

# Breaking the cycle of stress and social media

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# Financial Disclosures

The apps tested in our studies that are described in this presentation are owned by MindSciences, which I founded through a Yale incubator. I also have an equity interest in the company. 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.



# Average Time Spent In a Lifetime



**1 Years, 8 Months**  
Doing Housework



**1 Years, 11 Months**  
Socializing



**2 Years, 2 Months**  
Shopping



**3 Years, 7 Months**  
Eating & Drinking



**6 Years, 8 Months**  
Using Social Media

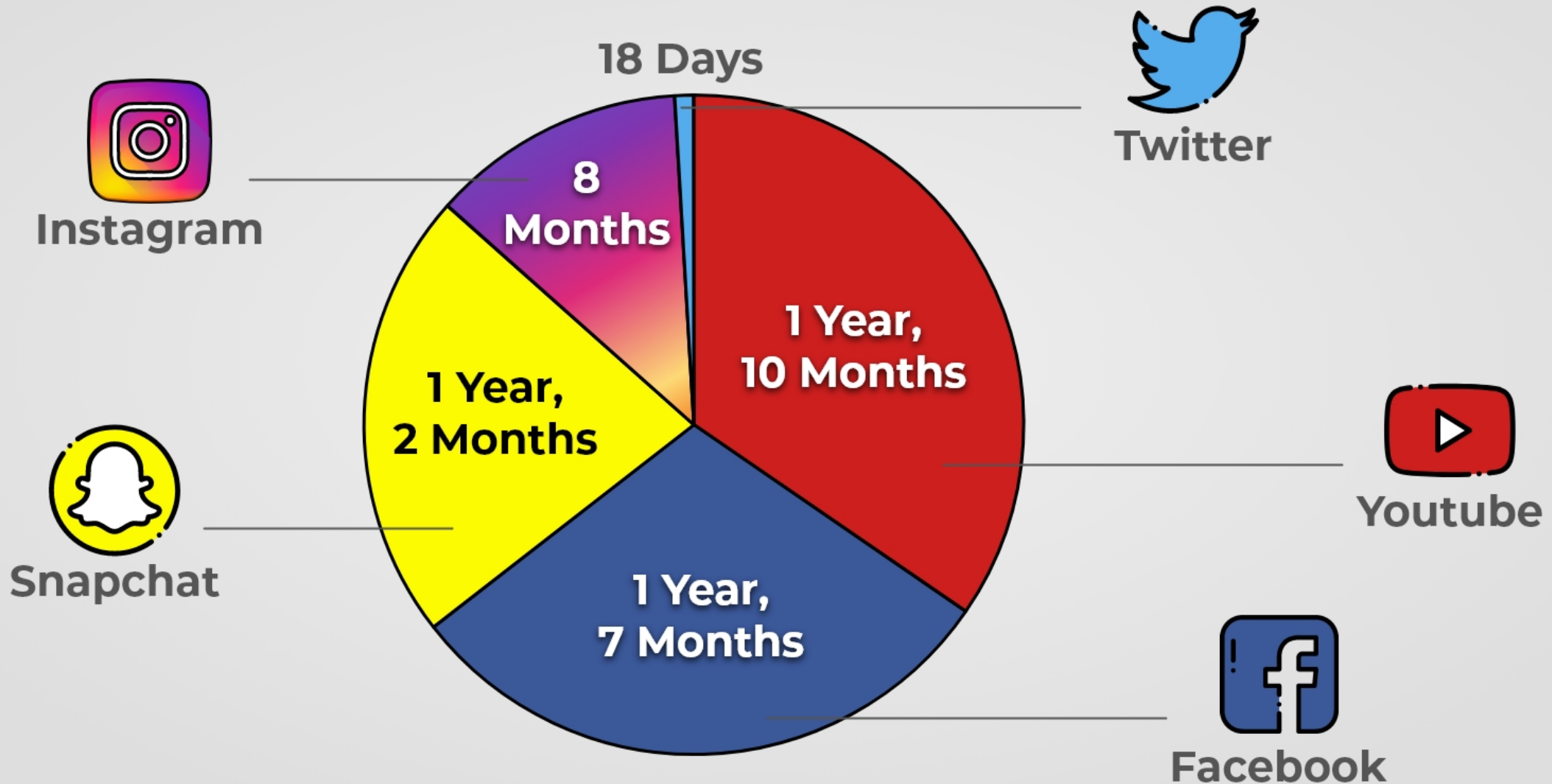


**8 Years, 4 Months**  
Watching TV



**26 Years, 5 Months**  
Sleeping

# Time Spent On Social in a Lifetime







人眼不知道才，神眼过认确

手机CELLPHONES  
低头族  
专用通道











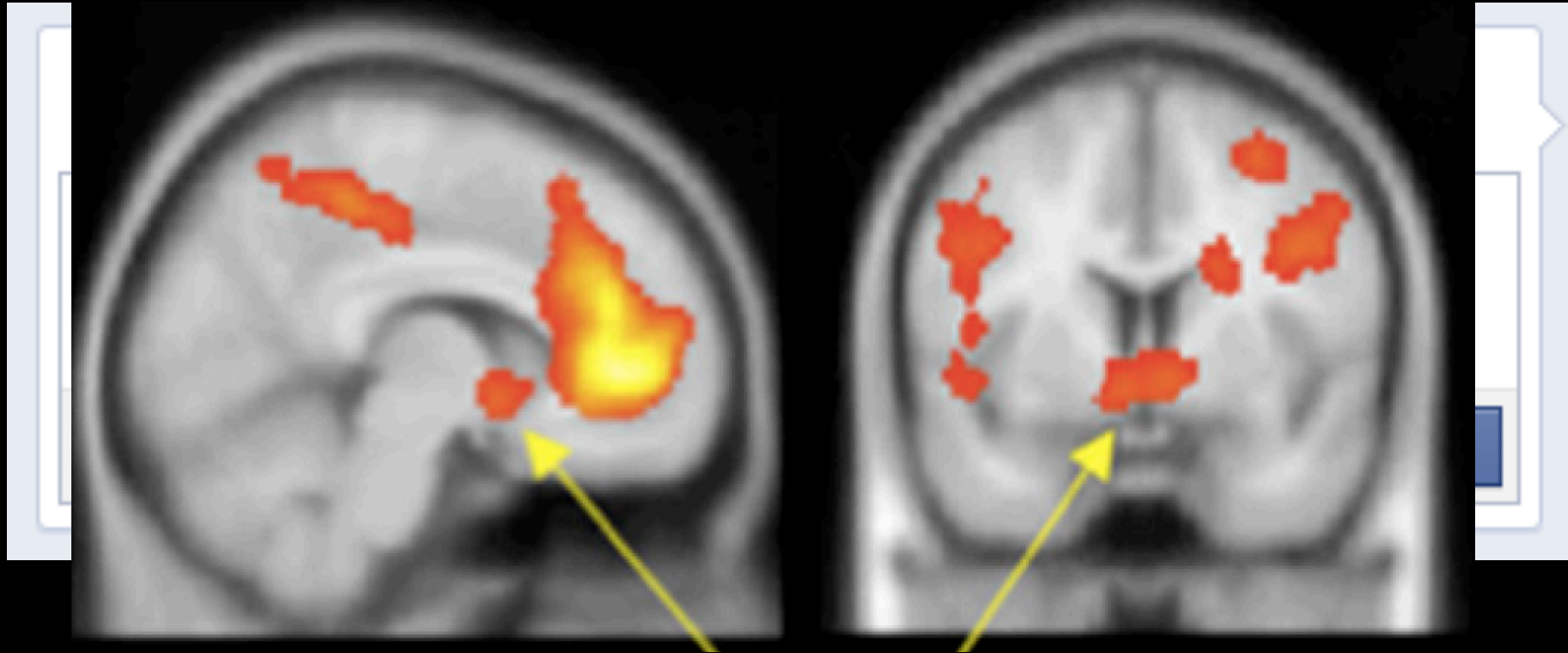








# Talking about ourselves is rewarding!



Nucleus Accumbens

Tamir *PNAS* (2012)

Meshi *Front Hum* (2013)

## Experiment: 24 hours without media...

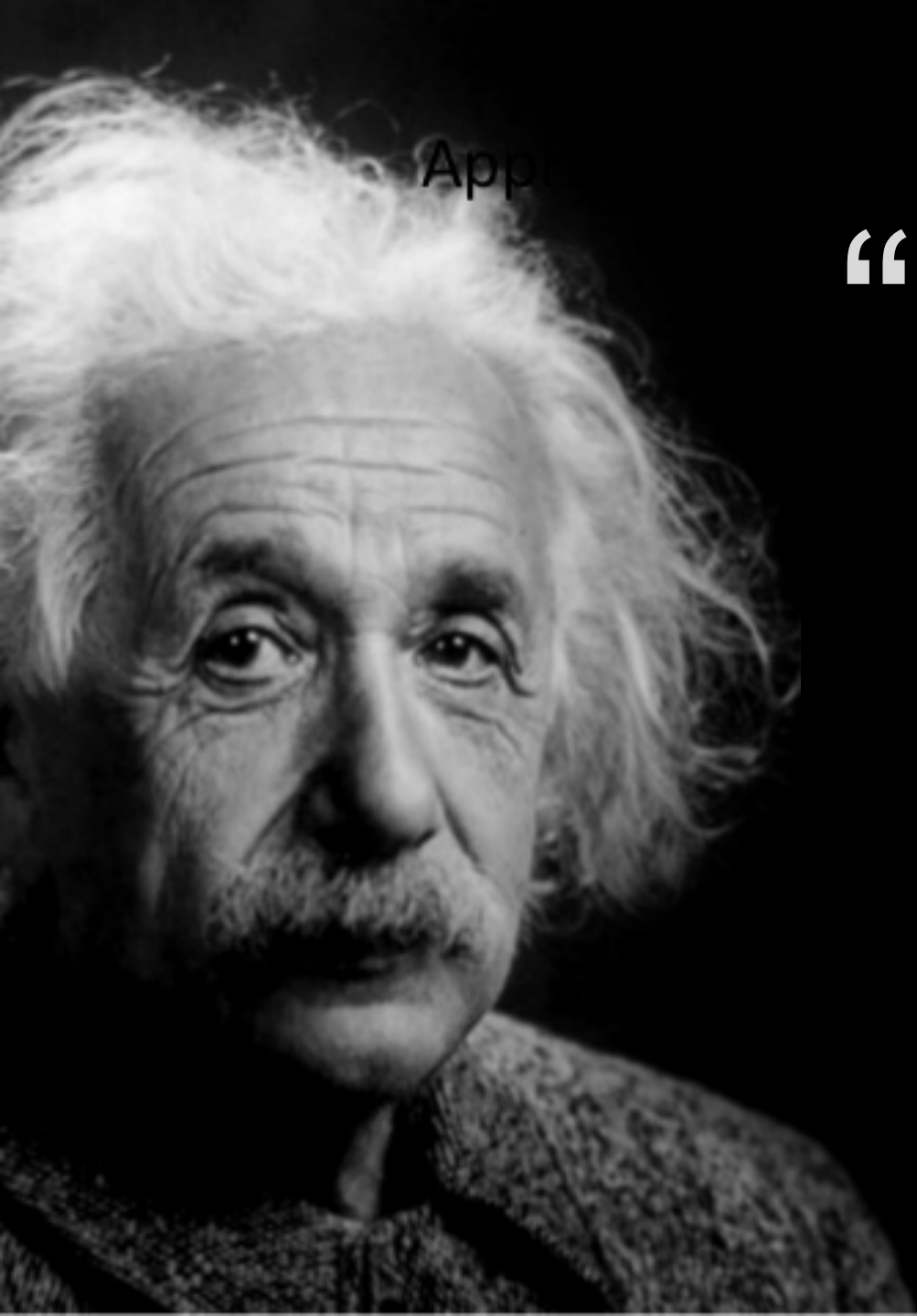
“Texting and IMing my friends gives me a constant feeling of comfort. Although I go to a school with thousands of students, the fact that I was not able to communicate with anyone via technology was almost unbearable. Honestly, this experience was probably the single worst experience I have ever had.”

