individuals *chose* to write about.

The advantage of this method, of course, is that researchers do not impose expectations on individuals reporting their experiences. Nevertheless, development of questionnaires and observational methods for assessing the frequency of these themes in experimental trials is a promising area for future research.

Another potential area of concern is non-random attrition of reporting as the experience progressed, particularly in our sample of timestamped reports. It is possible, for example, that positively valenced comedowns, as captured by word frequency analysis, better represent the experiences of individuals who continued to keep track of time. In turn, perhaps these individuals had more pleasant trips in general, including during the comeup. However, a preliminary review of the comeups experienced by these authors did not bear out this concern. Moreover, word frequency analysis and derivative visuals (figures 3 and 4) are, in our opinion, of secondary importance, and merely supportive of our primary phenomenological analyses.

A final [and future] consideration is to what extent our depiction of the psilocybin mushroom experience merely reflects the general arc of a storyteller's narrative – from problem to peak experience to resolution. Thus, is the Campbell-esque monomyth a basic way of telling any story or does it especially resonate with narrative arc of a psychedelic journey? This is a hard

question to answer, as individuals may be compelled to write about mushroom experiences in part because they contain the ingredients and structure of a personally meaningful story. Perhaps narrative construction – regardless of whether it is written down - is a natural sense-making response to unusual but meaningful experiences. It also bears mentioning that authors submitting reports to Erowid are encouraged to use a first-person narrative style, that authors may be intrinsically motivated to write ‘good’ stories, and that reports are subjected to a thorough editorial process. Therefore, the selection process may favor the publishing of interesting stories.

Nevertheless, looking at this issue in reverse, it appears that stories capture and recapitulate the emotional arc of psychedelic-like experiences, and that psychedelic ‘trips’ may reveal something about the biological bases of myth making or perhaps even the ‘groundtruth’ or validity of the Campbell-esque monomyth, i.e., that distress and mystery often come before salvation, clarity and wisdom. Psilocybin mushrooms appear to elicit and amplify the entire spectrum of human emotions but according to the present study, this arc does appear to be largely preserved across individuals. That psychedelic journeys mimic the trajectory of a hero’s journey, or indeed any narrative of human striving and adaptation, is most probably not a coincidence, and we hope that the current study provides impetus for further considerations on this theme.

“There are only two or three human stories, and they go on repeating themselves as fiercely as if they had never happened before.” (Willa Cather, in *O Pioneers!*, cited in ‘The Writer’s Journey’) [33].

References

1. Andersen, K. A., Carhart-Harris, R., Nutt, D. J., & Erritzoe, D. Therapeutic effects of classic serotonergic psychedelics: A systematic review of modern-era clinical studies. *Acta Psychiatrica Scandinavica*. **143**, 101-118 (2021).
2. Yaden, D. B., & Griffiths, R. R. The subjective effects of psychedelics are necessary for their enduring therapeutic effects. *ACS Pharmacology & Translational Science*. **4**, 568-572 (2020).
3. Roseman, L, Nutt, D.J. & Carhart-Harris R.L. Quality of acute psychedelic experience predicts therapeutic efficacy of psilocybin for treatment-resistant depression. *Frontiers in pharmacology*. **8**, 974 (2018).
4. Olson, D.E. The subjective effects of psychedelics may not be necessary for their enduring therapeutic effects. *ACS Pharmacology & Translational Science*. **4**, 563-567 (2020).
5. Griffiths, R. R., Richards, W. A., McCann, U., & Jesse, R. Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance. *Psychopharmacology*. **187**, 268-283 (2006).
6. Griffiths, R. R., Richards, W. A., Johnson, M. W., McCann, U. D., & Jesse, R. Mystical-type experiences occasioned by psilocybin mediate the attribution of personal meaning and spiritual significance 14 months later. *Journal of psychopharmacology*. **22**, 621-632 (2008).
7. Griffiths, R. R. *et al.* Psilocybin occasioned mystical-type experiences: immediate and persisting dose-related effects. *Psychopharmacology*. **218**, 649-665 (2011).
8. Peill, J. M. *et al.* Validation of the Psychological Insight Scale: A new scale to assess psychological insight following a psychedelic experience. *Journal of Psychopharmacology*. **36**, 31-45 (2022).
9. Roseman, L. *et al.* Emotional breakthrough and psychedelics: validation of the emotional breakthrough inventory. *Journal of psychopharmacology*. **33**, 1076-1087 (2019).
10. Brouwer, A., & Carhart-Harris, R. L. Pivotal mental states. *Journal of Psychopharmacology*. **35**, 319-352 (2021).
11. Brouwer, A., Carhart-Harris, R., & Raison, C. L. Psychotomimetic Compensation and Sensitization. Preprint at <https://doi.org/10.31234/osf.io/y8dn2> (2023).
12. Carhart-Harris, R. L., & Nutt, D. J. Serotonin and brain function: a tale of two receptors. *Journal of psychopharmacology*. **31**, 1091-1120 (2017).
13. Murnane, K. S. Serotonin 2A receptors are a stress response system: implications for post-traumatic stress disorder. *Behavioural pharmacology*. **30**, 151 (2019).

