

Soirée pour les membres

Journal Club 3

le 17 novembre 2022



Programme de la soirée :

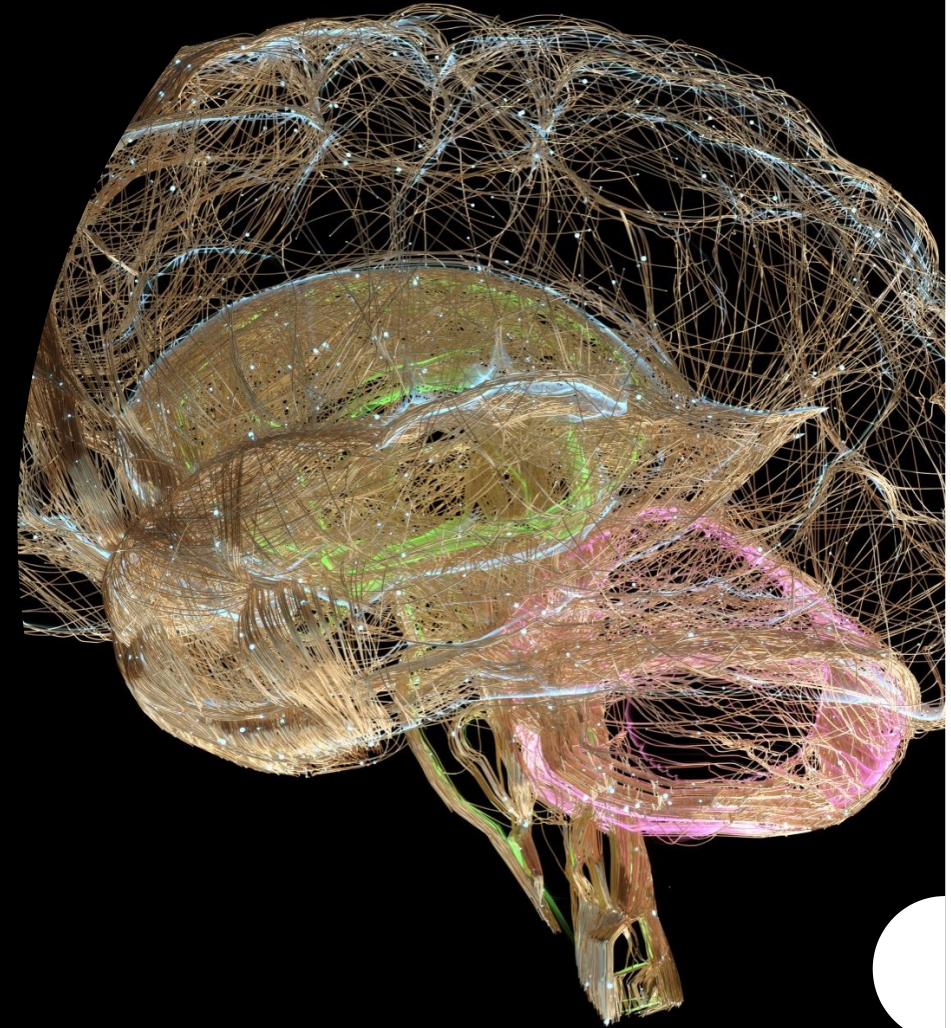
Présentation d'un article :

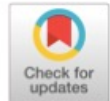
Lorrane Cardoso

étudiante en psychologie

Discussion puis apéro !

*The effects of
psychedelics on
the brain*





Neural correlates of the psychedelic state as determined by fMRI studies with psilocybin

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Edited by Leslie Lars Iversen, University of Oxford, Oxford, United Kingdom, and approved December 20, 2011 (received for review December 3, 2011)



Why is important to talk about these substances ?



