

The Mind Expanded

Psychedelics and the Brain: Insights from Neurobiology

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Mindfulness Center

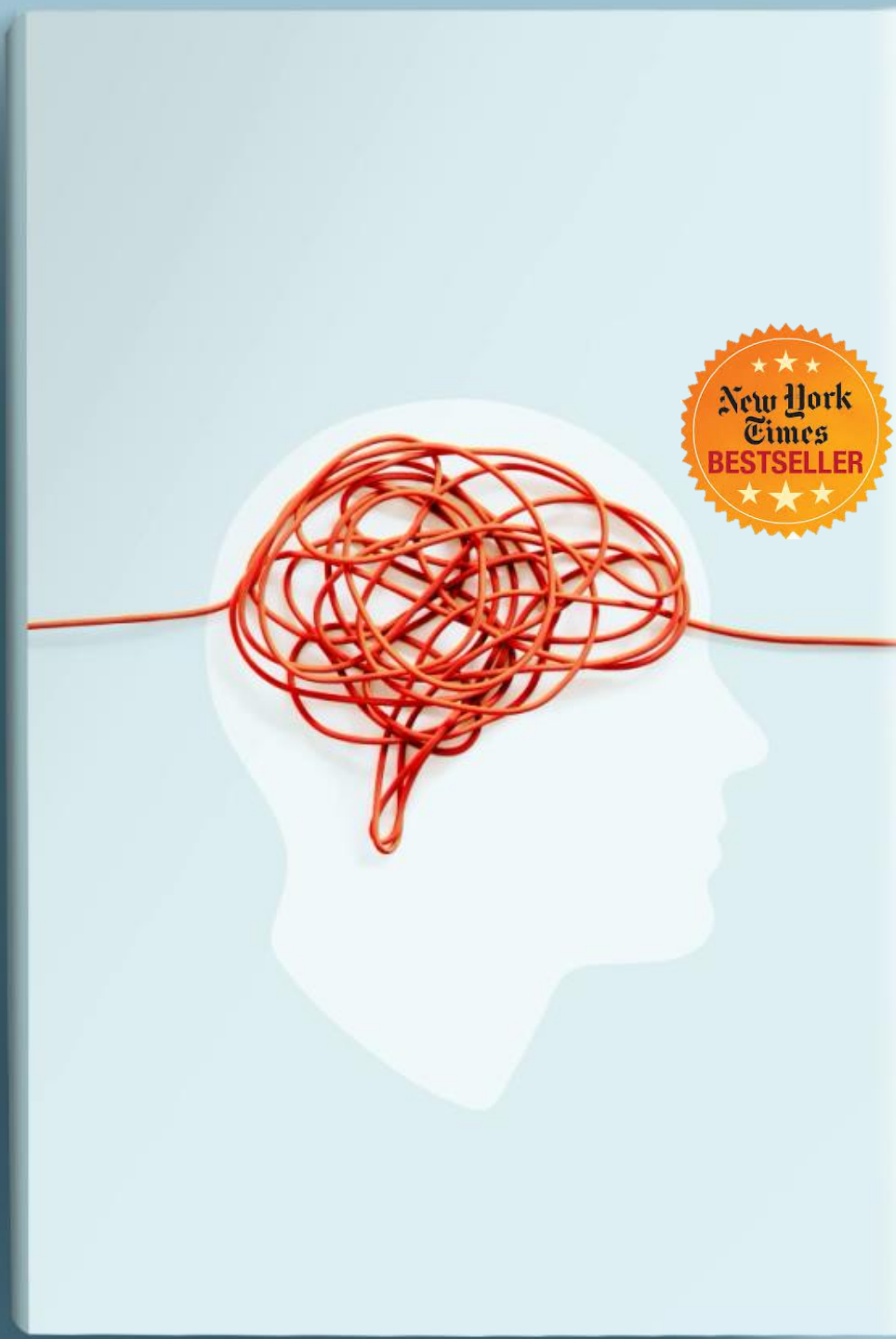


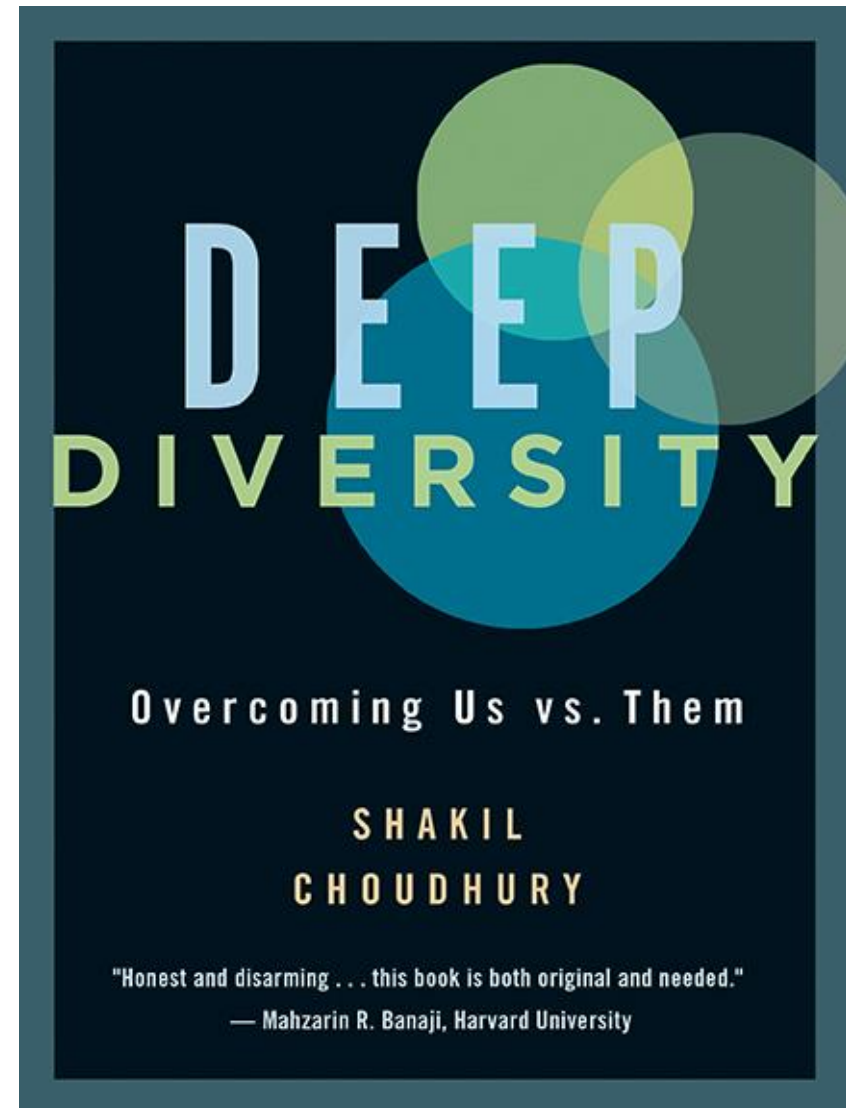
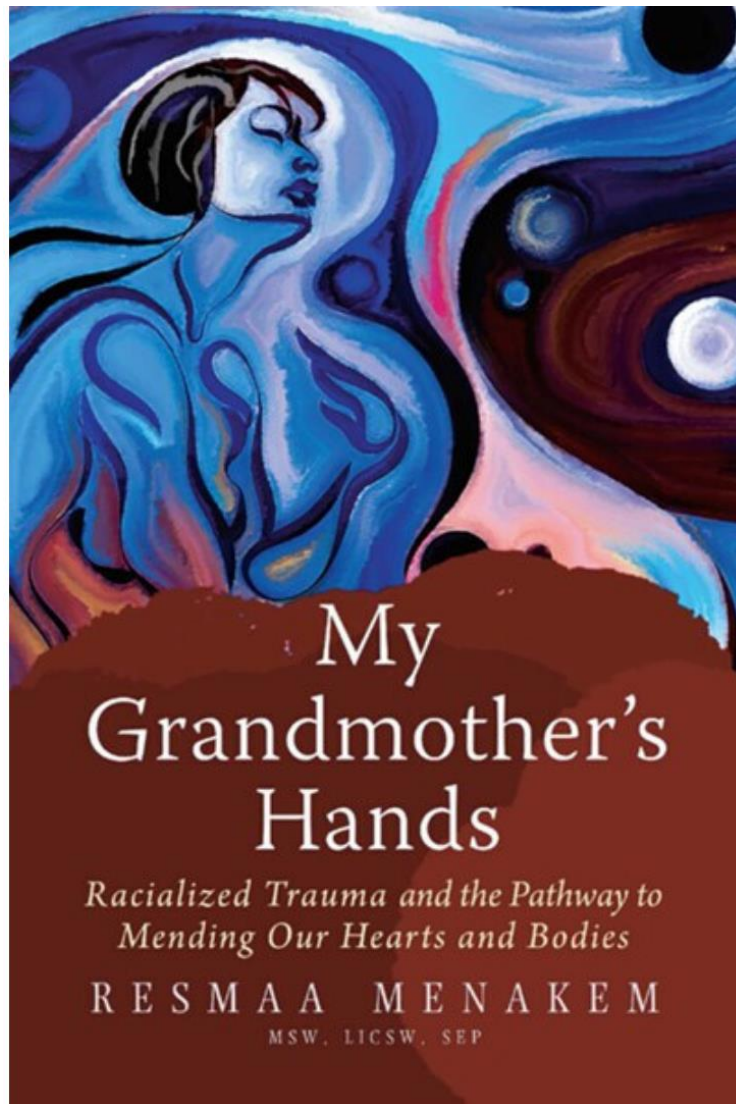
@judbrewer



Financial Disclosures

Dr. Brewer owns stock in, and serves as a paid consultant for Sharecare Inc. the company that owns the mindfulness apps described in this talk. The financial interest has been disclosed to and is being managed by my institution, Brown University, in accordance with its Conflict of Interest and Conflict of Commitment policies.

