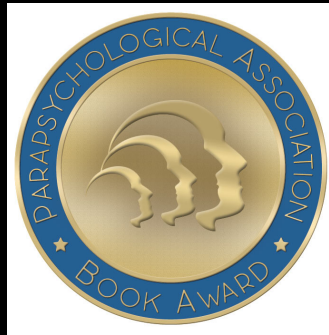
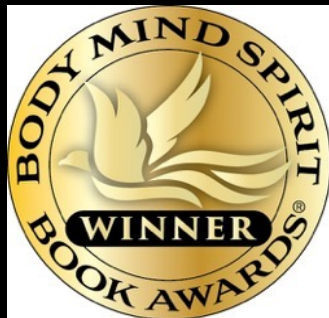


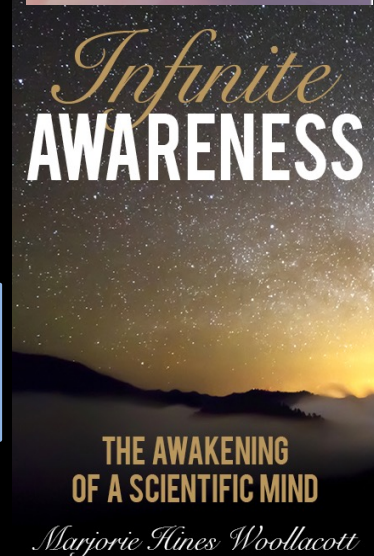
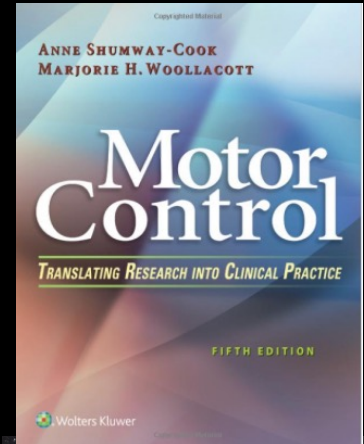
# Infinite Awareness: The Neurophysiology of the Mind-Brain Question



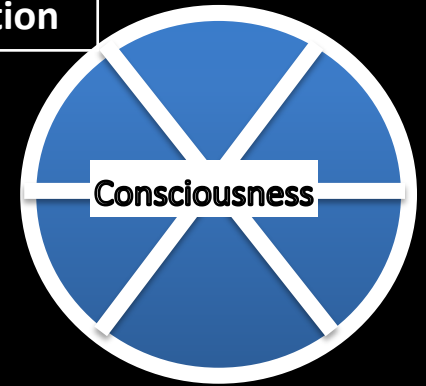
*Marjorie Woollacott, PhD  
Institute of Neuroscience,  
U. of Oregon*



Applied Precognition Project, 2023

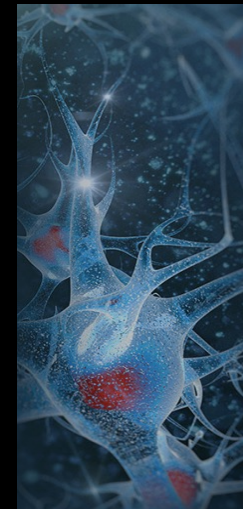
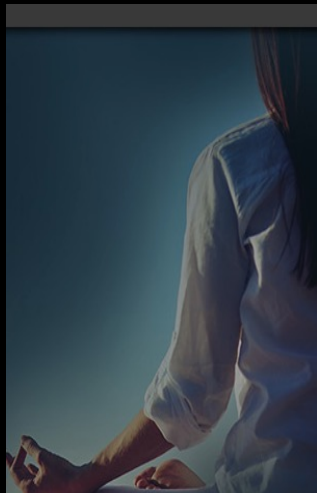


Meditation



# In 1976 I began to Meditate:

- Awareness of dimension of reality hadn't experienced before



A Chasm

# What Is the Normal Physiology of the Mind-Brain and What Happens to the Brain During Mystical Experiences?



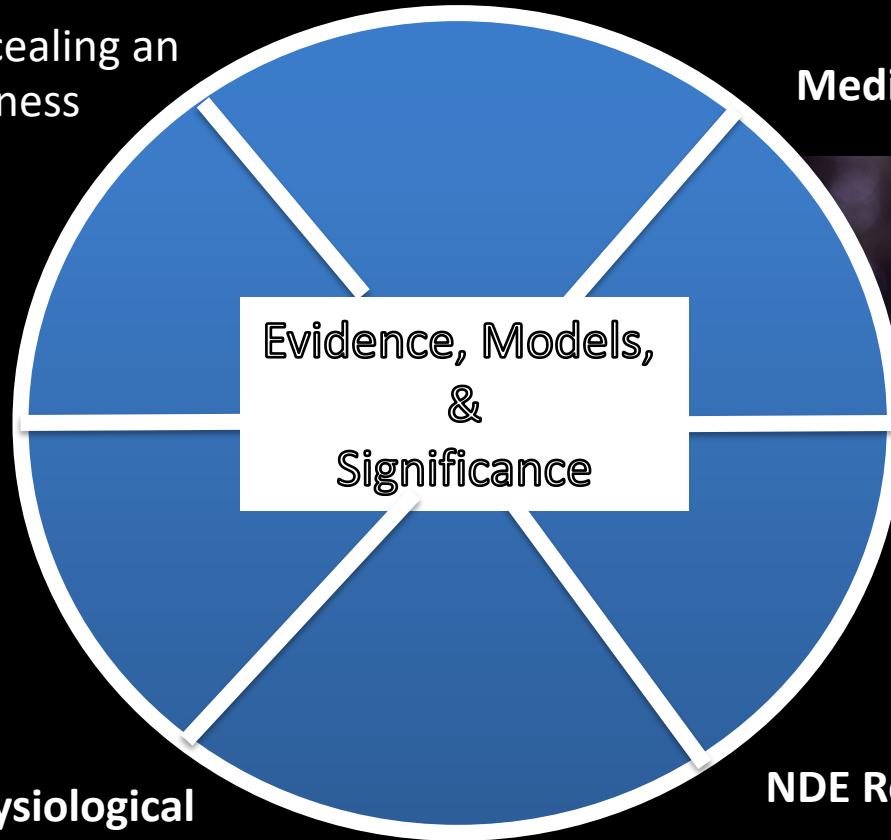
Brain Filters Concealing an Expanded Awareness



