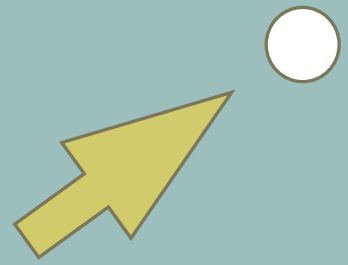

THE SCIENCE OF ATTENTION AND ENGAGEMENT FOR LEARNING

Julie Dirksen, Usable Learning

WHO HAS THE MOST BORING TOPIC?

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HYPOTHESIS:

One of the primary responsibilities of Instructional Design is

the Ruthless Management of Cognitive Load

Agree?

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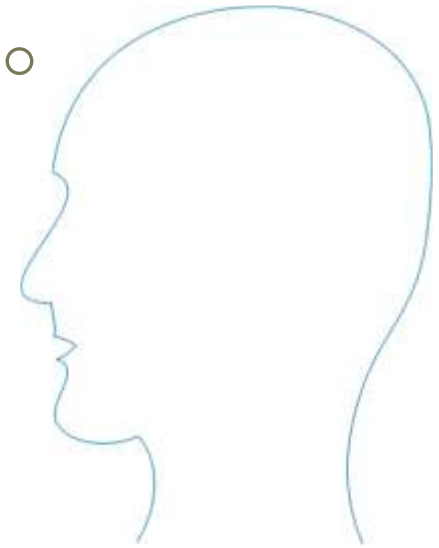
COGNITIVE LOAD THEORY (SWELLER)

Intrinsic

Germane

Extraneous

2 x 4 = 8



The online math textbook won't load and it's really annoying!

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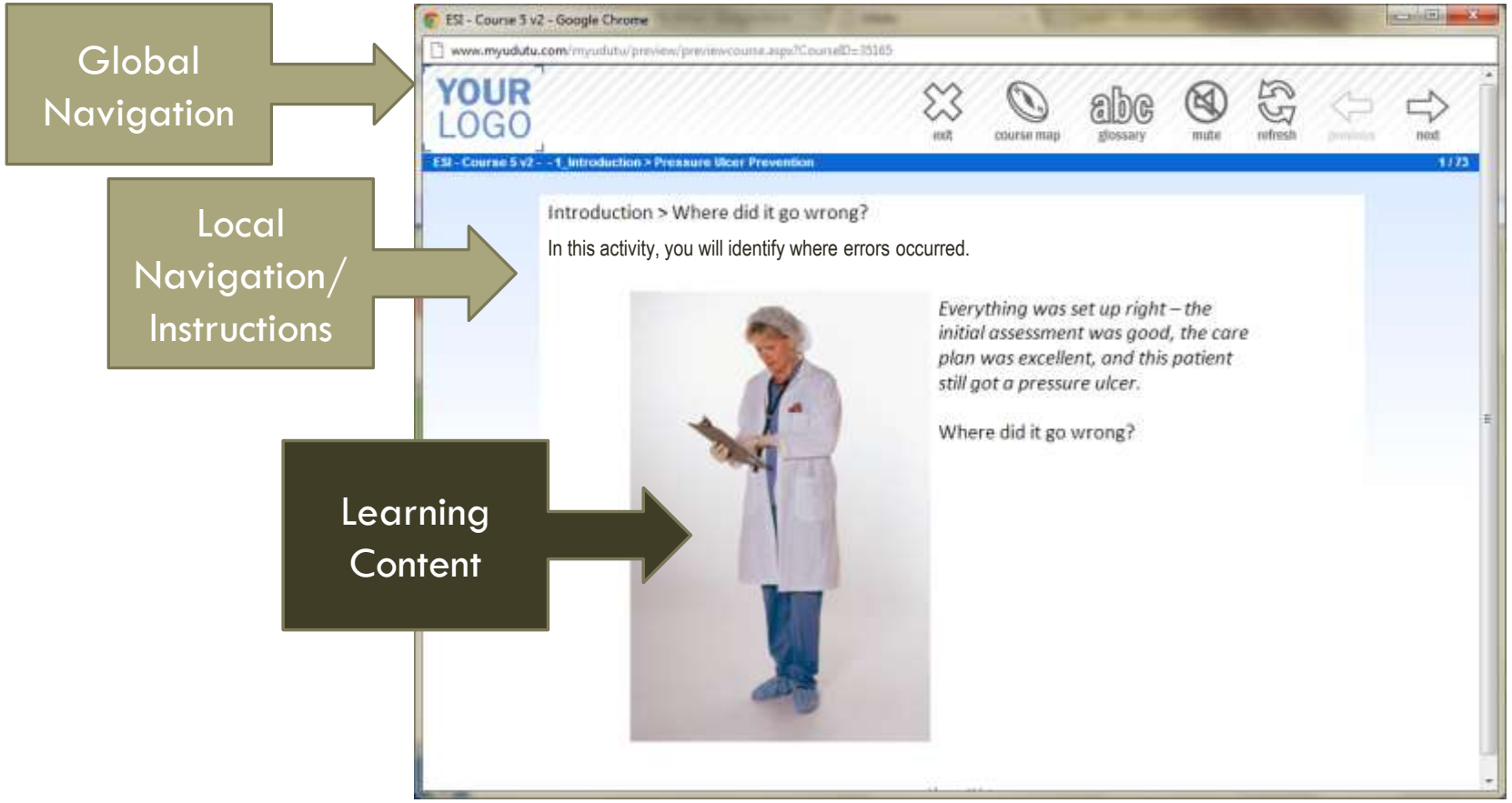
COGNITIVE LOAD IN ELEARNING



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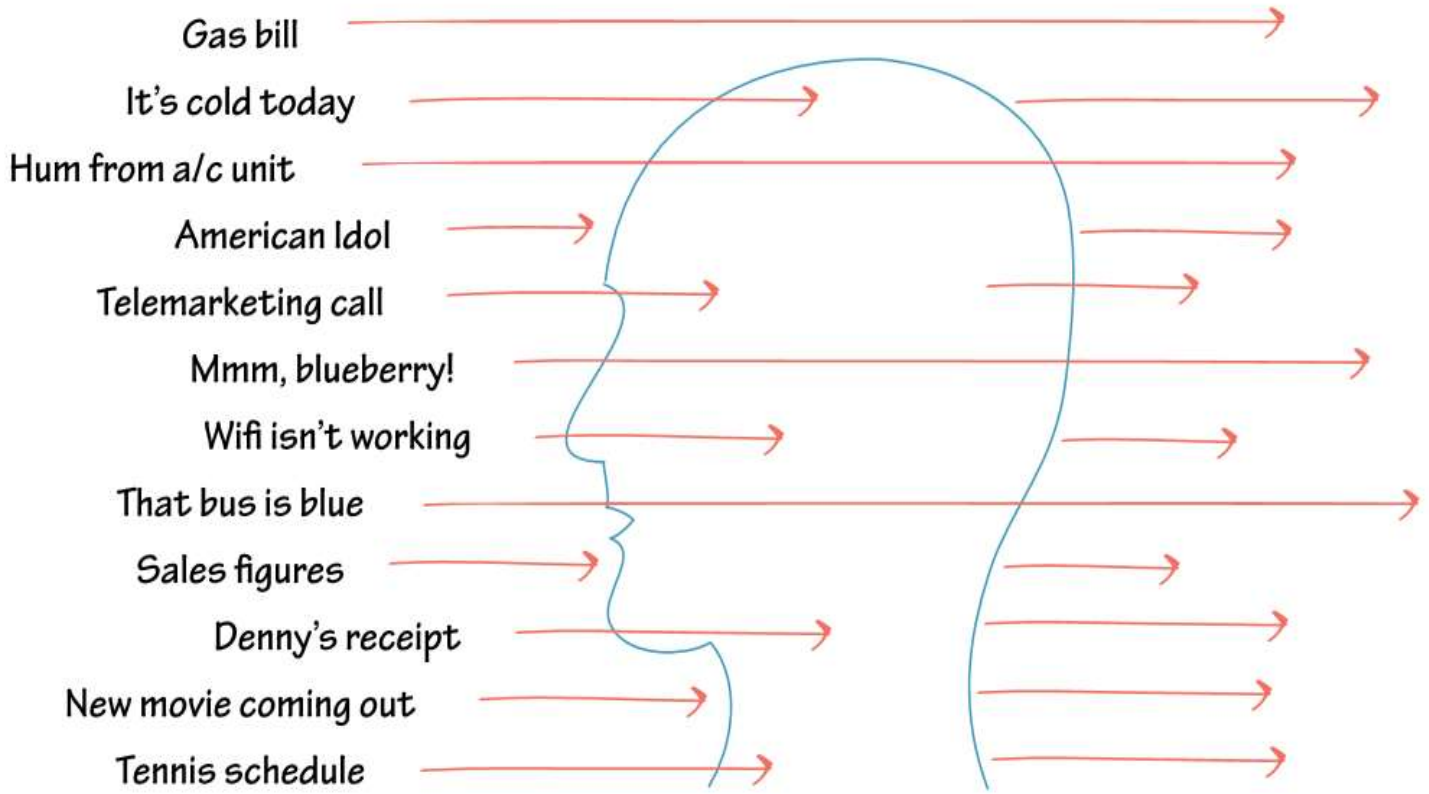
FLOODED WITH DATA



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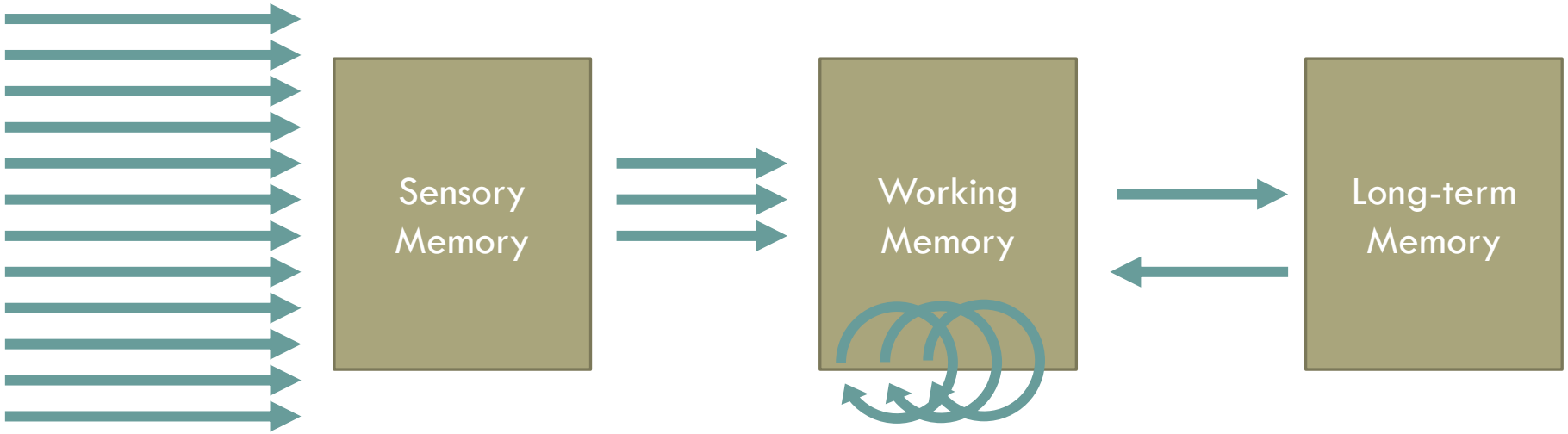
INFORMATION PROCESSING MODEL