“My short attention span prevented me from accomplishing much, so I stared at the wall for a little bit. After doing some push-ups, I just decided to take a few Dramamine and go to sleep to put me out of my misery.”

—*Students at U. Maryland*

# Willpower vs. Impulse





Apple

“

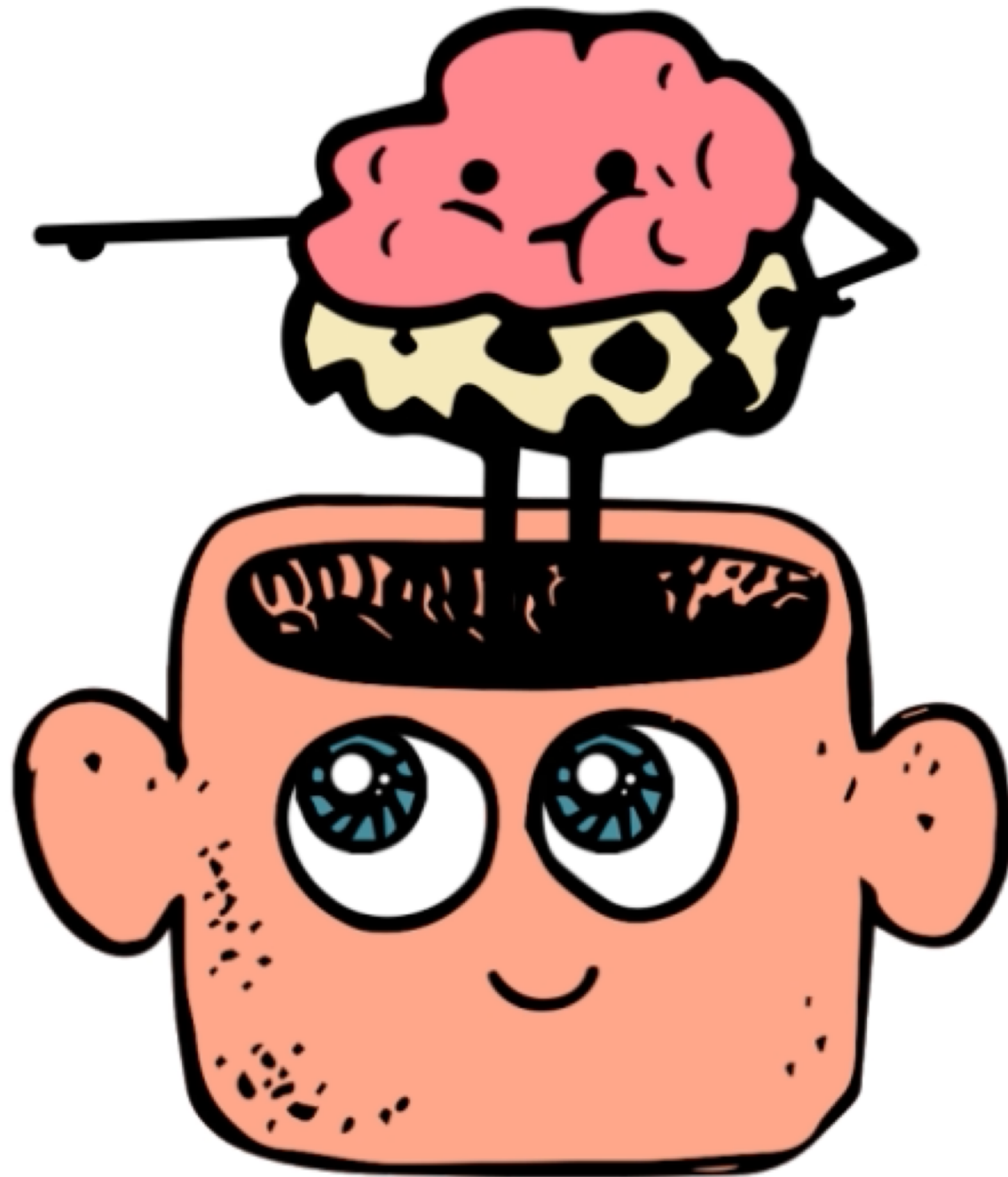
*No problem can be solved from  
the same level of consciousness  
that created it.*

”

Albert Einstein







OLD BRAIN:  
Limbic System  
Survival

NEW BRAIN:  
Prefrontal Cortex  
Thinking, Planning

An illustration on a yellow background depicting a woman with long red hair and glasses, wearing a blue and white striped shirt and dark pants, running towards the right. She has a look of stress or urgency. Surrounding her is a chaotic swarm of various icons representing digital communication and work: a clock, a heart, a document labeled 'NEWS', a question mark, a percentage sign, a 'to do' list, an '@' symbol, a smartphone, a document with a '1000' notification, a speech bubble, a red document, a blue speech bubble, a location pin, a document with a graph, a green arrow pointing down, and a white envelope. The word 'OVERLOADING' is written in large, bold, dark blue capital letters across the bottom left of the image.



A Venn diagram consisting of three overlapping circles. The left circle is olive green and labeled 'Misinformation'. The middle circle is blue and labeled 'Disinformation'. The right circle is orange and labeled 'Mal-information'. The circles overlap in pairs and in the center, creating a complex set of intersection areas.

## **Misinformation**

**unintentionally  
distributing incorrect  
information**

## **Disinformation**

**knowingly  
developing and  
disseminating  
incorrect information  
intended to deceive**

## **Mal-information**

**disturbing  
information such as  
personal information  
or “shock-value”  
information intended  
to harm**



# FOMO is Driven By Basic Needs

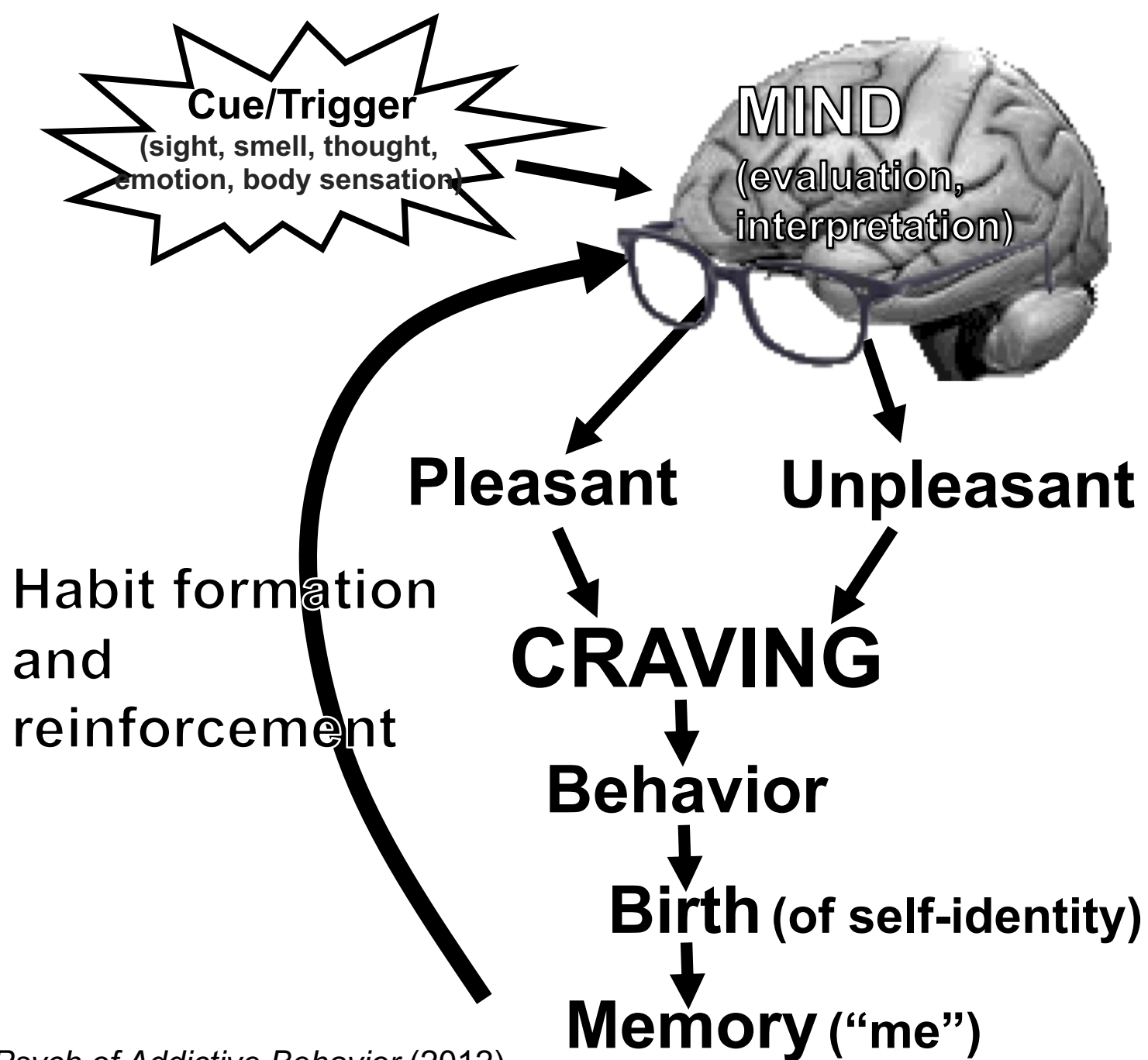
Belonging to a  
community



Grabbing an  
opportunity



User with FOMO

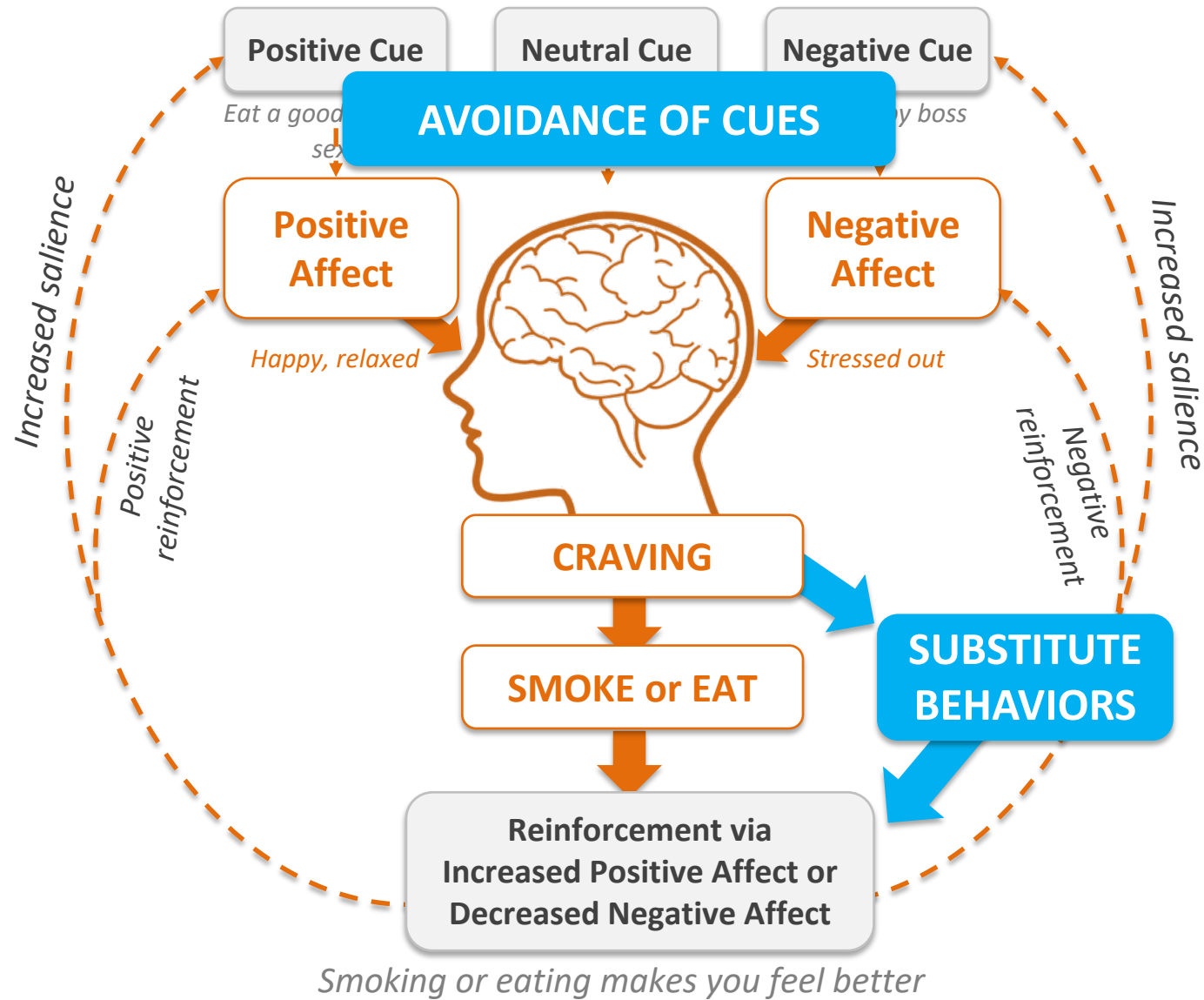


“

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

”