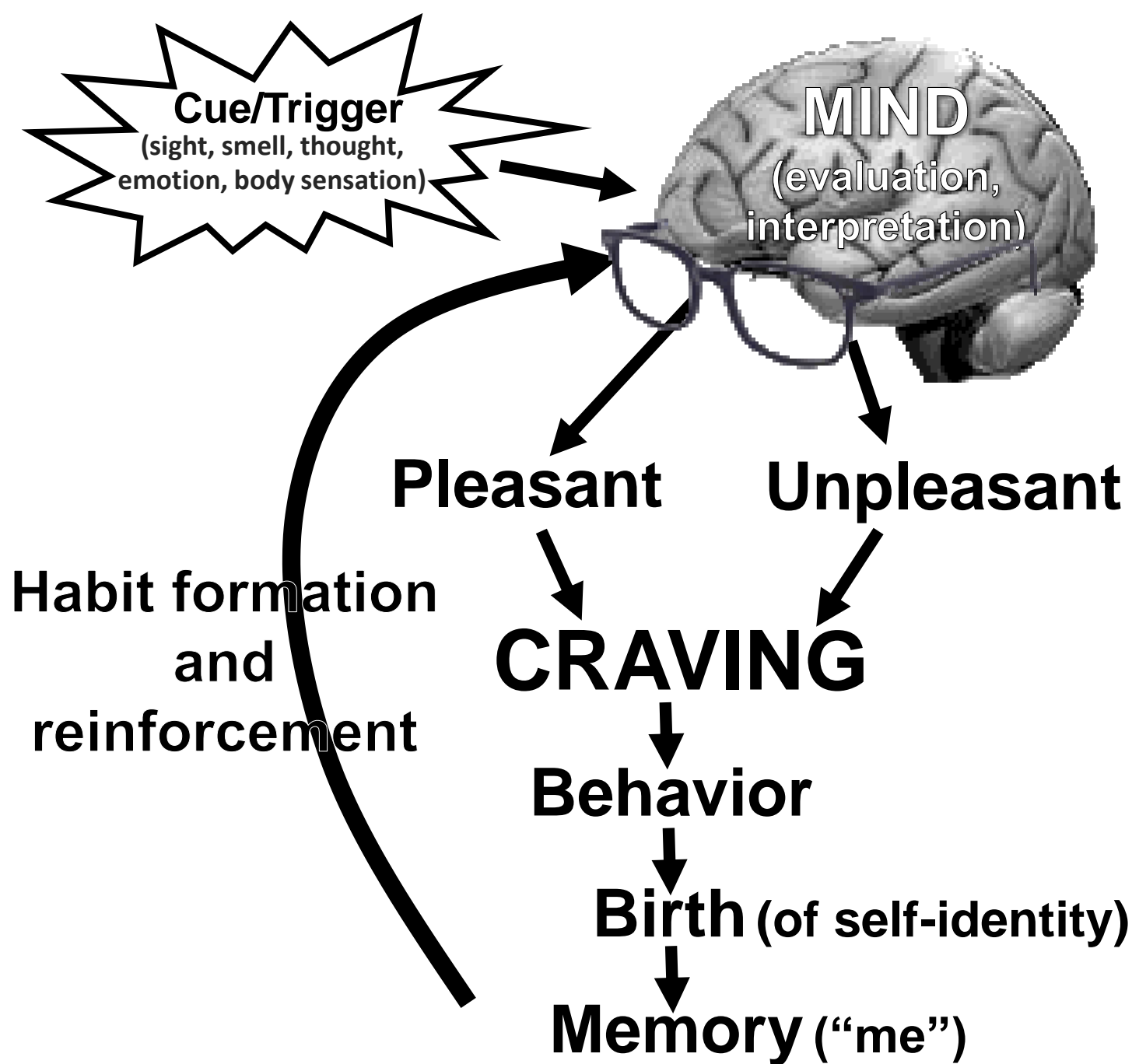




Podcast series: “Seeing White”

(E.g. Hoffman *PNAS* 2016)







Whatever a [person] frequently thinks and
ponders upon, that will become the inclination of
his mind



MN 19 “Two kinds of Thought”
(Bodhi trans)

//

Ego, the self which he has believed
himself to be, is nothing but a pattern of
habits

//

Alan Watts



Self-centered psychological functioning includes characteristics such as biased self-interest, egoism, egocentrism, and egotism.







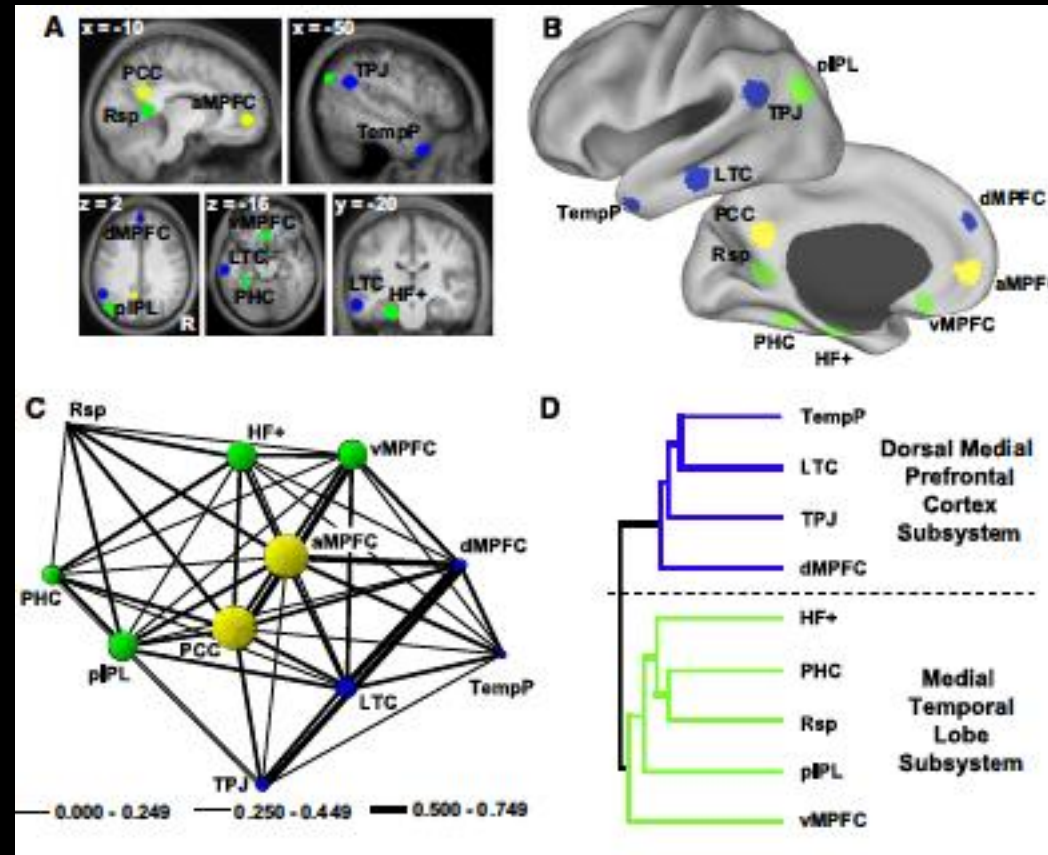


Your me is in the way



- Hui Hai

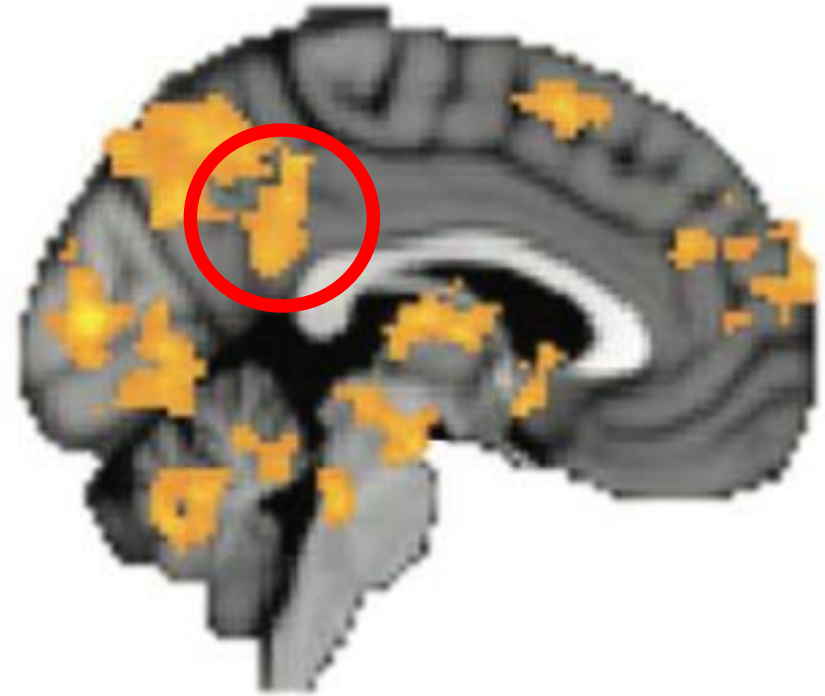
Default Mode Network (DMN)



Adolescents' Own Images

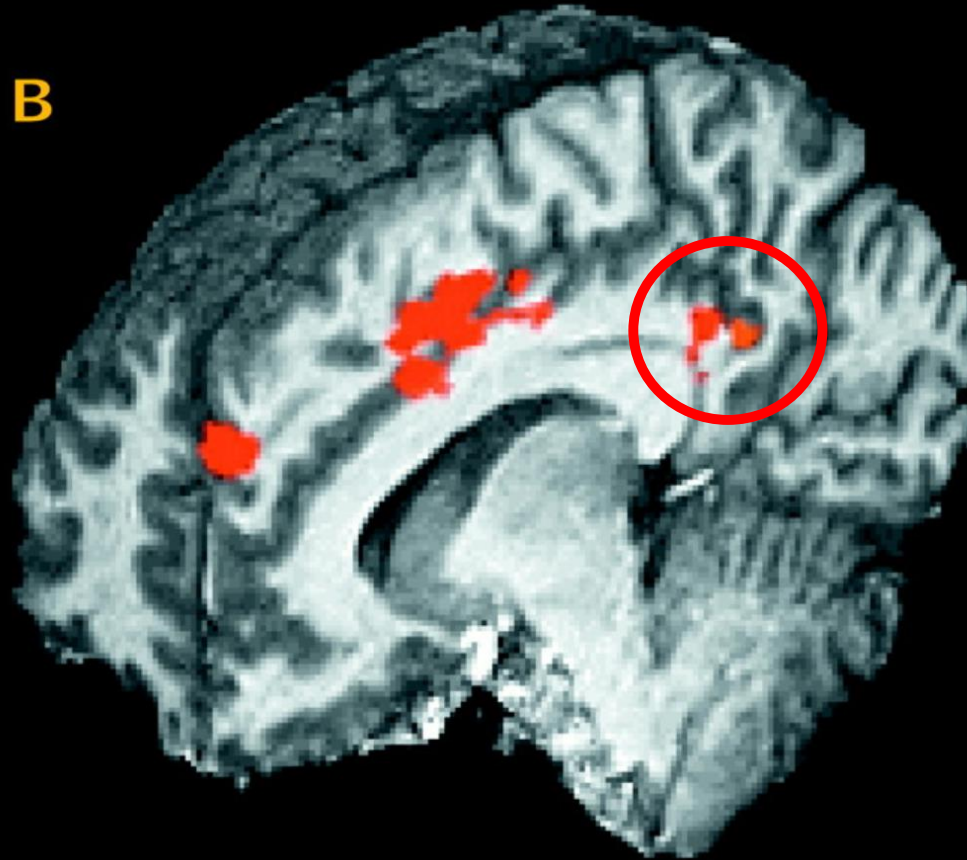
Many Likes > Few Likes

- Viewed simulated “Instagram” feed
- Brain activation was compared during viewing own images with many > few likes:
 - NAcc
 - PCC/precuneus



Sherman *et al* (2016)

Cocaine cue-induced craving activates the PCC

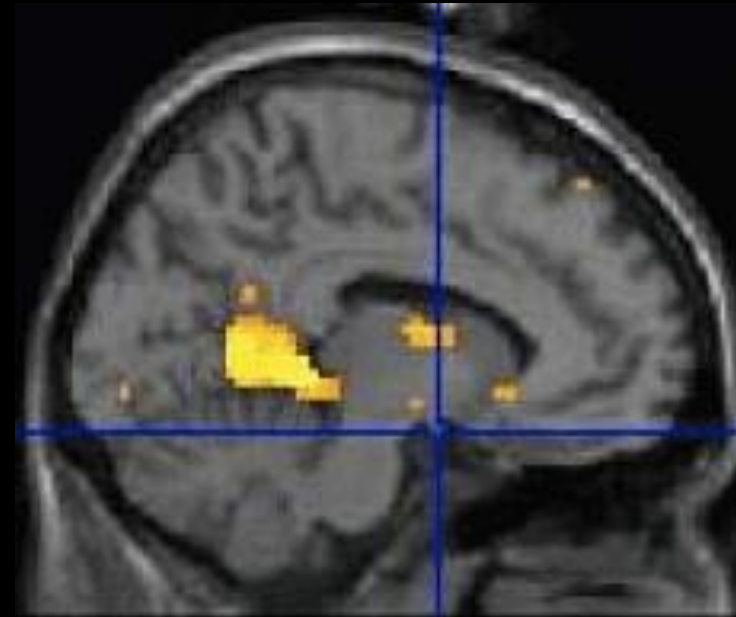


Garavan et al Arch Gen Psych (2000)