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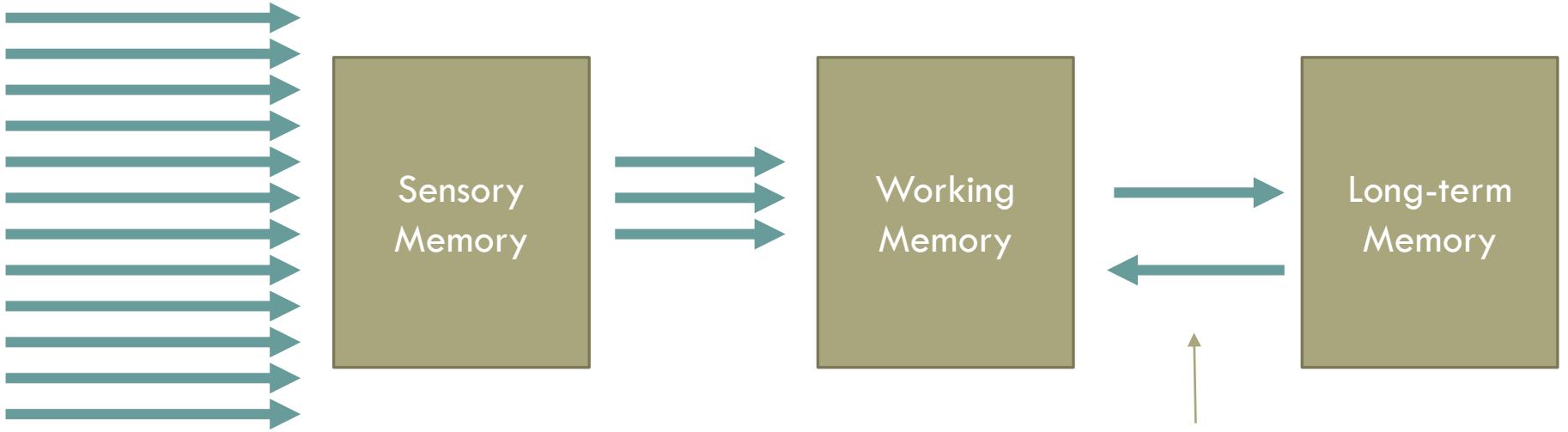
WHAT IS THE LAST CAR YOU REMEMBER SEEING?



- Unusual or surprising
- Emotional reaction
- Meaningful or relevant
- Previous experience
- Interacted with
- Repetition

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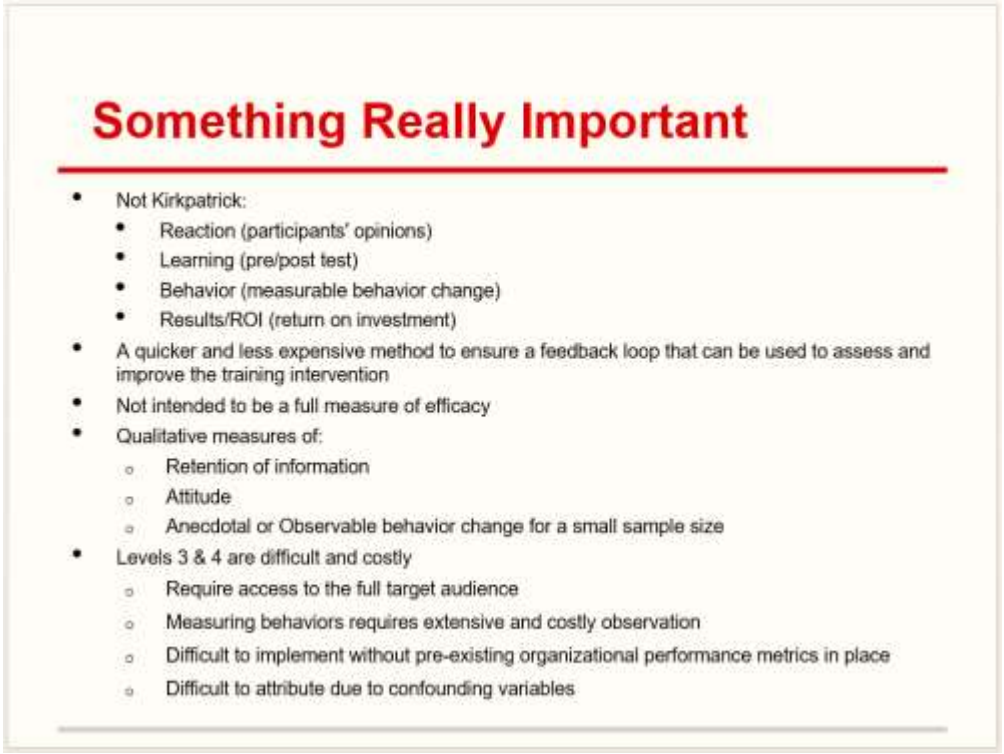
WE'VE ALL SEEN THIS SLIDE



How does it do?

- Unusual or surprising
- Emotional reaction
- Meaningful or relevant
- Previous experience
- Interacted with
- Repetition

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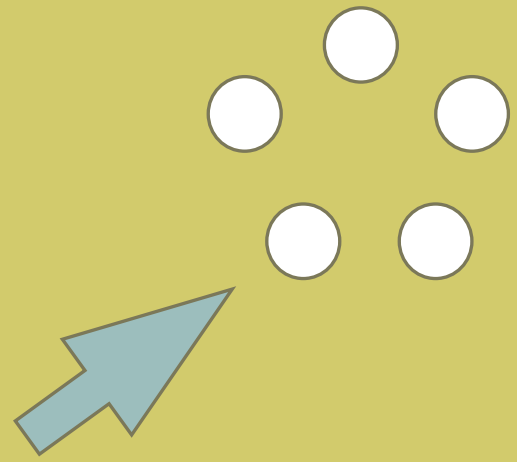
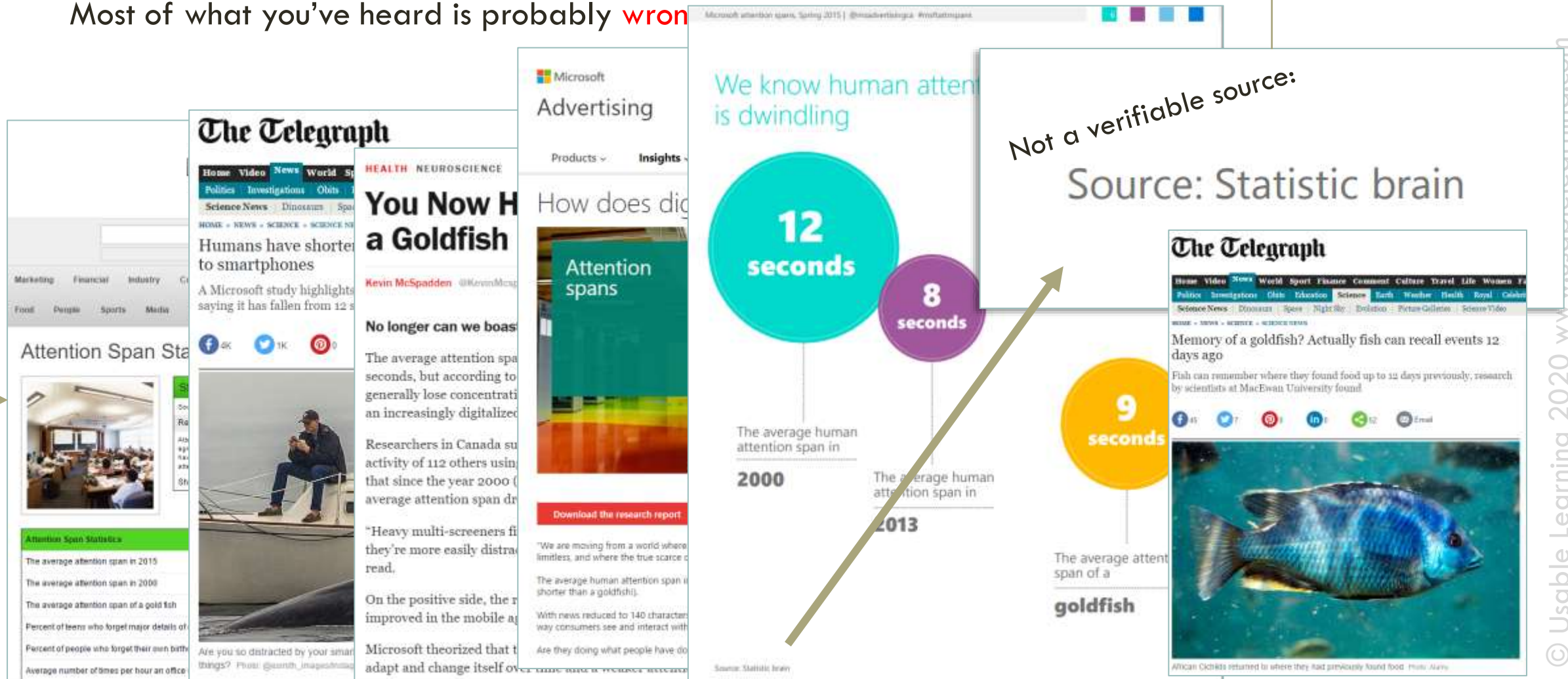


ATTENTION

A Resource Allocation Problem

HOW LONG IS THE AVERAGE ATTENTION SPAN?

Most of what you've heard is probably wron



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THERE ISN'T A SINGLE KIND OF "ATTENTION"

Focused Attention

Habitual Attention

Continuous Attention

Voluntary Attention

Selective Attention

Sustained Attention

Involuntary Attention

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INTERRUPTION OF CONTINUOUS ATTENTION

Reading, reading, reading, reading – oh look, the sun's out – reading reading reading – what time is it? – reading, reading…

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Level	Description
1. Focused Attention (easiest level)	Response to external stimuli.
2. Sustained Attention	Ongoing focus to carry out repetitive tasks.
3. Selective Attention	Staying focused while distractions are present.
4. Alternating Attention	Shifting focus between tasks that need different skills.
5. Divided Attention (most difficult level)	Responding simultaneously to multiple tasks. (May be rapid switching of alternating attention.)

Sohlberg and Mateer Attention Model, from Patti Shank on Elearning Industry

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TYPES OF ATTENTION

- Voluntary *(I need to read this…)*
- Involuntary *(Squirrel!)*
- Habitual *(Did you say something? Sorry, I was checking my phone…)*

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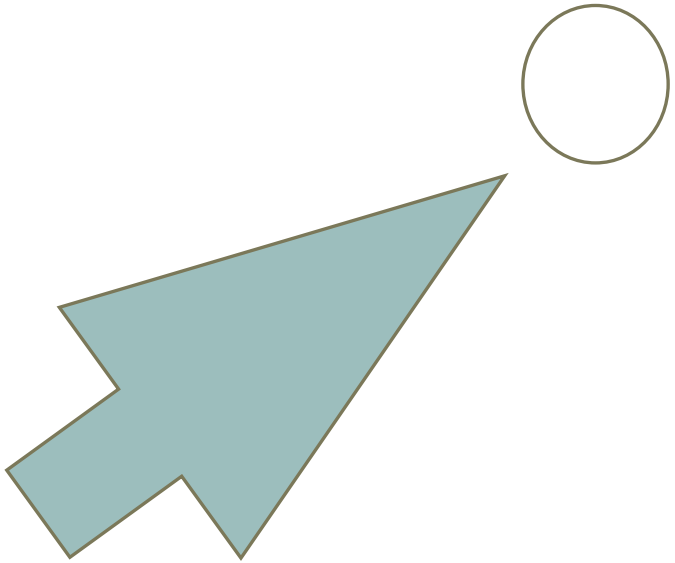
VOLUNTARY ATTENTION:
WHAT ARE YOU PAYING ATTENTION TO RIGHT NOW?