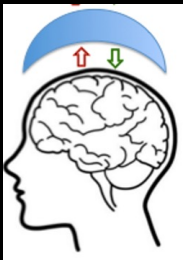
Meditation Research



Significance



Psilocybin Research



Neurophysiological Models



NDE Research

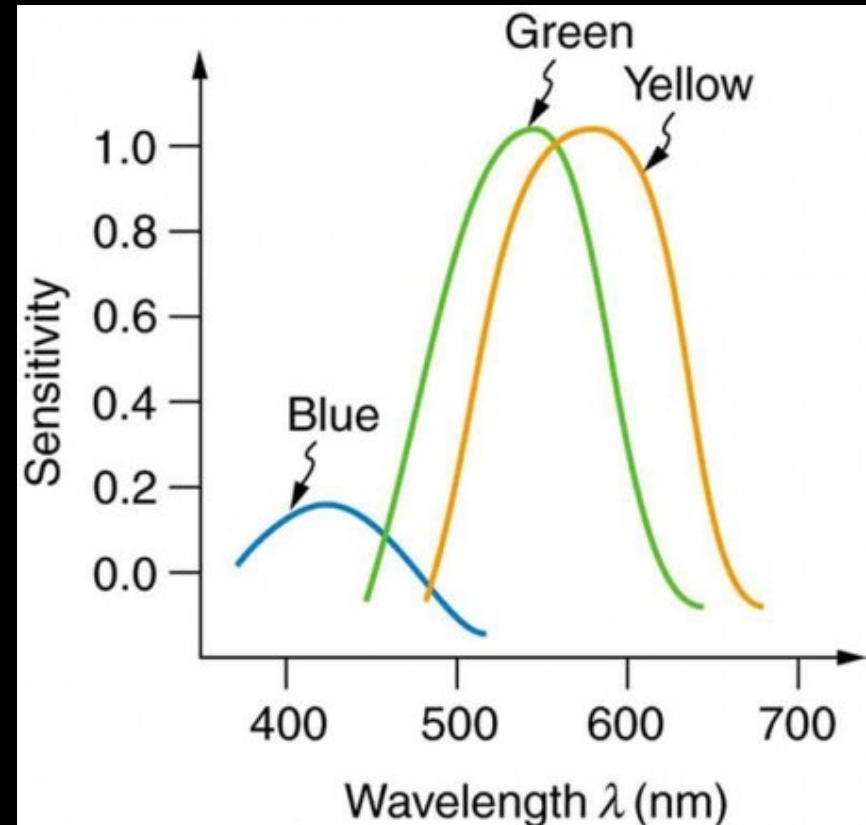
# Brain Filters:

## A Critical Aspect of Daily Life

- William James (also Myers, Bergson): the concept of filters (early 1900s) obscuring a more expanded awareness
- What are the filters?
  - Sensory Channels
  - Default Mode/Mind Wandering Network
  - Left vs. Right Brain Filters (seeing the parts vs. whole, language filters)
  - Thalamo-Cortical Loop

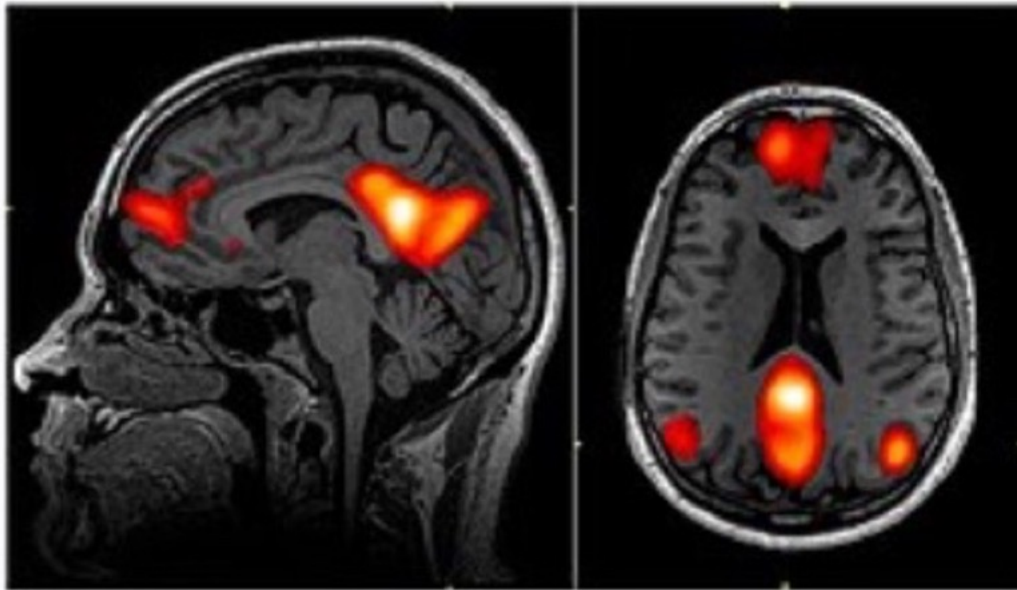
# Sensory Filters: Canalize and restrict our perception of the vibratory information around us

- Example: The pigments in visual receptors only pick up 3 ranges of wavelengths of the whole vibratory spectrum
- The same is true of all of the senses



# Default Mode or Mind-Wandering Network of the Brain: Considered by Many to Be the Source of Our Ego

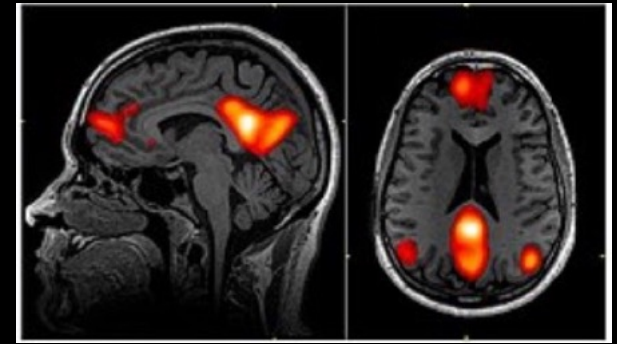
- Creates narrative or stories we tell about ourselves & others; source of ego, ID with thoughts, rolls we play
- In waking state highly active