14. Fusar-Poli, P. *et al.* The lived experience of psychosis: a bottom-up review co-written by experts by experience and academics. *World Psychiatry*. **21**, 168-188 (2022).
15. Geoffrion, S. *et al.* Systematic review and meta-analysis on acute stress disorder: rates following different types of traumatic events. *Trauma, Violence, & Abuse*. **23**, 213-223 (2022).
16. Hardy, A. *The spiritual nature of man: A study of contemporary religious experience* (Oxford University Press, 1979).
17. Yaden, D.B., & Newberg, A. *The varieties of spiritual experience: 21st century research and perspectives* (Oxford University Press, 2022).
18. Yung, A. R., & McGorry, P. D. The prodromal phase of first-episode psychosis: past and current conceptualizations. *Schizophrenia bulletin*. **22**, 353-370 (1996).
19. Campbell J. *Hero with a thousand faces* (Princeton University Press, 1972).
20. Madsen, M. K. *et al.* Psychedelic effects of psilocybin correlate with serotonin 2A receptor occupancy and plasma psilocin levels. *Neuropsychopharmacology*. **44**, 1328-1334 (2019).
21. Stenbæk, D.S. Brain serotonin 2A receptor binding predicts subjective temporal and mystical effects of psilocybin in healthy humans. *Journal of Psychopharmacology*. **35**, 459-468 (2021).
22. Hypersphere. "What are Pants?: An Experience with Mushrooms (Magic Mushrooms) (exp90351)". Erowid.org. erowid.org/exp/90351 (Oct 29, 2011).
23. Hannibal. "Sight Seeing With Cubensis: An Experience with Mushrooms - P. cubensis (exp92813)". Erowid.org. erowid.org/exp/92813 (Jul 19, 2013).
24. Brecksema, J. J. *et al.* Adverse events in clinical treatments with serotonergic psychedelics and MDMA: A mixed-methods systematic review. *Journal of Psychopharmacology*. **36**, 1100-1117 (2022).
25. Barrett, F. S., Johnson, M. W., & Griffiths, R. R. Validation of the revised Mystical Experience Questionnaire in experimental sessions with psilocybin. *Journal of Psychopharmacology*. **29**, 1182-1190 (2015).
26. bongd81. "Depth and Intensity of It Took Me by Surprise: An Experience with Mushrooms - P. mexicana (sclerotia) (exp114653)". Erowid.org. erowid.org/exp/114653 (Aug 20, 2020).
27. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders* (5th ed., text rev.). <https://doi.org/10.1176/appi.books.9780890425787> (2022).
28. Russell, G., & Lightman, S. The human stress response. *Nature reviews endocrinology*. **15**, 525-534 (2019).

