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The HPPD Information Guide

TL;DR:

1. HPPD stands for **Hallucinogen Persisting Perception Disorder**, a diagnosis found in the 'psychiatrist's bible', the Diagnostic and Statistical Manual (**DSM-5**)

2. It occurs when people take drugs - including and especially **psychedelic drugs** like LSD - and then report **changes** to their **visual perception** (what they see) that cause them **distress**

    a. These changes can be **constant** and always there - and then more perceptible according to certain triggers day-to-day - *and/or* they can take effect in **episodes**

    b. These changes include things like 'visual snow', after-images, trails, geometric phenomena, light sensitivity, and also more classically-psychedelic visuals subjective to each person's experiences

3. While not distressing for everyone, these visual changes ***can*** be very **distressing**. It's when people are distressed that they may find clarity and treatment with a diagnosis of HPPD

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Guide Version 1.3

4. After a period of intense **initial distress**, some people with HPPD **learn to live** with their visuals (and maybe other effects) and return to normal life

    a. If appropriate steps are taken, then visuals may tend to reduce by themselves over time, and may disappear entirely

    b. Even if the visuals do not decrease, the *distress* that makes the visuals diagnosable with HPPD can be conquered and normal life resumed

5. Many people with HPPD also experience **depersonalization/derealization** (DP/DR), when people feel separated from their bodies and themselves and the world feels unreal

    a. This is often the most distressing part of their experience, and it may be advised to focus on this more than reducing the visuals to assist recovery

6. HPPD experiences can be triggered by a full range of **psychedelic** and **psychedelic-adjacent compounds**, including LSD, psilocybin, DMT (including *ayahuasca*), ketamine, cannabis, MDMA, and a host of novel psychoactive compounds and research chemicals

    a. Similar changes can be triggered by **non-related drug classes** like antibiotics and psychiatric medications (SSRIs, antipsychotic drugs, or as a withdrawal symptom for benzodiazepines), and without drugs altogether: including as a complication of Visual Snow Syndrome, migraine with aura, head injuries, epilepsy, and beyond.

    b. These visual oddities can also be seen (usually in mild form) by people without any drugs or conditions as a normal part of visual perception, esp.

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in the dark or on blank surfaces

7. For those experiencing **distressing HPPD**, consulting with an **informed clinician** is advised. Focusing on **anxiety reduction** and recovery through psychotherapies like Cognitive Behavioral Therapy (CBT) may be helpful.

    a. Prescriptions with **Lamotrigine** and **Klonopin** are reported to be successful for some patients in reducing the intensity of visuals. This isn't the case for everyone, though, and no controlled trials have been performed to gauge the efficacy of different medications

    b. **Abstinence** from drugs of all kinds is advised - at least in the short-to-medium term after the symptoms first appear - to reduce the risk of intensifying the disorder

8. In the period after they first take effect, there is likely more benefit in **focusing** on the **associated distress and anxiety** (especially if depersonalization/derealization is also reported) than seeking to reduce the visuals themselves:

    a. Stress reduction and relaxation techniques, like deep breathing, journaling, yoga, CBT

    b. Exercise, stabilized and healthy sleep, and a carefully-controlled diet

    c. Taking note of your triggers for visuals and anxiety

    d. Talk therapy and counseling to work through the associated distress and plan responses

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e. Medications

9. We **don't** entirely **know how common** HPPD is.

    a. Some kind of change to visual perception after using psychedelics may be fairly common and is typically benign

    b. One estimate, produced in 2011 and cited in the DSM-5,[1] suggests that around 1 in 25 psychedelic users develop HPPD

    c. There is likely to be under-reporting, because of stigma associated with drug-induced conditions

10. HPPD is **under-researched**. We don't anything for certain about:

    a. How it works at a neurophysiological or psychological level

    b. What the main risk factors are, for visual changes in general and the cases when they cause great distress

    c. What works best as treatment

    d. Its specific relationship with drug use and in particular with psychedelics

    e. How it intersects with reports of similar changes triggered without drugs

Initial Recommended Reading

'A Review of Hallucinogen Persisting Perception Disorder (HPPD) and an Exploratory Study of Subjects Claiming Symptoms of HPPD', 2018: John H. Halpern, Arturo G. Lerner and Torsten Passie

[1] https://pubmed.ncbi.nlm.nih.gov/21035275/

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'HPPD: An extensive review of potential causes and treatments', 2021: Samuel Štancl

'Hallucinogen persisting perception disorder: what do we know after 50 years?', 2003: John H. Halpern

'Abnormal visual experiences in individuals with histories of hallucinogen use: a Web-based questionnaire', 2011: M J Baggott , J R Coyle, E Erowid, F Erowid, L C Robertson

Online communities

https://www.reddit.com/r/HPPD/

https://www.hppdonline.com/

https://www.facebook.com/groups/1566896810276728/

https://www.facebook.com/groups/HPPD-Anxiety-Depression-Depersonalization-Support-Group-205125116272670/

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1. What is HPPD?

Hallucinogen Persisting Perception Disorder (HPPD) is an under-researched, DSM-5-listed condition[2] in which people experience distressing, lingering changes to their visual perception after using drugs - especially psychedelic drugs like LSD.

To meet the general diagnostic criteria for HPPD, the onset of these changes must be **attributable** to the **use of drugs**, or not clearly better-explained by other causes, like such conditions as schizophrenia, epilepsy or viral infections. Again, to receive a *clinical diagnosis*, these changes **must** be **distressing** and reduce quality of life. These changes do not have to be distressing; they are often accepted and filter into the background of people's lives.

HPPD is often-treated in common parlance, however, as a catch-all label for all forms of visual changes (whether or not they create distress) after the use of psychedelics. There is no term yet in place for lingering visual changes that aren't distressing.

Something like *post-psychedelic visual changes* (PPVCs), or *post-drug visual changes* (PDVCs) - to account for the role of non-psychedelics in inducing them - may suffice.

These effects can **last anywhere from a few days to several years** - some people live with them for decades.[3] In up to 50% of HPPD patients, symptoms may spontaneously remit within five years.[4]

The onset of visual changes is linked with **substantial distress** for some people. They can prompt anxiety, panic attacks, depression, suicidal thoughts, and completed suicides;[5] many report a strong degree of isolation and loneliness, as if they're locked in a private 'dream world' that others can't relate to.

HPPD is also connected with **depersonalization/derealization**: a condition in which people feel very disconnected from their bodies and themselves and the world stops feeling real. HPPD can encourage these feelings through making the world look more surreal and psychedelic. Feeling anxious about the visual oddities may cause a 'recoiling' effect from the world that makes people sink into themselves and away from the world.

In the current literature, HPPD lies in two categories:

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2 http://repository.poltekkes-kaltim.ac.id/657/1/Diagnostic%20and%20statistical%20manual%20of%20mental%20disorders%20_%20DSM-5%20%28%20PDFDrive.com%20%29.pdf#page=576

[3] https://www.bjmp.org/content/25-years-hallucinogen-persisting-perception-disorder-diagnostic-challenge

[4] https://journals.lww.com/psychopharmacology/Citation/2001/06000/New_Hope_for_Hallucinogen_Induced_Persistent.17.aspx

[5] https://journals.lww.com/addictiondisorders/Abstract/2020/03000/Faces_of_HPPD__Hallucinogen_Persisting_Perception.6.aspx

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- *Type-1*, where these changes occur in temporary episodes
- *Type-2*, in which they appear as an invested, regular feature of everyday visual perception,[6] which can vary according to certain triggers

HPPD was first characterized by **Dr Henry Abraham**, a psychiatrist who had been working with people reporting post-psychedelic visual changes since the early 1970s. These visual changes have been described in some form since at least 1954.[7] A number of case reports[8] from the 'first wave' of psychedelic research in the early-1960s describes HPPD-style phenomena. and later entered the popular consciousness through the idea of 'flashbacks', first described by Mardi J. Horowitz in 1969.[9] HPPD presentation was also described by Stanislav Grof in 1978, based on his clinical work with LSD from the 1950s and 1960s.[10]

What are the main changes we see with HPPD?