Alan Watts

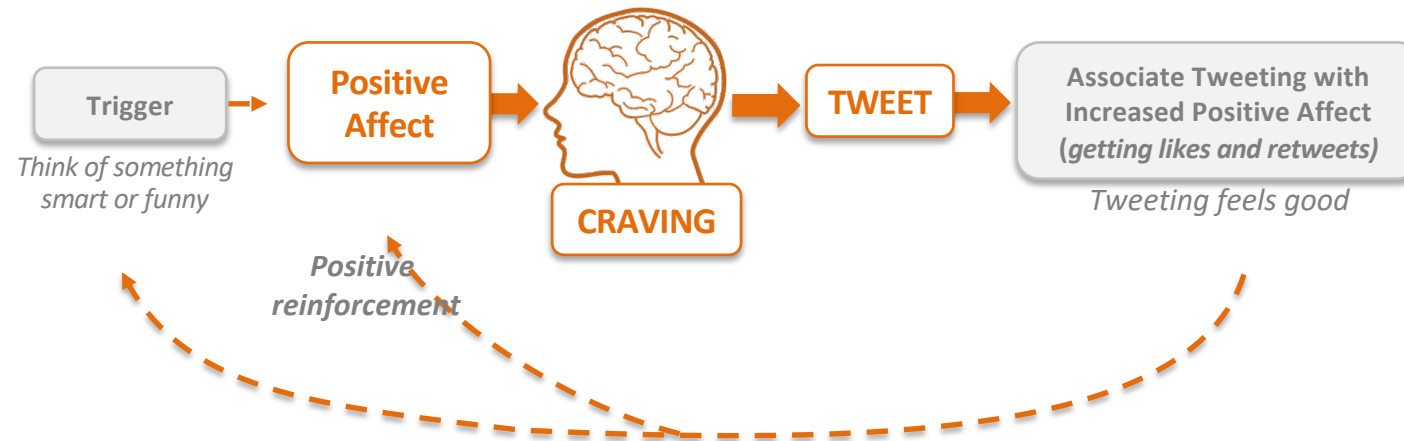


Thorndike 1898, Skinner, 1938, Zinser 1992, Piasecki 1997, Carter 1999, Lazev 1999, Cox 2001, Robinson 2003, Bevins 2004, Baker 2004, Cook 2004, Olausson 2004, Shiffman 2004, Carter 2008, Perkins 2010 etc.

# Social Media: a perfect storm

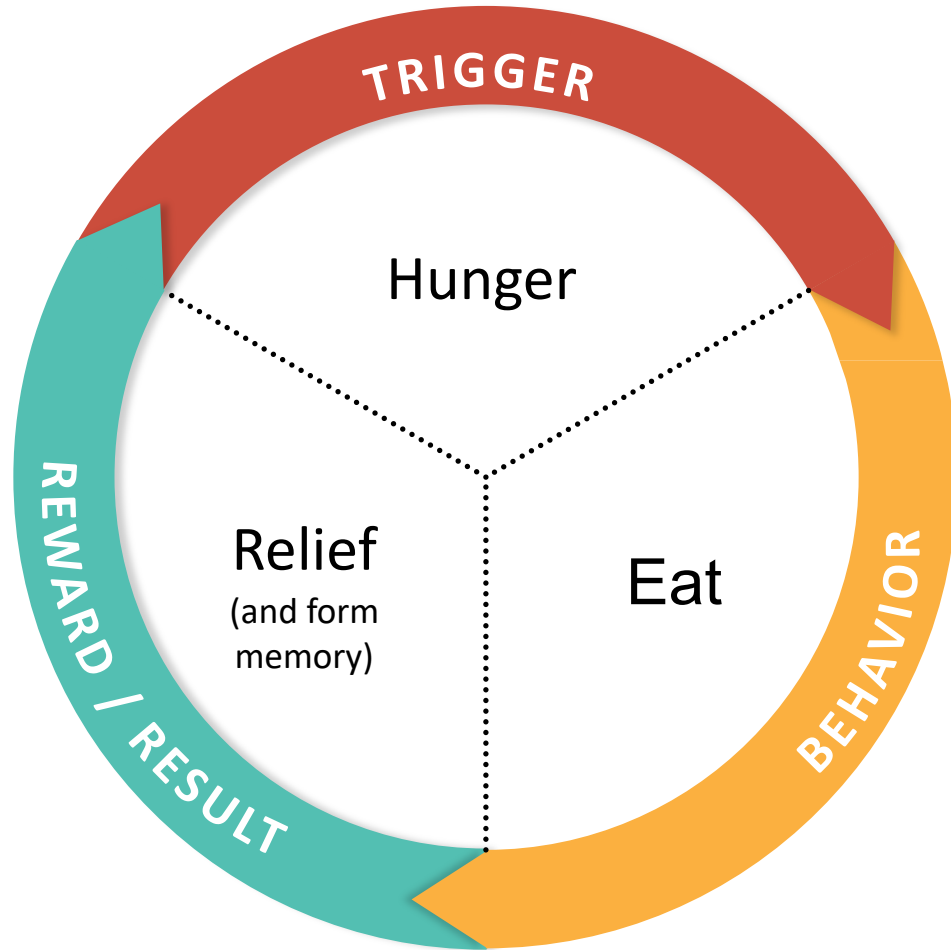
- Talking about ourselves = positive reinforcement
- Gossip is sticky/rewarding
- Distraction = negative reinforcement
- Portable (phone)
- Intermittent reinforcement

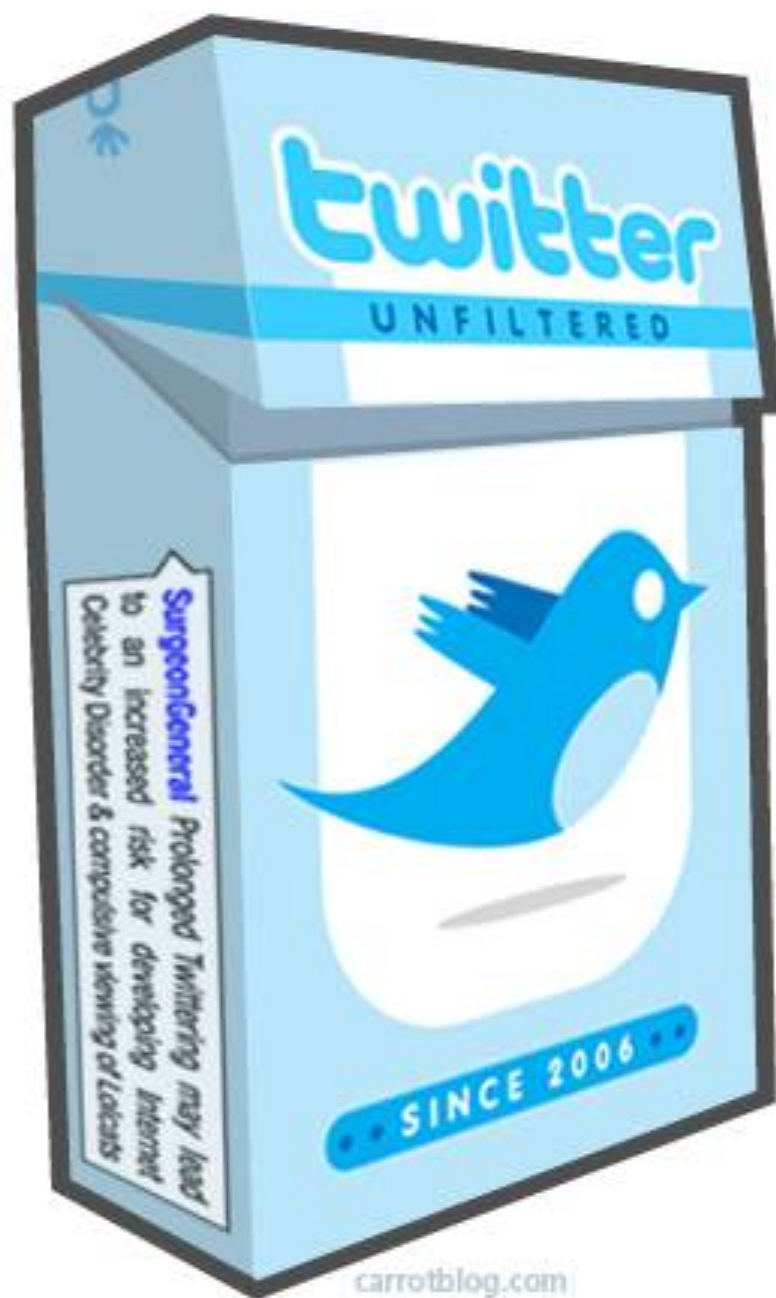
# Why we tweet from the toilet at 3am



(hint: nobody is there to tell us to stop)

# REWARD-BASED LEARNING



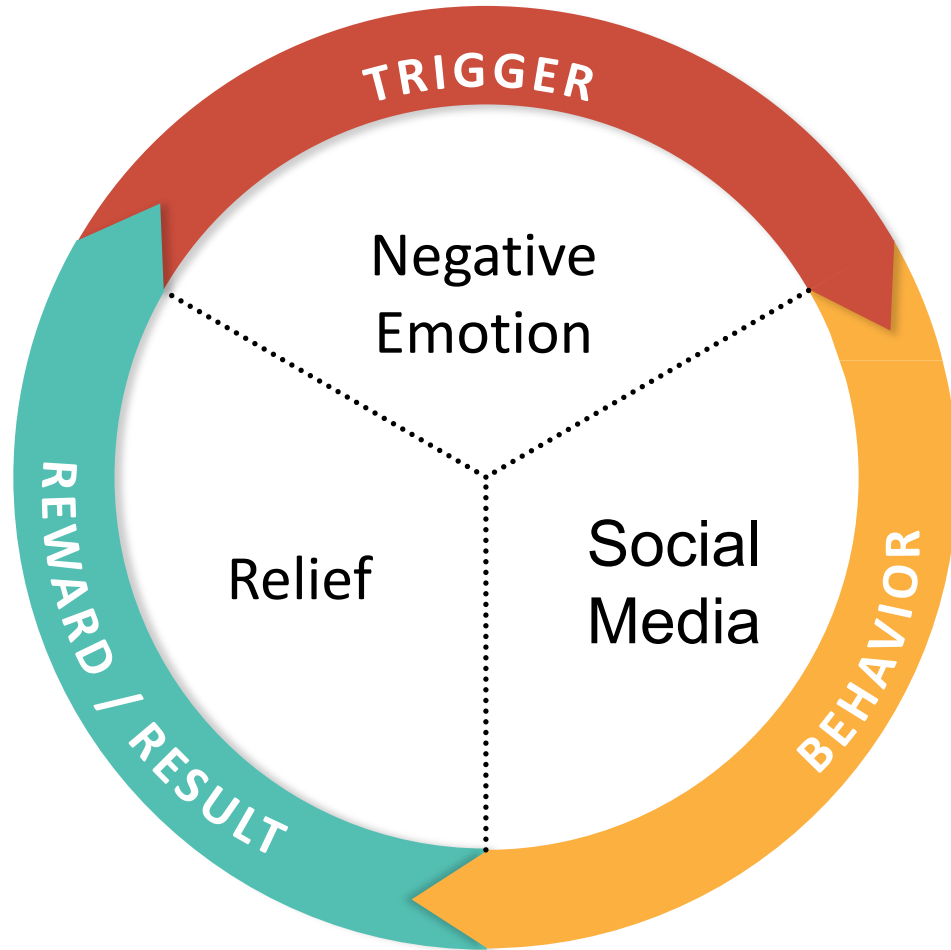








# REWARD-BASED LEARNING







**Plot twist. Waldo finds himself.**

“

Paying attention in the present  
moment, on purpose, non-  
judgmentally

”