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WHAT ARE THE CUES?

What are the cues telling you what to pay attention to?

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SOCIAL CUES (OKITA)

The belief that they were interacting with a live person increased arousal, attention and learning.

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CUES DEPEND ON THE AUDIENCE (VOGT & MAGNUSSEN)

What the general population focuses on:

What an artist focuses on:

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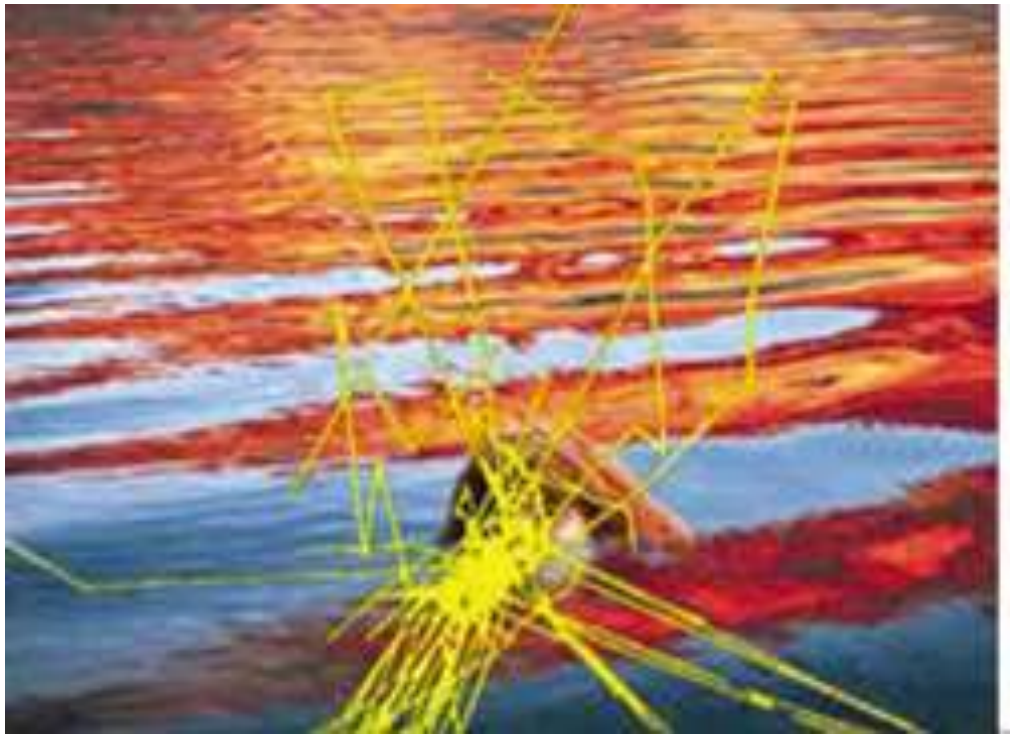
CUES DEPEND ON THE AUDIENCE (VOGT & MAGNUSSEN)

What the general population focuses on:



What an artist focuses on:

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MILGRAM – STREET CORNER EXPERIMENT

One person looking up on a street corner drew several other people also looking up

Social Norming

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LET'S COMPARE

Intrinsically motivated attention

Extrinsically motivated attention

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WHICH WOULD YOU RATHER HAVE?

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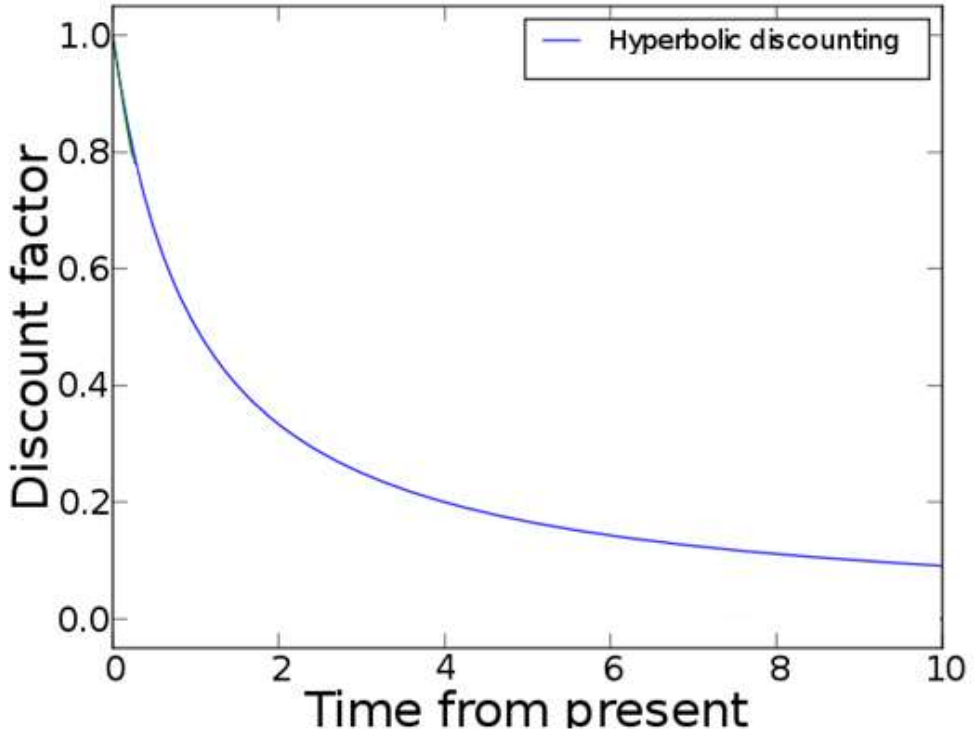
Poll

HYPERBOLIC DISCOUNTING (KAHNEMAN AND TVERSKY)



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Poll

CHALLENGE

Who wants to watch a video about printer repair?

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WE CAN FORCE OURSELVES TO PAY ATTENTION, BUT . . .

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NEUROENERGETIC THEORY (KILLEEN)

frontiers in Psychology | Personality and Social Psychology

‹ Archive

HYPOTHESIS & THEORY ARTICLE

Front. Psychol., 01 July 2013 | http://dx.doi.org/10.3389/fpsyg.2013.00373

Absent without leave; a neuroenergetic theory of mind wandering

Peter R. Killeen*

Department of Psychology, Arizona State University, Tempe, AZ, USA

Absent minded people are not under the control of task-relevant stimuli. According to the Neuroenergetics Theory of attention (NeT), this lack of control is often due to fatigue of the relevant processing units in the brain caused by insufficient resupply of the neuron's preferred fuel, lactate, from nearby astrocytes. A simple drift model of information processing accounts for response-time statistics in a paradigm often used to study inattention, the Sustained Attention to Response Task (SART). It is suggested that errors and slowing in this fast-paced, response-engaging task may have little to due with inattention. Slower-paced and less response-demanding tasks give greater license for inattention—aka absent-mindedness, mind-wandering. The basic NeT is therefore extended with an ancillary model of attentional drift and recapture. This Markov model, called NEMA, assumes probability λ of lapses of attention from 1 s to the next, and probability α of drifting back to the attentional state. These parameters measure the strength of attraction back to the task (α), or away to competing

"Lack of control is often due to fatigue of the relevant processing units in the brain caused by insufficient resupply of the neuron's preferred fuel, lactate, from nearby astrocytes."

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DOODLING TO REDUCE ATTENTION DRIFT (ANDRADE)

APPLIED COGNITIVE PSYCHOLOGY
Appl. Cognit. Psychol. (2009)
Published online in Wiley InterScience
(www.interscience.wiley.com) DOI: 10.1002/acp.1561

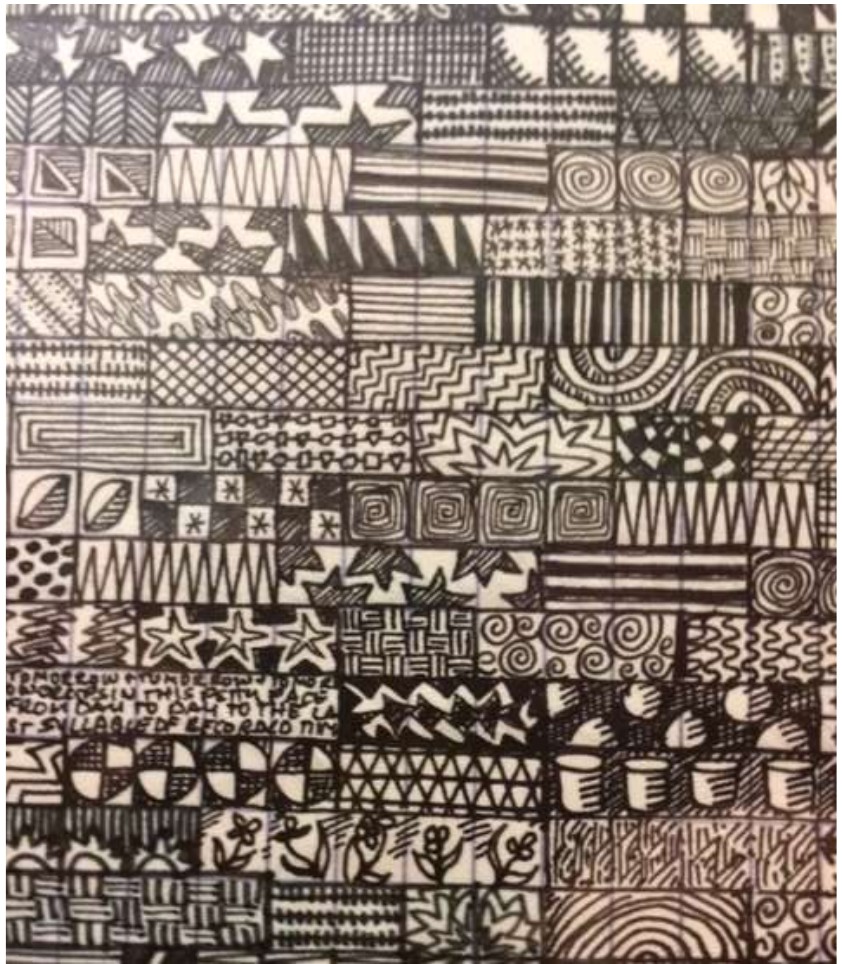
What Does Doodling do?

JACKIE ANDRADE*
School of Psychology, University of Plymouth, UK

SUMMARY

Doodling is a way of passing the time when bored by a lecture or telephone call. Does it improve or hinder attention to the primary task? To answer this question, 40 participants monitored a monotonous mock telephone message for the names of people coming to a party. Half of the group was randomly assigned to a 'doodling' condition where they shaded printed shapes while listening to the telephone call. The doodling group performed better on the monitoring task and recalled 29% more information on a surprise memory test. Unlike many dual task situations, doodling while working can be beneficial. Future research could test whether doodling aids cognitive performance by reducing daydreaming. Copyright © 2009 John Wiley & Sons, Ltd.