See the link for visual representations of what HPPD can look like.

While HPPD is a complex, under-researched, and highly-subjective condition, people consistently report similar kinds of changes.

- '*Visual snow*': When the field of vision is coated with small, grainy dots like the static of a detuned TV
- *'Haloes' and 'starbusts'*: When objects have a bright 'halo' or 'aura' ring around them, or concentric coloured rays around light sources
- *'Trails'*: When an object moves, a trail of faint replicated images follows it
- *'Ghosting'*: A whitish, 'ghostly' hue can surround objects and text
- '*After-images*': When the outline or silhouette of an object is seen on a surface after looking away
- *Intensified* '*floaters'*: Most of us have seen 'floaters', which are the small squiggly lines and shapes that sometimes appear in our vision. With HPPD, these floaters can become more visible, disturbing, and

[6] https://www.frontiersin.org/articles/10.3389/fpsyt.2017.00240/full

[7] https://www.cambridge.org/core/journals/journal-of-mental-science/article/abs/therapeutic-value-of-lysergic-acid-diethylamide-in-mental-illness/1B36D735CFBCE82E7052CE4E0F34CBE6

[8] https://ajp.psychiatryonline.org/doi/abs/10.1176/ajp.121.3.238

[9] https://pubmed.ncbi.nlm.nih.gov/5806803/

[10] https://drive.google.com/file/d/1CeembBGfj71vYZtxJl34PRWpLfz_u0x6/view?usp=sharing - page 160

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irritating

- *Enhanced hypnagogia and hypnopompia*, which are the visions people see between waking and sleeping, and on waking from sleep

- *Blue Field Entoptic Phenomenon:* The appearance of tiny bright dots moving quickly along squiggly lines in the visual field, especially when looking into bright blue light such as the sky

- *Changes to size and depth perception*: Things can seem smaller, 'at-a-distance', larger (so-called 'Alice in Wonderland Syndrome') or possessing a two-dimensional quality

- *Assorted psychedelic-style effects*: fractal kaleidoscopic patterns, faces, 'breathing' walls, moving, 'wavy' or shaky text, intense closed-eye visuals and enhanced phosphenes, or flashing and strobing lights
    - For those with Type-1 HPPD especially, a particular psychedelic experience can be entirely re-experienced - both cognitively and visually

People with HPPD report other, non-visual changes, too:

- *Physical effects*, such as head pressure, acute neck pain,[11] unequal pupil sizes[12], muscle twitches

- *Tinnitus* and ringing of the ears

- *More intense dreams*

- *Auditory changes*

- *Confused* and unclear thoughts, including 'brain fog', trouble processing information, memory loss, dyslexia, and the onset of stammering
    - A 2024 study comparing eight HPPD cases with matched psychedelic and non-user controls found trends toward lower visual memory and executive function scores in the HPPD group, though results were not statistically significant after adjustment.[13] While preliminary, such findings suggest that visual symptoms may, in some cases, be accompanied by subtle cognitive changes, warranting further neuropsychological research.

[11] https://www.reddit.com/r/HPPD/comments/jl59z7/anyone_get_neck_pain_since_hppd/

[12] https://www.hppdonline.com/topic/1094-different-sized-pupils/

[13]

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- *Depersonalization/derealization,* in which people feel detached from their bodies and the world stops feeling real
    - This affects large numbers of HPPD patients (possibly as many as 90% according to a survey of 26 people, all with prior mental health diagnoses)[14]

- *Anxiety, depression and panic*: According to that same survey of 26 HPPD patients, over 90% experienced anxiety and depression, and 69% suicidal thoughts.

    - Based on clinical work with hundreds of HPPD patients since the early 1970s, Abraham estimated that half experience generalized anxiety, depression, and panic attacks.

- The relationship between HPPD visual presentation and anxiety is unclear, and will likely vary from patient to patient.

    - Some may experience the onset of mood and emotional changes as a symptom of a broader underlying disorder triggered by the psychedelic experience. Others may experience anxiety because of fear around their visuals. Still others, as we'll see later, may be experiencing visuals *because* of a rise in baseline anxiety, in which the psychedelic experience may have been implicated.

Crucially, HPPD symptoms are not constant, but fluctuate according to:

- *Fatigue*
- *Stimulation*, including with caffeine
- *Anxiety* and stress
- *The nature of the environment*: visuals are more apparent in the dark, on blank surfaces, in enclosed rooms, and in environments where people had their original psychedelic experiences
- *Fixation and attention*, including staring at blank surfaces and an anxious tendency to look out for visuals
- *Intoxication* with other drugs, especially cannabis

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2. The HPPD struggle

[14] https://journals.lww.com/addictiondisorders/Abstract/2020/03000/Faces_of_HPPD__Hallucinogen_Persisting_Perception.6.aspx

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Intense visual changes can have a materially-**disruptive** impact on people's daily lives. They may inhibit their ability safely to drive, navigate dark environments, sleep, or socialize and maintain relationships.

The visuals may be more distressing if they remind people of their 'bad trips' and 'challenging experiences' on psychedelics. Even those whose changes developed after 'good trips' may feel like they're 'stuck' and 'permafried'.

- These patients' distress may be amplified by a fear that they can **never** take psychedelics or any drugs again. That their psychedelic experiences may have been extremely meaningful - and their friends and personal network can go on taking drugs without them - may cultivate a sense of loss and mourning.

HPPD can be intrinsically **isolating**. Basic differences in how one *sees* the same environment as others can make HPPD patients feel they're 'in their own world', forever cut off from everyone else and the 'world before'. This is underlined by a fear that these changes will be permanent, and that they indicate brain damage ('I fried my brain').

- HPPD is often tied to feelings of **shame**, with a sense of having caused it with illicit/'criminal' drug use. This can make it difficult to foster self-compassion or seek help from friends and/or family, who may be disapproving.

- Many people with HPPD are young, frequently teenagers, who may be especially-fearful of opening up to teachers, mentors, family and parents. This makes them more prone to isolation and loneliness, which can create a further fixation on their symptoms - feeding a vicious cycle of rising symptom intensity and anxiety. A pre-print survey of 445 respondents with histories of post-psychedelic visual effects found that approximately one-half of participants developed them up to age eighteen.

All the above may drive HPPD patients to **self-medicate** with alcohol and other drugs. It seems that alcohol and benzodiazepines especially can lessen the intensity of visuals, but there is a 'rebound' effect through withdrawal, comedowns, and hangovers that intensifies the HPPD.

- Abraham estimated that as many as one-third of his patients experienced alcoholism. The PRF has been made aware of second-hand reports of several HPPD patients having died from alcohol abuse.

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3. How should clinicians and patients respond?

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For someone reporting distressing visual changes, it's recommended that the priority should be reducing anxiety, depression and distress associated with the visuals.

- Many HPPD sufferers fixate and obsess on their visual changes. Owing to how severe, noticeable and disturbing these changes can be, this ought not to be judged. At least over time, however, many report that continuing to fixate only raises the distress and noticeability of the changes.

- Crucially, anxiety itself, including without drug use, can produce very similar (if not identical) visual oddities,[15] so it may be that anxious fixation raises the intensity of one's HPPD beyond merely noticing it more.