Jon Kabat-Zinn  
*Full Catastrophe Living*

# The “Caught Up” Continuum



DAYDREAMING

STRESS

ADDICTION

Fear

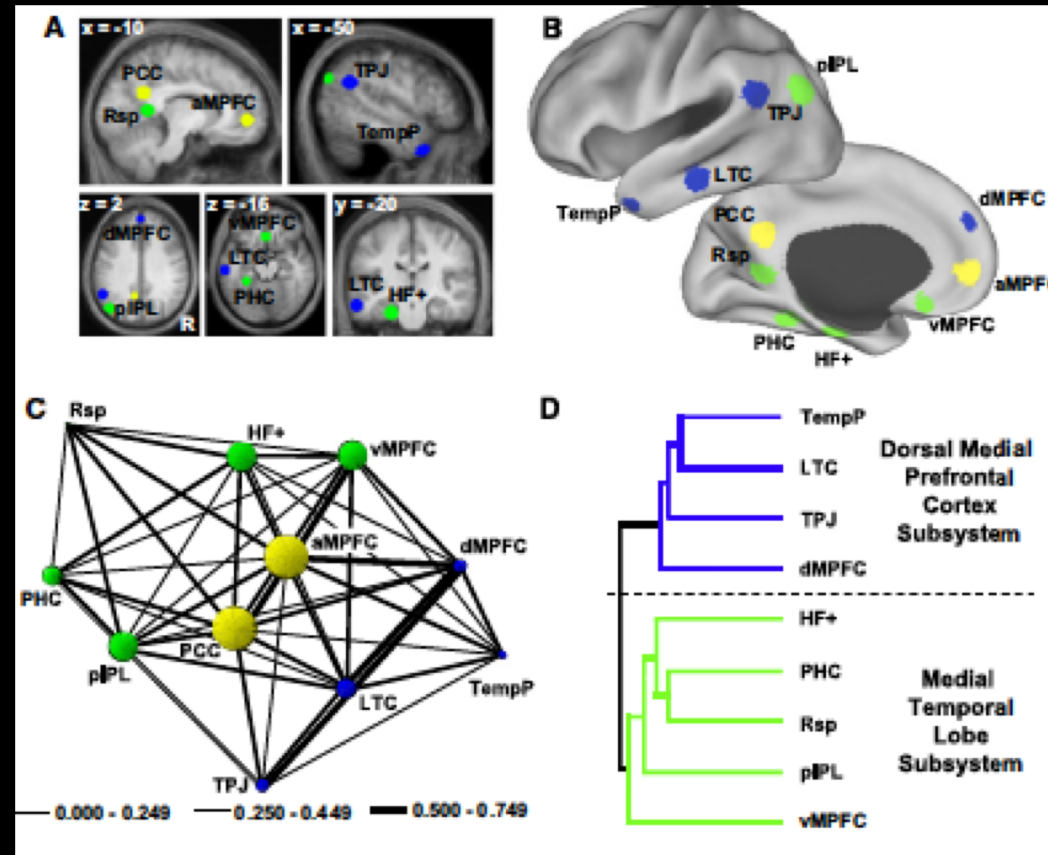


Anxiety





# 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)

Task of mindfulness training?

Get out of your own way

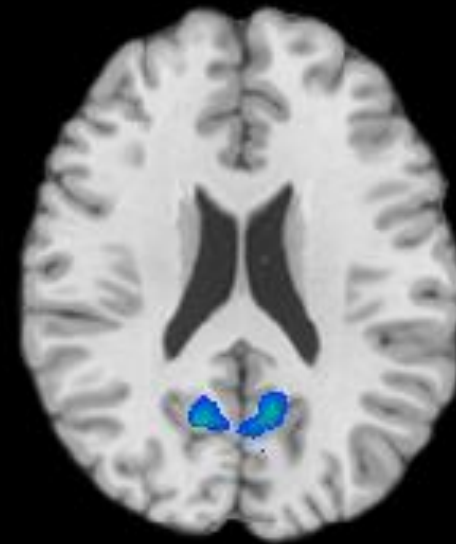
(Don't get caught up in yourself!)

# Decreased DMN activity during meditation in experienced meditators

(all meditations, Experienced > Novice)

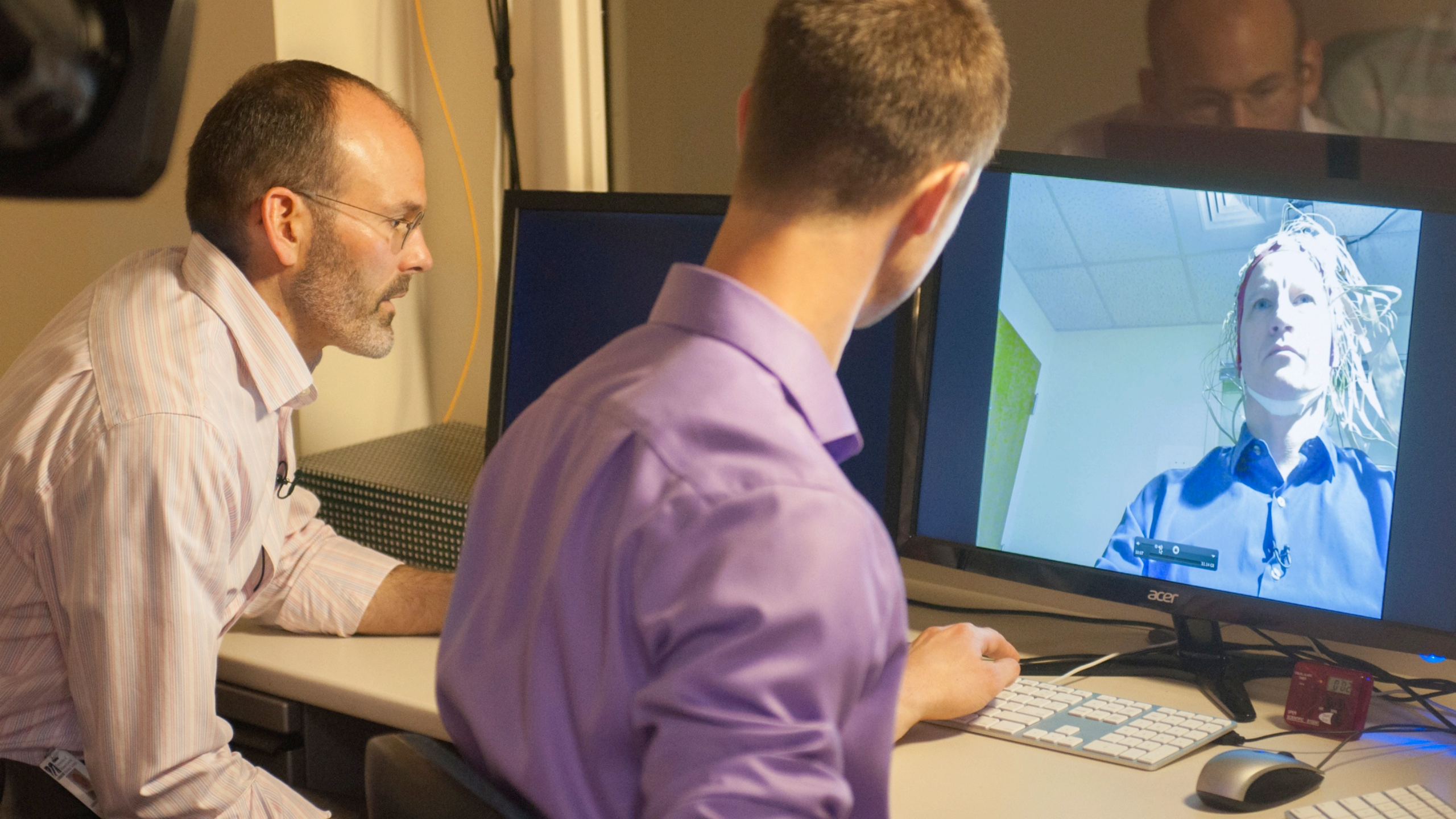


$x = -6$



$z = 21$







# Unwinding Anxiety

- Gradual training (30+ modules)
  - Understand our mind
  - Directly link to mindfulness
- Daily modules (10 minutes)
  - animations
- In-the-moment exercises
- Experience Sampling
  - Track progress & test efficacy

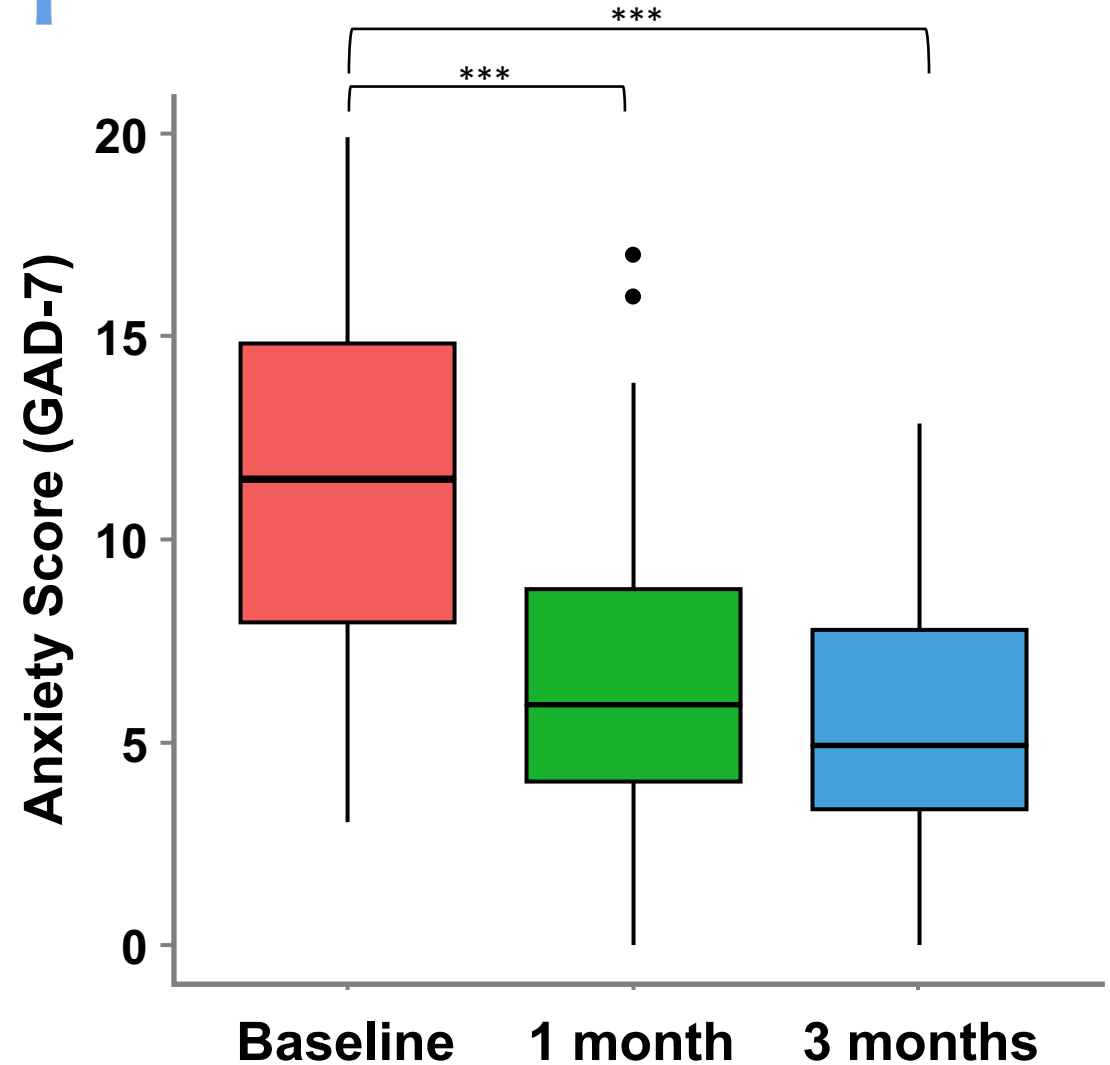


- ✓ 48% reduction in anxiety at month (p < .001) 1
- ✓ 57% reduction in anxiety at months (p < .001) 3