The call centre has put you on hold yet again and you start thinking about how good it would be to have a holiday, where you would like to visit . . . then you realize that the person you have been waiting to speak to has already started talking and you have not taken in anything they have said. This scenario illustrates the tendency for daydreaming to start in moments of boredom and, once started, to distract attention from the task in hand. In such a situation some people resort to doodling, aimlessly sketching patterns and figures unrelated to the primary task. It is not known whether doodling impairs performance by detracting resources from the primary task, as would be the case for the most concurrent cognitive tasks or whether it improves performance by aiding concentration (Do & Schallert, 2004) or maintaining arousal (Wilson & Korn, 2007). This question ties into more general issues in cognitive and applied psychology. Boredom is a very common experience (Harris, 2000) and daydreaming is a common response, even in the laboratory (Smallwood & Schooler, 2006). A way of aiding concentration would have implications for psychological research



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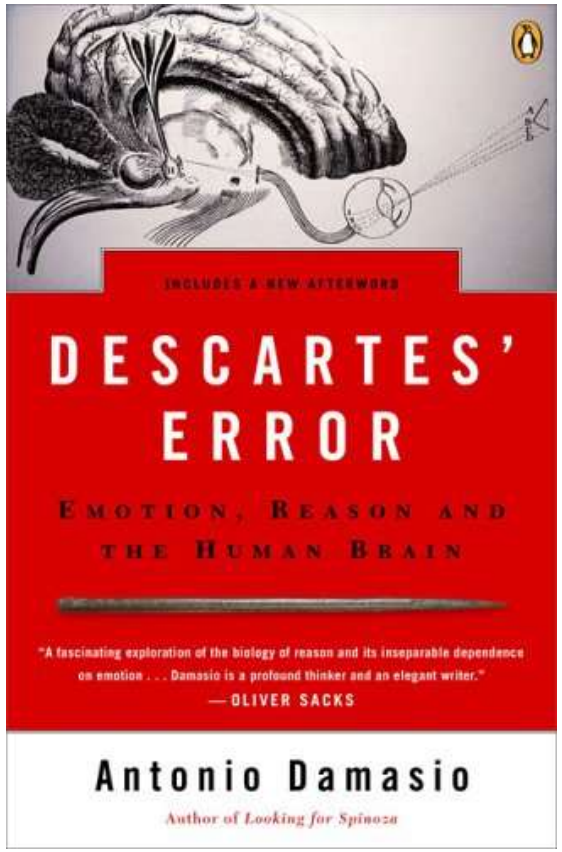
SOMATIC MARKERS (DIMASSIO)



Rational Decision Making

(is probably a myth…)

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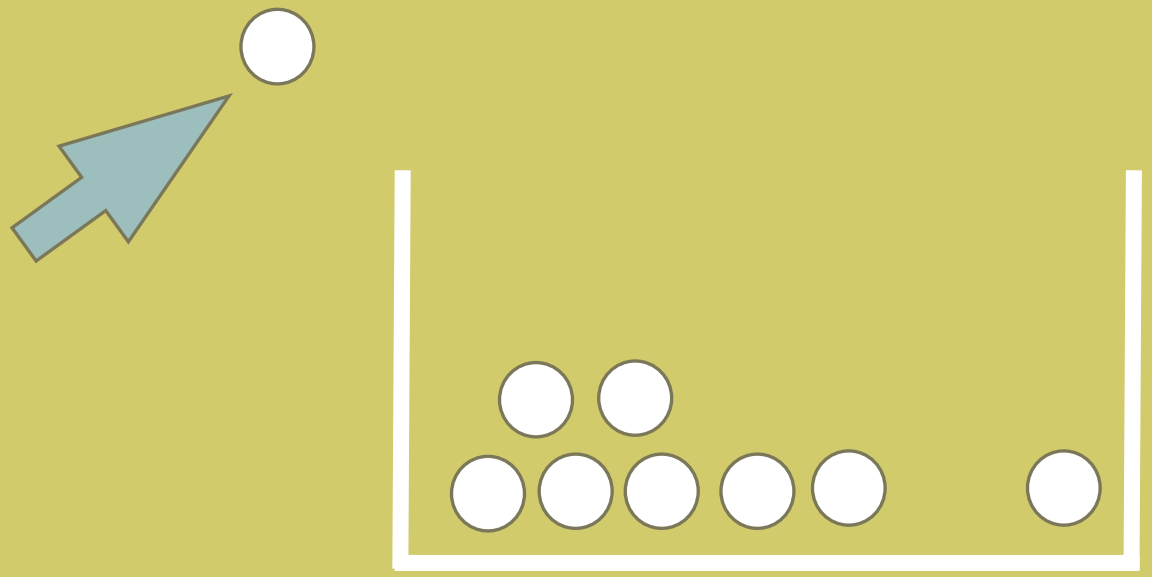
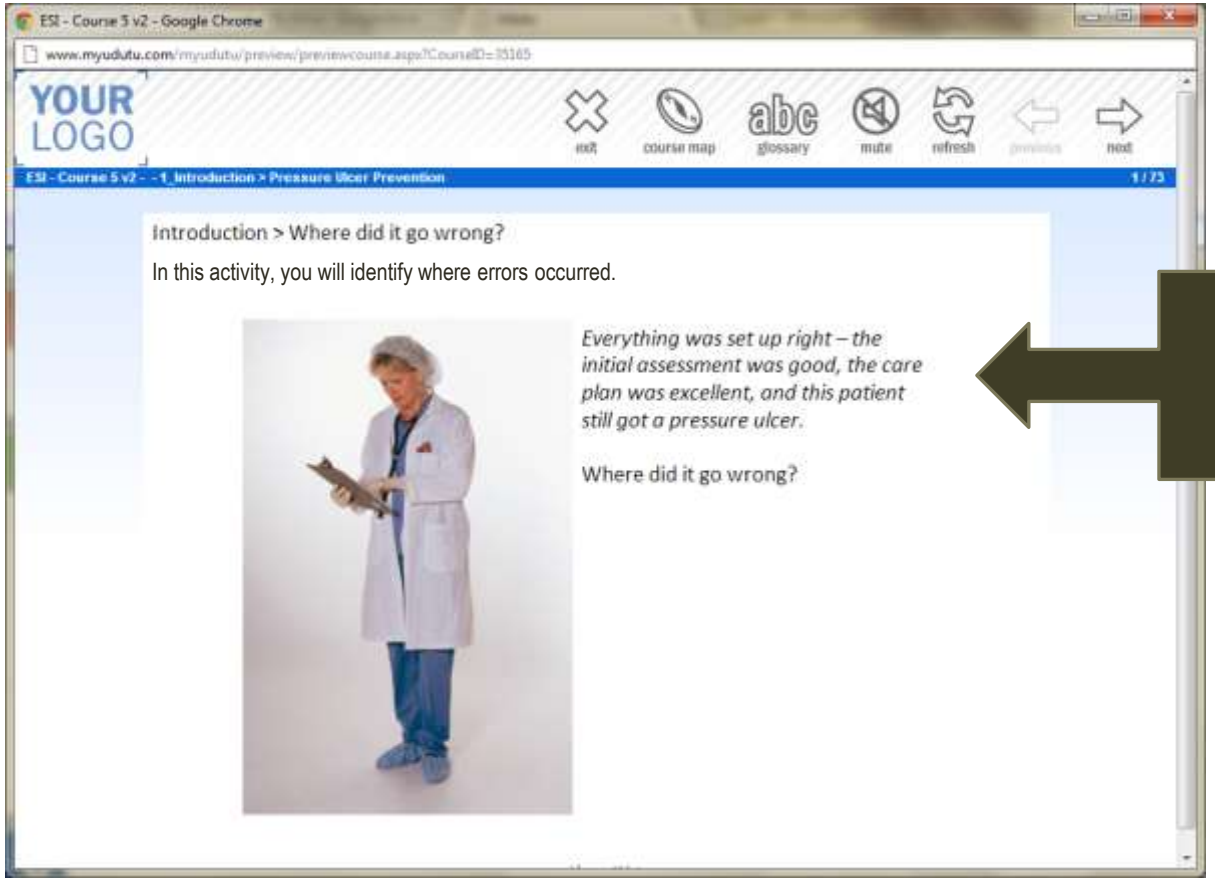


SO WHAT DO WE DO WITH THIS?

A few suggestions

RUTHLESSLY REDUCE EXTRANEOUS LOAD

Extraneous



Intrinsic

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IMPROVE READABILITY

High text density

A company has recently implemented a self-appraisal system for its annual performance evaluations. All employees are required to attend a classroom learning event that is designed to help them learn about the new system and the tools they should use to conduct and submit the self-appraisals.

Readability	
Passive Sentences	50%
Flesch Reading Ease	40.0
Flesch-Kincaid Grade Level	13.3

Lower text density / direct speech:

Our company just added a self-appraisal system to help with annual performance reviews.

You will attend a class to learn how to use it.

Readability	
Passive Sentences	25%
Flesch Reading Ease	53.8
Flesch-Kincaid Grade Level	10.2

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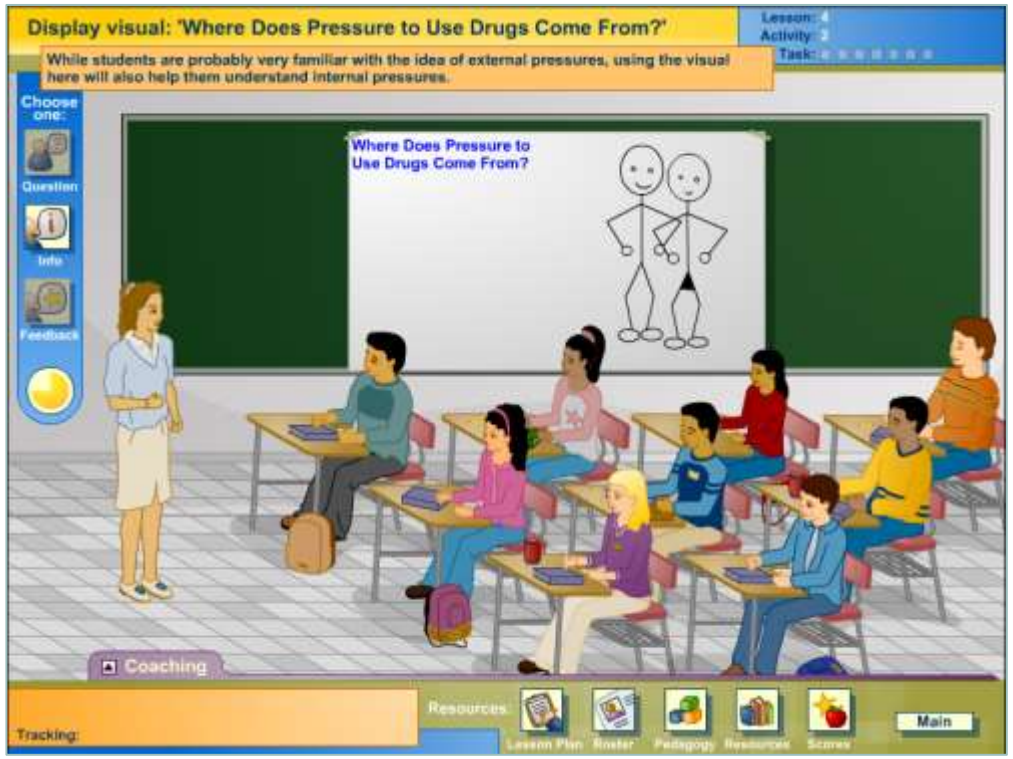
USER TEST