An attitude of ***acceptance*** has therefore helped many to return to functionally-normal lives. Research on the best **therapeutic approach** has not been conducted - and what benefits each subject will vary - but this acceptance and anxiety reduction may be cultivated through approaches like Acceptance and Commitment Therapy (ACT), Cognitive Behavioral Therapy (CBT), Internal Family Systems (IFS), mindfulness meditation, yoga, and a range of other therapies.

- Note, that in cases of HPPD that follow traumatic psychedelic experiences, meditation especially should be approached with caution, or pursued in a trauma-sensitive style.[16]

Consensus among HPPD patients in forums places great emphasis on ***bread-and-butter lifestyle changes*****:**

- *Healthy sleep*: fatigue is implicated in worsening HPPD
- Healthy *diet* low in sugar - specific elimination diets and fasting may be helpful[17]
- *Minimizing the use of stimulants*, including caffeine and nootropics
- *Physical exercise*, though intense exercise may also raise visual symptoms for some, at least in the short-term
- *Socialization and avoiding isolation*, including (where comfortable) opening up to others about your experience and fostering a support network
- Giving the condition *time* to resolve itself

Specific changes can be helpful:

[15] Further discussed in the mechanism section.

[16] https://davidtreleaven.com/tsm-in-practice/

[17] https://visualsnowman.com/category/health/diet/ - Visual Snow Syndrome (VSS) has very strong overlap with HPPD in symptoms, though there may be differences and the relationship is unclear. That said, VSS sufferers have explored dietary interventions with some success.

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- *Sunglasses*[18] and *blue- and orange-tinted glasses*[19]

- *Moving and avoiding isolation* in enclosed environments: much like psychedelic visuals, narrowing and honing the field of vision will raise the intensity of symptoms. It is not useful to stare and 'trip out' to the visuals if HPPD is distressing

- *Avoiding dark environments*: some HPPD patients even sleep with lights on

- Utilizing '*dark mode*' when using a computer

For those seeking to overcome severe and distressing visual changes, HPPD specialist-clinicians and many sufferers suggest immediate **abstinence** from all psychoactive drugs, at least in the weeks/months after their onset.

- After developing visual changes, some report that even single drug experiences (from caffeine and cannabis to LSD, MDMA and other more powerful psychoactives) can raise the visuals' intensity for extended periods of time.

- Cannabis should be approached with particular caution. After taking psychedelics, many people without HPPD report that the cannabis experience is made 'more psychedelic'. The same applies to HPPD patients.

For those whose visual changes are not distressing, continued drug use may not be problematic. If the use of drugs increases the intensity of the symptoms, however, this may make the condition distressing. It is also possible that continued drug use can cause other problems than HPPD, such as DP

Curiously - though this seems a minority - some report overcoming their visual changes through additional **psychedelic experience**, including with psilocybin,[20] ketamine,[21] LSD,[22] and ayahuasca.[23] This may affect the pharmacological understanding outlined below.

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[18] https://journals.lww.com/addictiondisorders/Abstract/2020/03000/Faces_of_HPPD__Hallucinogen_Persisting_Perception.6.aspx

[19] https://www.reddit.com/r/HPPD/comments/hee630/sunglasses_is_the_shit/

[20] https://www.reddit.com/r/shrooms/comments/5vinbr/shrooms_cured_hppd/

[21] https://www.reddit.com/user/psilocin_wins/comments/iivwzl/ketamine_reducing_hppd/

[22] https://www.reddit.com/r/HPPD/comments/6wpq2q/acid_got_rid_of_hppd_from_shrooms/

[23] https://www.reddit.com/user/psilocin_wins/comments/iivwzl/ketamine_reducing_hppd/
Additional case report told to the author via Halpern, J.

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Pharmacological Treatments[24]

A range of pharmacological treatments have been attempted, and case reports suggest promise for **certain medications**.
At the same time, low sample sizes and uncontrolled administration should caution investing too much confidence in their results. The addictive potential of benzodiazepines in particular may caution prescription, as well as the implication of benzodiazepine withdrawal in causing very similar visual changes.[25]

Because the breadth and depth of HPPD as a condition have not been fully researched, how much medications can achieve is unknown. That said, these medications can be especially useful as a short-term 'bridging' treatment for those with severe, debilitating cases.

- Lamotrigine (anti-epilepsy drug): Case reports and anecdotal reports in online forums suggest that the drug can be useful.[26]
  Breakdown of risks here: https://www.nhs.uk/medicines/lamotrigine/

- Reboxetine (antidepressant): Case report suggests no deterioration of symptoms, while an improvement in comorbid depression.[27]
  Breakdown of risks here: https://www.psycom.net/reboxetine-edronax

- Aripiprazole (a second-generation antipsychotic)[28]: While atypical antipsychotics have historically produced mixed results, this case report involving a 16-year-old demonstrated gradual improvement, but authors advised caution. *Breakdown of risks here*:
  https://www.nhs.uk/medicines/aripiprazole/side-effects-of-aripiprazole/

- Clonazepam (benzodiazepine): Shown to be successful among 18 patients.[29] *Breakdown of risks here*:
  https://www.nhs.uk/medicines/clonazepam/

[24] For an in-depth review of treatments, please see this guide:
https://doctorsonly.co.il/wp-content/uploads/2015/01/13_Flashbacks-and-HPPD.pdf#page=4

[25] https://www.verywellmind.com/benzodiazepine-withdrawal-4588452

[26] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3736944/

[27] https://pubmed.ncbi.nlm.nih.gov/12227224/

[28] https://pubmed.ncbi.nlm.nih.gov/39935673/
[29] https://pubmed.ncbi.nlm.nih.gov/12598822/
https://pubmed.ncbi.nlm.nih.gov/11475916/

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- Naltrexone (opiate receptor blocker): Two patients experienced dramatic improvement.[30] *Breakdown of risks here*: https://www.drugs.com/sfx/naltrexone-side-effects.html

- Risperidone (antipsychotic): Mixed results, some exacerbated, others improved.[31] *Breakdown of risks here*: https://www.drugs.com/sfx/risperidone-side-effects.html

    - Similarly, Haloperidol, another antipsychotic, may be prescribed to some patients, but existing reports suggest it makes symptoms worse.[32]
      Breakdown of risks here: https://www.drugs.com/mtm/haloperidol.html

- Clonidine (anti-hypertensive): 6 of 8 subjects reported improvement.[33] *Breakdown of risks here*: https://www.drugs.com/sfx/clonidine-side-effects.html

Psychological Treatments

Counseling and psychedelic integration may be helpful. As discussed in the mechanism section below, distressing visual changes may be more likely after traumatic psychedelic experiences; non-traumatic psychedelic experiences may, for some patients, still maintain a psychological 'charge' that can be addressed with integration work.

- Counselors and HPPD patients should pay particular attention to the emotional triggers of their symptoms. It may be that certain stressful situations raise the noticeability and presentation of HPPD in a general way, but some may notice that particular stressors (environments, people, situations) raise symptoms in ways that others don;'t

- All this suggests that HPPD has a holistic relationship with one's mental and emotional health, and could point at areas that themselves need resolving.

Being that HPPD exists often as a problem of fixation and anxiety, counselors may be encouraged to explore the other ways that these express in patients' lives - and to see whether resolving *those* has an indirectly-lessening effect on the presentation of HPPD.