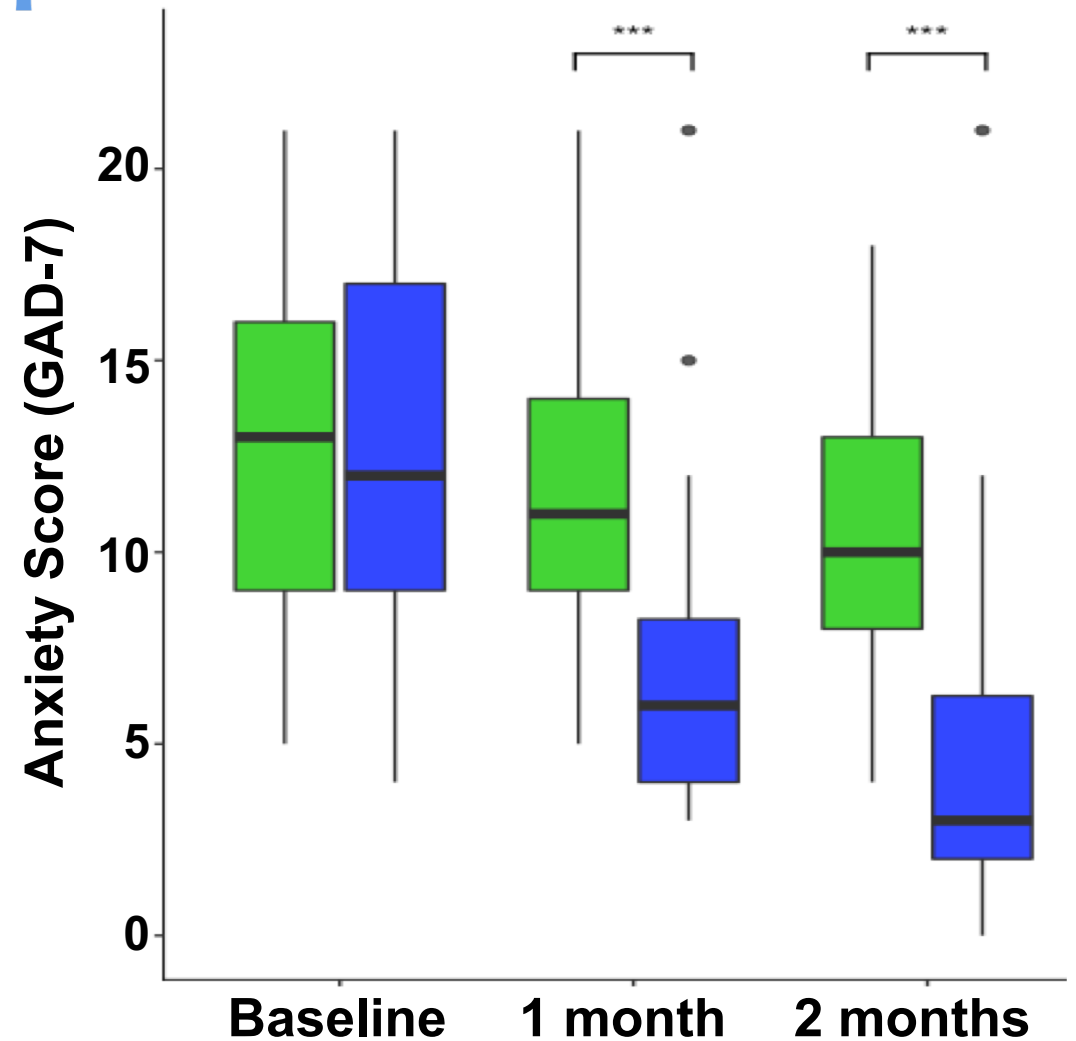
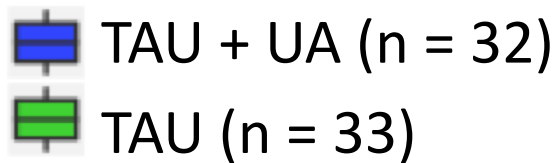
#### GAD-7 Scoring

- 0 – 4 (minimal anxiety)
- 5 – 9 (mild anxiety)
- 10 – 14 (moderate anxiety)
- 15 – 21 (severe anxiety)

(n = 34)



- ✓ 45% reduction in anxiety at month 1
- ✓ 67% reduction in anxiety at month 2
- ✓ Number Needed to Treat = 1.6







# Three Gears of Habit Change

- First step: Awareness of being caught up in a habit loop
- Second step: Exploring the results/rewards of the behavior
  - “What do I get from this?”
- Third step: Stepping out of the habit loop
  - RAIN
  - Breathing into anxiety
  - Loving kindness etc.

# Step 1: Recognizing habit loops

“

I am suddenly thunderstruck with the realization that I avoid many things because I am afraid that if I engage in them I will feel anxiety. Wow.

”

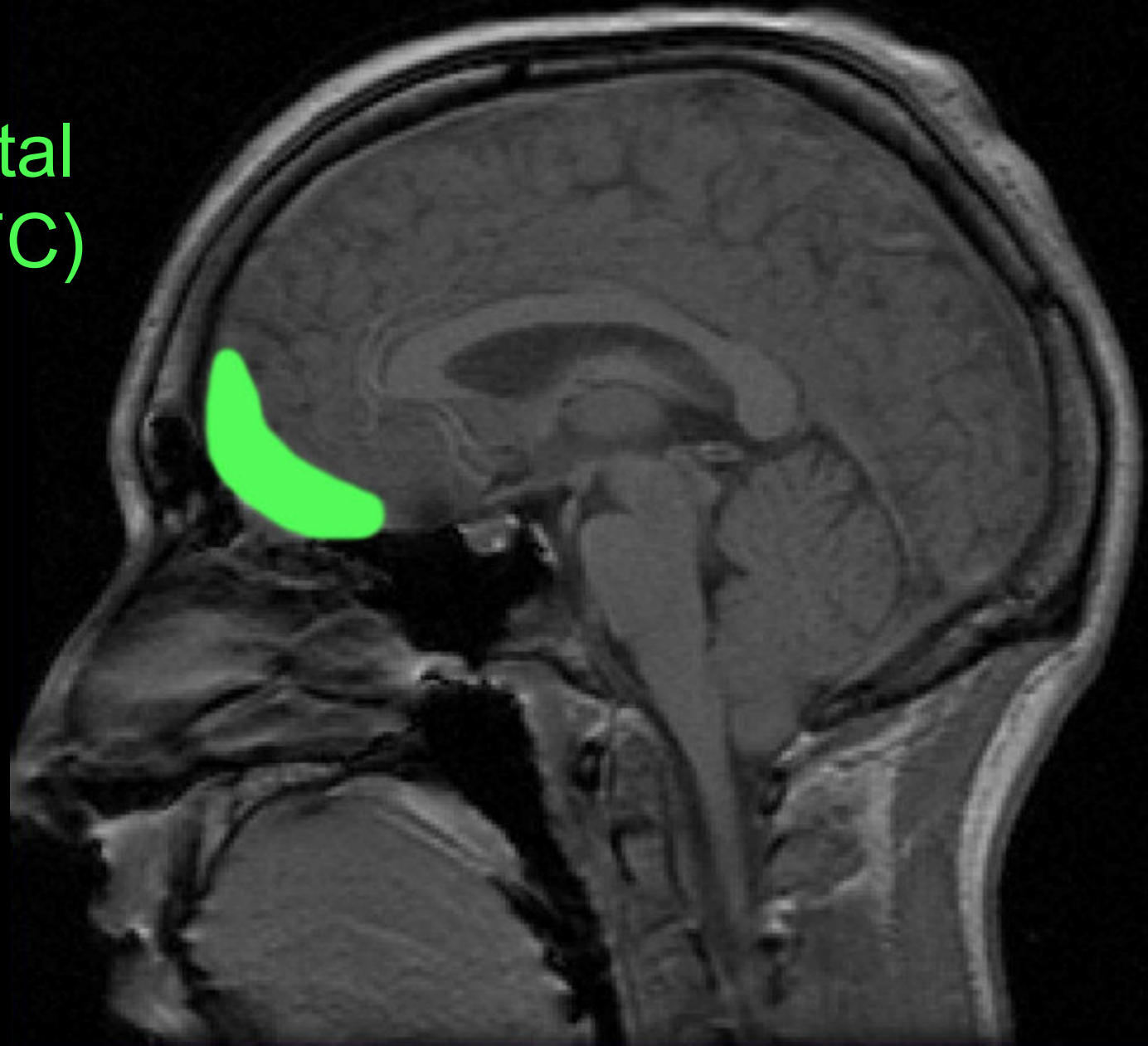
Unwinding Anxiety member



Step 2:  
The beginning of  
the end



Orbitofrontal  
cortex (OFC)





# Reinforcement Learning Models and Mindfulness-based Craving Tool

Standard Rescorla-Wagner (RW) reinforcement learning model:

- $V_{t+1} = V_t + \alpha \delta t$   
→ *Reward Value of consuming craved item*
- $\delta t = \lambda t - V_t$ 
  - $\lambda t$ : actual outcome. learning signal = contentment felt after eating
  - Proxy for V of eating (measure onto which V is fitted) = craving change
  - If craving has been reduced from the exercise -> less motivation to eat
  - if craving has increased after exercise - > more motivation to eat

$\delta t$  = Prediction Error (PE) = *discrepancy between an expected outcome and actual outcome*

(Eg. Expecting to feel very content after smoking a cigarette yet experiencing strong disgust towards actual sensations from smoking)

- $\alpha$  : a static subject-level parameter which modulates the rate of learning or update in value from the PE signal

The interface is titled 'Mindfulness-based Craving Tool'. It has two columns: 'TYPE' and 'AMOUNT'. Below these are five rows of exercises, each with a checkbox and a description. To the right of the exercises is a slider labeled 'How strong is your craving now compared to before the exercise?'. The slider has a scale from -10 to +10, with labels: 'a lot stronger' (+10), '+5', 'same as before' (0), '-5', and 'a lot weaker' (-10). The slider is currently set at 0. Below the slider is a question: 'Do you want to eat now?'. At the bottom are two buttons: 'NO' and 'YES'.