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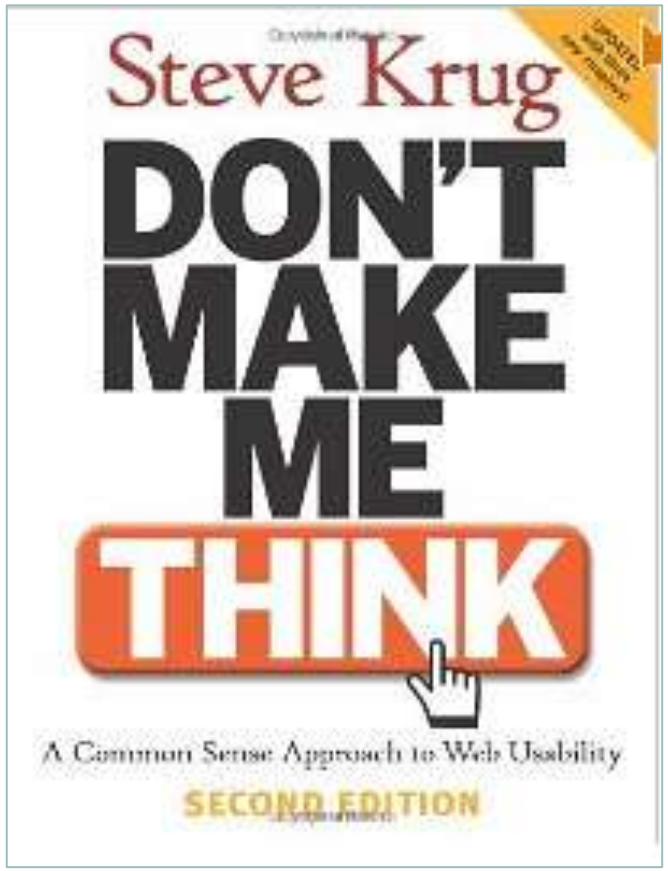
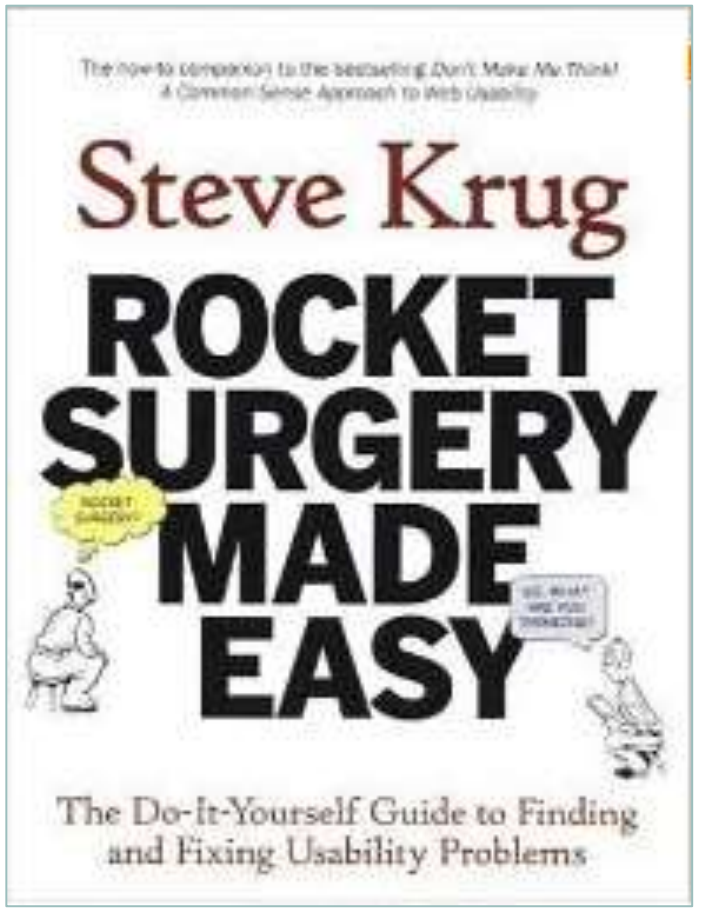
USER TEST





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MAKE CHOICES A BIT EASIER (OR HARDER)

“in seven weeks, New York Googlers consumed 3.1 million fewer calories from M&Ms”

Source http://abcnews.go.com/Health/google-diet-search-giant-overhauled-eating-options-nudge/story?id=18241908

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Sugary drinks at the bottom behind the frosted glass:

The Google Diet: Search Giant's Revamped Eating Habits | NEXT VIDEO

Source http://abcnews.go.com/Health/google-diet-search-giant-overhauled-eating-options-nudge/story?id=18241908

LET PEOPLE CHOOSE

Course: Introduction to Dealing with Back Pain

Where would you like to start?

- Overview & Facts
- Symptoms & Types
- Diagnosis & Tests
- Treatment & Care
- Living & Managing
- Support & Tools

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MAKE IT AS SHORT AS POSSIBLE (BUT NOT SHORTER)

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CREATE A SENSE OF IMMEDIACY

This is important material, so please pay attention.

Your senior account manager left the office and is booked on a flight to South America. You have two hours to audit the accounts and figure out if there's been financial wrongdoing. What should you look for?

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DON'T STRIP OUT THE EMOTION

Insurance procedures

Something Important about Insurance

- Not Kirkpatrick:
  - Reaction (participants' opinions)
  - Learning (pre/post test)
  - Behavior (measurable behavior change)
  - Results/ROI (return on investment)
- A quicker and less expensive method to ensure a feedback loop that can be used to assess and improve the training intervention
- Not intended to be a full measure of efficacy
- Qualitative measures of:
  - Retention of information
  - Attitude
  - Anecdotal or Observable behavior change for a small sample size
- Levels 3 & 4 are difficult and costly
  - Require access to the full target audience
  - Measuring behaviors requires extensive and costly observation
  - Difficult to implement without pre-existing organizational performance metrics in place
  - Difficult to attribute due to confounding variables

A story about Jim, a teen who was injured in a car accident, and how his family dealt with the aftermath

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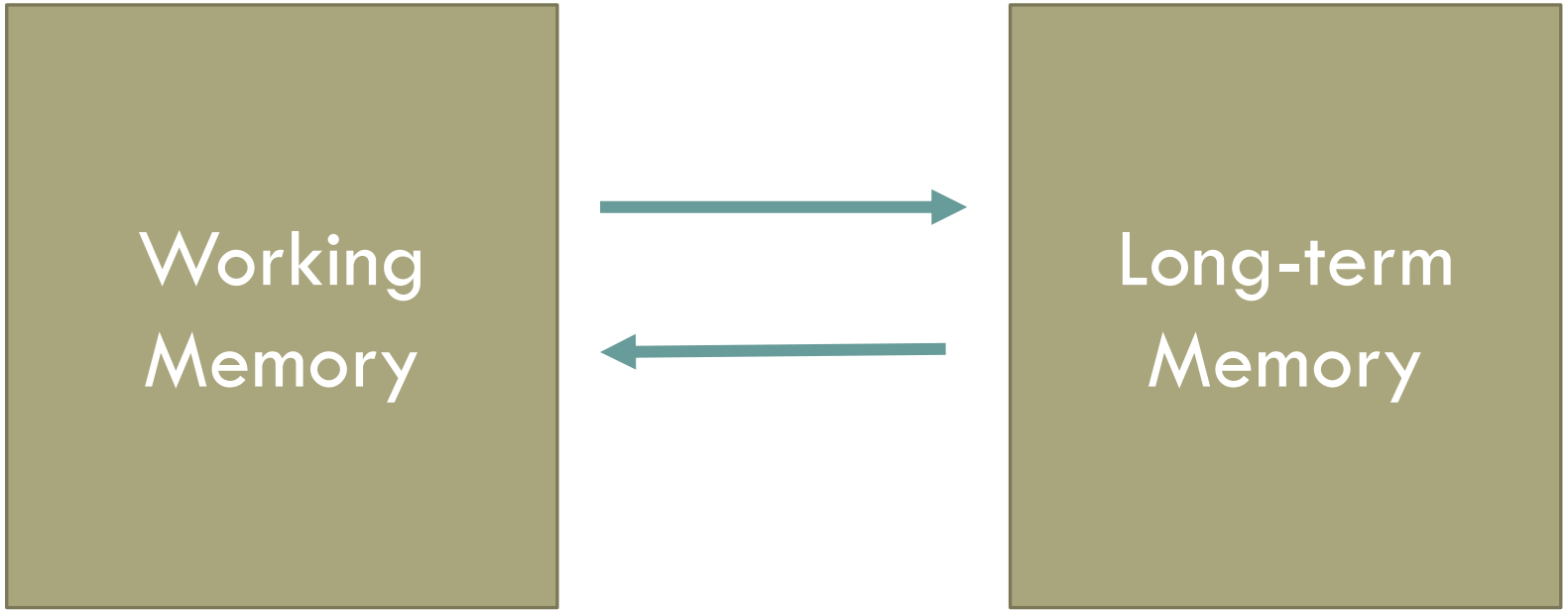
TIE TO THEIR OWN EXPERIENCE



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LET LEARNERS DRIVE

What do you want to learn about?

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MATERIALS

Slides and Resources:

https://usablelearning.com/resources/attention-and-learning/

Julie@usablelearning.com

Twitter: usablelearning

Facebook group:

Facebook.com/groups/designforhowpeoplelearn

Information about courses at:

Designbetterlearning.com

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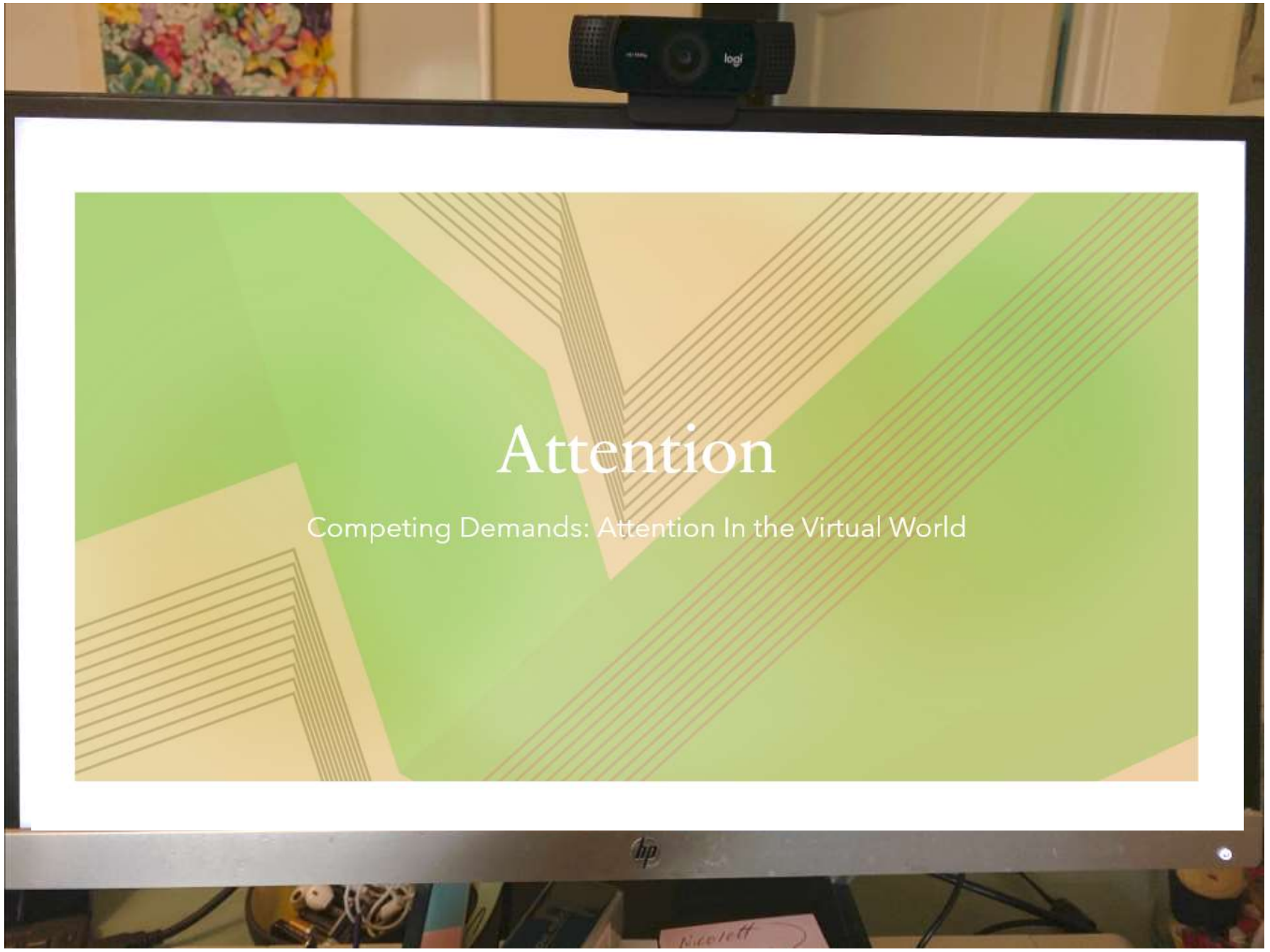
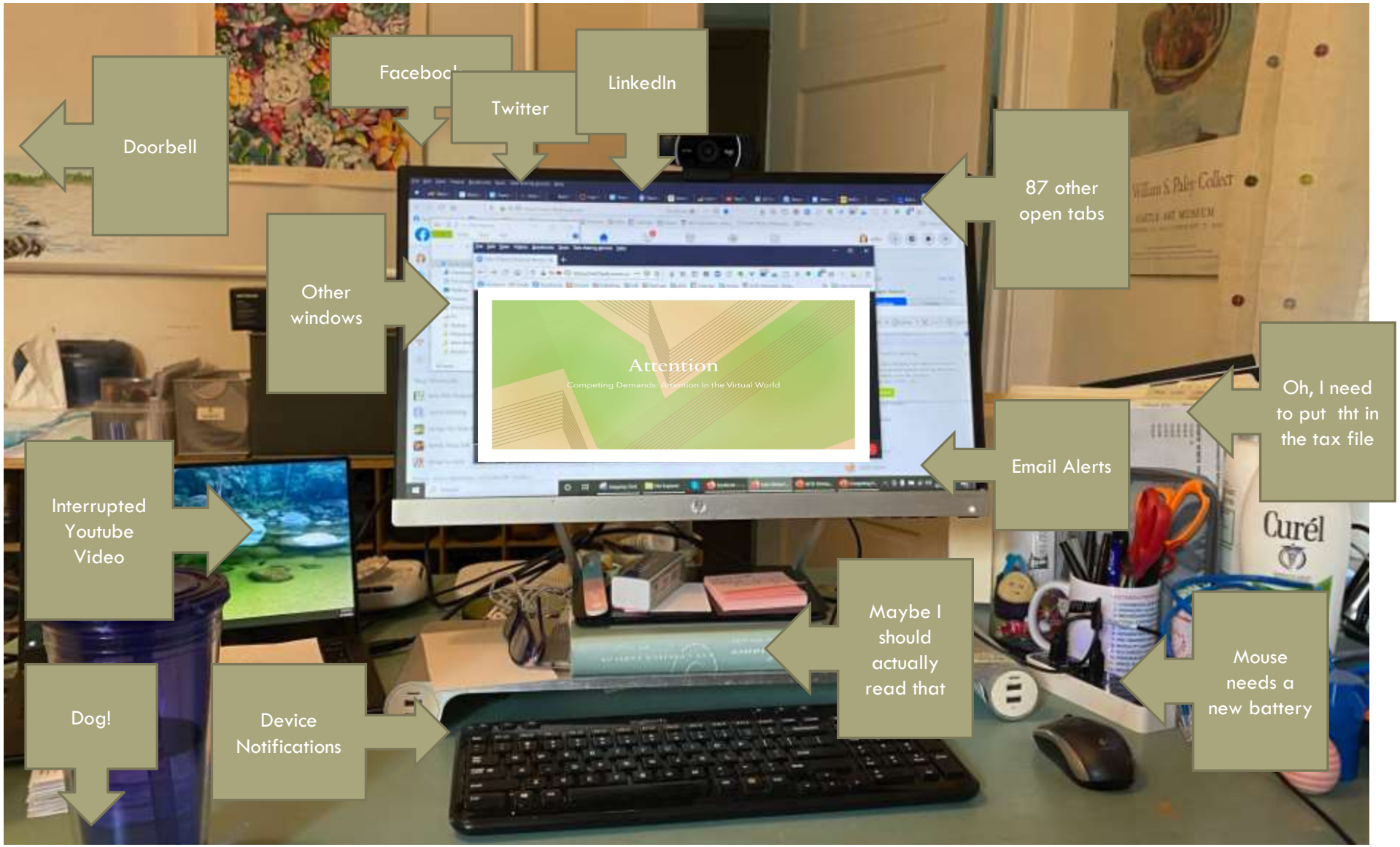
SO WHAT ABOUT VIRTUAL?

What can you do? What can you help your learners do?


Attention
Competing Demands: Attention In the Virtual World


Facebook
Twitter
LinkedIn
Doorbell
87 other open tabs
Other windows
Attention
Competing Demands: Attention In the Virtual World
Oh, I need to put tht in the tax file
Interrupted Youtube Video
Email Alerts
Maybe I should actually read that
Mouse needs a new battery
Dog!
Device Notifications

WHAT ARE THE CUES?

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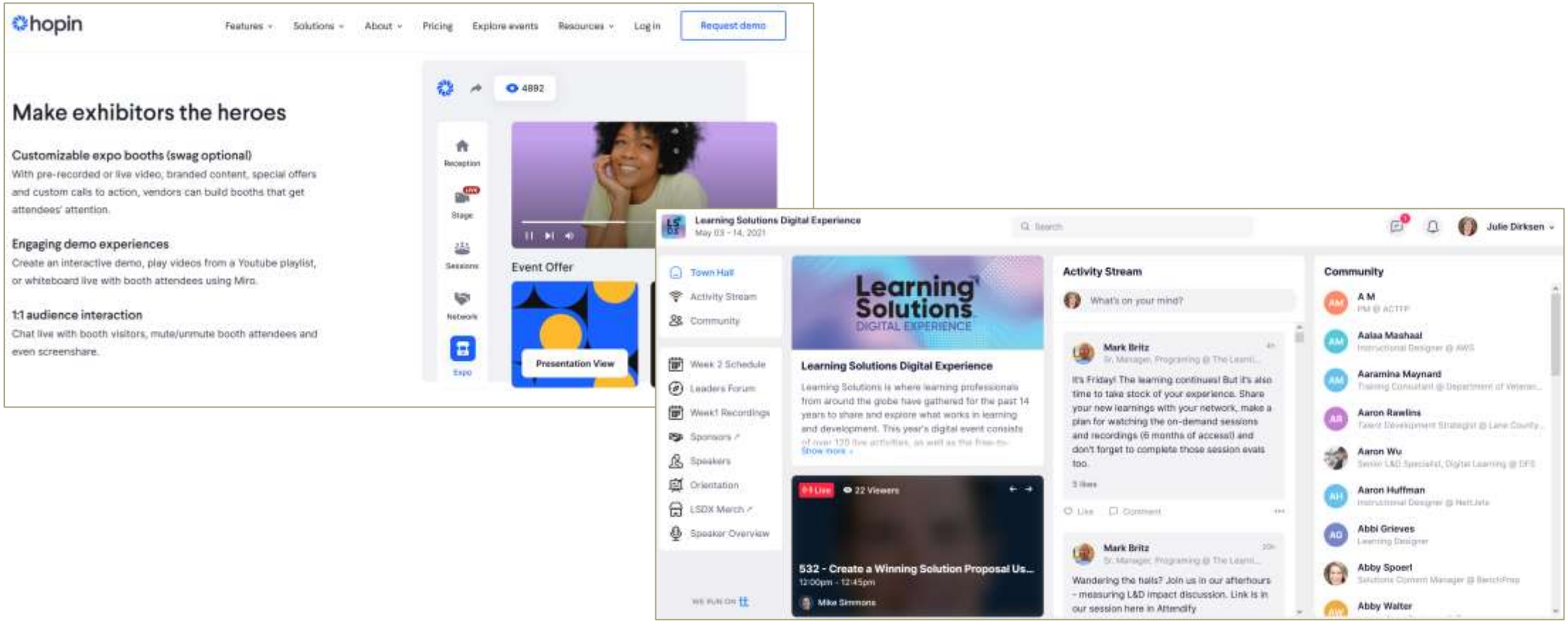
WHAT DO YOU DO IRL?



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TAKE CONTROL

Joe Edelman

Humane Tech

https://www.humanetech.com/take-control

Don't accept defaults

What do you value?

Turn Off Notifications

Red is a trigger color that instantly draws our attention. Reclaim your time by turning off notifications.

TAKE CONTROL

- *Go to **Settings** > **Notifications**, or swipe left on any incoming notification and hit **Manage** > **Turn Off***

Remove Toxic Apps

Remove apps that profit off of addiction, distraction, outrage, polarization, and misinformation.

TAKE CONTROL

- ***Remove Facebook*** → *Message friends with **Signal***
- ***Remove TikTok*** → *Send video messages by direct text or with **Marco Polo***
- ***Remove Snapchat*** → *Get creative in Text instead*
- ***Remove Instagram*** → *Use **VSCO** for photography*

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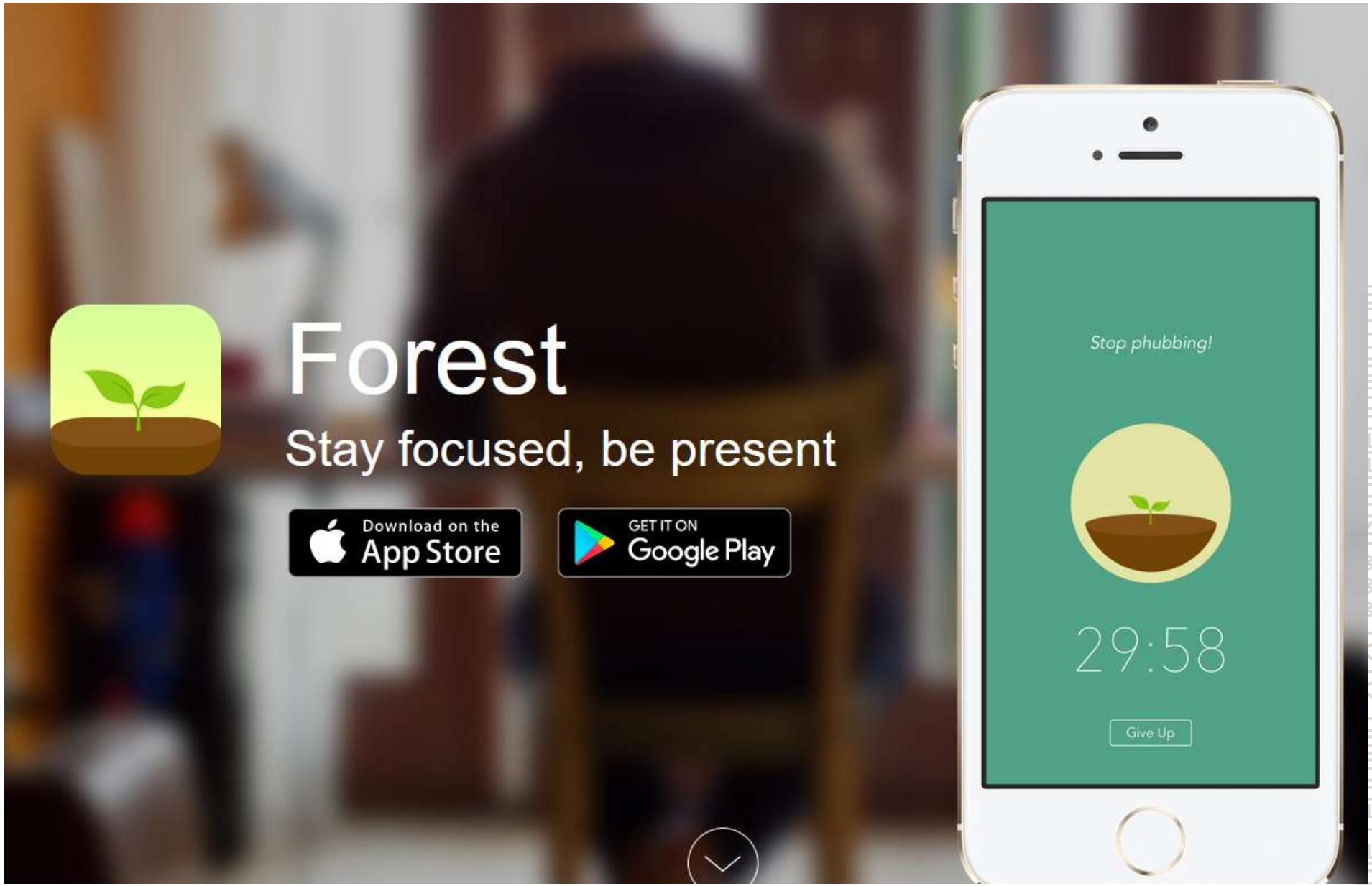
FOCUS APPS