Journal of Affective Disorders 258 (2019) 11–24

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

psychopharmacology (2020) 23(6): 385–400

rch 2020

SAGE
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PDF

Review article

Classical psychedelics for the treatment of depression and anxiety: A systematic review

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psychedelics: a review and proposed
on

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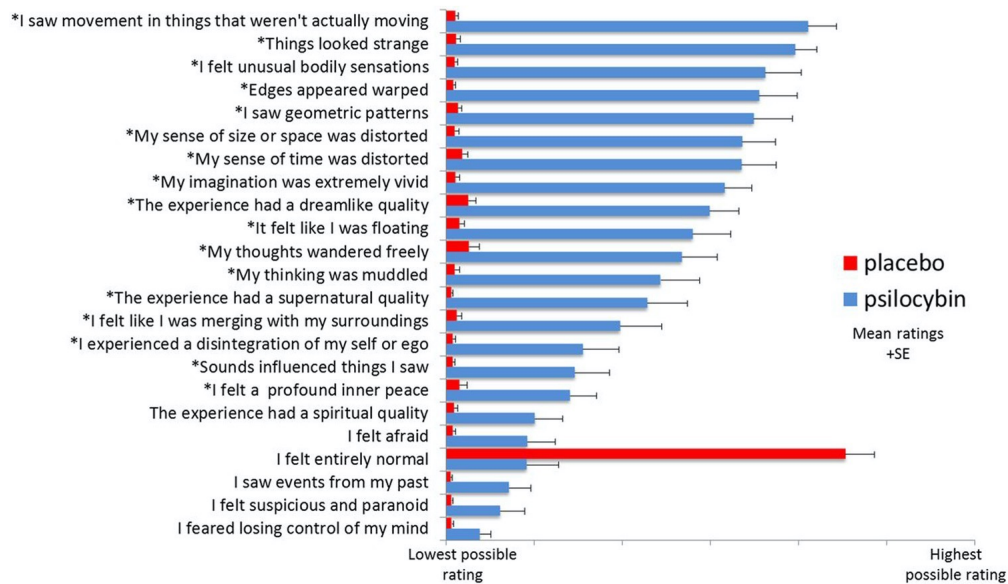


What are psychedelics ?

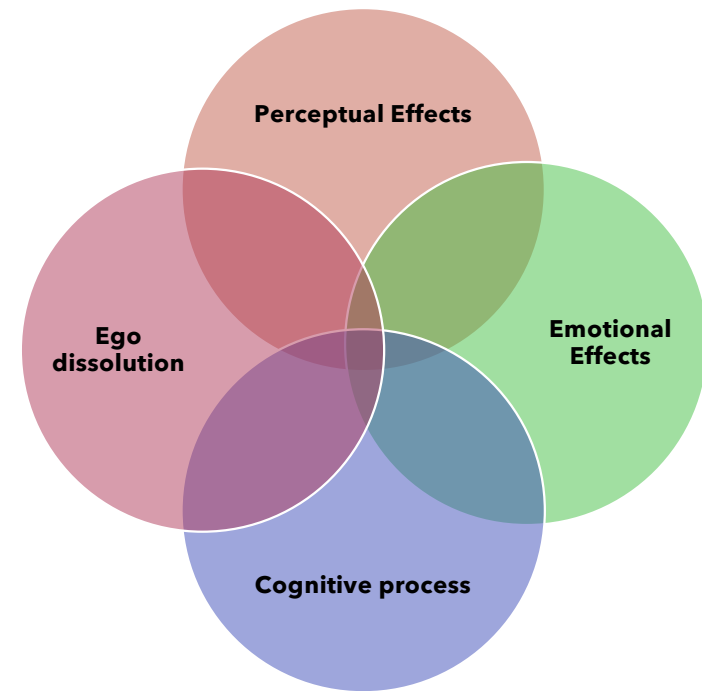
- The name psychedelics means «mind-manifesting»,
- Psychedelics (serotonergic hallucinogens) are psychoactive substances that changes:
 - Perception
 - Mood
 - Cognitive processes. (Nichols, 2016).
- There two categories of psychedelics :
 - Classic
 - Non-classic, dissociative
- A “trip” can last 12 hours (LSD) but it also can last for 15 min (DMT) - (Hallucinogens DrugFacts, 2022)
- Psylocybin has been used for years in healing ceremonies. For many indigenous people of Mexico, these mushrooms are part of a sacred and ancient tradition. (Van Court and al., 2022)