fMRI scan showing regions of the default mode network

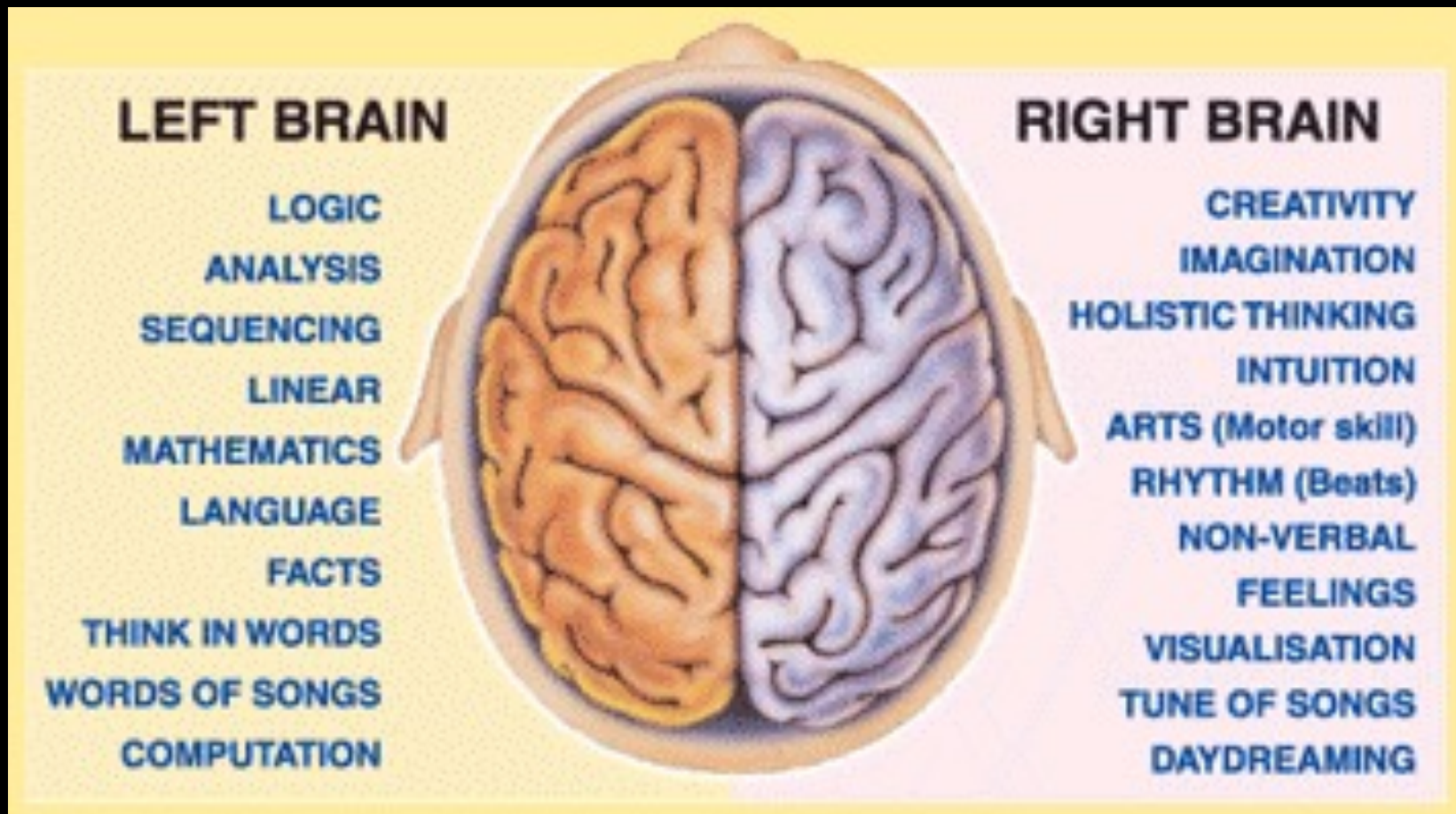
During normal thoughts

# DMN Influence



- **Filters out broader perceptual awareness**
- **What we experience is a small trickle of the information available from the universe.**
- **The more we're involved in egoic narrative, the less we see of the real nature of the world.**
- **During day-to-day living it is very active.**

# Left vs. Right Brain Filters: Left Br. Dominance may filter out holistic perceptions





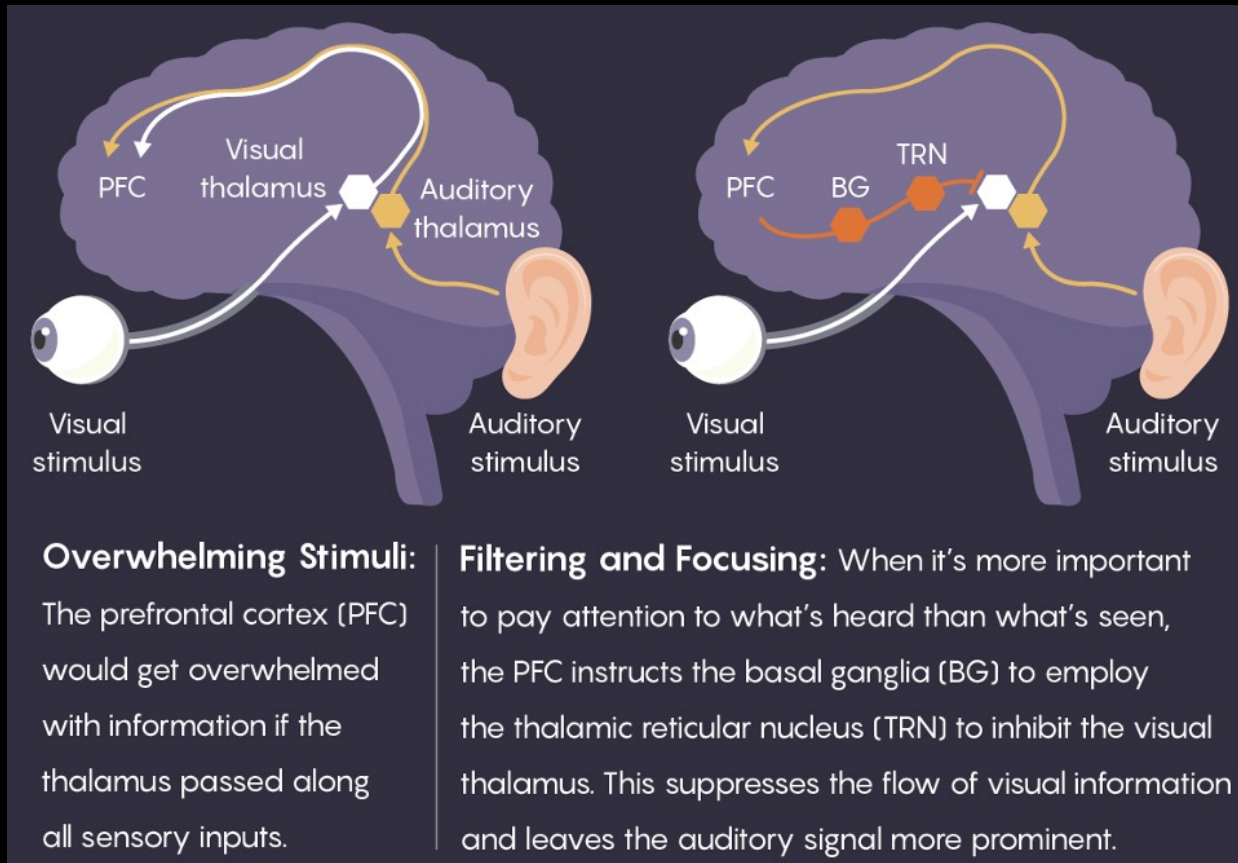
# A Dominant Left Brain's Influence



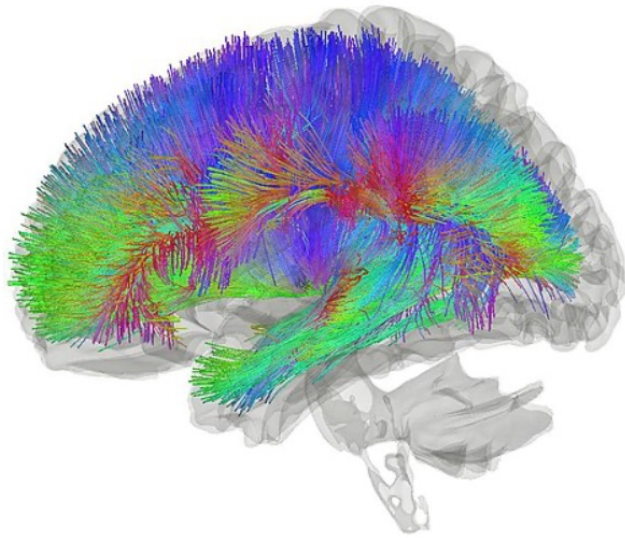
- L-hemisphere **language centers described as perceptual filter:**
  - **focus attention on particular aspects** of the world.
  - Helps some things stand forward – others recede
- Jill Bolte Taylor - Stroke to left side of brain, lost language centers:
- **“I shifted from the doing-consciousness of my left brain to the being consciousness of my right brain”**
- **“...from feeling small & isolated to feeling enormous and expansive”**
- **immediately after the stroke - lost many brain perceptual filters:**
  - **light was uncomfortable**
  - **sound “blasted her brain senseless”**
- She could not understand words, but became emphatic