Viewing smoking pictures activates the DMN

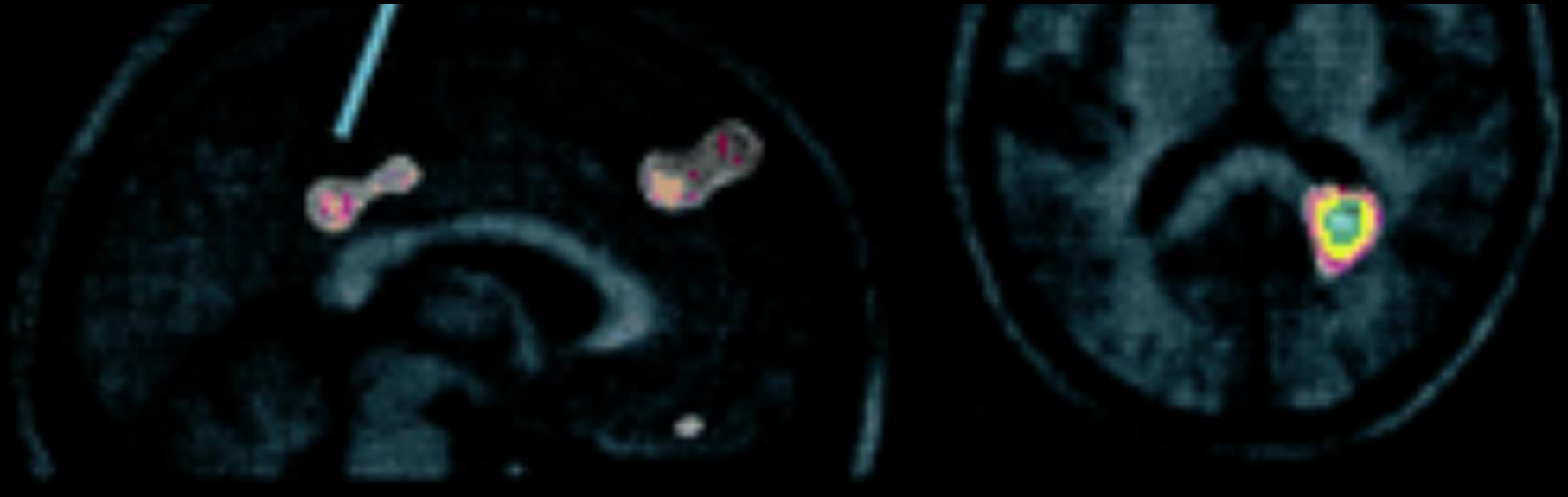
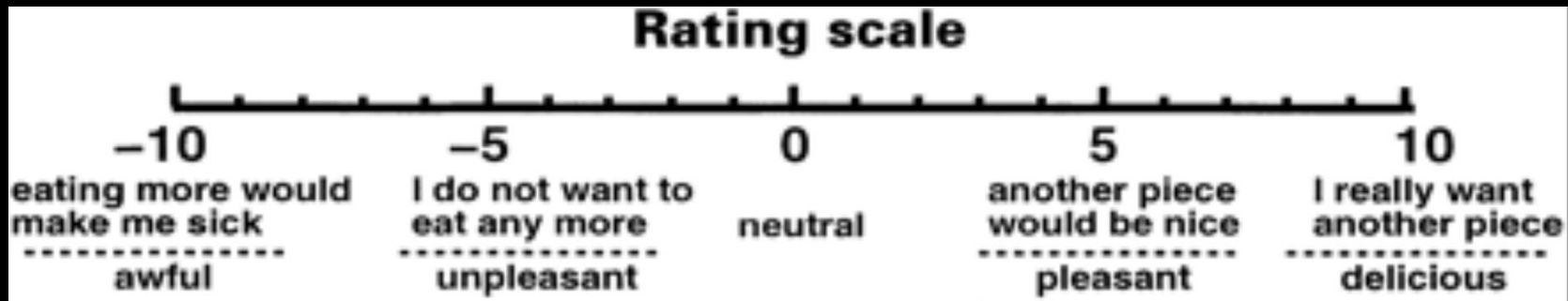


Viewing gambling pictures activates the PCC



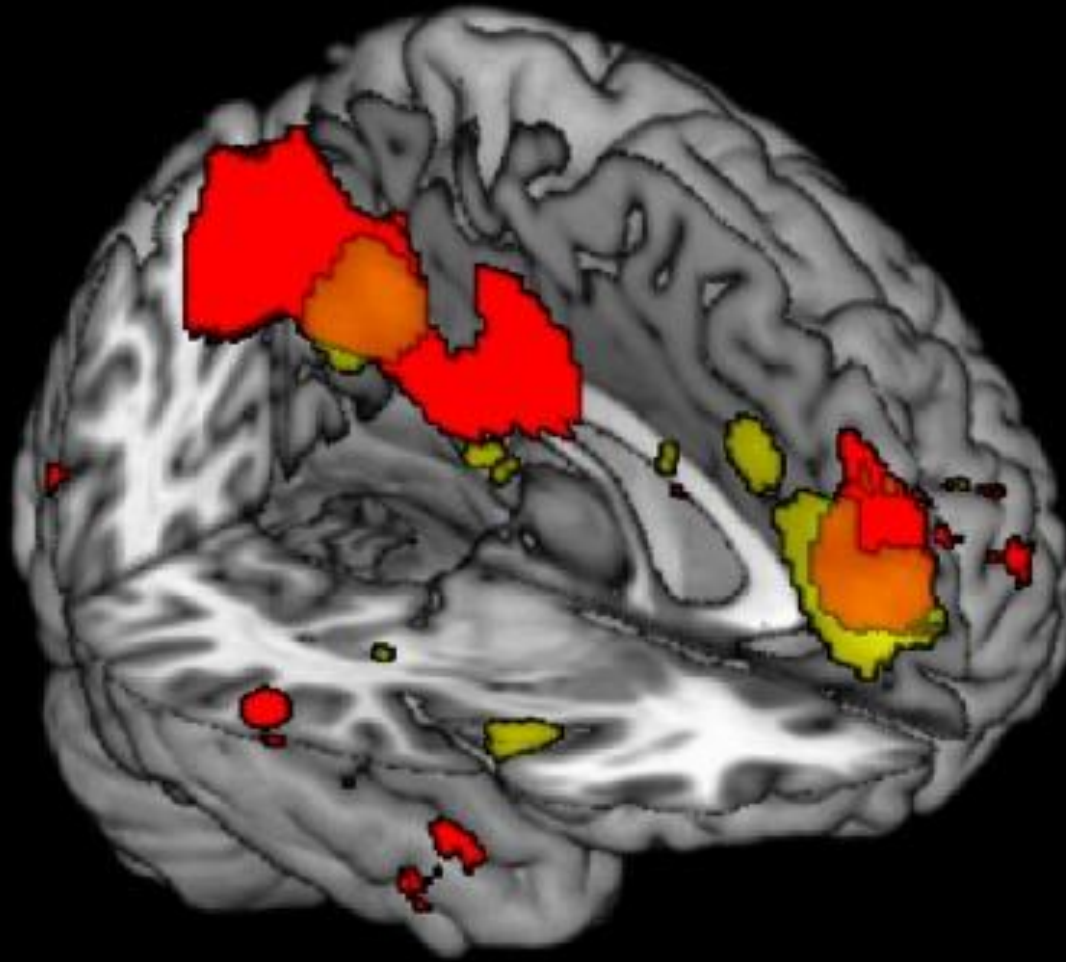
Goudriaan et al *Addiction Biology* (2010)

Wanting more, wanting less activates the PCC



Small et al *Brain* (2001)

Worry activates the PCC



Servaas et al *HBM* (2014)

The curious case of the PCC

- “Resting state” (Raichle 2001)
- Mind-wandering/Disruption of attention (Greicius 2003, Weissman 2006, Mason 2007, Li 2007, Eichele 2008, Wen 2013)
- Autobiographical memory, Past and future “self” (Schacter 2007, Andrews-Hanna 2010, others)
- Judgment about trait adjectives (Kelley 2002, Whitfield-Gabrieli 2011, others)
- Self-attribution in social situations (Cabanis 2013)
- Liking a choice you made (Jarcho 2011, Kitayama 2012)
- Prevention goals (Strauman 2013)
- Induced immoral behavior (van Veen 2009)
- Care and justice issues (Caceda 2011)
- Guilt (Morey 2012)
- Emotional processing (Peyron 2000, Maddock 2002, Zhao 2007, Gentili 2009, Bluhm 2012)
- Craving (Garavan 2007, Brody 2007, Jarraya 2010)

How do studies of the PCC converge?

- What about the self is processed in the PCC?
(Brewer, Garrison and Whitfield-Gabrieli, 2013)
 - “getting caught up” in experience? (Garrison et al 2013)
 - Experiential self?
- mPFC –conceptual self? (Qin 2011)

The “Caught Up” Continuum



DAYDREAMING

STRESS

ADDICTION

Fear



Anxiety





Self-centered psychological functioning includes characteristics such as biased self-interest, egoism, egocentrism, and egotism.

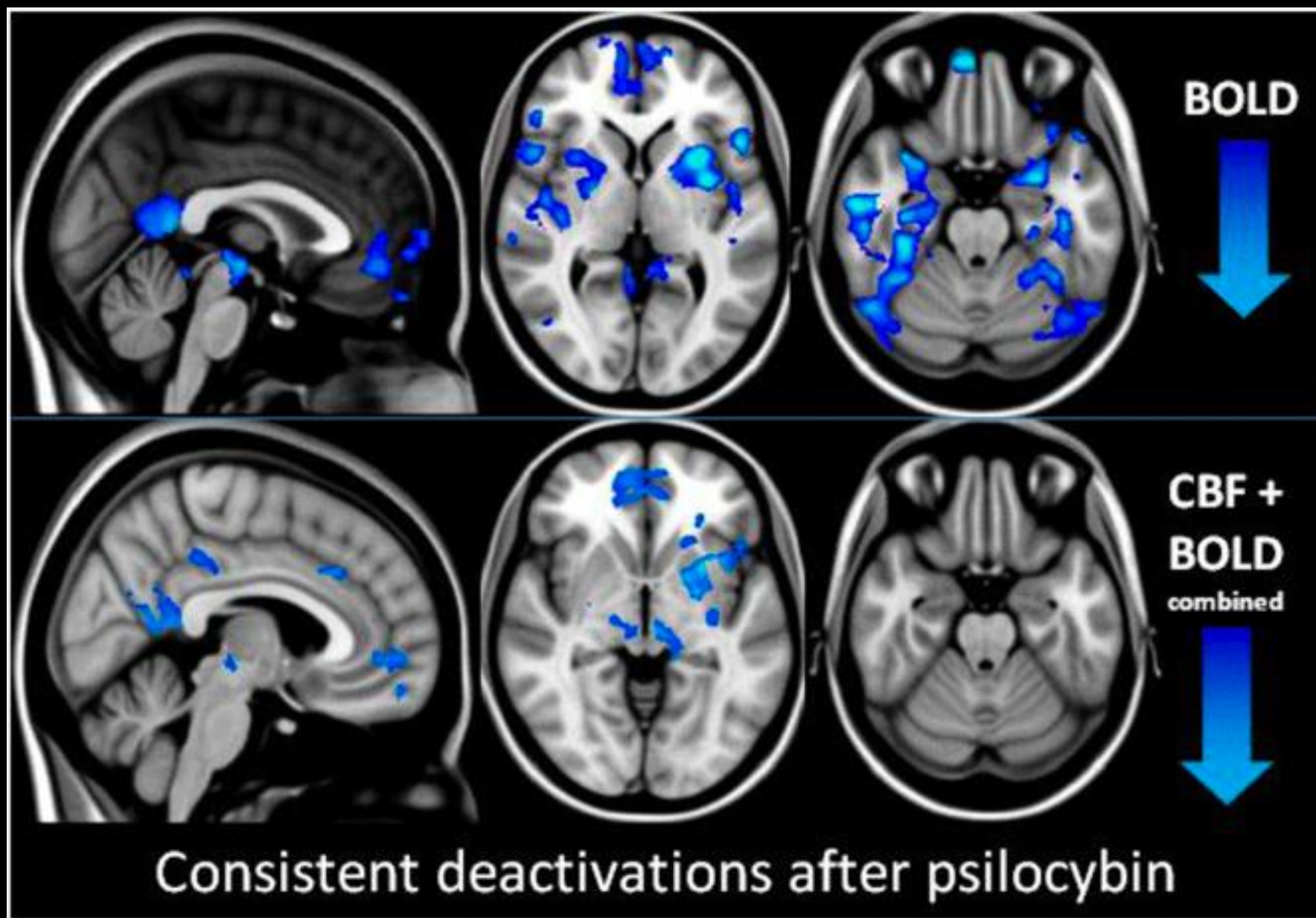
In contrast, we use the term “selflessness” to qualify the self’s alternative psychological functioning. It is characterized by low levels of self-centeredness and a low degree of importance given to the self (i.e., not exaggerated). This style of psychological functioning is closely related to characteristics such as altruism, kindness, respect, empathy, compassion