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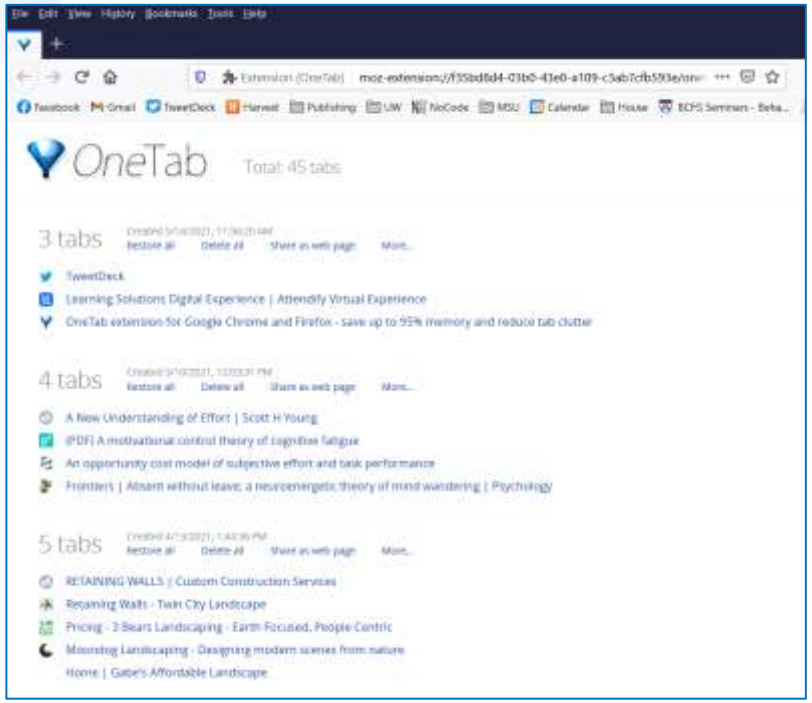
GATHER UP LOOSE ENDS

Before: Lost in a mess of tabs, browser is slow



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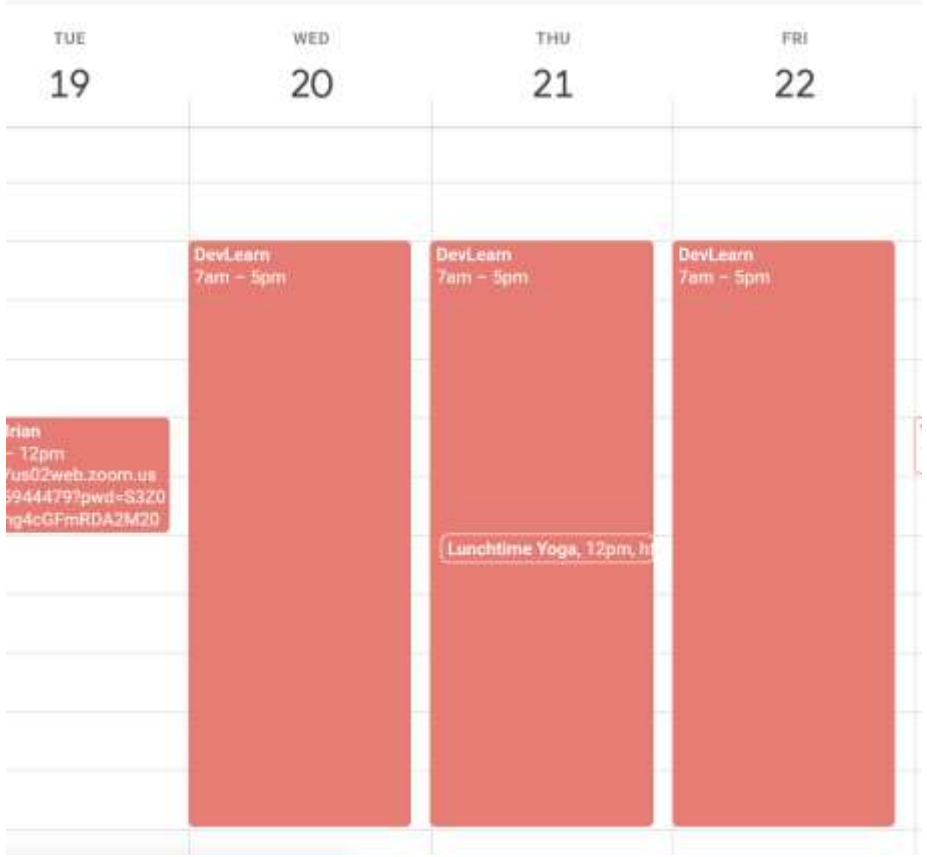
TIME BLOCKING AND OUT-OF-OFFICE



What do you do when you are *really* out of the office?

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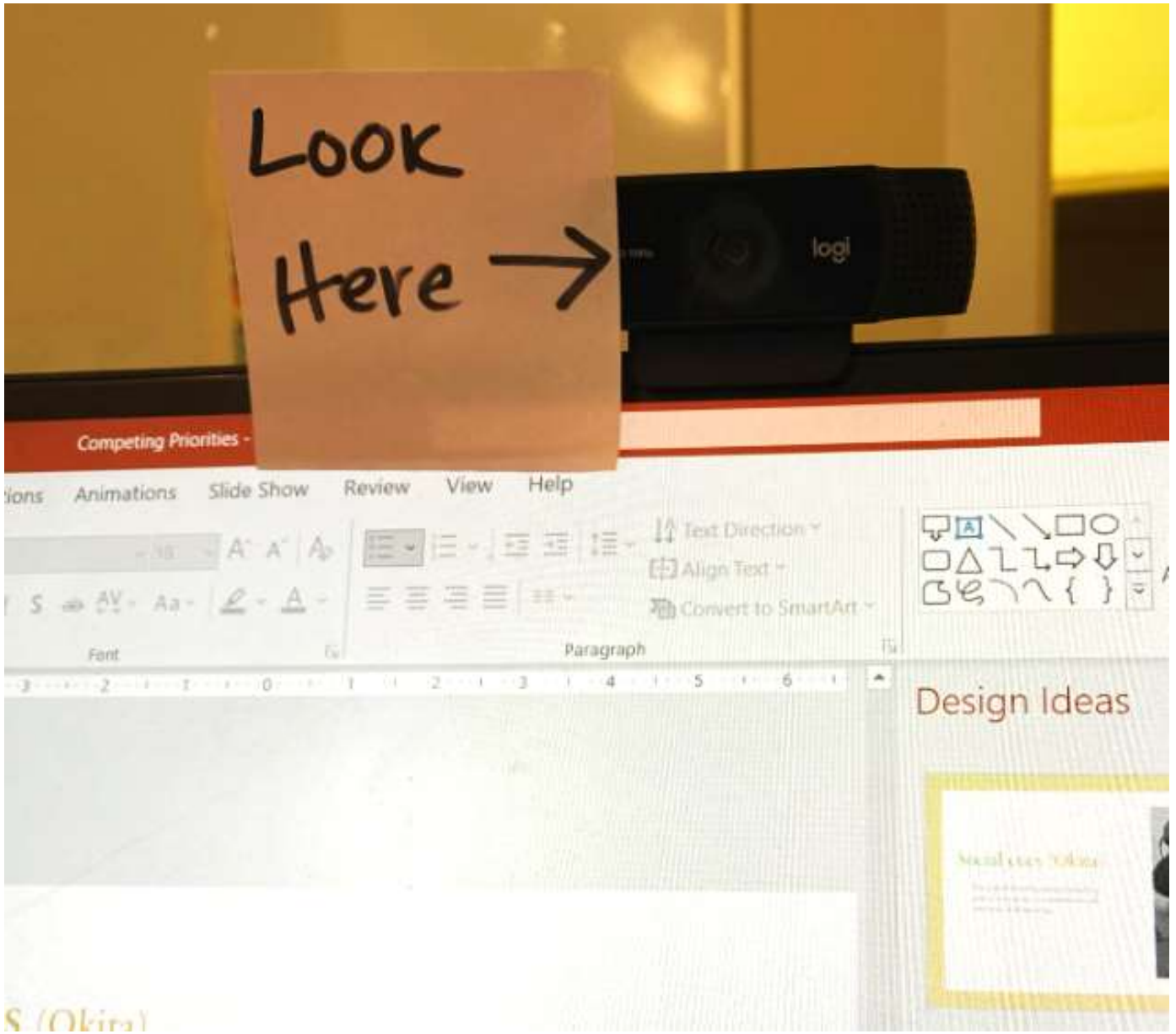
EYE CONTACT

From Will Thalheimer
Virtual Eye Contact
https://www.youtube.com/watch?v=_Yp_nbz-puE



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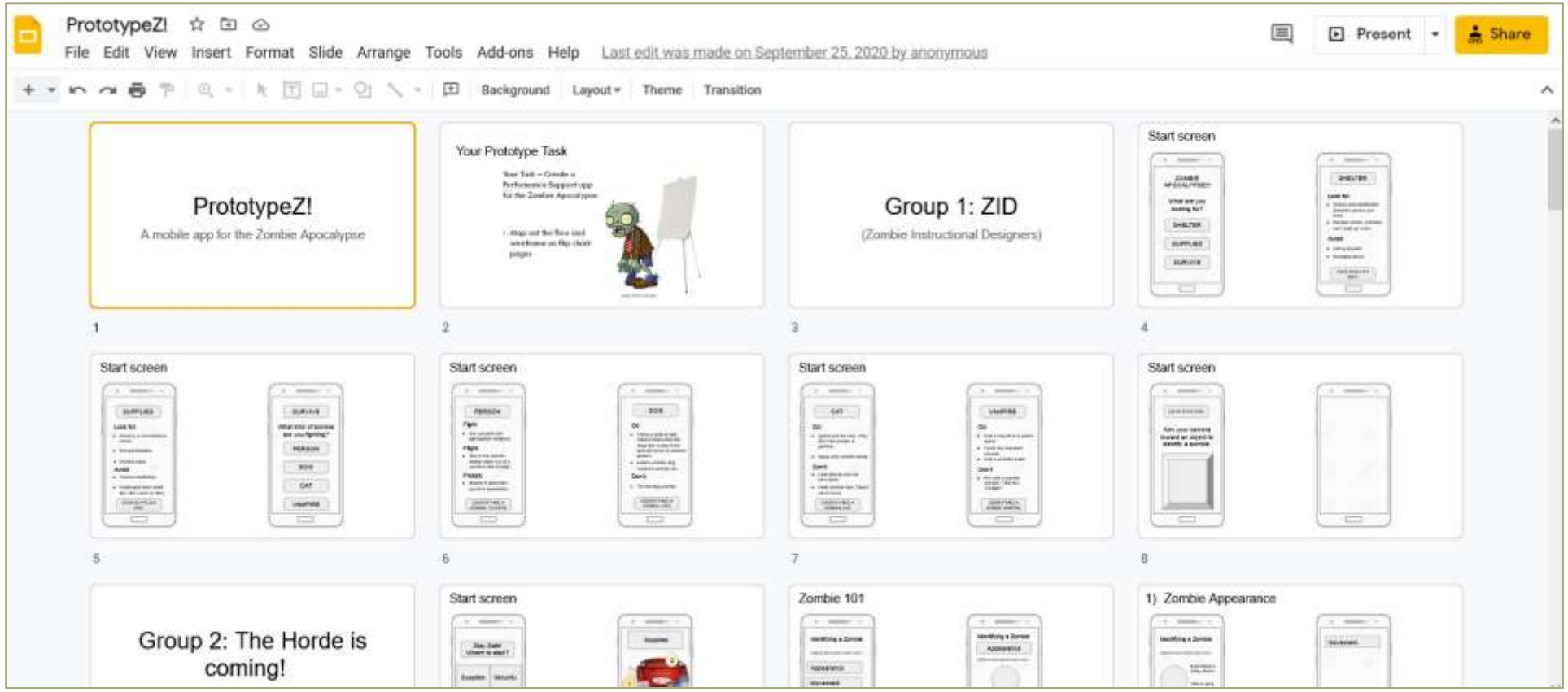
USING VIRTUAL WHITEBOARDS