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[30] https://pubmed.ncbi.nlm.nih.gov/9054801/

[31] https://pubmed.ncbi.nlm.nih.gov/15963699/
https://pubmed.ncbi.nlm.nih.gov/8784656/
https://www.ncbi.nlm.nih.gov/pubmed/8784656

[32] https://academic.oup.com/milmed/article/136/9/754/4919182?login=true

[33] https://pubmed.ncbi.nlm.nih.gov/10836284/

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Professionals and patients are encouraged also to see this case report, outlined in *The Thaw: Reclaiming The Patient in Psychiatry* by Paul Genova.[34] This describes a novel approach in which the psychiatrist leaned into their *own, drug-free* capacity for experiencing similar visual phenomena, and doing so together and in harmony with the HPPD patient. The patient was able to overcome their anxiety and distress more effectively than with Klonopin.

Professionals are also encouraged to read the following case reports[35] of Cognitive Behavioral Therapies (CBT) and related **psychotherapeutic techniques** with HPPD (then called psychedelic flashbacks). Addressing anxiety, stress and self-stigma through challenging the clients' internal beliefs that they were 'brain damaged', 'weirdos', 'freaks' - and other self-pathologizing labels common to HPPD patients - resolved both anxiety and the presentation of visuals.

The famed LSD researcher Stanislav Grof - who administered the drug to over 5,000 patients in the 1950s and 1960s - framed the development of visual changes in a *psychodynamic* way. That is, psychedelic experiences relax the boundary of the unconscious and conscious parts of the psyche, and HPPD symptoms are suggestive of 'unconscious material' that was not properly 'processed' in the drug experience.

Grof handled his cases of HPPD through encouraging a re-encounter with this material, either through additional and carefully-monitored psychedelic experimentation, or states induced by Holotropic Breathwork: a technique for altering consciousness through intensive hyper-ventilation with reports of promise, but also real risks.

- Data was not collected beyond anecdotal descriptions, but Grof claims that all his HPPD cases resolved after their encounters together with follow-up therapy.

Non-psychotherapeutic meaning making frameworks

The role of 'meaning making' frameworks - ways of interpreting, making sense, and forming identity - in the process of resolving lingering trauma and anxiety is well-established.[36] HPPD patients may be advised to look beyond seeing themselves as 'broken' and identifying with having a 'disorder' in reducing distress. Recall, visual changes after psychedelics needn't be distressing.

In particular, psychiatric labels may be problematic by feeding destructive internal narratives: that they are 'brain damaged', 'weird', 'broken', 'fried', and otherwise-afflicted with a condition often-characterized as lacking

[34] https://www.google.co.uk/books/edition/The_Thaw/1Hgsb_5NdPYC?hl=en&gbpv=1&dq=the+permanent+trip
[35] https://drive.google.com/file/d/1lKpM2CfFcLopzW9eAkLne6gJV-vWyUJB/view?usp=sharing
https://psycnet.apa.org/record/2009-13265-004
https://psycnet.apa.org/record/1974-01670-001

[36] https://www.sciencedirect.com/science/article/pii/B9780128030158000127

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treatment and adequate clinical responses. These self-stigmas can combine and synergize with prohibitionist and anti-drug attitudes prevalent across culture.

Instead, people at risk of developing distress, or otherwise looking to draw meaning from their experiences, may benefit from reading accounts of those who have channeled their experiences into art, spiritual practice, aesthetic and sensory enjoyment, or mystical understandings - especially since similar visual phenomena can be experienced as an effect of meditation, yoga, or other spiritual practices. Some, particularly those who developed visual changes after relatively positive experiences with psychedelics, interpret their visuals as 'free trips', and this ought not to be prejudiced by clinicians.

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4. What is the Perception Restoration Foundation?

The Perception Restoration Foundation (PRF) is an industry-funded 501 (c) (3) nonprofit.

Its mission is to raise funds for studies and increase awareness around HPPD at all levels, in order to discover better treatments, increase clinical understanding, find a possible cure, and ensure a harm-reduction framework for the burgeoning 'psychedelic renaissance' in mental health treatments.

What are the PRF's plans?

Thanks to its fundraising efforts, the PRF has secured two breakout studies into HPPD.

Macquarie University researchers will use a suite of advanced brain imaging techniques (fMRI, MEG, EEG) to look deep in the brains of patients to try and understand HPPD's possible neurophysiological mechanism. This is the most in-depth look into HPPD ever.

Another study is with the University of Melbourne, which will create a psychophysics-based visual processing test for HPPD that anyone can access online. This test will assess if people may have HPPD, or may have subclinical symptoms that could develop into HPPD in the future.

- This is based on the tentative findings of Drs. Torsten Passie and John Halpern,[37] which suggest that people may be more likely to develop debilitating visual changes if they already experience everyday visual effects more prominently than most people.

[37] https://pubmed.ncbi.nlm.nih.gov/27822679/

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The PRF is also laying the groundwork for a large-scale genetic test, which may find that vulnerability to HPPD is heritable and screenable.

A PRF-produced documentary on HPPD, *Living In A Distorted World*, will be released later this year. You can see the trailer here.

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5. What kinds of drugs can cause HPPD?

These changes seem to arise especially after people use classic psychedelic drugs, including LSD, magic mushrooms, *ayahuasca*, 2-CB, ibogaine, etc., but also related (but not classically psychedelic) drugs like MDMA, cannabis, dextromethorphan (DXM), datura, ketamine,[38] salvia, and diphenhydramine (DPH).[39]

- Yet some people report the onset - or significant deterioration - of HPPD-style changes after using non-psychedelic drugs like SSRI antidepressants,[40] antibiotics,[41] antipsychotics,[42] and nootropics.[43] Similar changes can also be prompted by powerful consciousness-affecting techniques - either fleetingly or in lasting ways - by meditation and yoga.

In anecdotal reports and the existing literature, it seems that LSD is the leading cause of visual changes compared to other kinds of drugs. It is unclear whether this is because LSD has been historically the most commonly-used psychedelic, or there is something special to the LSD experience or its effect on neurophysiology. A recent study found no significant difference between LSD, psilocybin and MDMA in the creation of lingering visual effects in trial settings.[44]

Note, there may also be a special relationship with the drug 5-MeO-DMT. A phenomenon known as 5-MeO

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[38] https://www.longdom.org/open-access/hallucinogen-persisting-perception-disorder-following-therapeuticketamine-a-case-report-2329-6488-1000281.pdf

[39] https://pubmed.ncbi.nlm.nih.gov/12227234/

[40] https://www.hppdonline.com/topic/1181-can-one-get-hppd-from-taking-an-ssri/
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3096346/

[41] https://www.hppdonline.com/topic/1097-hppd-and-antibiotics/

[42] https://pubmed.ncbi.nlm.nih.gov/6135405/

[43] https://mad.science.blog/2020/10/19/2-dimensional-vision-after-noopept/

[44] https://pubmed.ncbi.nlm.nih.gov/35076721/

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DMT 'reactivation' is described by the user community, in which the drug's high is vividly re-experienced. One small survey[45] found that 69% of those who had smoked the drug experienced 'reactivations'.

Is HPPD caused by taking 'too much'?

Because HPPD is under-researched, there is no known relationship between people's dosage history and their likelihood of developing HPPD.

- That said, some people report these changes after only a *single*, *low-dose* experience with a *tested* drug - some even a *microdose* - and others after a handful, and still others after many more. The likelihood of developing visual changes probably increases with the number of drug experiences.

Based on clinical consultations with hundreds of HPPD-reporting subjects over decades, Abraham suggested speculatively that the population falls in three groups, on a possibly genetic basis: those who report onset after one-to-three trips, the next after five-to-ten, and the final group after fifty-or-more.

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6. How common are these visual changes?

visual changes in general may not be uncommon, but diagnostic HPPD is probably rare.