Phenomenology

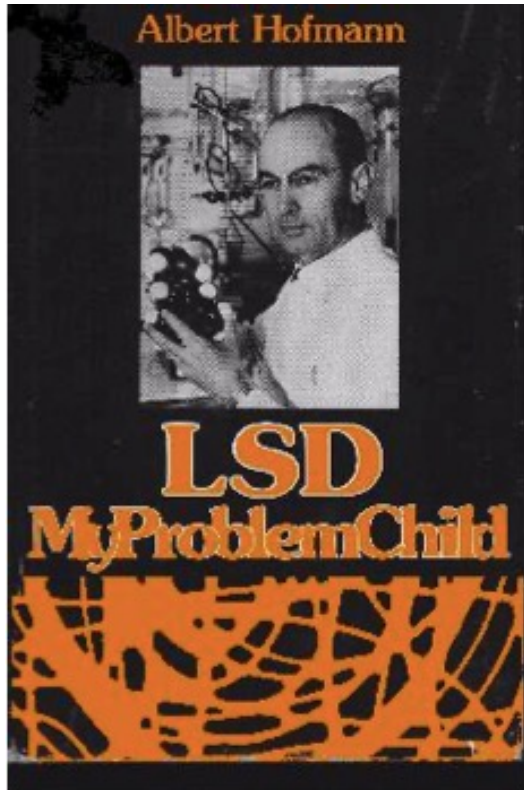
Subjective effects of psilocybin



(Preller & Vollenweider, 2016)



(Swanson, 2018)



- « By now it was already clear to me that LSD had been the cause of the remarkable experience ...I had to struggle to speak intelligibly(...)
- Everything in my field of vision wavered and was distorted as if seen in a curved mirror. I also had the sensation of being unable to move from the spot.
- (...) I was taken to another world, another place, another time. My body seemed to be without sensation, lifeless, strange. Was I dying? Was this the transition? At times I believed myself to be outside my body, and then perceived clearly, as an outside observer, the complete tragedy of my situation
- (...) Now, little by little I could begin to enjoy the unprecedented colors and plays of shapes (...) It was particularly remarkable how every acoustic perception, such as the sound of a door handle or a passing automobile, became transformed into optical perceptions. Every sound generated a vividly changing image, with its own consistent form and color.

LSD - My Problem Child (c)1980 by McGraw-Hill Published by McGraw-Hill Book Company
ISBN 0-07-029325-2