# The Thalamus & Thalamo-Cortical Loop

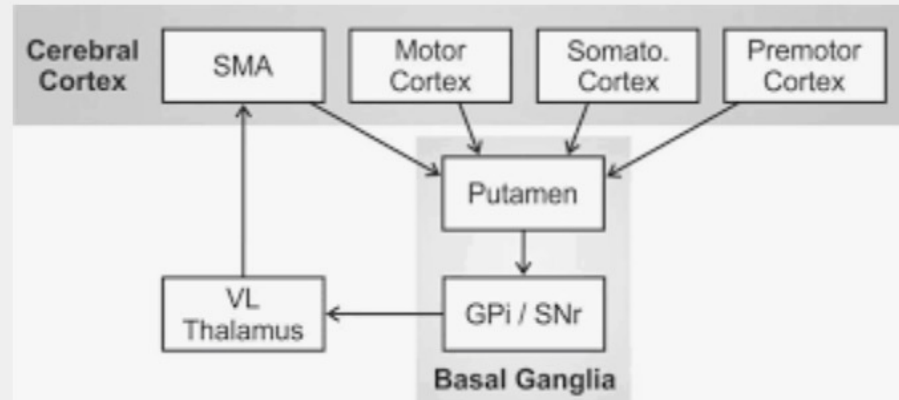
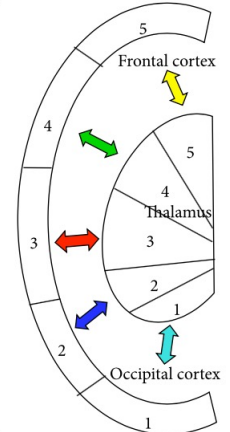
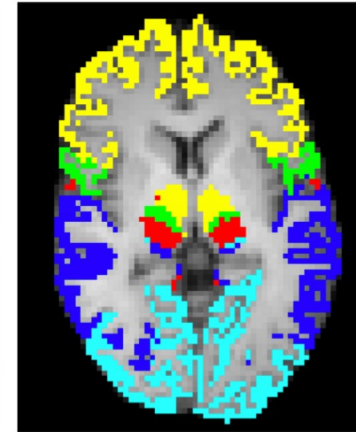
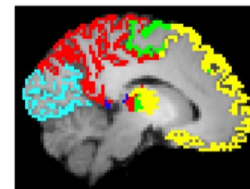
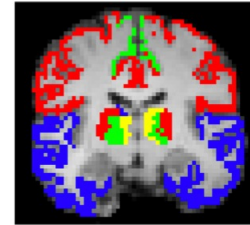
## Control What Part of the World We Attend to



# Reverberating Thalamo-Cortical Loop



Tractography of thalamocortical radiation



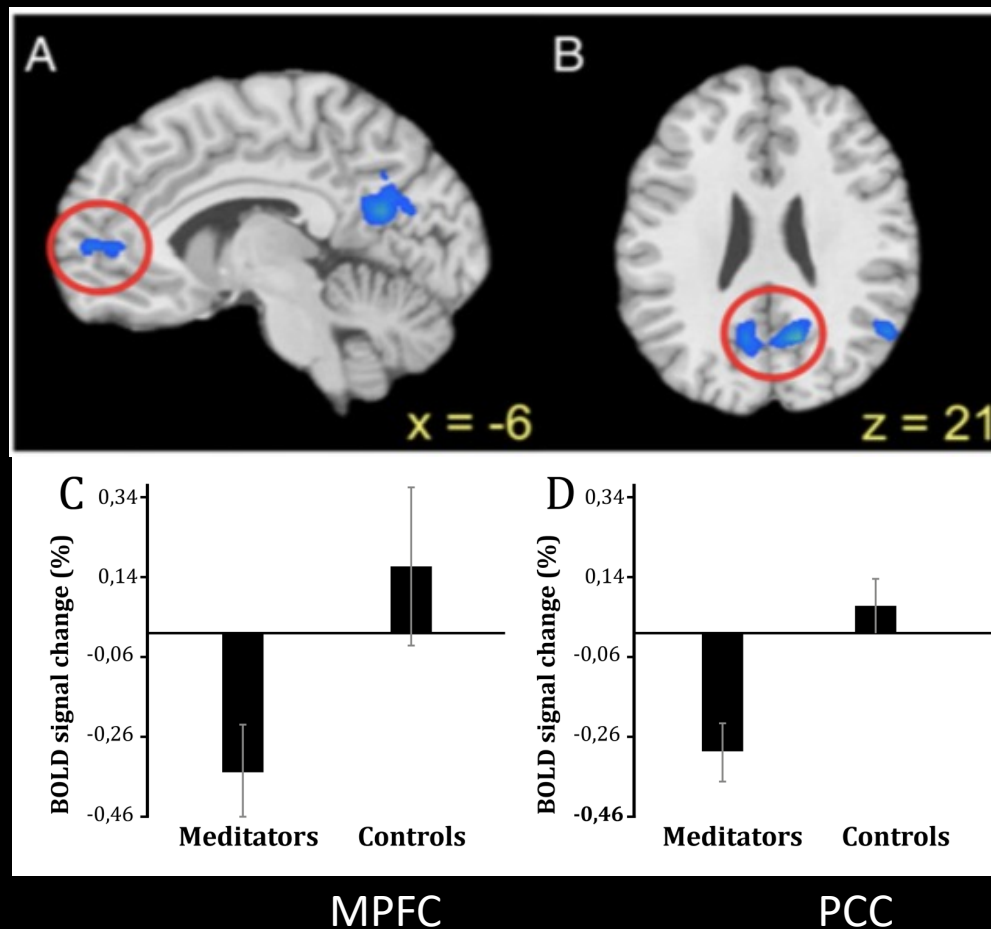
What happens in  
your brain when you  
are meditating?

# Case Study: Description of Perceptual Changes in a Meditation Practice



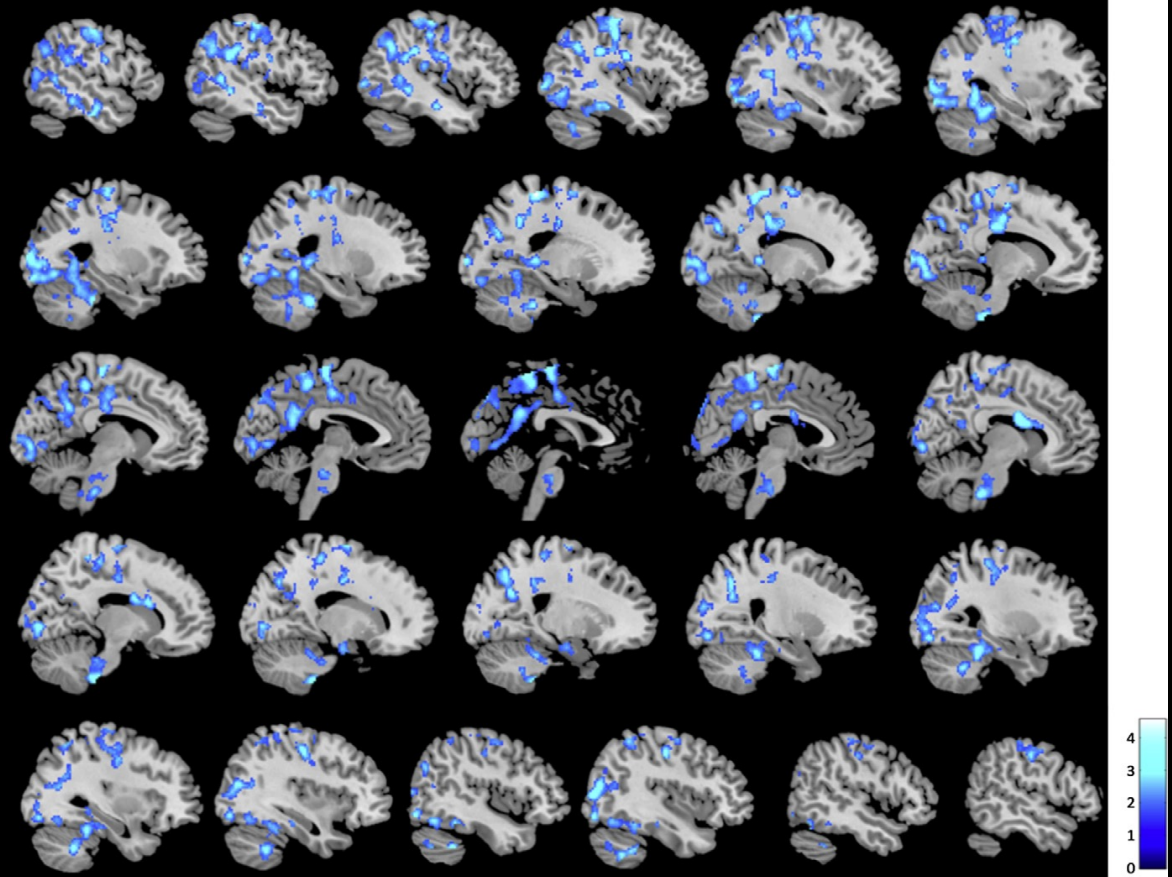
- Walsh, 1983
- The experience feels like having a faint but discernible veil removed from my eyes, and that the veil is made up of hundreds of subtle thoughts and feelings.
- Each one of these thoughts and feelings seems to act as a competing stimulus or “noise” that thus reduces sensitivity to any one object.
- Thus, after meditation, any specific stimulus appears stronger and clearer, presumably because the signal : noise ratio is increased.