Preliminary estimates of visual change experiences (then called 'flashbacks') from the 1960s to the 1990s were wide-ranging: anything between 1 in 20 to even 1 in 50,000 people.[46]

The last study, however, a 2011 survey of 2,455 users of psychedelics via Erowid,[47] found that up to three-fifths of psychedelic users reported lingering changes, 25% in ways that were seemingly-permanent, and 4.2% in ways so distressing that they could prompt seeking clinical help. The latter is suggestive of diagnostic HPPD.

"HPPD may be much more common than we ever believed" -
Dr. Matthew Baggott, MDMA researcher and primary author of the 2011 study

[45] https://psycnet.apa.org/record/2020-73978-005

[46] https://pubmed.ncbi.nlm.nih.gov/27822679/

[47] https://pubmed.ncbi.nlm.nih.gov/21035275/

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A 2010 survey[48] of 626 subjects via Imperial College London found that 34% experienced moderate visual changes after using psychedelics, and 6% more extreme changes. Of the 40% total, 73% reported that the changes did not bother them at all, 24% reported that they would rather not have them but could live with them, and 3% reported distress.

As well as low sample sizes, both studies may be subject to sampling bias.[49]

With the first study in particular, Krebs[50] describes that HPPD-specific surveys tend to be reposted on dedicated forums (possibly pushing the sample beyond an unbiased account of psychedelic users), which are also populated by those more likely to find their changes distressing.

- Equally, being that the 2011 survey was recruited via Erowid - made up of psychedelic enthusiasts - it may be that visual changes are less likely to be distressing, and possibly to be enjoyed, than people less invested in the psychedelic community.

- It is also possible, however, that the number experiencing visual changes is inflated. Psychedelic enthusiasts on Erowid are likely to have more psychedelic experiences than non-enthusiasts, which raises the probability of developing visual changes. 61% of the sample, for instance, had tried salvia.

Those included in the 2010 survey may be more likely to accept or be neutral around their visual changes. The study was recruited via psychedelic-oriented websites, including Bluelight, MAPS, and Shroomery, and dance-and-rave culture sites like Hijack, Breakbeat, and EFestivals.

A large cross-sectional study (N = 10,289) found that people who had ever used drugs linked to HPPD (n = 2,175; 21.1%) were slightly more likely to report visual hallucinations at some point in their lives compared to non-users. However, lifetime use of these drugs was not associated with greater distress from current hallucinations or more impact on daily functioning. The findings suggest that while psychedelic drug exposure may increase the likelihood of experiencing visual hallucinations, the development of chronic, burdensome symptoms likely depends on a combination of individual vulnerability factors rather than drug use alone. The authors note that their data were not specific to HPPD-like disturbances and call for future longitudinal studies to track such symptoms and contributory factors more closely.

A 2025 prospective cohort study of 654 participants found that ~32% reported at least one HPPD-type symptom four weeks after psychedelic use—but fewer than 1% found these symptoms distressing enough to

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[48] https://www.researchgate.net/publication/232053401_User_perceptions_of_the_benefits_and_harms_of_hallucinogenic_drug_use_A_web-based_questionnaire_study

[49] https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0063972

[50] https://www.researchgate.net/scientific-contributions/Teri-S-Krebs-32801579 - author correspondence

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meet clinical criteria. The study used a self-selected group of people (with 74% men) already planning psychedelic use, with a likely non-representative demographic profile and possible high dropout rates, which may skew prevalence estimates. Symptoms were self-reported and tracked for only four weeks, so results may overrepresent transient, subclinical changes while missing delayed-onset or long-term, clinically significant HPPD cases.

The handful of English-language online HPPD communities (including groups on Facebook, Reddit and HPPDOnline.com, across which there may be overlap in memberships) suggests a volume numbering at least in the dozens of thousands. Search up 'HPPD' on a platform like TikTok,[51] and you'll see videos tallying millions of views by influencers describing their experiences, with comment sections abundant in those reporting the same.

Many more may be uncaptured, including those:

- Not speaking English
- Unconnected to social media in general
- Unaware that their visual changes may be linked to HPPD diagnoses
- Misdiagnosed with other disorders
- Unaware of online forums
- Too affected by their visual changes to engage with forums and questionnaires
- Whose symptoms are apparent but not to a level of great distress

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7. What could the mechanism be?

For an in-depth breakdown of the possible science, it's advised that you check out Samuel Štancl's report on HPPD here: https://samuelstancl.me/hppd

In the clinical and scientific literature around HPPD, it's recognized that the condition is under-researched. This means that we know little about how it works, and what exactly may be going on in the brain and beyond.

In providing the most in-depth work of HPPD to date, Holland and Passie suggest that HPPD is likely a multifactorial phenomenon whose kind varies from individual to individual. Understanding how *HPPD works* is also dependent on understanding what HPPD is in relation to other disorders - something not yet confirmed in research (*see final section*).

Neurophysiology

[51] https://www.tiktok.com/search?q=hppd&t=1638960754813

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HPPD's leading neurophysiological hypothesis, introduced by Dr Henry Abraham (who first codified HPPD), relates the condition to a 'disinhibition' of the visual cortex.

- Drugs like LSD decrease, or 'disinhibit', the filters of the brain's visual cortex, so visual 'noise' that would otherwise be filtered out may remain in the field of vision. HPPD occurs when these filters do not return to their pre-drug state. This may make HPPD akin to a form of 'visual tinnitus' (and tinnitus is also experienced as a symptom).

- This disinhibition is linked to reductions in *alpha wave power* in the brain.[52] A neuroimaging study by Abraham[53] suggested that alpha wave frequency *increases* with HPPD patients versus controls.

- The role of an objective alteration to visual perception was lent support by 1982[54] and 1988[55] studies executed by Abraham, in which he found both non-HPPD-experiencing LSD users and HPPD patients had decreased ability to discriminate color differences and light sensitivity during dark adaptation. HPPD patients reported further decreased ability.[56]

There could be a role for *neuroplasticity*, or neurons' ability to change and reform in response to experience.

- Psychedelics likely have heightening effects on neuroplasticity that last beyond the initial drug experience - including for up to a week. Bayesian Brain models similar to the REBUS and entropic brain hypotheses introduced by UCSF's Robin Carhart-Harris may provide an effective explanatory medium:[57] by shaking the 'snowglobe' of our nervous system's categories of perception through a psychedelic experience (or psychoactive changes altogether) with spikes to neuroplasticity, it could be that those categories do not settle as before when the drug's effects stop.

    - Neuroplasticity models may explain why visual effects may be experienced by many psychedelic users for up to three days after a psychedelic experience, which then usually wane as the brain's categories re-concretize. This would imply additionally that a 'critical window' (*discussed later*) exists for 'setting' visual changes as HPPD, and that certain behaviors and hygienes can be adopted to avoid lingering effects.

[52] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4855588/

[53] https://pubmed.ncbi.nlm.nih.gov/11566431

[54] https://pubmed.ncbi.nlm.nih.gov/6980680

[55] https://psycnet.apa.org/doiLanding?doi=10.1037%2F0021-843X.97.4.443

[56] This may be related to anecdotal reports of 'sensory enhancements' after psychedelics.

[57] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6588209/

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- Neuroplasticity models also relate visual effects with anxiety: the more patients fixate on their symptoms, the more they tend to intensify and surface.

- A neuroplasticity model may explain why, in some cases, further psychedelic experimentation can reduce or eliminate HPPD symptoms. It may also explain why non-psychoactive doses (microdoses) can have lingering visual effects, as well as why non-drug activities known to raise neuroplasticity or otherwise shift visual systems[58] like meditation[59] and states of high 'arousal' (e.g. anxiety) can prompt similar changes.