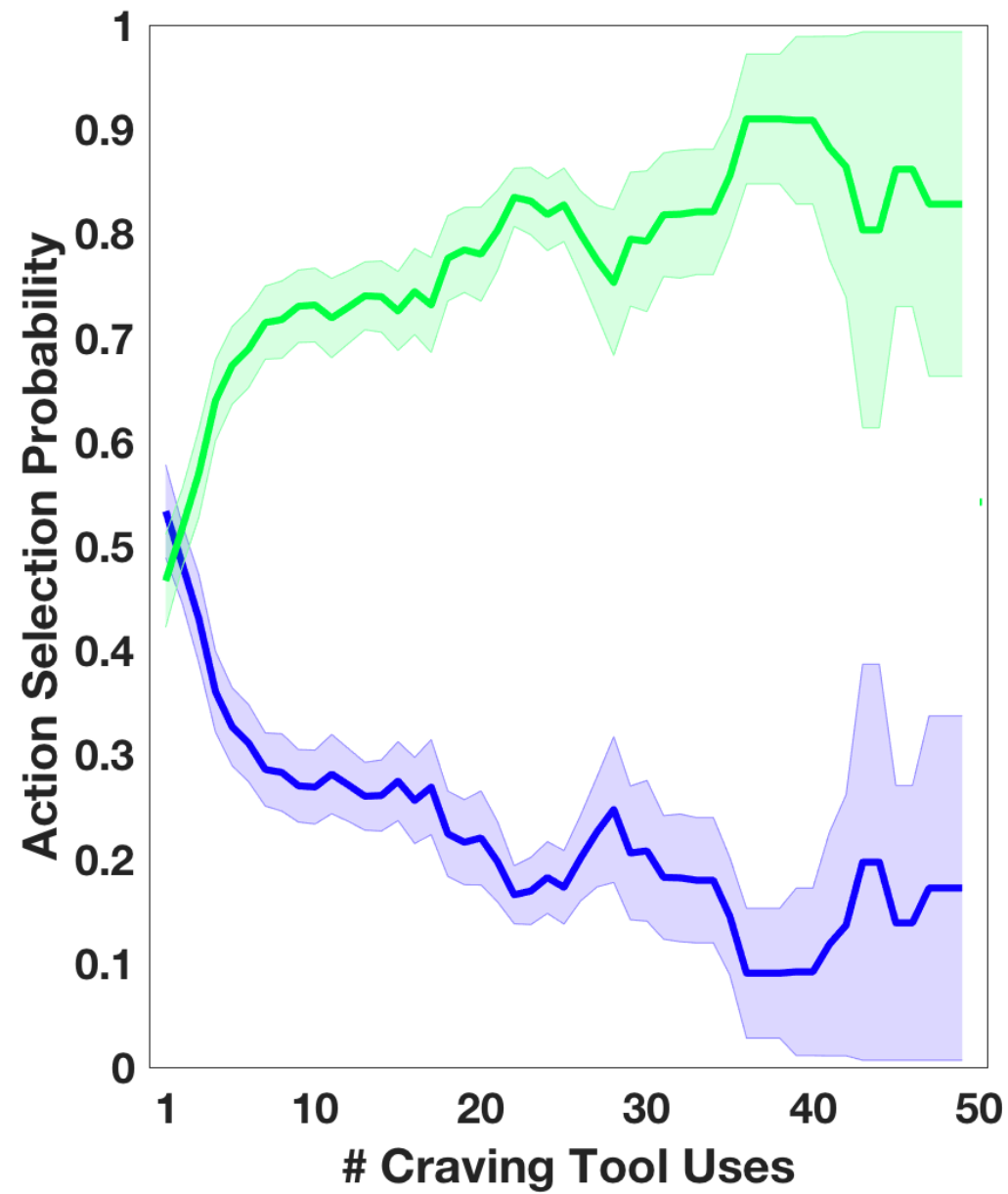
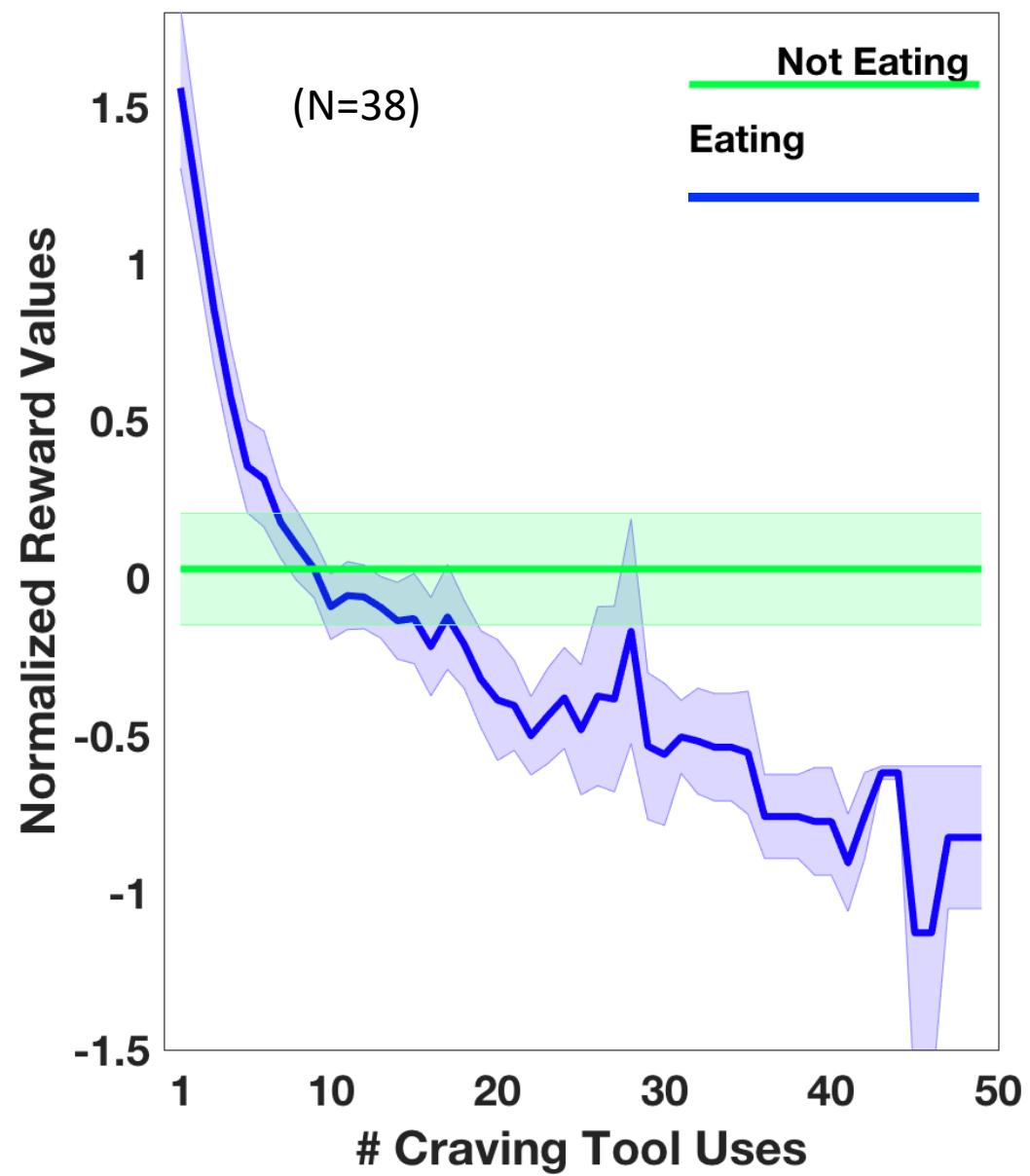
TYPE	AMOUNT
<input checked="" type="checkbox"/> Bring to mind the food you are STRUGGLING with	
<input type="checkbox"/> IMAGINE eating the amount that you usually eat of it.	
<input type="checkbox"/> Let it settle in your stomach.	
<input type="checkbox"/> Now, focus on what it feels like in your belly. Notice what your body feels like after you ate it.	
<input type="checkbox"/> Notice your thoughts and emotions.	

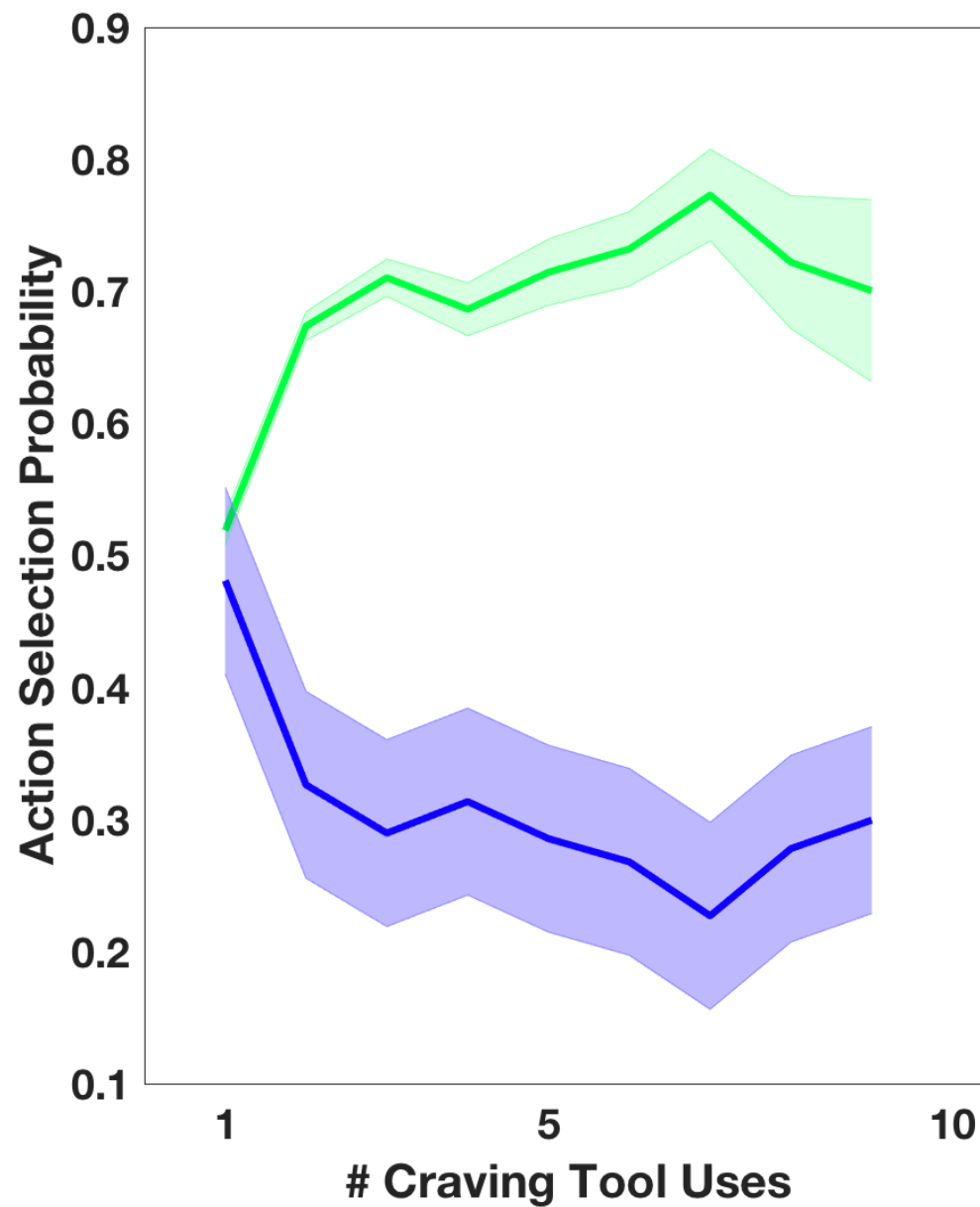
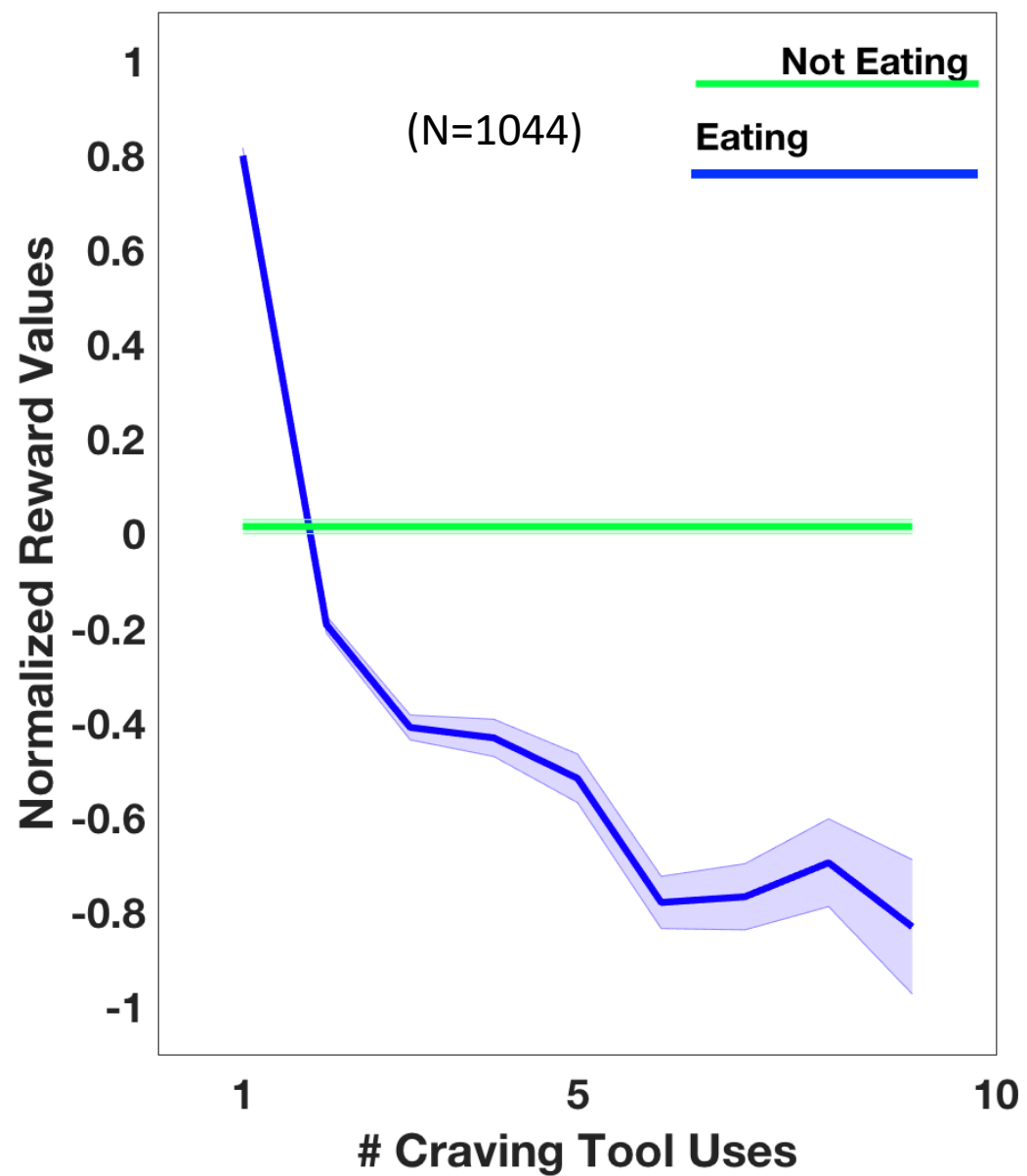
How strong is your craving now compared to before the exercise?