What Does Research Say? There are significant reductions in two primary nodes of the Default Mode Network during deep experiences of meditation (Brewer et al, 2011)

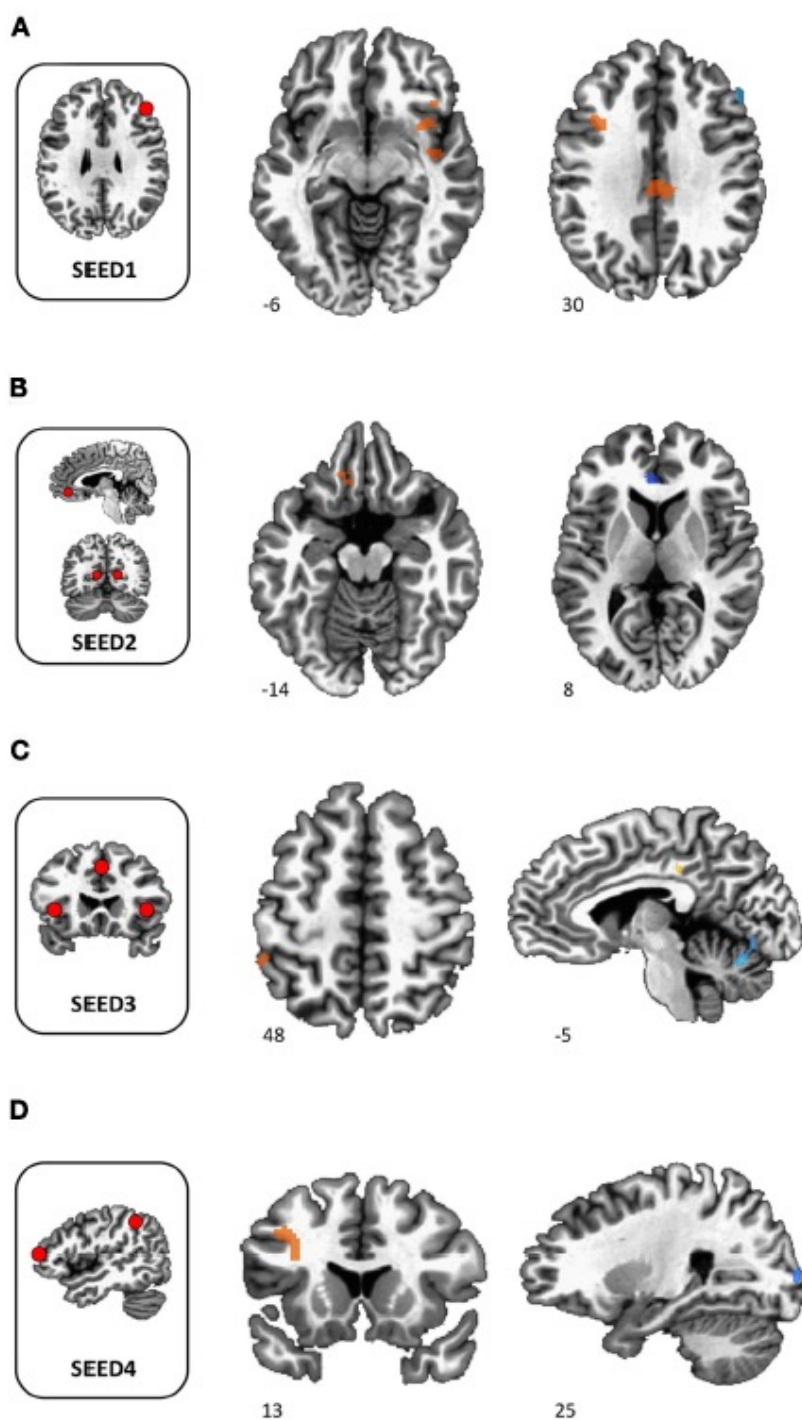


# Lower Activity in Wide Areas of Brain During Meditation in Meditators

- Garrison et al, 2014
- Meditators showed less brain activity in numerous areas throughout the Brain (lower BOLD signal) than novices.
- No regions showed more bold signal in meditators than novices



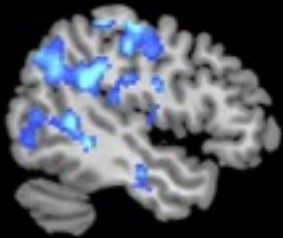
# Increased Brain Connectivity in Long Term Meditators



- Hasenkamp & Brasalou, 2012
- Participants with more meditation experience exhibited increased connectivity within attentional networks, as well as between attentional regions and medial frontal regions.



# What is the Significance?



Gives us direct correlations between states of mystical unitive consciousness in meditation and:

- activity reduction in brain areas acting as filters to expanded awareness (DMN, Language, many other parts)
- increased brain connectivity in attentional areas, helping maintain absorption, adding to the silence.

# Does Psilocybin Have Similar Effects? Cancer patients transformed by Psilocybin experience

Part of the Johns Hopkins University Medical Center  
clinical trial (Barrett & Griffiths, 2017)