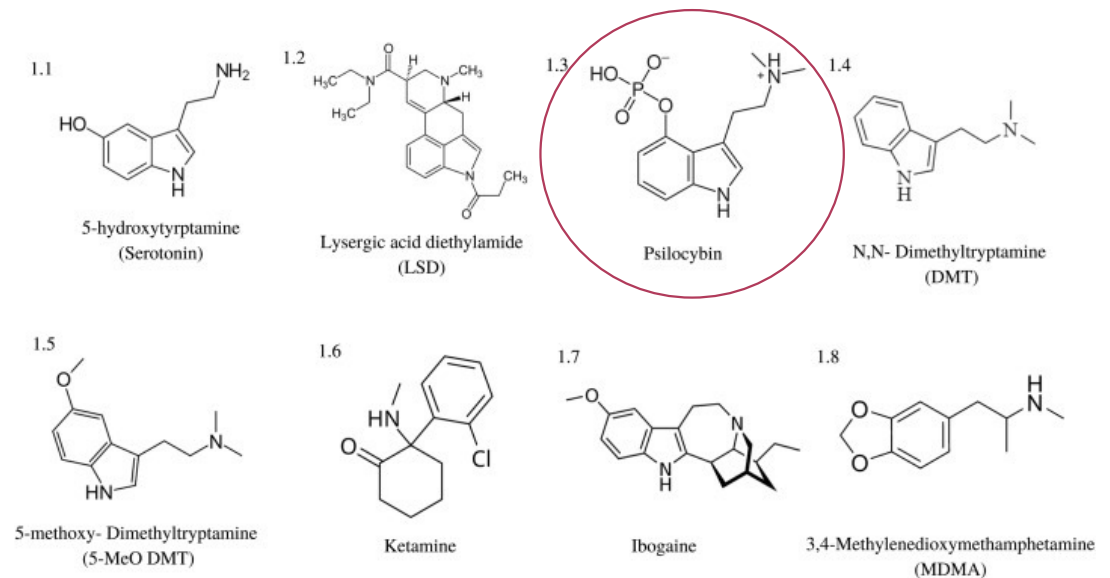


Pharmacology effects

→ Psilocybin (4-phosphoryloxy-N, N-dimethyltryptamine) is an indole alkaloid originally derived from fungal species primarily in the genus. (Geiger et al., 2018)

→ Psilocybin binds **to 5-HT_{1A}, 1D, 2A, 2C** but does not bind to dopaminergic receptors

They are generally considered physiologically safe and do not lead to dependence or addiction. (Nichols, 2016)





Hypothesis

→ **Theoretically hypothesis**

Carhart-Harris and al. 2012 tested the effects of psilocybin on the brain; this study was design to investigate the how these substance could induce change in consciousness.

→ **Operationalized hypothesis :**

They have hypothesized that psilocybin would incresead blood fluid in the brain.

Self-consciousness

→ *«Consciousness is awareness of one's body and one's environment; self-awareness is recognition of that consciousness—not only understanding that one exists, but further understanding that one is aware of one's existence»* (Jabr, 2012)

→ Self-consciousness can be viewed as a multidimensional construct that includes somatosensory, agentic, narrative and social components.



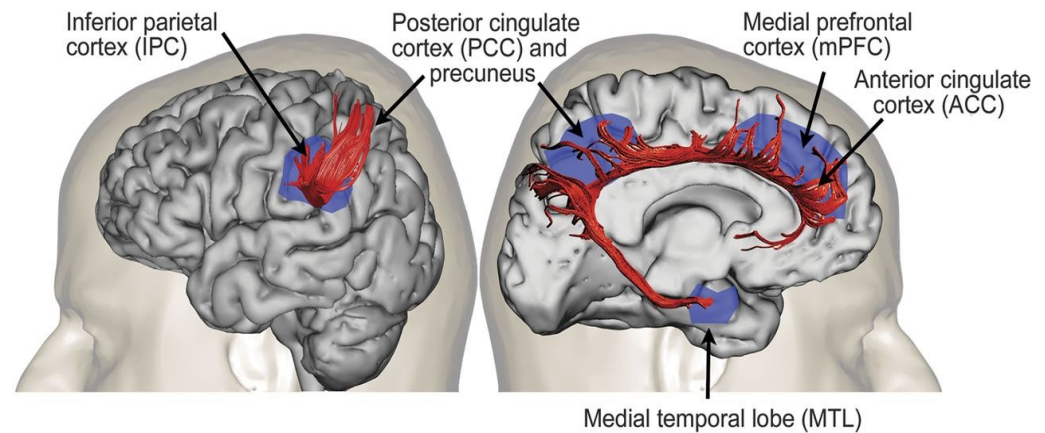
Default mode network

→ **DMN is a set of brain regions that shows low frequency oscillations during a resting.**

(Broyd and al., 2009)

Default mode network is often associated

with: Autobiographical memory; Self-reflection,; Self-referencing and Theory of mind