a lot stronger +10  
+5  
same as before 0  
-5  
a lot weaker -10

Do you want to eat now?

NO YES





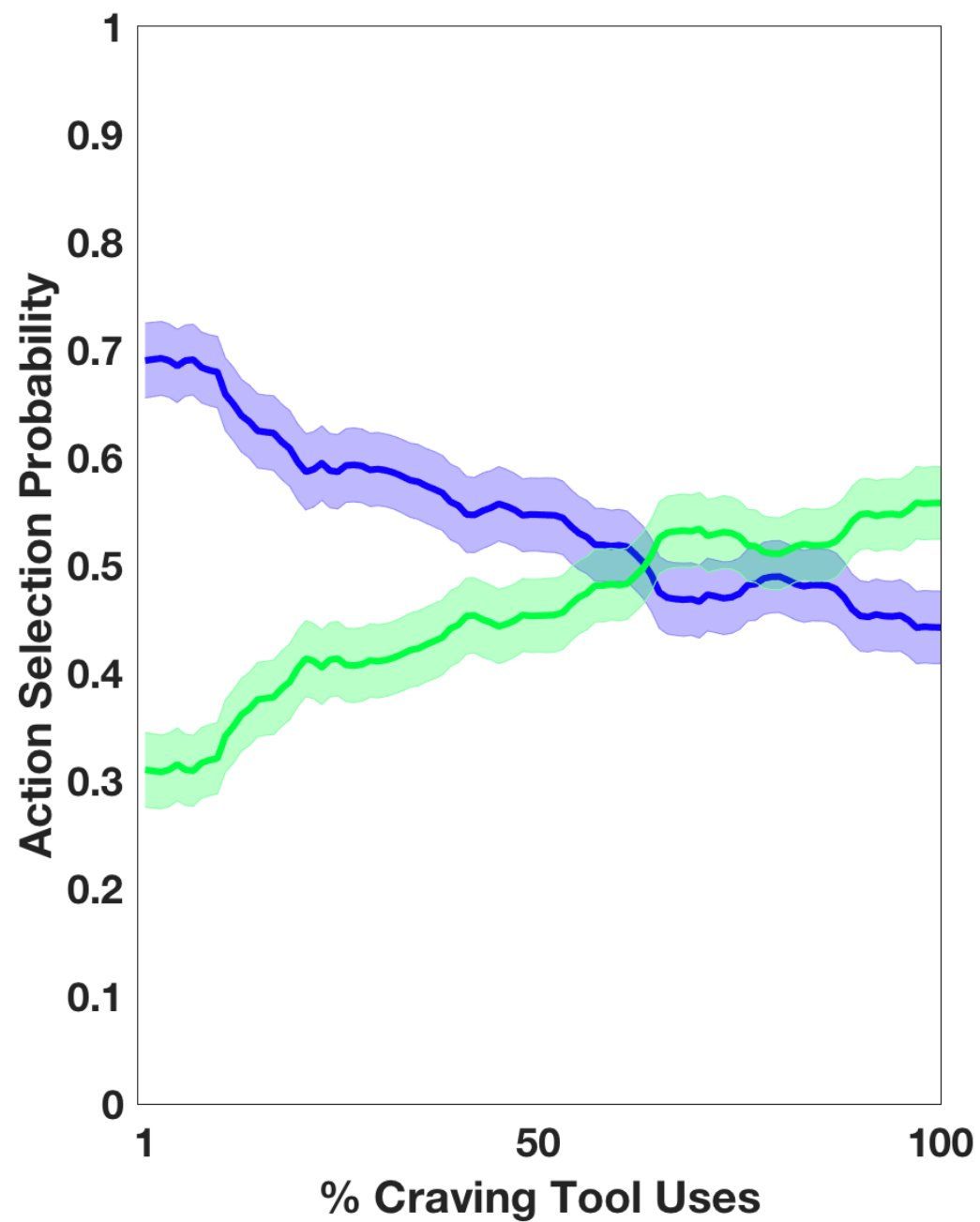
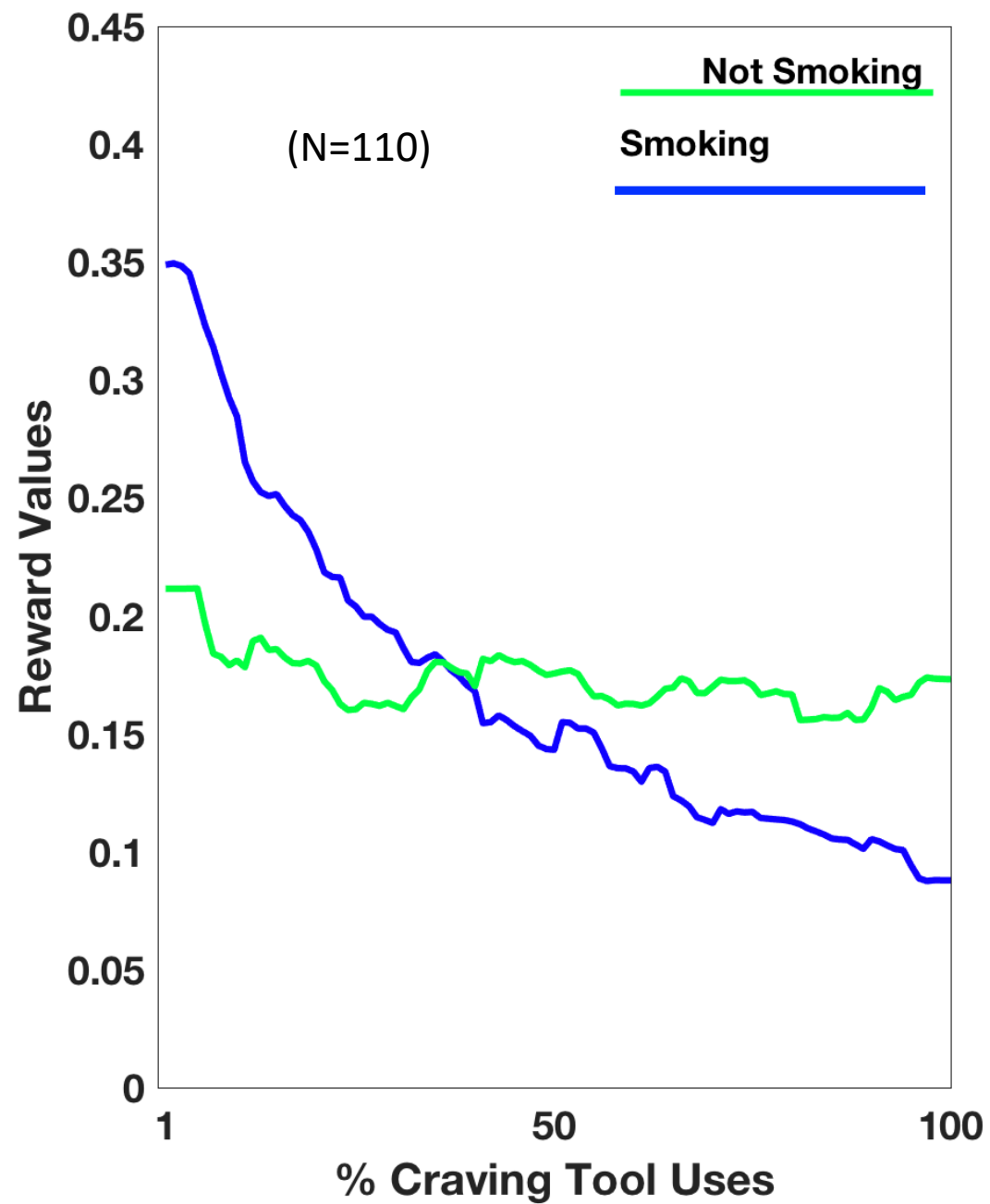
“

Dear sneaky habit loop that  
says eating junk food is fun: I  
AM ON TO YOU.

”

Eat Right Now member





“

Today all the cigarettes I smoked  
were disgusting.