# Example of First-Person Perspective: Mystical Experience in Psilocybin Research

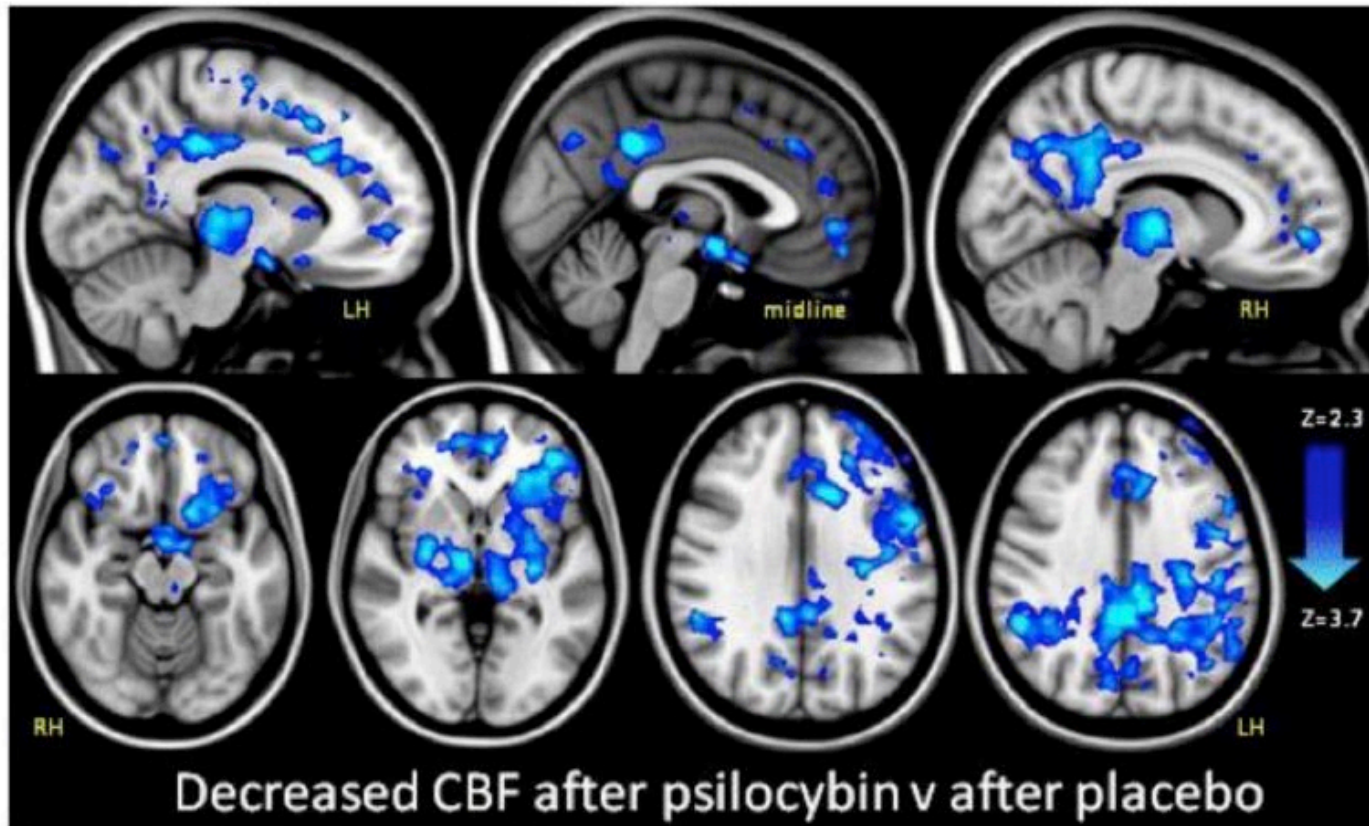
(Barrett & Griffiths)

The person said:

- In my mind's eye, I felt myself instinctively taking on the posture of prayer in my head.
- I bowed to this force.
- I was humbled and honored to be in this presence.
- It felt more real than any reality I have experienced....
- Time and space did not exist there.
- There was only this **feeling of unconditional and undying Love.**



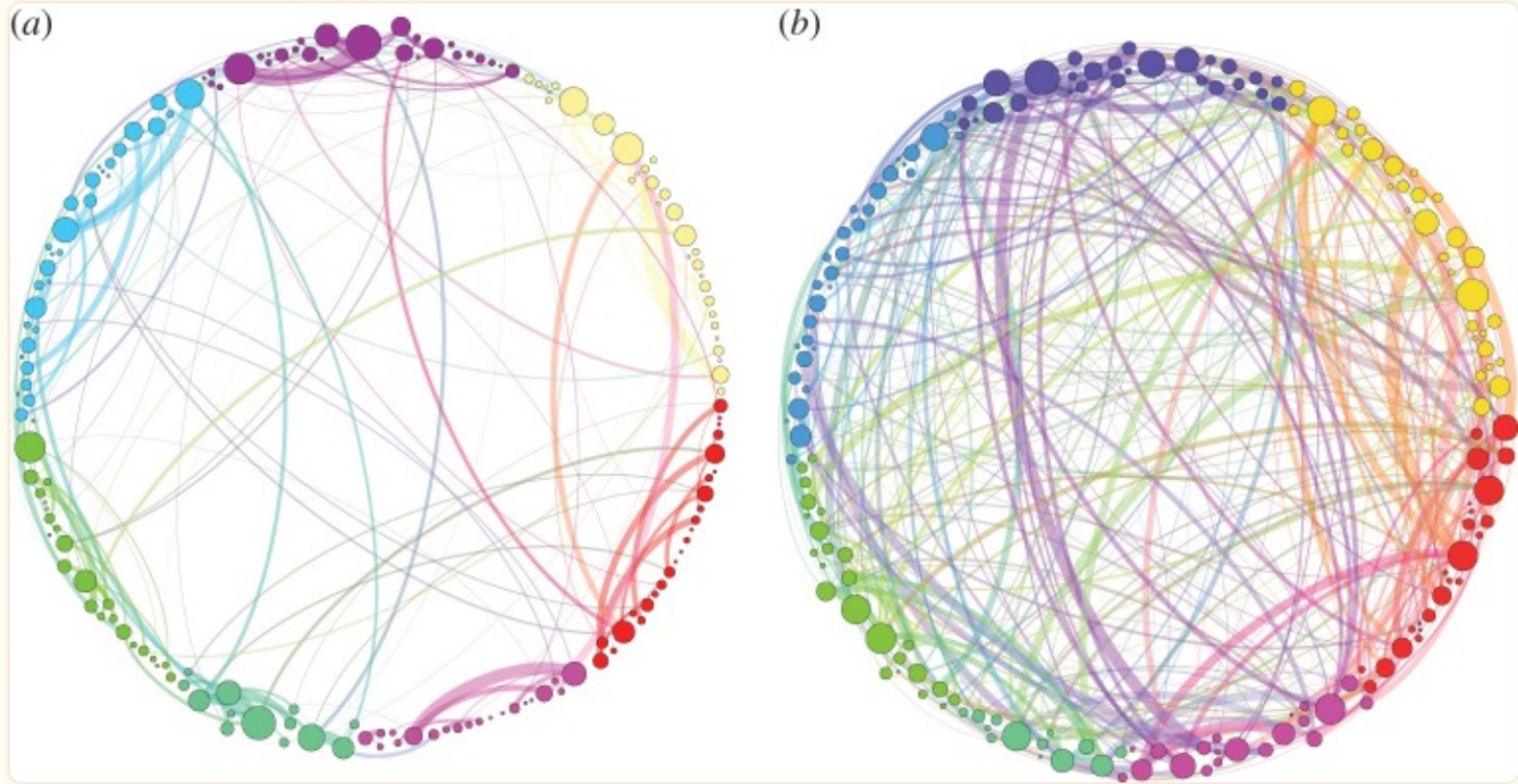
# Mystical States Associated w/ Psilocybin: Correlated with reduction in Brain Activity (Carhart-Harris et al, 2012)