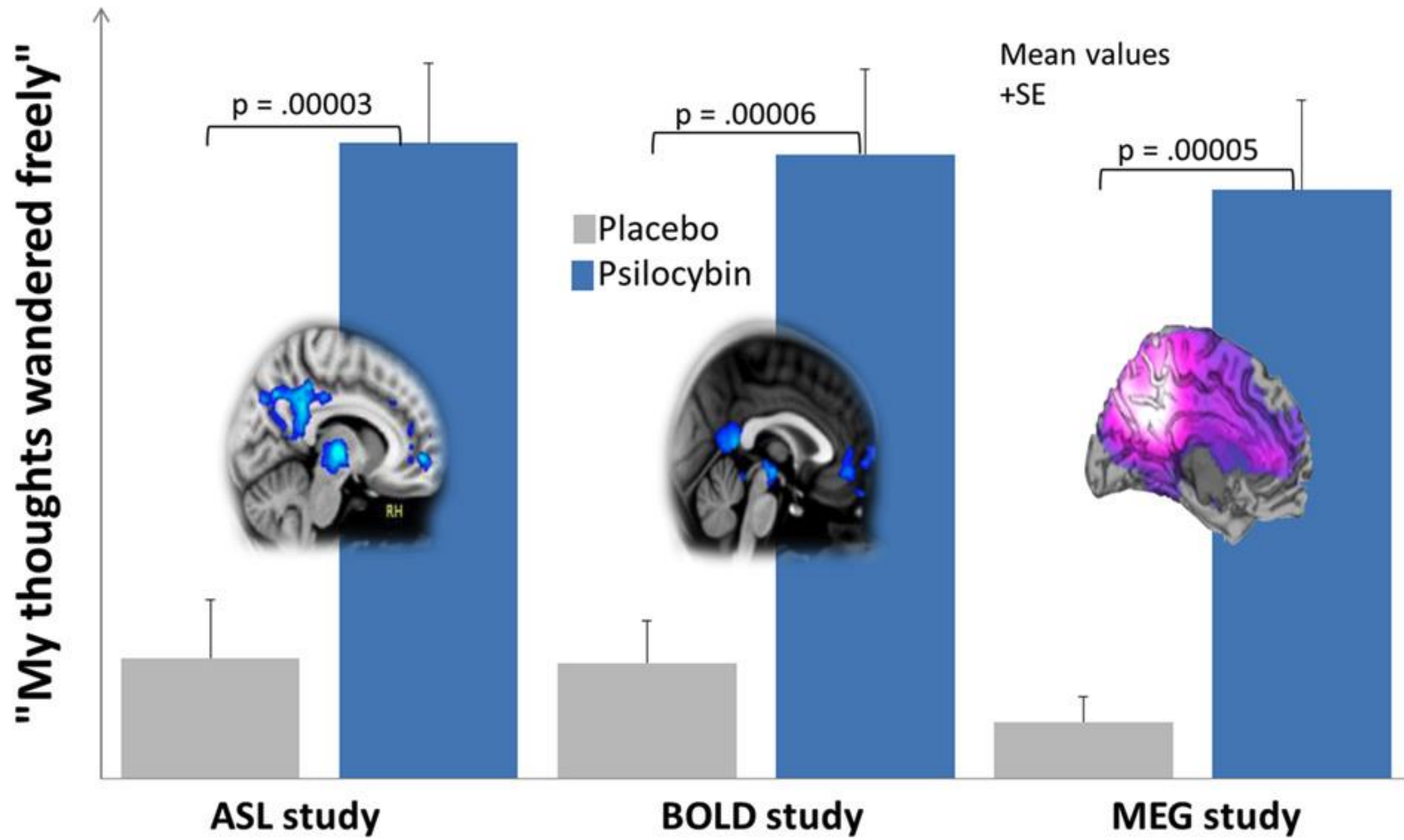
Task of mindfulness training?

Get out of your own way

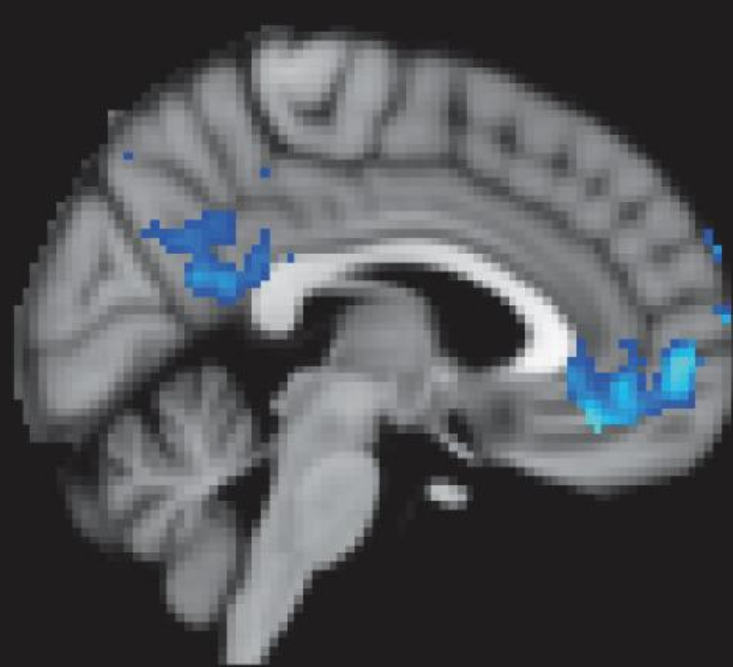
(Don't get caught up in yourself!)



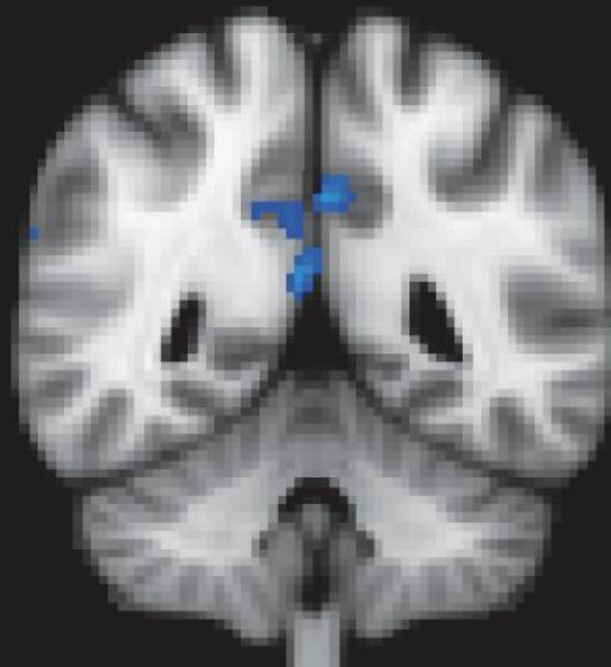
Psilocybin promotes an unconstrained style of cognition



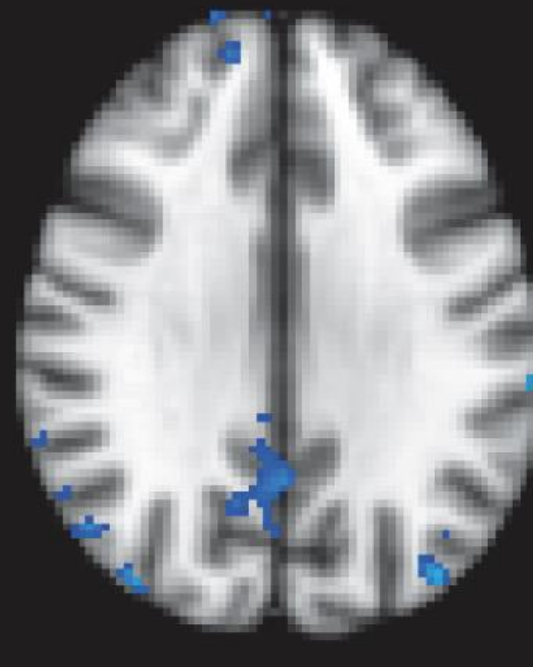
Ayahuasca decreases DMN activity (verbal fluency task)