Source: Sandrone S , and Catani M Neurology 2013;81:e172-e175

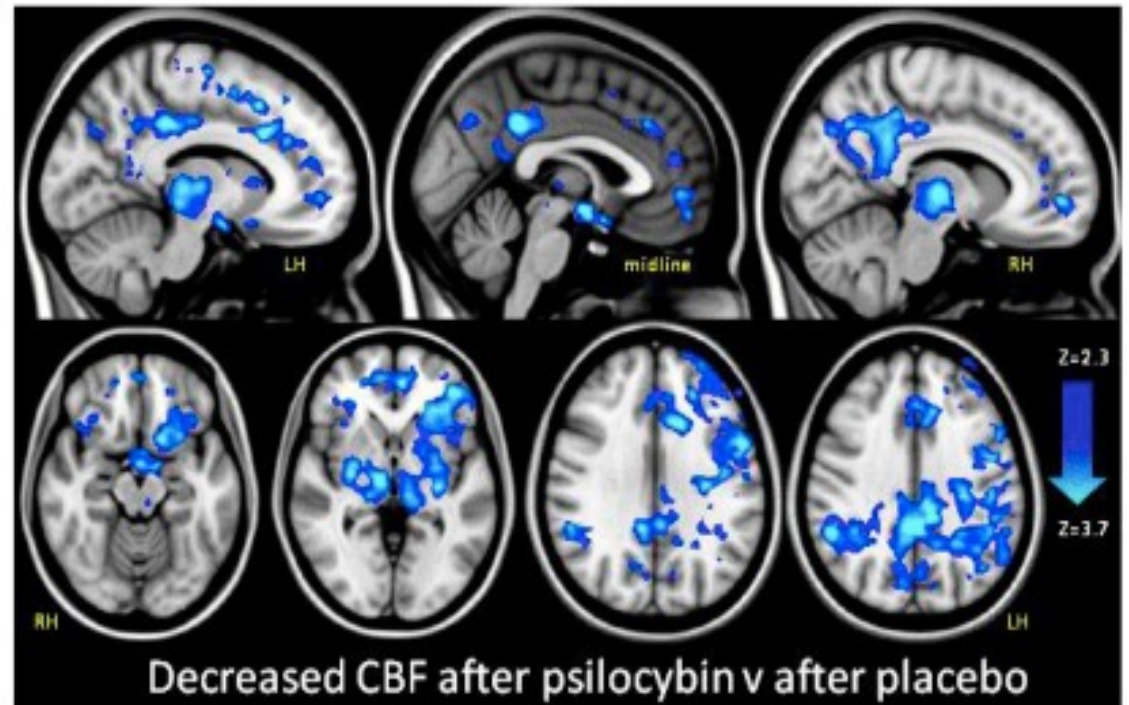
Method

- **15 healthy participants, hallucinogen-experienced** subjects (five females), mean age 34.1 (SD 8.2)
- The experiment lasted two sessions, each session lasted 18 min, subjects were asked to relax while being scanned **by ASL**
 - 1st session- Subjects received placebo (10-mL saline) in the first scan
 - 2nd session- Subjects received psilocybin (2 mg in 10-mL saline)
- The intensity of the subjective effects was rated via button press on a 0- 10 -(10 = extremely intense effects)
 - Before the infusion, 5-min postinfusion, and 12-min postinfusion.