# Increased connectivity with Psilocybin

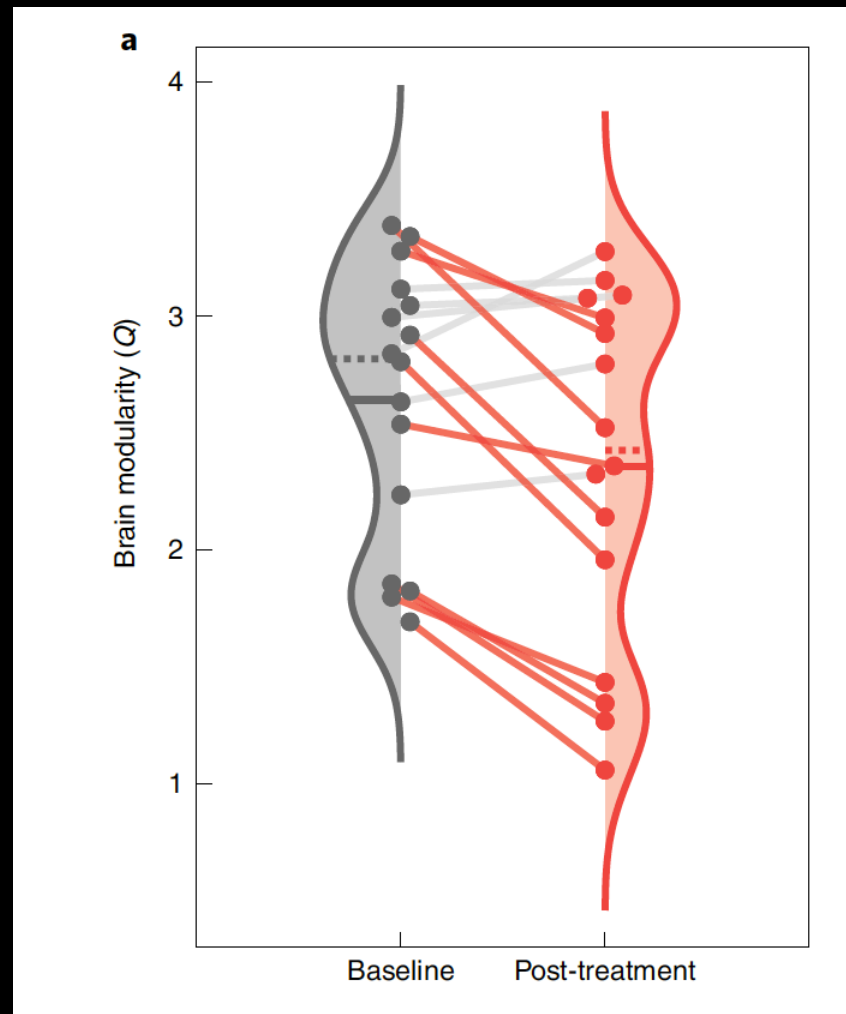
## Petri et al, 2014

Psilocybin promotes brain network integration at the organismal level



# Increased global integration in the brain after psilocybin therapy for depression

Daws et al, 2022, Nature Medicine



# Significance

- In 2 different mystical experiences w/ diff. triggering events, we see the same effect on brain activity
- There is Reduction in brain filter activity, esp. DMN
- There is a Decrease in DMN connectivity & Increase in brain connectivity w/ higher order networks: more integrated brain function
- More evidence for hypothesis: expanded awareness is assoc. with reduction, not increase in brain activity

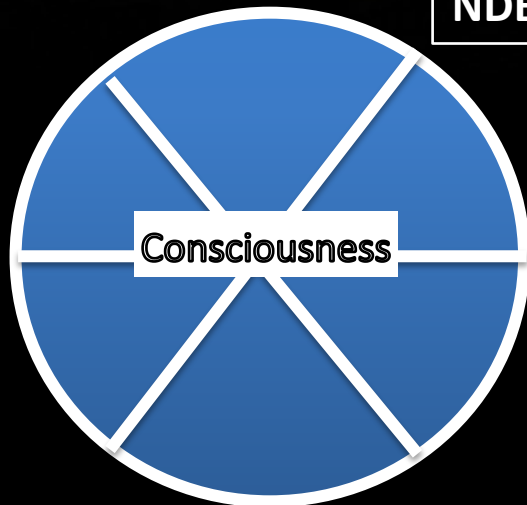


# Are Perceptual Filters Reduced in Near Death Experiences?



- Case Study: Bettina Peyton, MD

NDE Research





# Persistence of Filter Reduction in NDE

## Case Study: Anke Evertz (2020)



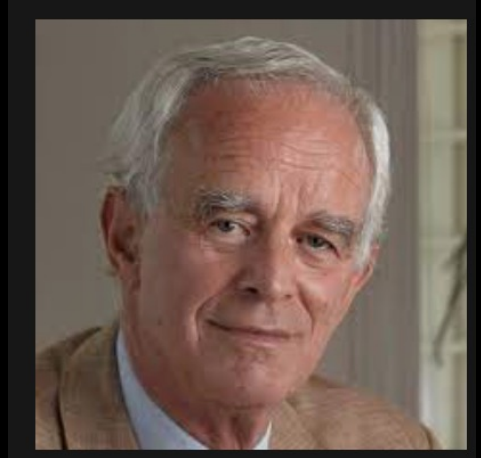
After NDE from severe burns: Brain filters substantially reduced:

- "In the beginning it was very difficult. My senses of hearing and sight were so sensitive. I sensed all the material and spiritual levels at the same time. I knew what my husband and son were feeling & thinking."
- "I was supposed to lie down on a pillow. But I couldn't take this pillow anymore because I could feel the pain of the geese that had been robbed of their feathers."
- "That's how I learned why the ego is developed, why we need this protective wall. If our senses were that open to everything, we wouldn't be able to focus on ourselves."



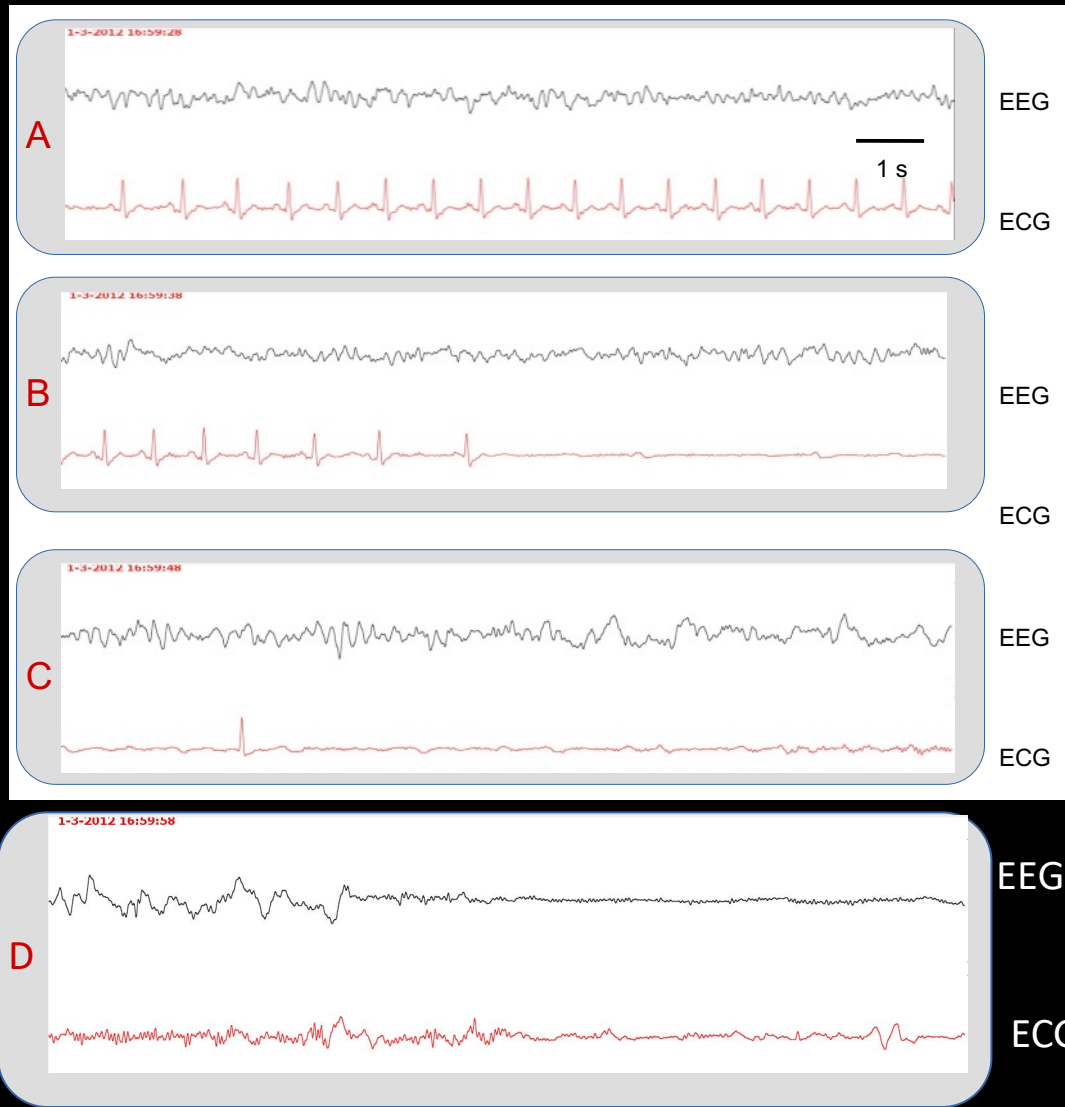
# Can Consciousness Exist w/o brain activity?