x = 4

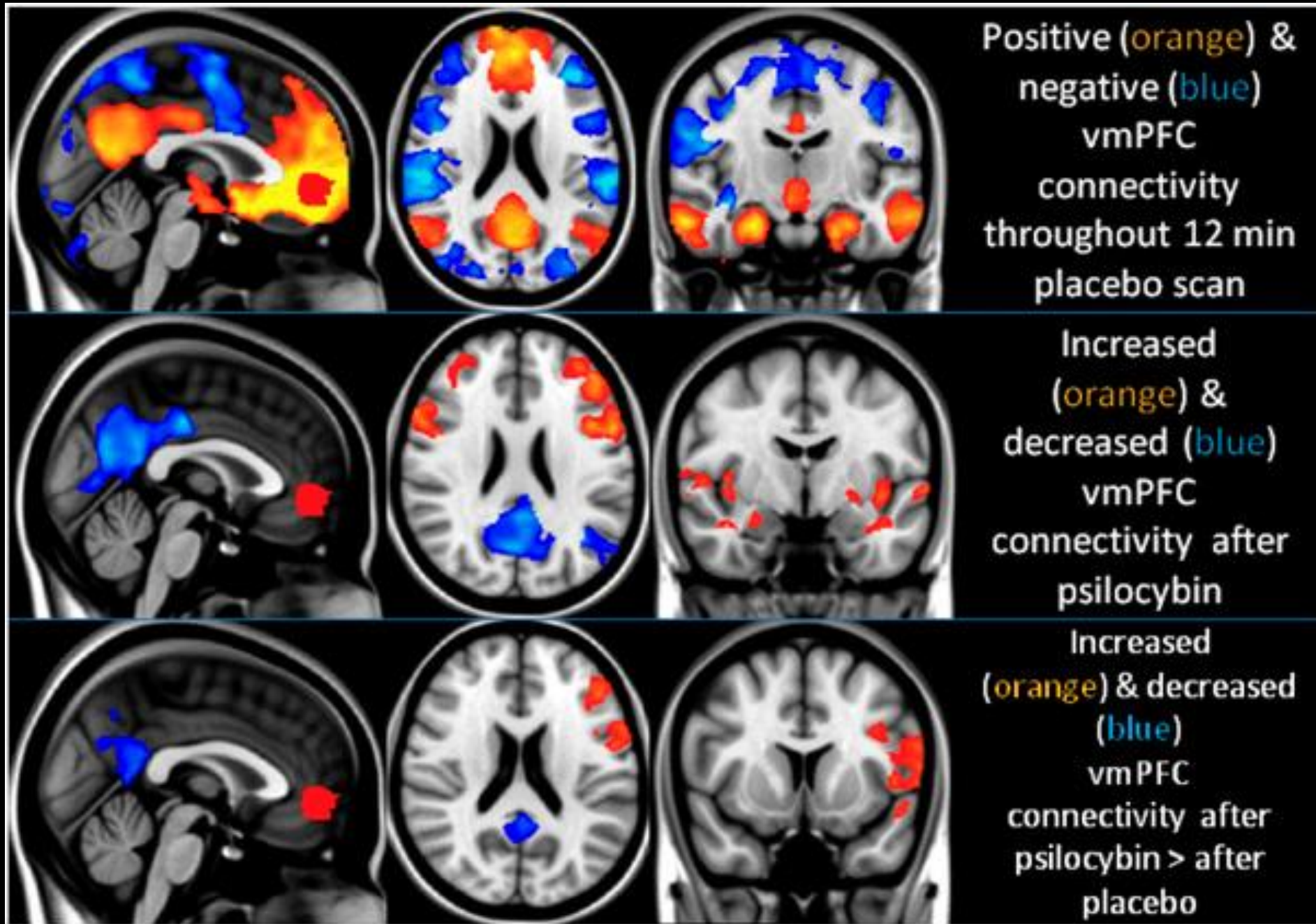


y = -48

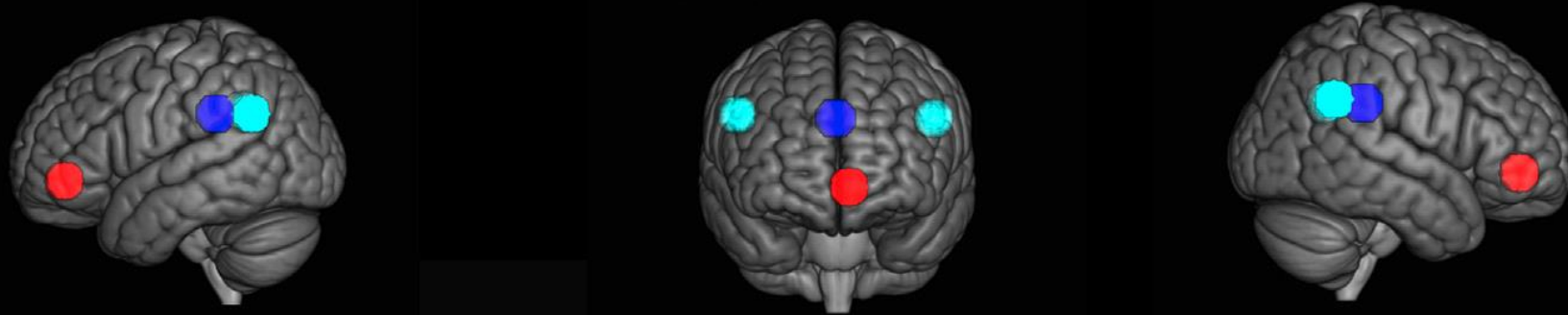


z = 30

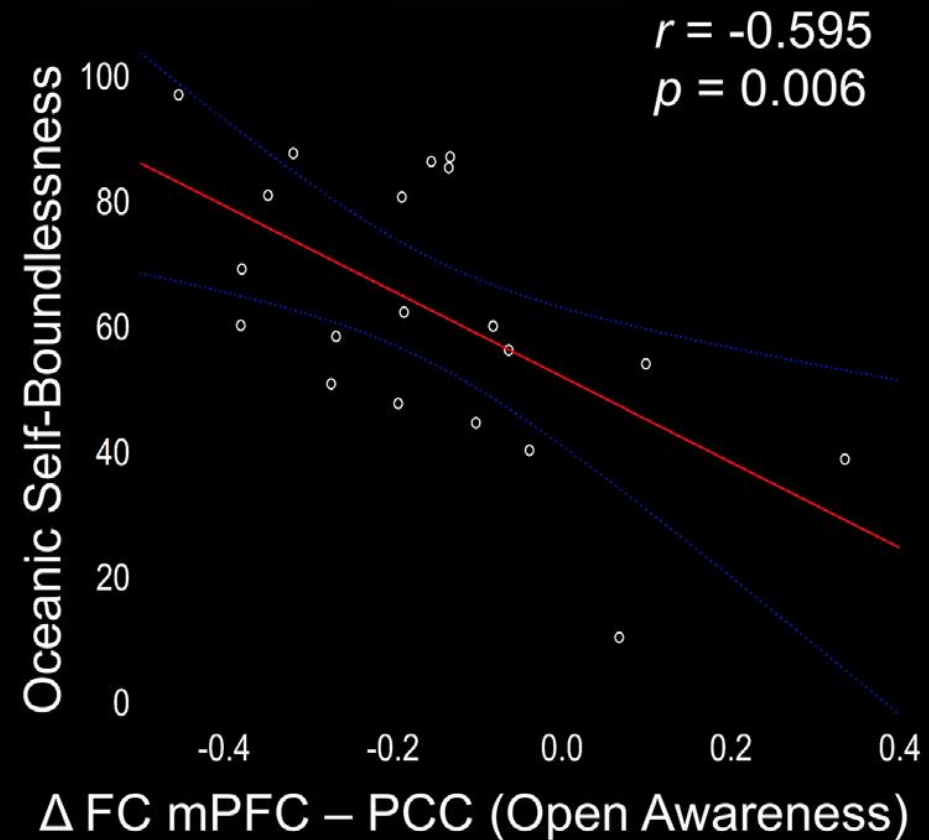
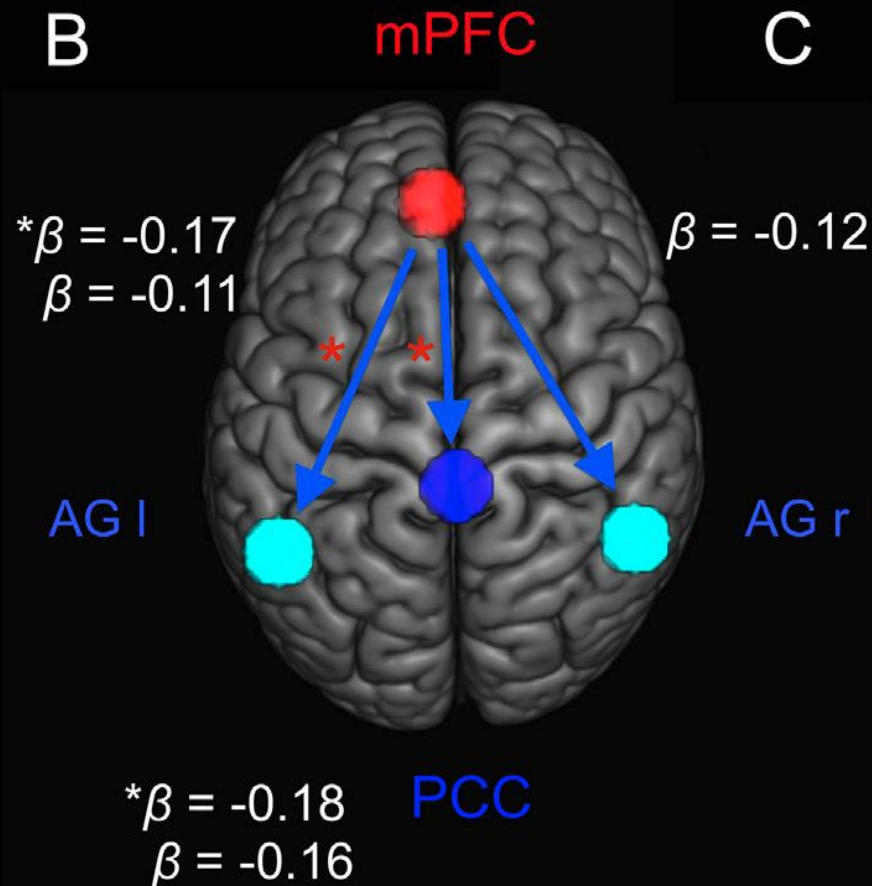




A Changes in functional connectivity of the default mode network during open awareness meditation

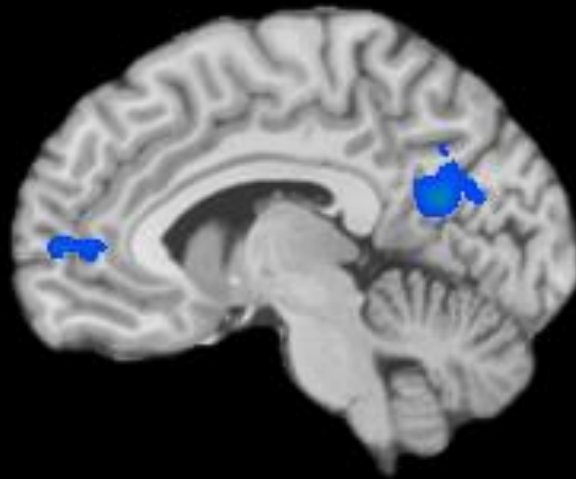


B C

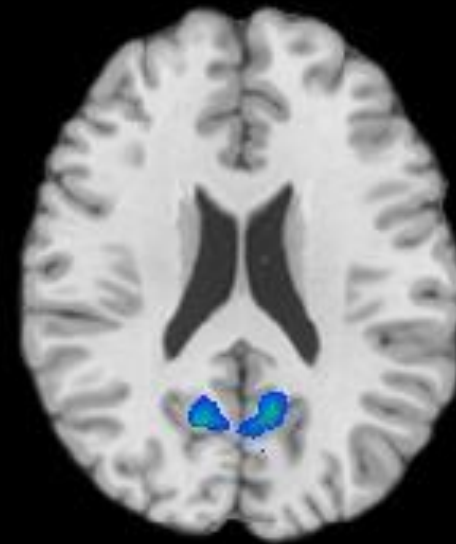


Decreased DMN activity during meditation in experienced meditators

(all meditations, Experienced > Novice)