- It may underlie also why teenagers are especially-vulnerable, as with plastic and developing brains.

- LSD may be particularly-implicated in HPPD. If this is shown to be the case - something contested - neuroplastic models may explain this result through LSD's *long duration* - that is, with more hours of seeing abnormal visual changes and 're-setting' its prior visual categories, the effect may be stronger than with shorter-acting drugs. Smokeable N, N-DMT, for instance, isn't particularly-associated with visual changes, while longer-acting *ayahuasca* is. At the same time, as noted above, 5-MeO-DMT is associated with later perceptual experiences at some frequency, despite having a similar length and duration.

Synaptogenesis may be involved. As described by Štancl (2021):

- Psychedelics induce strong synaptogenesis, or the creation of new synapses, resulting in high synaptic density. EEG scans show less inhibitory activity in the visual cortex both in people on psychedelics and in people with HPPD.

- This means that electrical currents are being enhanced in the visual cortex by increased synaptic connection. This also underwrites why pruning excessive synapses through pharmacological treatments like lithium - or even exercise[60] - may be useful.

Psychology

Psychological factors may play a role. This is likely not exhaustive, because people report the onset of very similar visual changes - as described earlier - after taking drugs without particularly-affective psychoactive properties, including antibiotics and microdoses.

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[58] https://opentheory.net/2019/11/neural-annealing-toward-a-neural-theory-of-everything/

[59] https://www.frontiersin.org/articles/10.3389/fpsyg.2013.00973/full

[60] https://www.sciencedirect.com/science/article/abs/pii/S0889159120324600

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Bad trips, anxiety, and trauma

A 2018 paper by Halpern and Passie suggested that challenging drug experiences, including intense reactions of panic, dysphoria, anxiety and trauma, may be associated with a higher likelihood of developing HPPD.[61] This is more likely for psychedelic use in uncontrolled settings.

- HPPD often co-arises with depersonalization/derealization (DP/DR): a dissociative reaction in which people feel disconnected from their bodies and immediate environments. This is suggestive of anxiety and trauma, and there is no evidence that drug-induced DP/DR is categorically different to that induced without drugs.[62]

- Holland and Passie[63] also suggest a possible 'psychodynamic' framing of this comorbid phenomenon, in terms of hallucinogen-induced ego weakness - including reductions in sense of self (manifesting in dissociative episodes) and control over internal stimuli. The phenomenon can also be described in terms of an 'activation of unconscious tension systems'.

Bad trips and challenging drug experiences may imply that certain shocks to prior perceptual and cognitive categories are, in some sense, not resolved - requiring that later integration and contemplation may be useful for resolving HPPD.

- Many people, however, go on to develop HPPD after positive drug experiences (which may motivate them to continue using drugs).

Flashbacks and re-experiences are recognized in experiences of Post-Traumatic Stress Disorder (PTSD). For some cases of Type-1 HPPD in particular, psychedelic 'flashback' experiences may be categorized as instances of trauma *induced by psychedelics*, over and above a distinct effect of psychedelics.

There may be an as-yet unknown link between unprocessed trauma, anxiety and visual change, further suggested by the presence of emotional triggers for one's HPPD. In combining states of acute anxiety with abnormal perception, it may be that later experiences of anxiety create a state-dependent learning effect - something noted by early authors[64] - in which neuroplastically-altered perceptual priors then associate anxious states with abnormal perception, perhaps in feedback loops.

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[61] https://pubmed.ncbi.nlm.nih.gov/27822679/

[62] https://www.cambridge.org/core/books/abs/depersonalization/druginduced-depersonalization-disorder/3C51C69FA8D223D161ABD1EE9D064013

[63] http://www.vwb-verlag.com/Katalog/m207.html - summarized in https://pubmed.ncbi.nlm.nih.gov/27822679/

[64] https://bibliography.maps.org/resources/download/8893

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Drug-free anxiety[65] and depersonalization[66] are independently-associated with similar, if not identical, visual changes. HPPD somatic changes, including head pressure, are also associated with anxiety, [67] and trauma is known to have possibly-similar effects on vision.[68]

- In explaining this, drug experiences may induce elevations of anxiety expressed in visual change. The 5-HT2A receptor, which is the active site for several key psychedelics, is linked with anxiety in preliminary tests with rodents.[69]

- Note, psychedelic drugs can cause the onset of mania:[70] an experience implicated independently in similar visual changes for some people.[71]

Among the very impaired (n=55) in a survey[72] of 445 respondents with histories of post-psychedelic visual changes, 60% worry often or very often (40%) that their friends can now take drugs without them, and 45.5% believe it's probably or definitely true (45.5%) that a condition of abstinence 'sucks'.

Over a third (35.1%) of the overall sample believed it probably or definitely true that they can never tell anyone else about their condition. Some degree of belief that one has sustained brain damage was held consistently across the sample, but increased in intensity and frequency by impairment type.

The study found evidence of some confusion about how HPPD should best be defined. Approximately equal proportions of the very impaired, for instance, deemed it false, true or neither true nor false that all HPPD is a re-experiencing of drug states, and increasingly large proportions by impairment believing that only people with HPPD see post-drug visual oddities.

At a more basic level, recall that diagnostic HPPD is linked to *distress*, and negative emotion is more likely after a challenging drug experience. It may be that the *content of the experience itself is neutral, while 'bad trips' account for the distress* that defines diagnostic HPPD.

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[65] https://www.anxietycentre.com/anxiety-disorders/symptoms/eye-vision-problems/

[66] https://www.dpmanual.com/about/depersonalization-symptoms-the-10-most-common/

[67] https://patient.info/news-and-features/what-causes-head-pressure-and-brain-fog

[68] https://pubmed.ncbi.nlm.nih.gov/20435270/

[69] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6511758/

[70] https://www.medrxiv.org/content/10.1101/2021.04.02.21254838v1.full.pdf

[71] https://ajp.psychiatryonline.org/doi/pdf/10.1176/appi.ajp.2017.16121379

[72] https://www.academia.edu/106658125/I_cant_stop_looking_for_my_visuals_Evidence_of_HPPD_as_a_somatic_symptom_disorder

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Personality, Gender and Mental Health Priors

Holland and Passie suggest that dissociative personality factors may predispose people towards developing HPPD and depersonalization/derealization. In particular, trait *absorption*, or a tendency to be preoccupied with internal mental images, have vivid recollections of the past, be lost in daydreams and fantasies, and other phenomena.

Absorption is known to be related to *openness to experience*,[73] which may be both enhanced by psychedelic drug use[74] and may render people more likely to experiment with psychedelic drugs in the first place.

Absorption is also linked with *hypnotizability*: or an individual's ability to experience suggested alterations in physiology, sensations, emotions, thoughts, or behavior during hypnosis.[75] Greater hypnotizability - especially in relation to the considerable emotional imprints and memories incurred by psychedelic experience - may cause some people to 'sink into' unusual perceptual experiences classifiable under HPPD or PPVCs.

All the above may be relevant for HPPD's possible link with background neurodivergent types like ADHD, autism, and OCD - all of which are linked with absorption, hyper-sensitivity, disembodiment and dissociative experience, fixation, and in particular with perceptual oddities.[76] Newer data reinforce that trait absorption, younger age, female sex, and a history of psychiatric disorders may predict the likelihood of experiencing subclinical post-psychedelic visual changes.[77] A pre-print survey of 444 respondents with experience of post-psychedelic visual changes showed that cis women were markedly more likely to be very distressed.