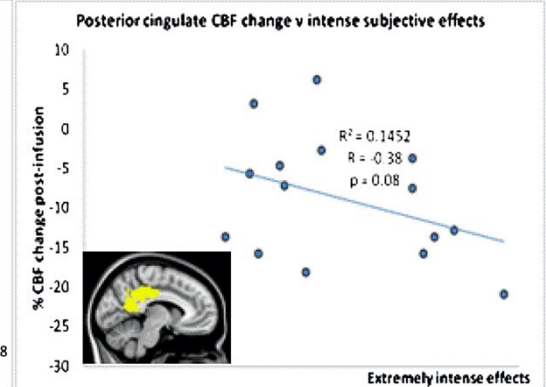
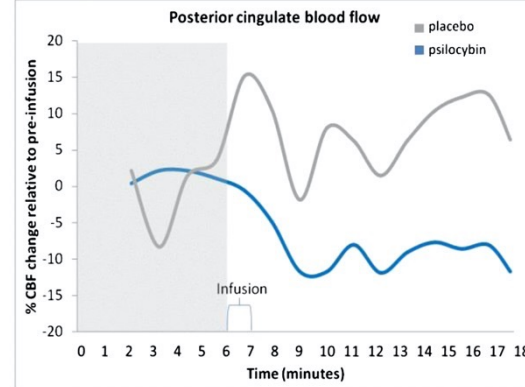
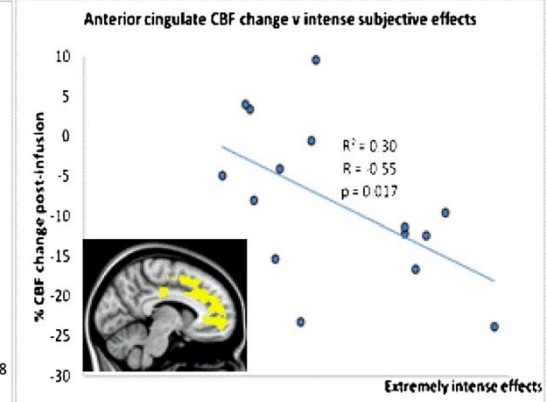
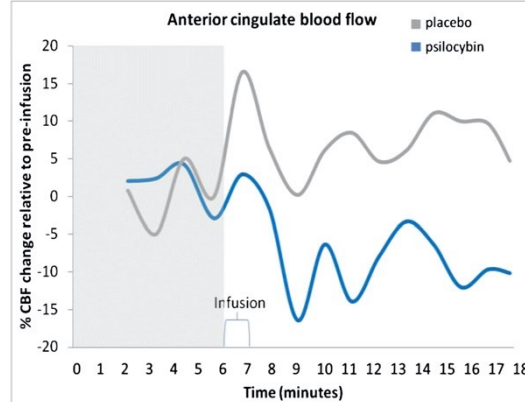
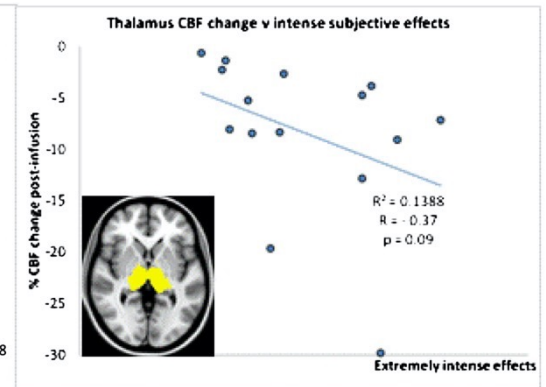
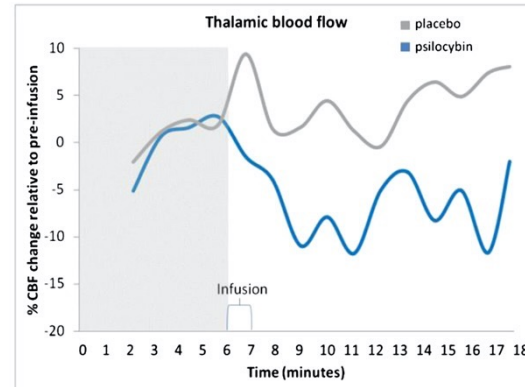
Results by ASL

This 1st experiment showed a significant CBF decreases in:

- Subcortical
- Cortical regions
- The decreases were localized to high-level association regions (e.g., the PCC and mPFC) and important connector hubs, such as the thalamus, PCC and ACC/mPFC.



Correlations



Method - BOLD fMRI

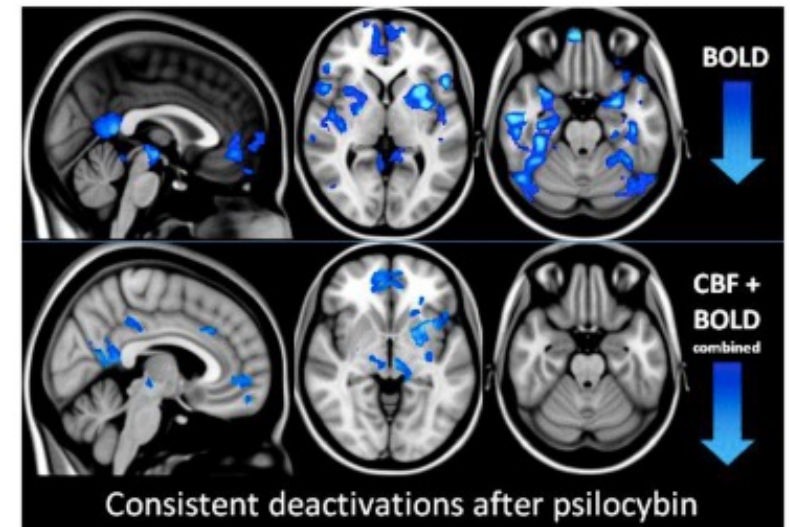
- 15 healthy participants, (two females); mean age of 32 (SD 8.9).
- The BOLD scans took place 6 months after the 1st experiment (ASL); participants were requested to do an «Eyes-closed task-free» that lasted 12 mins.
- This experiment took two visits
 - 14 days apart
 - Placebo and psilocybin were randomly given on the 1st or the 2nd visit