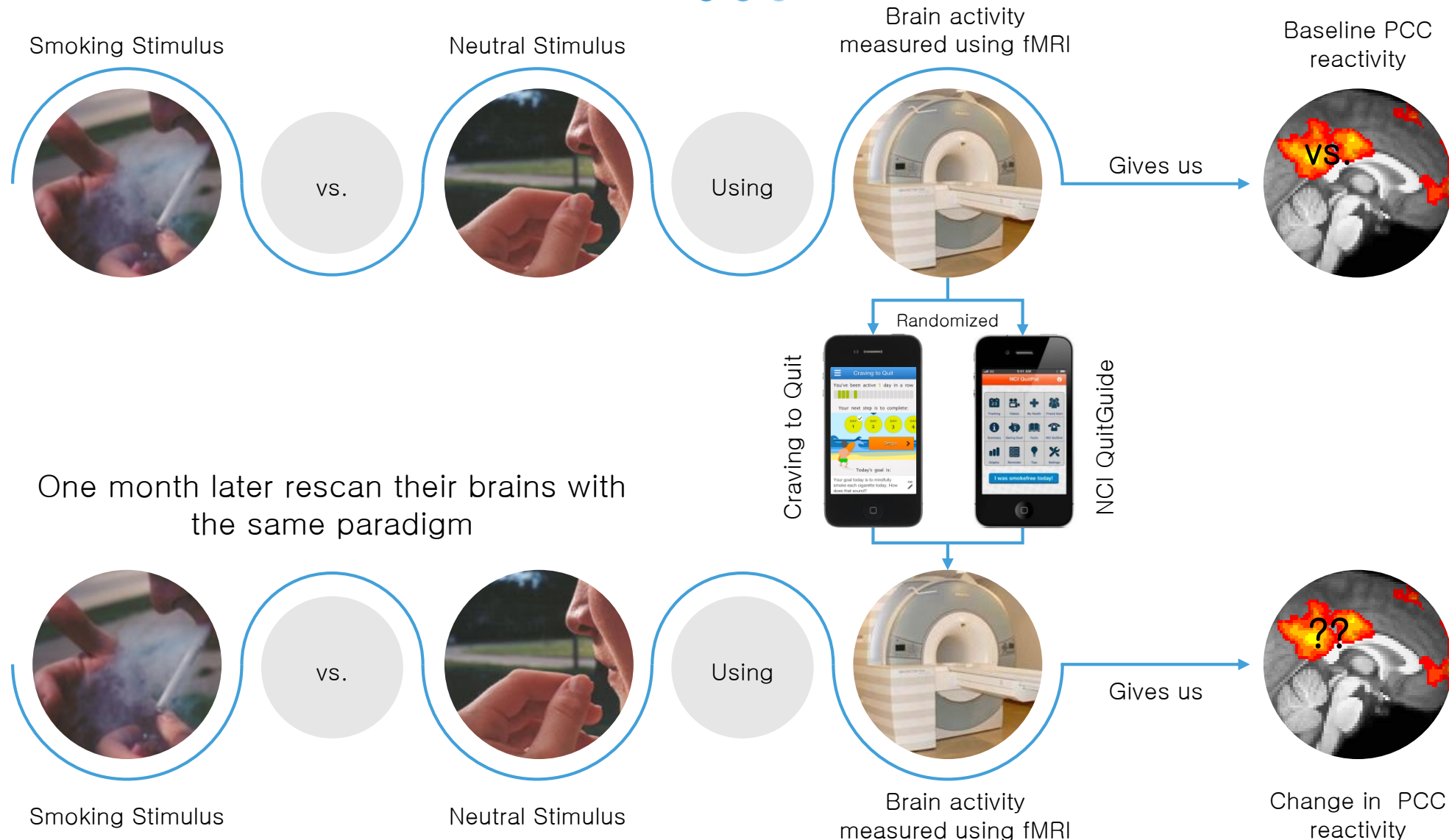


$x = -6$



$z = 21$

CAN APP-BASED MINDFULNESS TRAINING CHANGE BRAIN ACTIVITY?

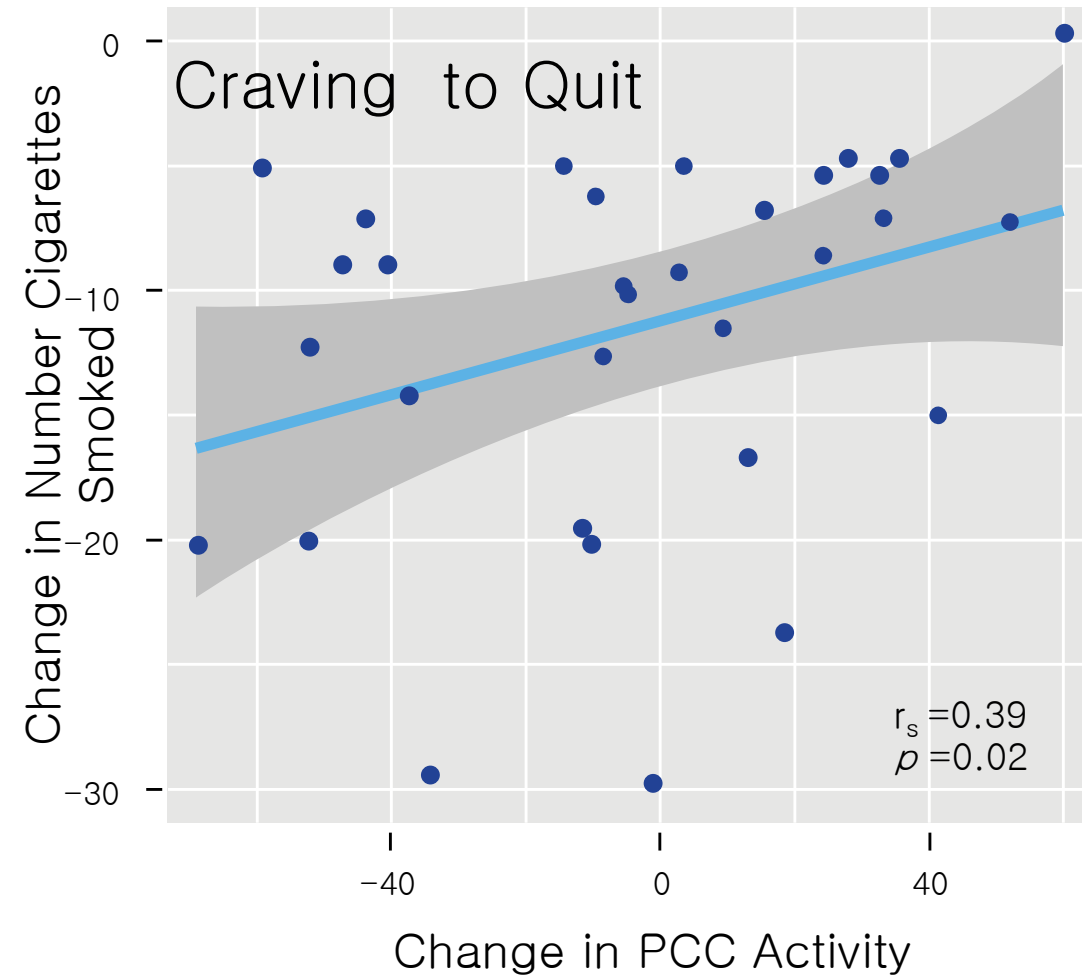


DECREASED PCC ACTIVITY CORRELATES WITH DECREASED IN CIGARETTE SMOKING *ONLY* WITH MINDFULNESS TRAINING



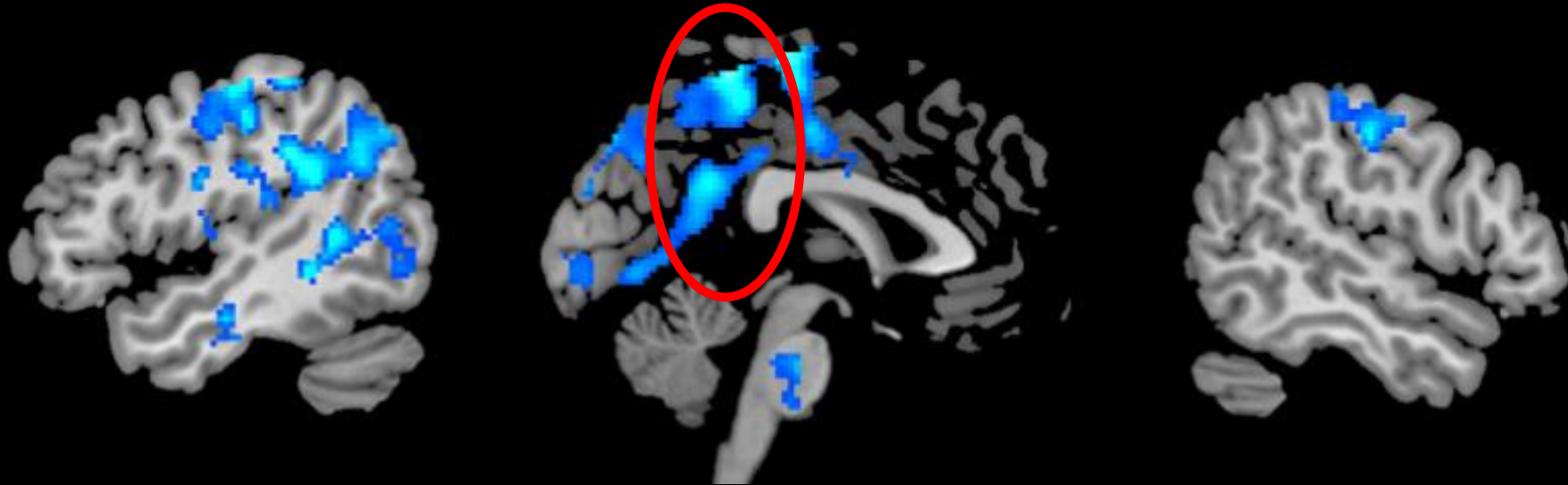
	C2Q (n = 33)	NCI (n = 34)
PCC activity	$r = .39$ $p = .02$	$r = .08$ $p = .65$
Number of modules completed	$r = .49$ $p = .004$	$r = .20$ $p = .24$

Janes et al (2019)



Neural substrate of loving kindness meditation

Reduced BOLD signal in meditators (n=20) v. novices (n=26)