”

Craving to Quit member

“

I'm starting to think that over the years I've tricked myself into believing that anxiety is productive—even a reward. A thought about work arises (trigger), I jump into worrying or distraction (behavior), and I get more anxiety as a result (reward/outcome). During the first few days of this program, I was confused by this loop, and I wondered how anxiety can possibly feel like a reward. A reward? It feels horrible! But I think I'm onto something: for me, feeling anxious, as horrible as it is, has come to seem like the “right” way to feel, the appropriate response to having unfinished tasks ahead of me. After all, it seems logical that this kind of discomfort would lead to productivity.

”

Unwinding Anxiety member

Step 3:  
Rewards that are  
more rewarding



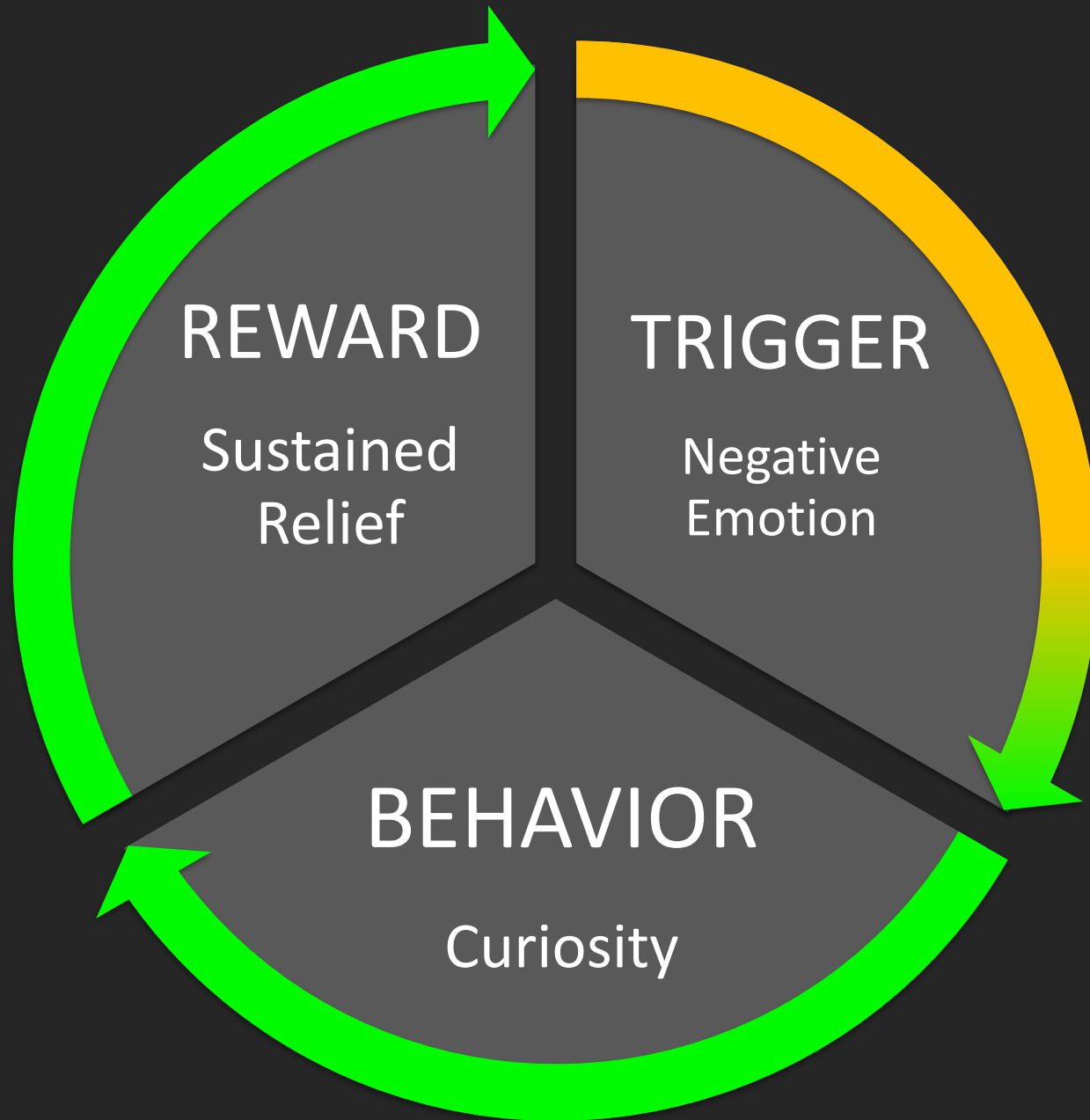


“

I have no special talents. I am  
only passionately curious

”

-Albert Einstein



“

When I first started the program, I didn't quite buy into the benefits of curiosity. Today I felt a wave of panic and instead of immediate dread or fear, my automatic response was, “Hmm, that's interesting.”

That took the wind right out of its sails!  
I wasn't just saying it was interesting, I actually felt it.  
I was so thrilled.

”

Unwinding Anxiety member

“

My relationship with anxiety has completely transformed over the past four weeks. I used to think the anxiety *was* me. I still feel anxiety coming, but **as a body sensation and not as a thought**. And that makes all the difference.

”

Unwinding Anxiety member



“

For me the suffering is showing up as being way worse than the actual bodily sensations of anxiety. As I am learning to be, in loving kindness and curiosity, with my body sensations of anxiety I am not suffering...

”

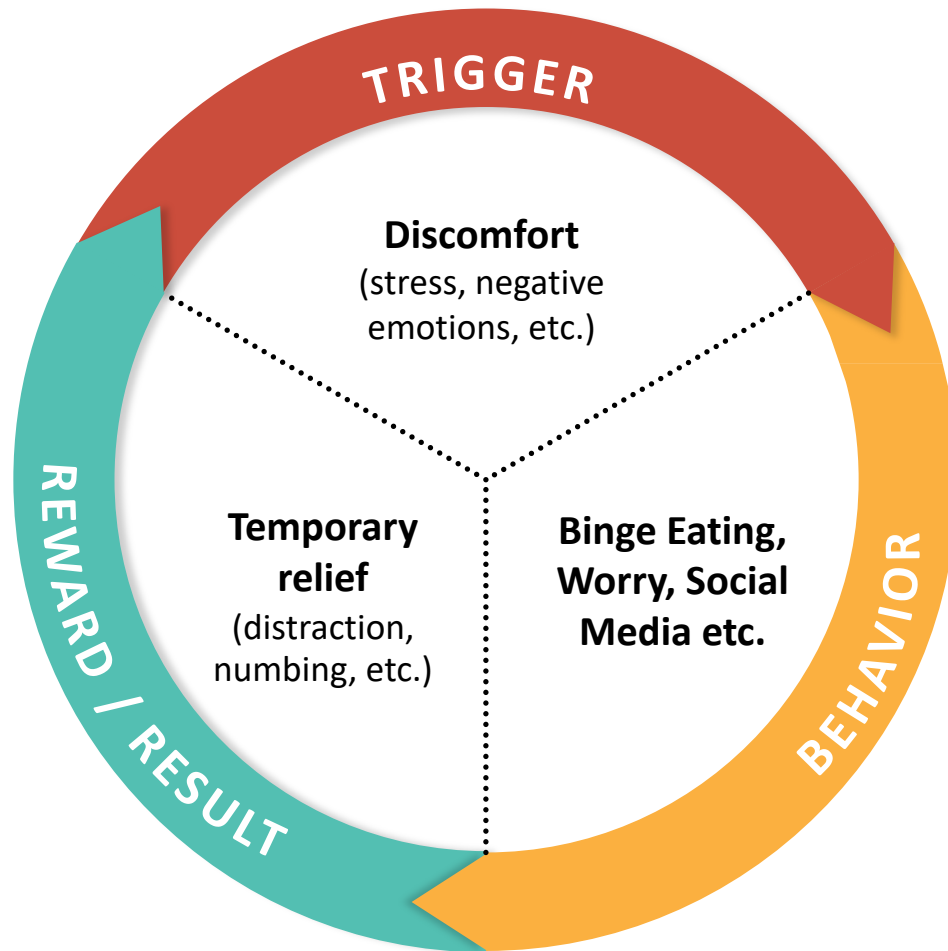
Unwinding Anxiety member

“

There is a worm  
addicted to eating grape leaves  
Suddenly he wakes up,  
call it grace, whatever, something  
wakes him, and he is no longer a worm,  
He is the entire vineyard,  
and the orchard too, the fruit, the trunks,  
a growing wisdom and joy  
that does not need to devour”

- Rumi, “The Worm’s Waking”

# EVERYDAY ADDICTION HABIT LOOP



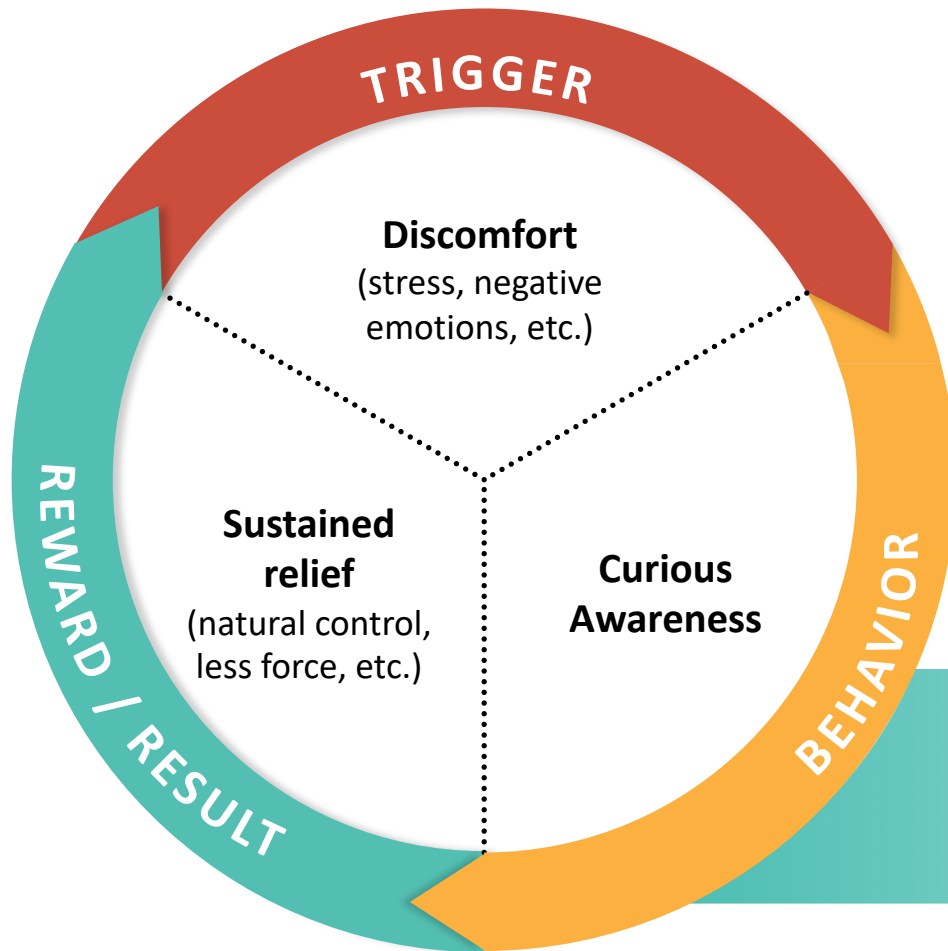
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The same **ancient learning system** that evolved to form survival **habit loops** is the source of **everyday addictions**.

# HACKING THE HABIT LOOP



The habit loop **can be re-purposed** using reproducible and validated methods: it can be hacked using **curiosity**...




*Operational target for mindfulness training:  
bringing into awareness behaviors that are  
more rewarding*





## MORE INFORMATION:

- [www.drjud.com](http://www.drjud.com)
  - Free CME/CEU courses
-  @judbrewer
- Mindfulness Center @Brown
  - [www.brown.edu/mindfulnesscenter](http://www.brown.edu/mindfulnesscenter)



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## INSTRUCTIONS FOR LIVING:

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

- Mary Oliver