Results by BOLD FMRI

→ BOLD signal results were similar to scans with ASL.

→ Consistent decreases in **the mPFC, ventral PCC, putamen, and subthalamic nuclei** .

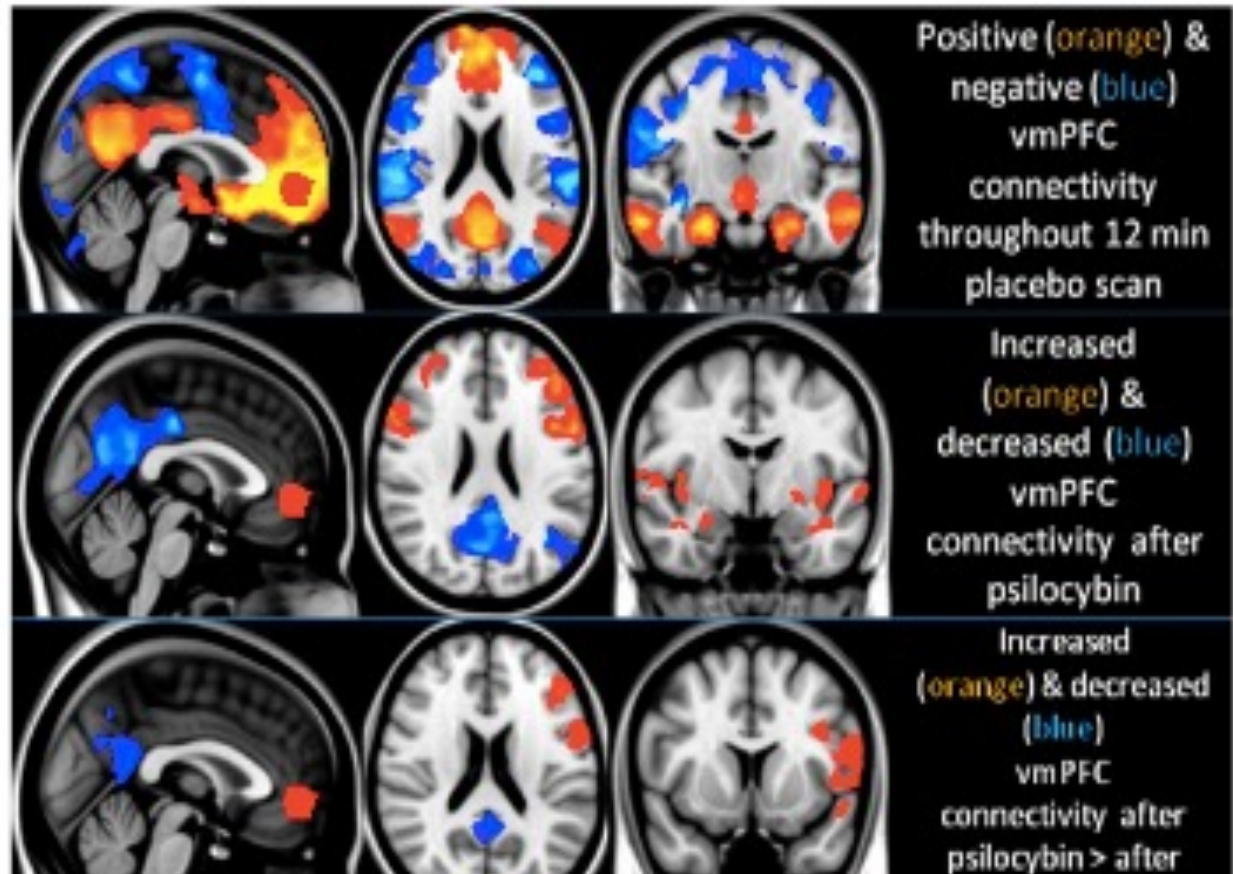
→ Also additional BOLD signal decreases (e.g., in higher order visual areas) that were not showed with ASL