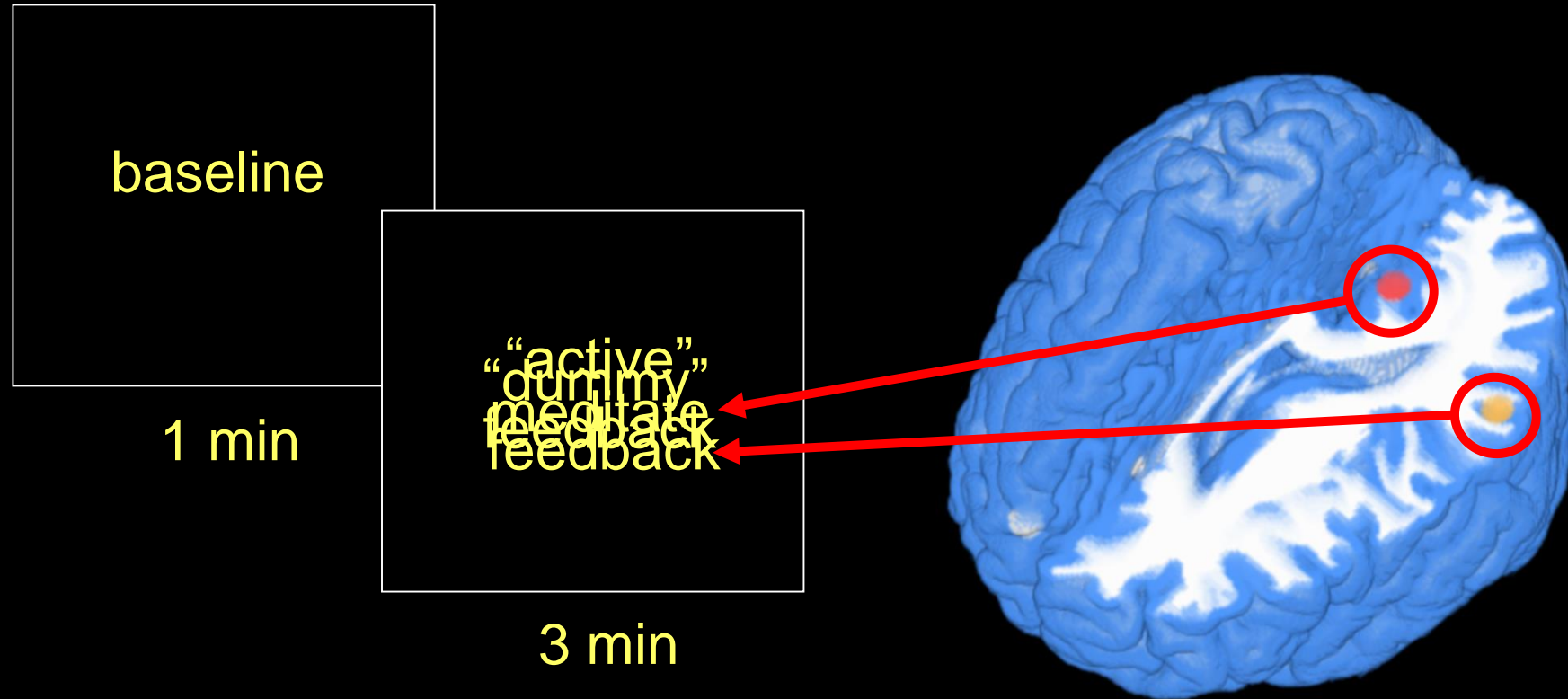


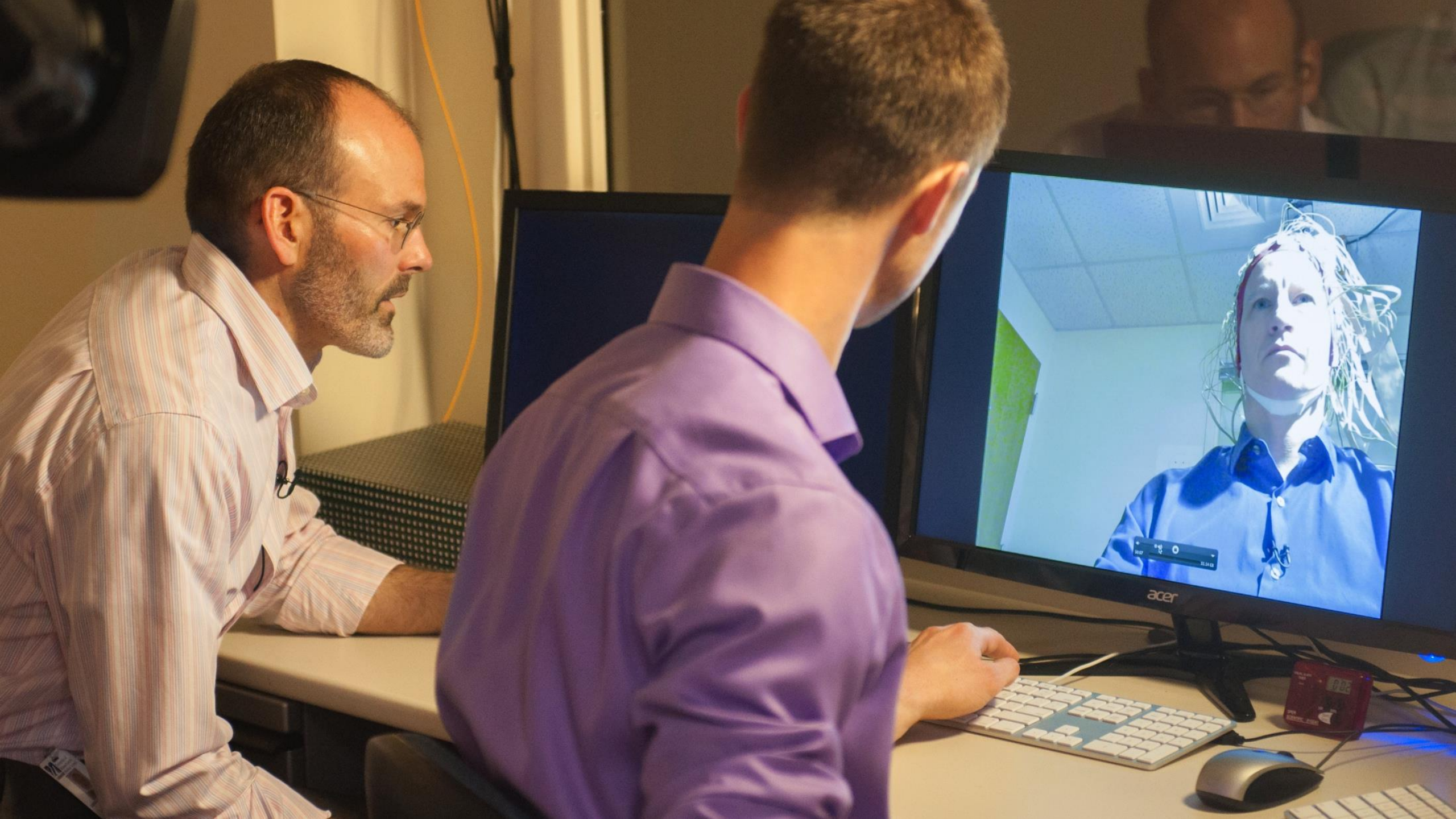
Science is a way of trying not to fool yourself. The first principle is that you must not fool yourself, and you are the easiest person to fool.

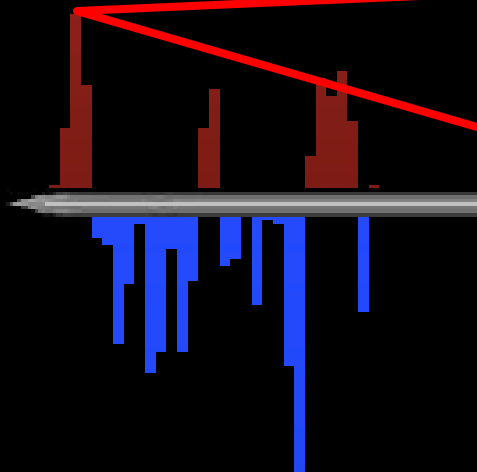


-Richard Feynman

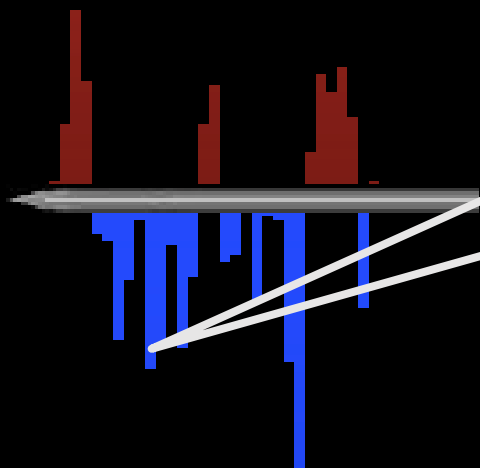
Real-time meditation feedback



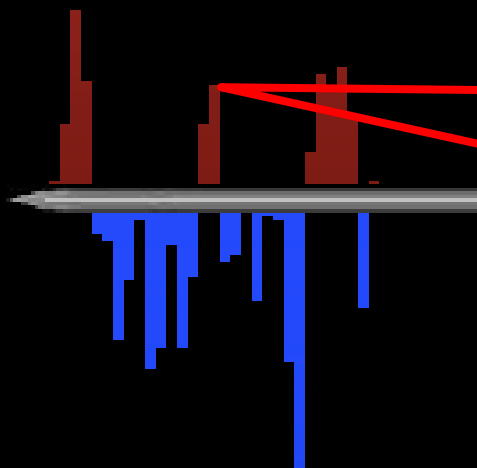




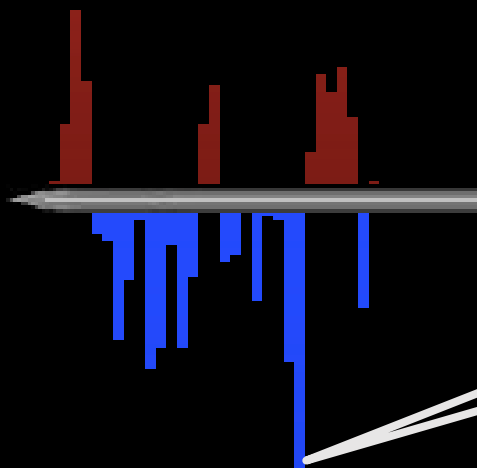
So at the beginning, I caught myself, that I was sort of trying to guess when the words were going to end and when the meditation was going to begin. So I was kind of trying to be like “okay ready, set, go!” and then there was an additional word that popped up and I was like “oh shit” and so that’s the red spike you see there...



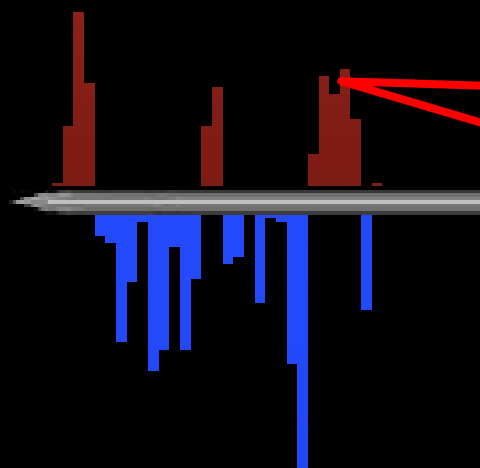
...and then I sort of
immediately settled in and I
was really getting into it...



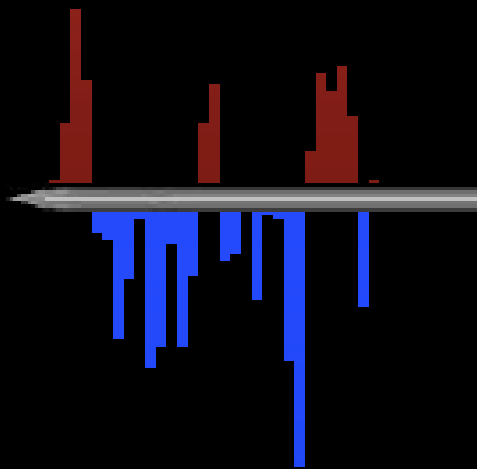
...and then I thought "oh my gosh this is amazing it's describing exactly what I am saying" and then you see that red spike...



... and I was like “okay, wait don’t get distracted” and then I got back into it and then it got blue again...



...and I was like "oh my gosh this is unbelievable, it's doing exactly what my mind is doing" and so [chuckles] then it got red again...



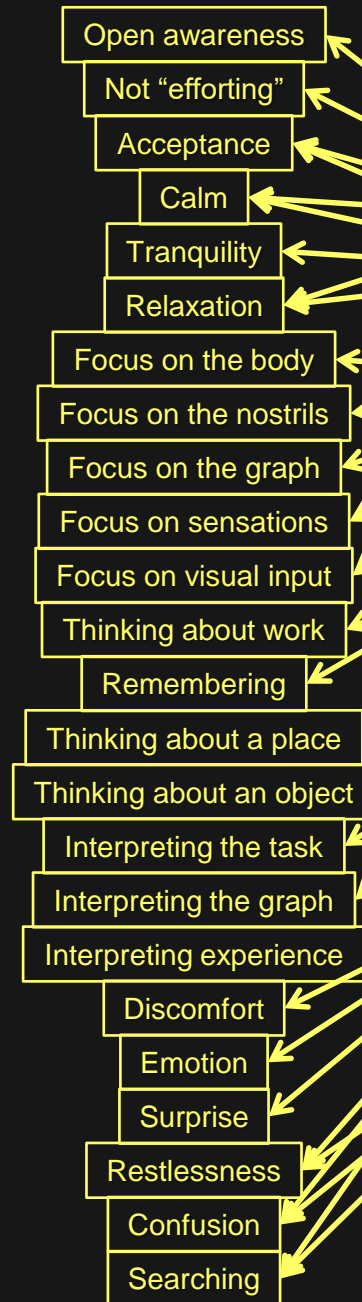
...So I just find it really funny because it's...that's...to the next question, that's a perfect map of what my mind was going through.