29. Shalev, A.Y. Acute stress reactions in adults. *Biological psychiatry*, **51**, 532-543 (2002).
30. World Health Organization. *International statistical classification of diseases and related health problems* (11th ed.). <https://icd.who.int/> (2019).
31. Jones, N. T. *et al.* Delayed Anxiolytic-Like Effects of Psilocybin in Male Mice Are Supported by Acute Glucocorticoid Release. *bioRxiv*. (2020).
32. Kaelen, M. *et al.* The hidden therapist: evidence for a central role of music in psychedelic therapy. *Psychopharmacology*. **235**, 505-519 (2018).
33. Vogler, C. *The writer's journey: mythic structures for screenwriters and storytellers*. (M. Wiese Productions, 2020).
34. Keyes, K. M., & Patrick, M. E. Hallucinogen use among young adults ages 19–30 in the United States: Changes from 2018 to 2021. *Addiction*. <https://doi.org/10.1111/add.16259> (2023).
35. Anagha, K., Shihabudheen, P., & Uvais, N. A. Side effect profiles of selective serotonin reuptake inhibitors: a cross-sectional study in a naturalistic setting. *The Primary Care Companion for CNS Disorders*. **23**, 35561 (2021).
36. Ferguson, J. M. SSRI antidepressant medications: adverse effects and tolerability. *Primary care companion to the Journal of clinical psychiatry*. **3**, 22 (2001).
37. S. "Validated in the Ocean of Love: An Experience with Mushrooms - P. cubensis (exp113944)". Erowid.org. erowid.org/exp/113944 (Feb 9, 2020).
38. Passie, T., Guss, J., & Krähenmann, R. (2022). Lower-dose psycholytic therapy—a neglected approach. *Frontiers in Psychiatry*. **13**, 1020505 (2022).
39. Bloomfield, M. A. *et al.* (2021). Psychological processes mediating the association between developmental trauma and specific psychotic symptoms in adults: A systematic review and meta-analysis. *World Psychiatry*. **20**, 107-123 (2021).
40. Bryant, R. A., Creamer, M., O'Donnell, M., Silove, D., & McFarlane, A. C. The capacity of acute stress disorder to predict posttraumatic psychiatric disorders. *Journal of psychiatric research*. **46**, 168-173 (2012).
41. Bailey, T., Alvarez-Jimenez, M., Garcia-Sanchez, A. M., Hulbert, C., Barlow, E., & Bendall, S. Childhood trauma is associated with severity of hallucinations and delusions in psychotic disorders: a systematic review and meta-analysis. *Schizophrenia bulletin*. **44**, 1111-1122 (2018).
42. Kleim, B., Graham, B., Bryant, R. A., & Ehlers, A. Capturing intrusive re-experiencing in trauma survivors' daily lives using ecological momentary assessment. *Journal of abnormal psychology*. **122**, 998 (2013).
43. McCarthy-Jones, S. Is shame hallucinogenic? *Frontiers in psychology*. **8**, 1310 (2017).

44. Tedeschi, R. G., & Calhoun, L. G. A clinical approach to posttraumatic growth. *Positive psychology in practice*. 405-419 (2004).
45. Granitsas, D. A. All laughter is nervous: An anxiety-based understanding of incongruous humor. *Humor*. **33**, 625-643 (2020).
46. Safron, A. Rapid Anxiety Reduction (RAR): A unified theory of humor. Preprint at <https://doi.org/10.48550/arXiv.1911.02364> (2019).
47. Ramachandran, V. S. The neurology and evolution of humor, laughter, and smiling: the false alarm theory. *Medical hypotheses*. **51**, 351-354 (1998).
48. Carhart-Harris, R. L. *et al.* The entropic brain: a theory of conscious states informed by neuroimaging research with psychedelic drugs. *Frontiers in human neuroscience*. **8**, 20 (2014).
49. Carhart-Harris, R. L. The entropic brain-revisited. *Neuropharmacology*. **142**, 167-178 (2018).
50. Carhart-Harris, R. L., & Friston, K. J. REBUS and the anarchic brain: toward a unified model of the brain action of psychedelics. *Pharmacological reviews*. **71**, 316-344 (2019).
51. Hofmann A. *LSD: my problem child*. (Oxford University Press, 2013).
52. Kuc, J. *et al.* Psychedelic experience dose-dependently modulated by cannabis: results of a prospective online survey. *Psychopharmacology*. **239**, 1-16 (2021).

Figure Legends

Fig 1. Percentage of timestamped reports that reference the comeup ('comeup', 'come-up', 'coming up') and comedown ('comedown', 'come-down', 'coming down') at given timepoints. Despite low percentages of timestamped reports that explicitly reference the comeup and comedown, the graph maps well onto first-person accounts, as well as the temporal relationships between plasma psilocin levels, 5-HT_{2A}R occupancies and subjective intensity ratings after psilocybin ingestion [20, 21].

Fig 2. Percentage of text fragments expressing common themes of the comeup (N=47) and comedown (N=83).

Fig 3. Percentage of timestamped reports containing stems for common emotion words by time-segment (N=279 total, N by time-segment varies).

Fig 4. Percentage of timestamped reports containing stems for common physical and cognitive words by time-segment (N=279 total, N by time-segment varies).

Fig 5. A summary of the trajectory of a typical psilocybin mushroom experience as derived from thematic content and word frequency analysis.

Author Contributions

Authors (AB, JKB, CLR, RLC-H) were involved in developing the conceptual framework for the article and in writing and editing the manuscript. Authors (EE, FE, ST) were involved in more than 20 years of collecting, editing, and publishing experience reports, and in the editing of the manuscript.

Additional Information

Competing Interests

AB reports receiving an academic scholarship from Usona Institute. CLR reports consulting work for Usona Institute and Novartis. EE, FE, and ST are employees of Erowid Center, a US 501(c)(3) non-profit educational organization, though they receive no bonuses or additional compensation for work related to this topic.

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Supplementary Files

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