Somatic Attention and Suggestion

Phenomena like visual snow, after-images, tinnitus and floaters are not necessarily uncommon. As a possibly-overlapping mechanism with anxiety and fixation, it may be that some people with HPPD are noticing perceptual features that had previously been filtered into the ignorable background of their experience, or which have otherwise been increased by a catalyzing psychedelic experience.

- Halpern and Passie found that HPPD patients were possibly more likely to have experienced visual oddities before they took drugs.

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[73] https://pubmed.ncbi.nlm.nih.gov/2016669

[74] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3537171/

[75] https://www.tandfonline.com/doi/full/10.1080/00207144.2021.1836934

[76] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4261727/
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0177804
https://pubmed.ncbi.nlm.nih.gov/18227743/

[77] https://conexiant.com/psychiatry/articles/one-third-report-hppd-after-psychedelics

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- This led Krebs and Johansen[78] to recommend re-attributing some HPPD experiences to Somatic Symptom Disorder, whereby people fixate and ruminate on perhaps-normal somatic experiences and perceptions. It is possible that, because psychedelic experiences are very subjectively significant, people will tend to attribute these changes to them that may have happened otherwise or have other causes.

This is unlikely to be exhaustive, because many HPPD patients report florid and extreme visual changes that they did not experience before, and could not have simply 'not noticed before'. Note, these changes may have taken effect as soon as a day after a drug experience.

- It's possible, too, that histories of such visual experiences imply a vulnerability that has been activated or catalyzed by drug experiences.

- We should not draw from this explanation that HPPD is "in the head", either. As well as risking a gaslight or minimisation of people's experiences, it ignores a possible reason why 'ordinary' perceptual phenomena may have become discretely more noticeable: an elevation in anxiety, which may well be a predictable and co-arising cognitive feature of HPPD.

At the same time - as well as the effects of obsessive fixation and anxiety - there is evidence to suggest that, in line with the findings of absorption and hypnotizability described above - pseudohallucinations reminiscent of past psychedelic experiences can be induced entirely by suggestion and placebo effects[79] among non-HPPD reporting patients. This may provide an additional explanatory layer for the role of attention and expectation in feeding visual changes.

In a survey of 445 respondents with some post-psychedelic visual history, 45.5% of those who were very impaired "look around to check in on their visuals" and over three-quarters (76.4%) monitored whether their visuals were changing. Very distressed respondents were also likely to ruminate on how they had come to develop their condition and whether its symptoms were "normal".

It is also clear that HPPD-style experiences are related to certain environmental and internal triggers that prompt memories of the psychedelic state and state-dependent learning: location, music, food, friends, and certain states of mind - as with anxiety, described above, but also hyper-arousal, mood elevation and euphoria, ego dissolution, and the whole panoply of psychedelic-induced psychologies that can be realized through non-drug means. This may also underlie why people report that HPPD or PPVC effects 'kick in' - either fleetingly or enduringly - when high on cannabis, whose overlap (and frequent drug combination) with psychedelic states may evoke memory and learning effects.[80]

[78] https://journals.sagepub.com/doi/abs/10.1177/0269881114568039

[79] https://pubmed.ncbi.nlm.nih.gov/1176972

[80] https://pubmed.ncbi.nlm.nih.gov/1254369/

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- Note: combined with the effects of anxious fixation, the fact of suggestibility effects should prompt particular delicacy and caution in advising patients and user populations reporting HPPD to spend too much time in dedicated online forums, where hypochondria, negativity, and cycles of distress are common. It should also prompt any advocates for awareness of visual change experiences to acknowledge the possibility of non-distress, and to emphasize the nuance of distress-bearing HPPD cases, so as to prevent psychogenetic cases of the disorder.

Outside-the-lab contamination

The above assumes that the drugs people consumed were as described, or at least did not contain potentially-neurotoxic or otherwise-dangerous contaminants. This could provide a partial explanation for lingering (or at least distressing) visual changes' lack of appearance in psychedelic clinical trials.

Note: people have reported visual changes after taking tested drugs, and sub-HPPD visual changes have also been observed in trial settings.[81] Readers may be curious to read a case report of HPPD after the use of ibogaine for opioid dependency,[82] or the historical literature of HPPD-style experiences after LSD therapy in the early 1960s.

- That said, contamination is a particular risk with LSD and MDMA. LSD substitutes like 25i-NBOMe have been linked to overdose deaths and outbreaks of psychotic and violent behavior, and may have a higher surface area for risk in visual changes, too.[8384] Some report long histories of use with classic psychedelics and the sudden onset of HPPD with the use of 25i-NBOMe.

- Street MDMA may be significantly-overdosed, or contain adulterants like synthetic cathinones,[85] which could be linked independently to the onset of visual changes.[86] In general, New Psychoactive Substances (NPSs) have been linked to visual changes, too.[87]

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[81] https://www.researchgate.net/publication/354870310_Correction_to_Safety_pharmacology_of_acute_LSD_administration_in_healthy_subjects

[82] https://pubmed.ncbi.nlm.nih.gov/30300292/

[83] https://www.reddit.com/r/Drugs/comments/2xrlzz/how_to_cure_hppd_after_horrific_nbome_trip/

[84] https://pubmed.ncbi.nlm.nih.gov/34980551/

[85] https://drugpolicy.org/drug-facts/what-are-most-common-adulterants-whats-sold-molly-or-ecstasy-other-words-what-chemicals

[86] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6896660/

[87] https://link.springer.com/article/10.1007%2Fs40429-019-00249-z

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Genetics

In all of the below - both neurophysiological and psychological - there may be a role for heritable predispositions to HPPD. Recall, Abraham speculates that subjects reporting visual change fall into four dominant groups: those who will never develop them, those who report onset after one-to-three trips, the next after five-to-ten, and the final group after fifty-or-more.

This may be based on genetic factors, which the PRF is planning to investigate through mass testing.

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8. How can we minimize the risk of HPPD if we decide to take psychedelics?

1. *This has not yet been researched, but there is reason to suspect that the immediate period after a trip - say, one-to-five days - is important.*

This is because the brain is still neuroplastic and affected by psychedelics for up to a week (or longer) after the trip.[88] And HPPD (*see mechanism section above*) may be understood as a problem of 're-setting' one's brain back into its ordinary perceptual categories after the shock of a psychedelic experience.

If you want to avoid HPPD, what matters is ensuring that your perception re-transitions to its prior sober state safely. In this one-to-five day period, it may be advised, then, to...

Sleep well

Avoid cannabis and further drug taking - some people report that their HPPD was 'kicked in' by a subsequent drug experience

Process the psychedelic experience through dedicated *integration* practices, such as journalling, contemplation, meditation, and inquiry

Keep stress and anxiety to a minimum

Re-embodiment - or, re-connecting to body sensations - practices may be recommended, including through mindfulness meditation. This may help to reduce the risk of dissociative disorders like

[88] https://www.frontiersin.org/articles/10.3389/fpsyt.2021.724606/full

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depersonalization/derealization, too

Reduce screen use - focusing on screens may cause a dis-embodying effect, as well as 'damming' the psychological energies activated by the psychedelic experience

Avoid triggering environments, such as places that are enclosed or rich in blank surfaces, and *try not to self-induce visuals through staring and fixation*

a. If someone wants to be extra-careful, they may wish to avoid the places where they had their psychedelic experience

b. All this is because 'training' the brain in 'hallucinatory' ways of seeing while it's neuroplastic may cause lingering changes once neuroplasticity is reduced and stable categories re-affirmed

2. Optimize your set and setting

HPPD seems to be more likely after bad trips and challenging experiences, whose likelihood strongly depends on how people organize their set and setting. In particular, *stress* and *trauma* going into a psychedelic experience may be a trigger for HPPD experiences, even at low-dose (and *microdose*) levels

3. Have you experienced some unusual visuals before?

As discussed earlier, HPPD patients may have had a higher-than-normal experience of certain visual oddities, which are rare parts of normal perception. In particular, phenomena like visual snow, haloes, after-images, floaters, and colors in the dark may suggest an underlying tendency in perception that could be triggered by a psychedelic drug to be more intense

4. Have you tested your drugs? If so, what drug are you taking?

HPPD may be more likely with Novel Psychoactive Substances (NPSs) and Research Chemicals (RCs) with more unpredictable, less researched, and possibly-neurotoxic effects. Adulterants in street drugs may also have neurotoxic and other risky properties

It seems that long-acting psychedelics like LSD are more likely to cause HPPD. While LSD may have certain advantages over other psychedelics subjective to each user, someone very conscious of developing HPPD (at least compared to other risks) may be wish to avoid LSD in favour of a shorter-acting psychedelic

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5. How often are you tripping?