Neurophenomenology

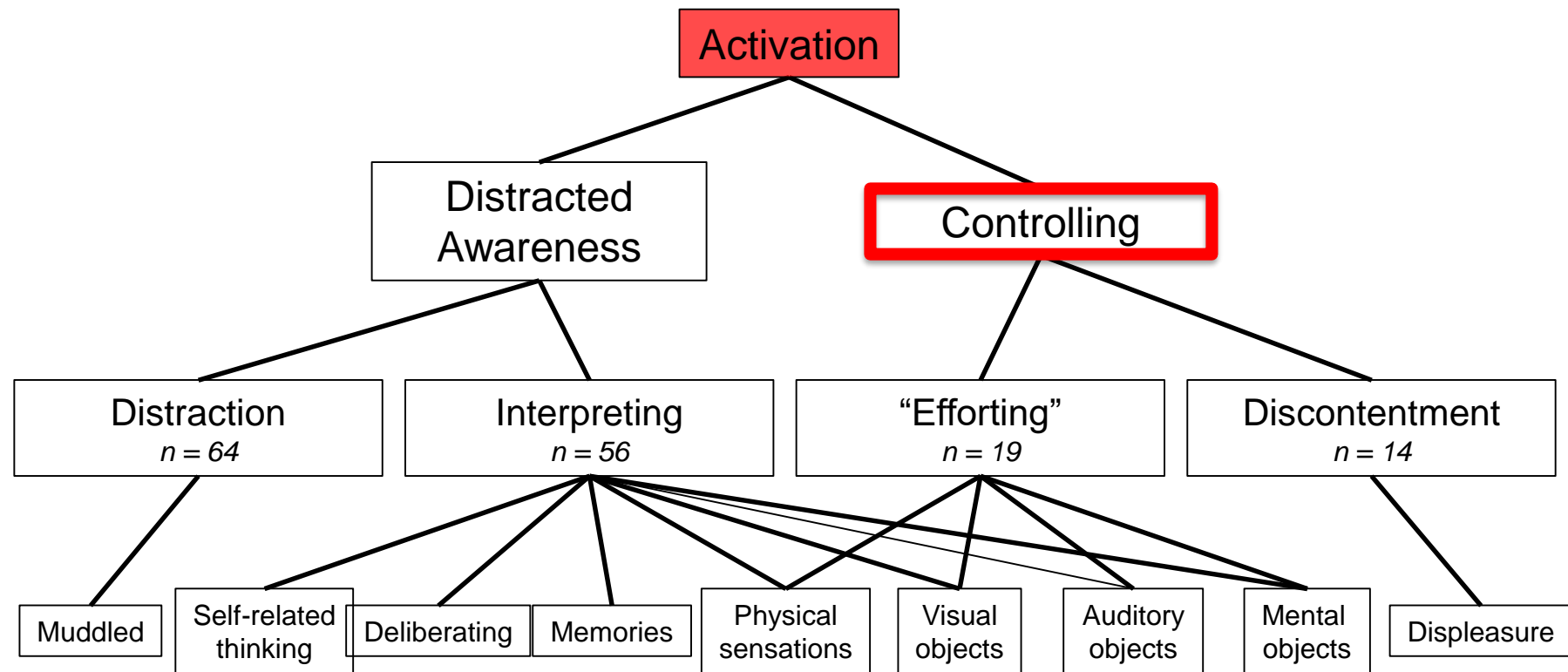
(Lutz and Thompson 2003)

- Use first-person self-report to better understand cognitive processes related to third-person physiological (e.g., brain imaging) data
- Grounded Theory Method (GTM)
 - Qualitative analysis of self-report data
 - Derive theory from empirical data

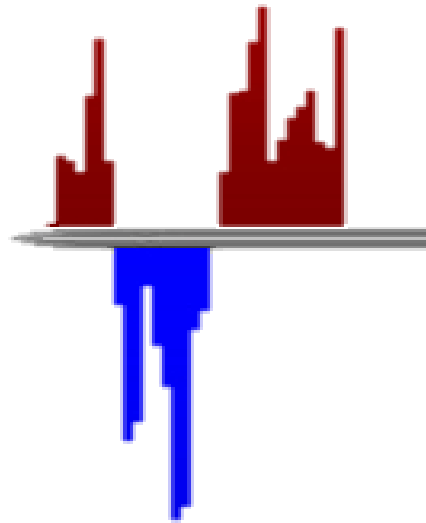
Open Code



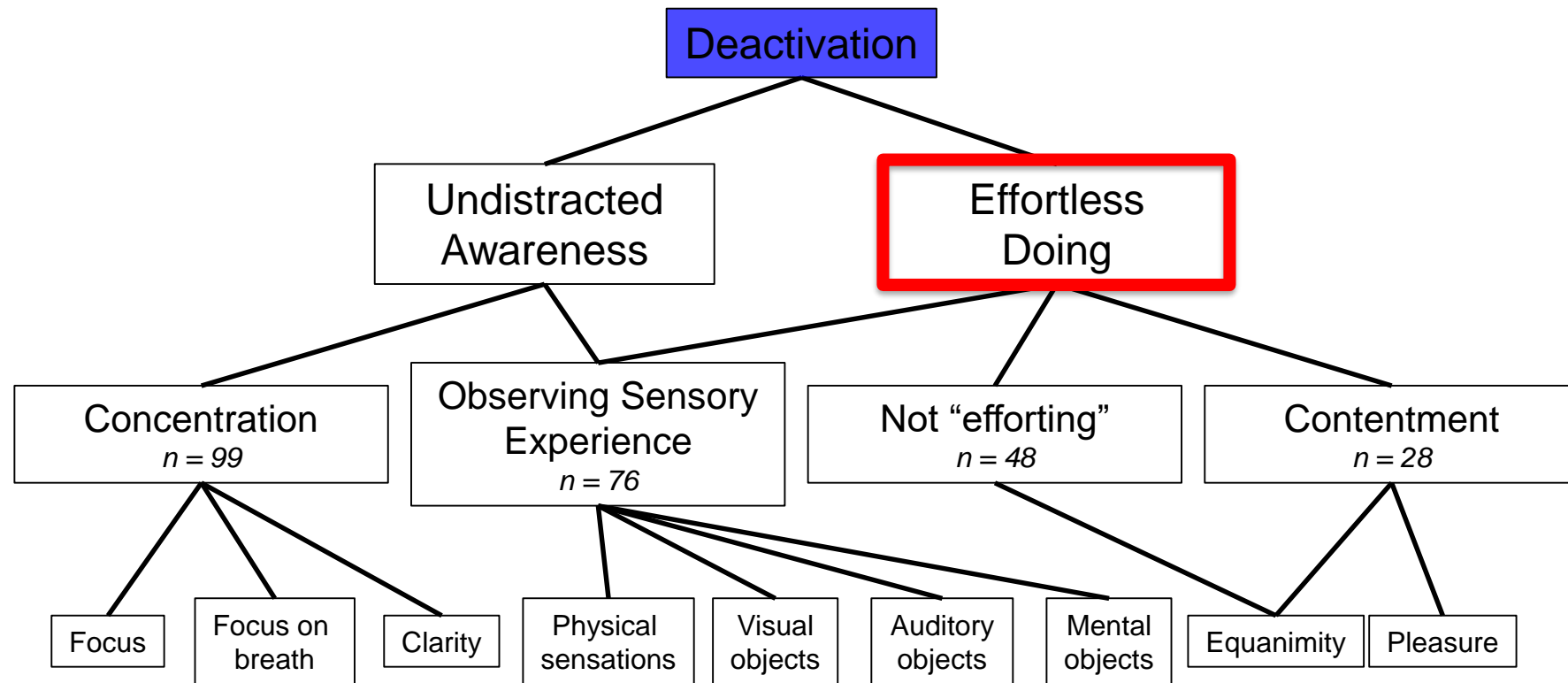
Garrison et al (2013) *Frontiers in Hum Neuroscience*



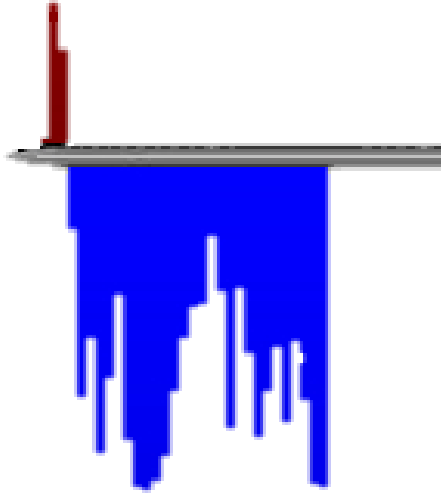
PCC Activation



“I worried that I wasn’t using the graph as an object of meditation, so I tried, like, to look at it harder or somehow pay attention more to it”



PCC Deactivation



“Toward the middle I had some thoughts which I don’t see on the graph maybe because I let them kind of flow by”



“I noticed ...that the more I relaxed and stopped trying to do anything, the bluer it went”



"NO!

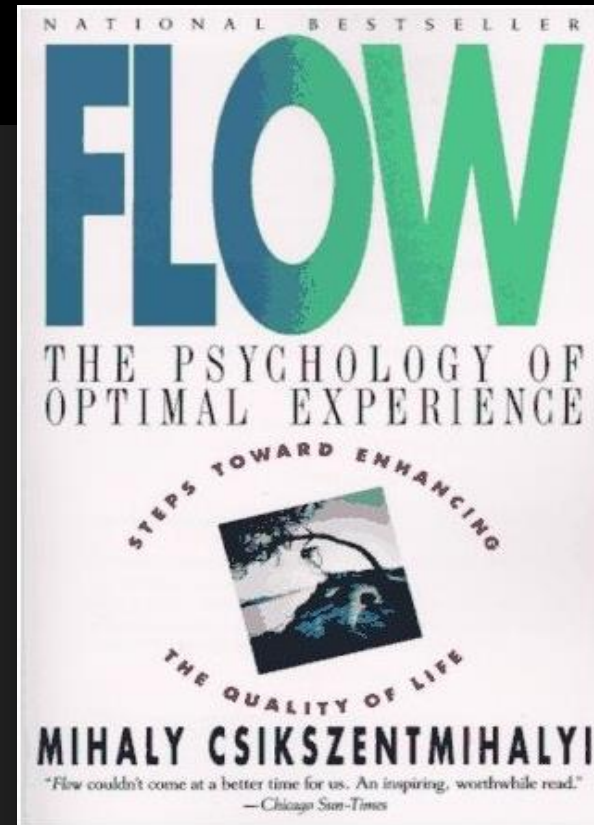
Try not!

DO or DO NOT,

There is no try."

Flow

a mental state when a person is fully immersed in the present in a feeling of energized focus.



Expert



“

There was a sense of flow, being
with the breath...flow deepened in
the middle.

”

Experienced Meditator





"The ego is a bottomless pit of suckiness. And so you finally let go of the self that clings to itself (one definition of ego). True freedom comes when ego goes."



- Shozan Jack Haubner

// Be empty of worrying.
Think of who created thought.
Why do you stay in prison
when the door is so wide open?
Move outside the tangle of fear-thinking.
Live in silence.
Flow down and down
in always widening rings of being.



- Rumi, "A community of spirit"

Gratitude!

Subjects


Pablo Abrante
Bruce Barton (UMass)
Sarah Bowen (UW)
Willoughby Britton (Brown)
Kathy Carroll (Yale)
Neha Chawla (UW)
Todd Constable (Yale)
Jake Davis (CUNY)
Gaëlle Desbordes (MGH)
Susan Druker (UMass)
Hani Elwafi
Kathleen Garrison (Yale)
Jeremy Gray (Yale)
Elizabeth Hoge (Georgetown)
Sean (Dae) Houlihan
Catherine Kerr (Brown)

Hedy Kober (Yale)
Vera Ludwig
Sarah Mallik
G. Alan Marlatt (UW)
Ashley Mason (UCSF)
Linda Mayes (Yale)
Bill Nardi
Alex Ossadtchi (SSI)
Prasanta Pal
Xenios Papademetris (Yale)
Lori Pbert (UMass)
Mark Pflieger (SSI)
Marc Potenza (Yale)
Maolin Qiu (Yale)
Rahil Rojiani
Alex Roy

Bruce Rounsaville (Yale)
Juan Santoyo (Brown)
Cliff Saron (UC Davis)
Dustin Scheinost (Yale)
Ryan Smith (Laureate Inst.)
Veronique Taylor
Danny Theisen
Evan Thompson (Toronto)
Tommy Thornhill
Nicholas Van Dam (NYU)
Remko van Lutterveld
Andrea Ruf
Katie Witkiewitz (UNM)
Jochen Weber (Columbia)
Sue Whitfield-Gabrieli (MIT)
Patrick Worhunsky (Yale)

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- Free CME courses
-  @judbrewer
- Mindfulness Center @Brown
- www.brown.edu/mindfulnesscenter



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INSTRUCTIONS FOR LIVING:

1. PAY
ATTENTION
2. BE
ASTONISHED
3. TELL ABOUT IT

- Mary Oliver