## 3<sup>rd</sup> Person Scientific Data



- Van Lommel et al., 2001
- Prospective study: 344 patients w/ cardiac arrest in hospital network. Flat EEG (no brain activity)
- 12% had NDE— ¼ watched and recalled events during cardiac arrest with no brain activity.
- “The thus far assumed, but never proven, concept that consciousness and memories are localized in the brain should be discussed. How could a clear consciousness outside one’s body be experienced at the moment that the brain no longer functions during a period of clinical death with flat EEG?”

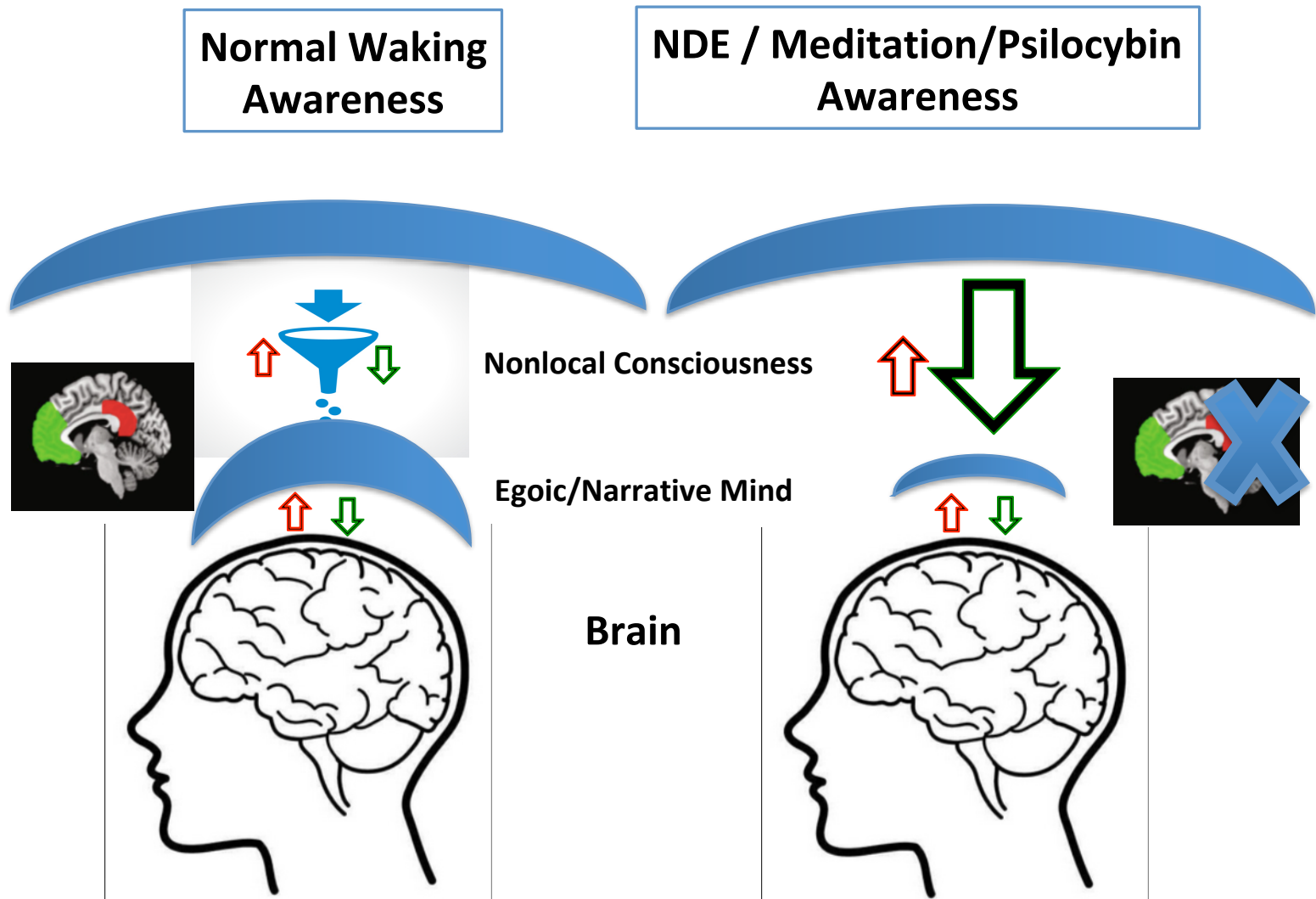
# Neural Data during NDE: Cardiac Arrest and Flat EEG (van Lommel)



**EEG and ECG  
registration  
during asystole  
= cardiac arrest**

**With the courtesy  
of prof. M. van  
Putten,  
neurophysiologist  
university Twente**

# What Models Can Explain These Data Related to Meditation, Psilocybin and NDE Effects?



# So what have we learned about brain correlates of expanded consciousness through examining meditation, NDEs, and psilocybin studies?

- Research in each area, both 1<sup>st</sup> & 3<sup>rd</sup> person perspective, give evidence that:
  - Activity of brain filters concealing wider consciousness is reduced/absent during mystical exper.
- Modern neuroscience supports theories of William James: mystical exper. open doorways to higher awareness through stilling filters, including
  - left-brain language filters
  - Thalamus, part of Thalamo-cortical loop
  - Default Mode Network (egoic ID)



How Can We More Easily Access  
These Expanded States of  
Awareness?

# The Mystical Experience and Its Neural Correlates

Marjorie Woollacott, PhD<sup>1</sup>, and Anne Shumway-Cook, PhD<sup>2</sup>

<sup>1</sup> *University of Oregon*

<sup>2</sup> *University of Washington*

*Journal of Near-Death Studies, 38:1, 3-25. Spring 2020*

**ABSTRACT:** Despite their different etiologies, three types of spiritually transformative experiences (STEs)—near-death experiences, psilocybin experiences, and meditative experiences of cosmic consciousness—appear to have attributes that are common to a broad range of mystical experiences, including an experience of expanded awareness. In addition, all three appear to be associated with profound and lasting transformations in the lives of experiencers. Finally, these three experiences appear to share some common neural correlates. In this article, we discuss similarities in case studies of these STEs, in data from controlled clinical research studies on their transformative effects, as well as from neurophysiological data correlated with the occurrence of the STEs themselves. In all three STEs, research shows a reduction in neural activity in the major centers of the brain, including the Default Mode Network, the foundation of egoic stories involving the narrative related to oneself and the world in which one lives. It is proposed that during these STEs, reduced neural activity in areas of the brain that normally act as a filter or reducing valve mechanism opens the capacity to expanded awareness, which is associated with lasting transformation in the lives of experiencers.