PPI

Psilocybin-induced changes in vmPFC (red) functional connectivity.

- Regions where activity was positively coupled to that of the vmPFC are shown in orange
- Regions where activity was "negatively" coupled to activity in the vmPFC are shown in blue



Discussion

The results showed that:

- ✓ Desactivation on connector hubs of the DMN may explain alteration on consciousness.
- ✓ Decreases in the mPFC, ventral PCC, putamen, and subthalamic nuclei with ASL and BOLD.
- ✓ Psilocybin decreased blood flow in PCC by up to 20% in some subjects.

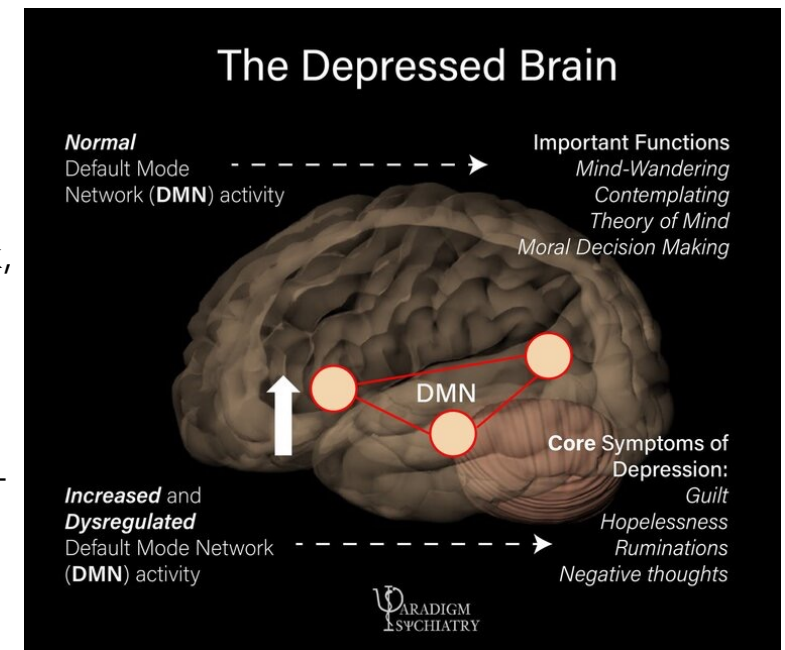
How could these results be relevant in therapy?

- There is some evidence that drug-induced alterations of self-consciousness may mediate therapeutic outcomes. (Millière and al. , 2018)
- Ego-dissolution, this mystical experience may help in therapeutic outcomes,.
- We can speculate that the disruption of these narratives may have some positive effects then.

How could these results be beneficial to mental disorder?

→ **Depression**

- DMN in depression has showed an overactivity;
- These results showed decreased activity on this network, therefore could be helpful to treat depression.
- Also, depression could be characterized to have a pessimistic trait . This trait has been linked to deficient 5-HT2A receptor (mPFC).



Source : Paradigm-psychiatry

Limits of this study

→ Duration of these drugs ?

→ Small sample ?

→ Biases of selectivity ?

→ Weak correlations ?

→ Standardize procedure ?

→ The other study that used PET did not show the same results on CBF-

Limits of these substance

→ It is not a solution for all mental health problems.

→ It is not recommended to people with predisposition of schizophrenia or bipolar to do this type therapy.

Thanks for your attention!

Perceptives of the future

→ Maybe research with DMT should be encourage.

→ More techniques should be used to do a research on psychedelics.

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