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HABITS

Are you bringing your meeting habits to virtual classes?

Ask the question “How are you handling this differently?”

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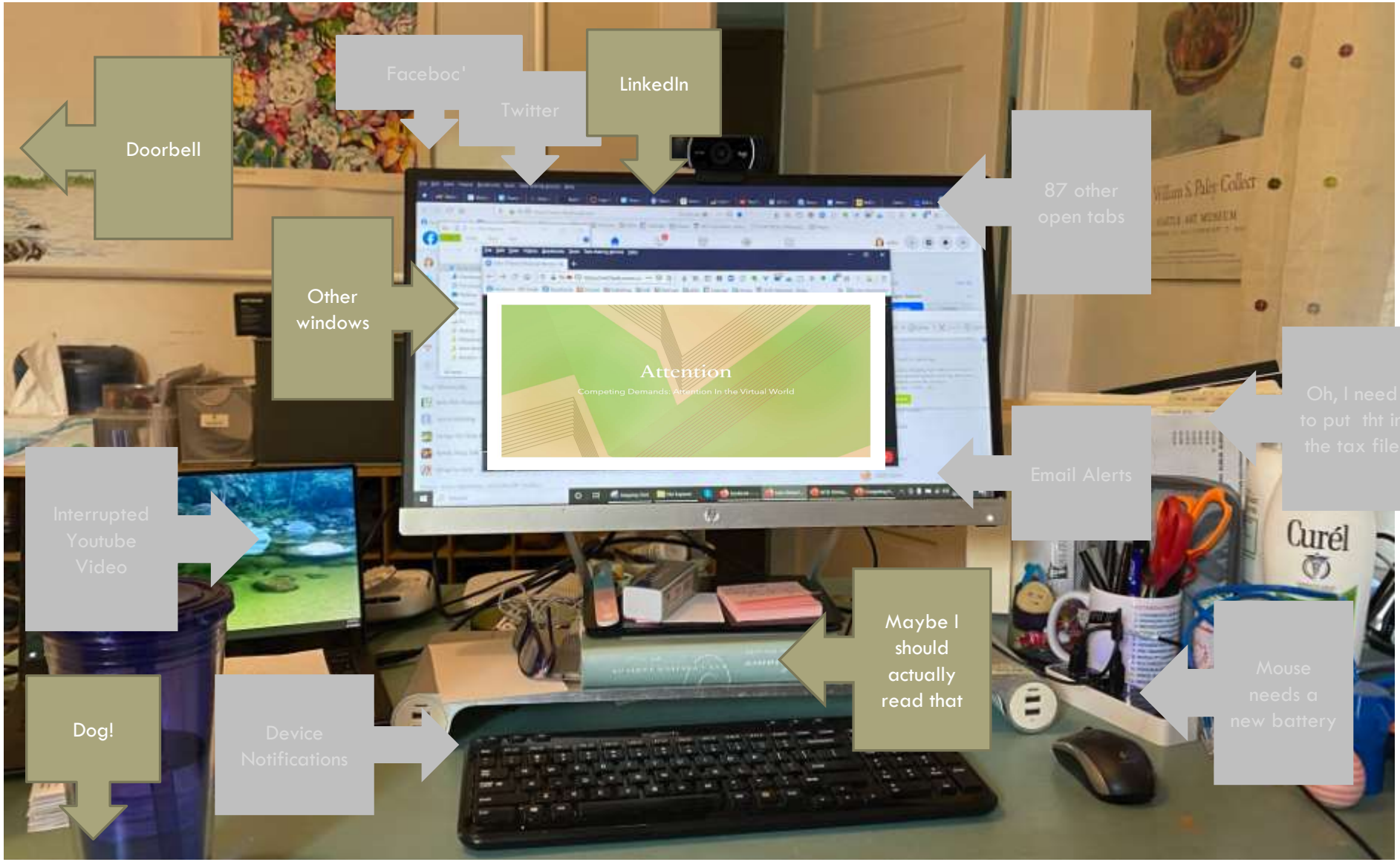
PRESERVING COGNITIVE LOAD

ASK YOUR LEARNERS:

What strategies can learners come up with?



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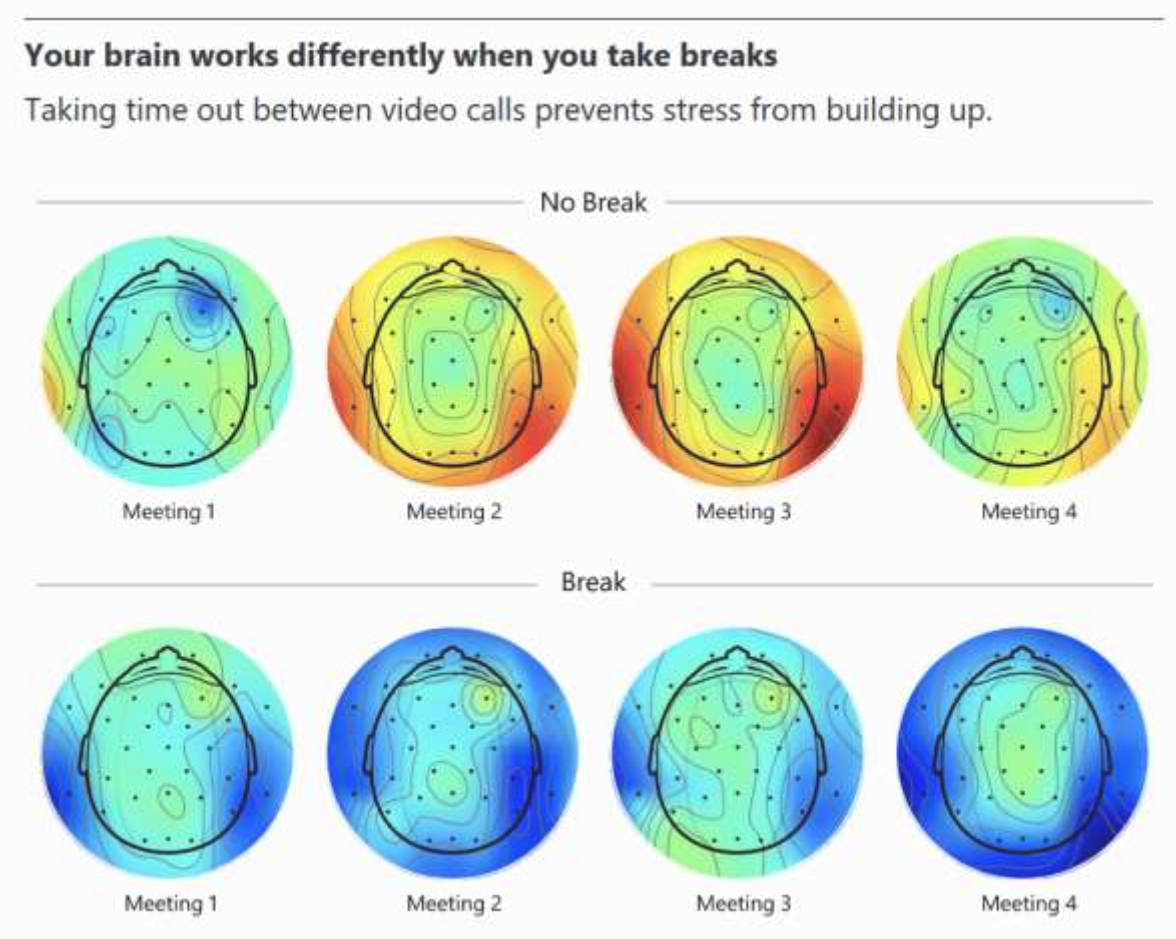
BREAKS

Microsoft study looking at EEG images from back-to-back meetings, and meetings with breaks in between

https://www.microsoft.com/en-us/worklab/work-trend-index/brain-research



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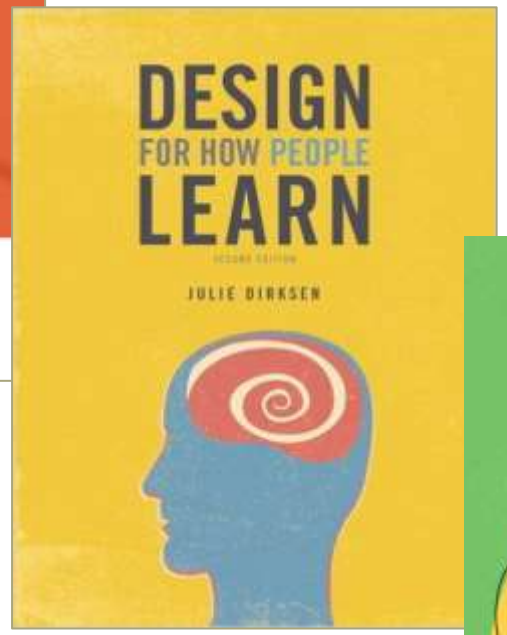
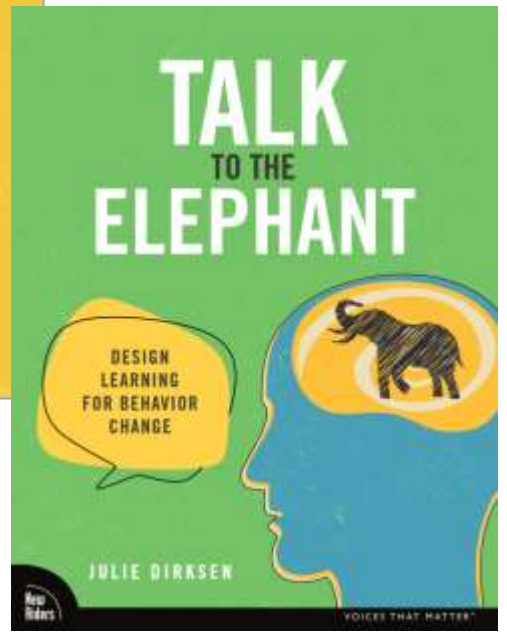
MATERIALS





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