Taking lots of psychedelics frequently is likely to be correlated with a higher risk of developing HPPD. This can be explained in a number of ways:

1. A higher likelihood of having a bad trip
2. Activating a latent, repeat dose-dependent susceptibility
3. More likely to over-excite relevant perceptual circuits
4. More 're-training' of perception in 'hallucinatory' ways of seeing, perhaps by means of neuroplasticity effects
5. Less time in which to integrate properly one's experiences, and a possibility of a 'cascade' of neuroplasticity from taking psychedelics while still in a neuroplastic state

9. HPPD is connected with other disorders

It's unlikely that HPPD is a standalone disorder separate from other conditions, or one unique or tied intrinsically to the action of psychedelics. Recall, the visual changes associated with HPPD are continuous with the spectrum of normal visual perception, as well as dissociation, anxiety and Visual Snow Syndrome.

These changes may also be prompted by non-psychedelic drugs, like SSRI antidepressants, antibiotics, antipsychotics, and others, as well as through non-drug techniques like meditation, sensory deprivation, hypnotic suggestion and more. VSS itself can have many kinds of causes, including head injury,[89] viral infection,[90] a lifelong affliction, psychiatric drug prescription,[91] spontaneous unexplained onset, and other causes. This suggests that some cases of HPPD may be better-categorized as psychedelic-induced VSS, but more qualitative and neurophysiological research is required to see how much they overlap.
HPPD may also involve more complex pseudohallucinations - especially indicated in the early literature of persisting visual changes - that have overlap with psychosis spectra: something that may likewise be continuous with ordinary perception.[92]

HPPD's conceptual focus on perception may raise problems. It seems that HPPD involves strong network effects[93] and criss-cross between different kinds of changes: perception, cognition, and emotion, and especially through its consistent co-morbidity with dissociative effects, which are described independently as having visual

[89] https://pubmed.ncbi.nlm.nih.gov/34084555/

[90] https://www.hindawi.com/journals/criopm/2021/6668552/

[91] https://link.springer.com/article/10.1007/s00228-020-02996-9

[92] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4454466

[93] https://www.frontiersin.org/articles/10.3389/fneur.2021.724072/full - note, authors have suggested that Visual Snow Syndrome may be characterized as a network disorder continuous with other perceptual conditions

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symptoms. The emphasis on visual perception may also sideline the disorder's implication in other kinds of perception, including those of auditory and tactile sense.

This raises a number of core questions:

- What are the differences between HPPD and other conditions, and VSS in particular?

- What are the neurophysiological differences between HPPD and VSS?

    - While the symptoms of migraine with aura and VSS show strong overlap, for instance, data suggest that the two have different neurological pathways.[94] A 2021 study found that people reporting HPPD had less experience of migraine compared to drug-free VSS controls.[95]

- Is there a unique psychedelic 'value add' - more hallucinogenic-style phenomena like melting walls, geometric patterns, shifting text, for instance - and how might that be explained?

- Even if psychedelic drugs have no standalone, categorical effects, why do they seem to be implicated in creating these changes with comparative frequency?

- If visual changes needn't be distressing, what are the conditions under which they become distressing and enter the territory of diagnostic HPPD?

    - Is it a function of psychological factors, or is there a characterizable change in emotion and cognition that can co-arise with visual change?

The 'flashback' issue: DSM-5 and methodology questions

All the above means that the current DSM-5 designation of HPPD should be approached cautiously. It describes the HPPD diagnosis as the following:

1. *Re-experiences* of phenomena necessarily experienced under the influence of hallucinogens

2. That these changes must be *linked substantively* to the use of hallucinogenic drugs

3. That these changes cannot be linked to other mental health conditions implicated in visual change

[94] https://journals.lww.com/neurotodayonline/fulltext/2019/01100/visual_snow_is_a_real_neurological_phenomenon.3.aspx

[95] https://pubmed.ncbi.nlm.nih.gov/33979006/

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4. That these changes create distress

Point 1 deserves particular attention, because it has framed much of the early literature and popular understanding around post-psychedelic visual changes (PPVCs). As opposed to a necessary 'flashback' into the visuals induced by a psychedelic state, it seems that PPVCs and HPPD needn't have been experienced under the influence: something noted by other researchers.[96] This is further bolstered, you'll note, by HPPD visuals being experienced by people who have never taken psychedelics.

- To the extent that HPPD effects *do* involve vivid re-experiences of the psychedelic state, this should prompt questions about possible mechanisms, of which there could be many: as discussed above, trauma, state-dependent learning, suggestion, anxious fixation, real neurophysiological alteration, and still more will likely play a varying role from subject-to-subject.

Point 2 may be complicated by refractory periods experienced with HPPD onset. While many HPPD patients report their visual changes taking effect within day(s) of an experience - which seems to bolster the theory of psychedelics playing a substantial role - others may only report them weeks, months, or even years later. For example, one case report[97] describes an HPPD diagnosis after a twenty year gap since the patient's last psychedelic experience. It may be that HPPD has historically provided a convenient label for difficult diagnoses, especially since psychedelic drugs are so associated with abnormal visions.
Point 2 is also complicated, of course, by the surrounding context - especially in the theorized 'critical period' in the week following an experience -, which may explain the onset of HPPD more than the psychedelic drug *per se*:

a. Anxiety and trauma
b. Fatigue
c. Obsessive fixation on visual perceptions they'd already-experienced before (but not noticed)
d. Background mental illness
e. Non-hallucinogenic drug use
f. Currently-unknown risk factors

Point 3 is problematized by the frequent comorbidities - overlapping conditions - experienced with HPPD. As discussed, effects of anxiety, post-traumatic stress, dissociation, depersonalization, mania can include similar perceptual effects.

Point 4 is made difficult in the context of cultural conversation. Where HPPD is discussed, it is often treated as interchangeable with post-psychedelic or post-drug visual changes (PP/PD VCs) altogether, which produces the frequent absurdity in self-reports online that people 'enjoy HPPD' or 'aren't bothered by their HPPD'. In

[96] https://pubmed.ncbi.nlm.nih.gov/27822679/
[97] https://pubmed.ncbi.nlm.nih.gov/12664374/

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preserving a label for the distinct, distress-bearing character of HPPD, then, new labels of PPVCs or PDPCs may be advisable for use by researchers and clinicians where necessary.

Being that many psychedelic users report non-distressing visual changes, then, it's advised that researchers interested in PPVCs in general (as opposed to HPPD) look beyond HPPD forums in recruiting subjects for questionnaires and other studies.

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