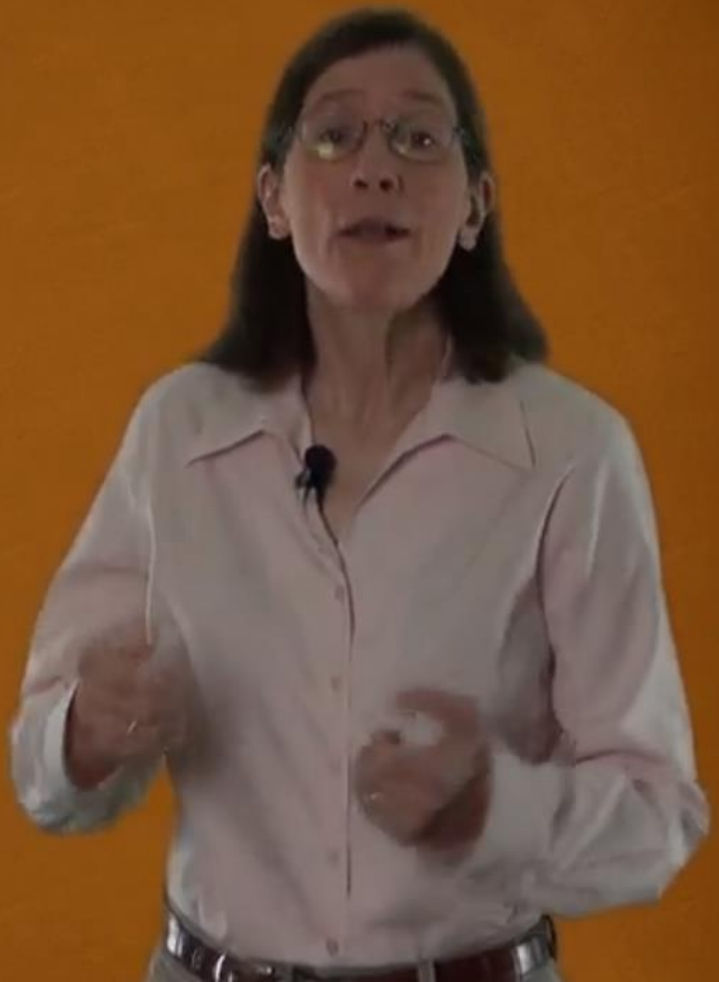
Learning How to Learn

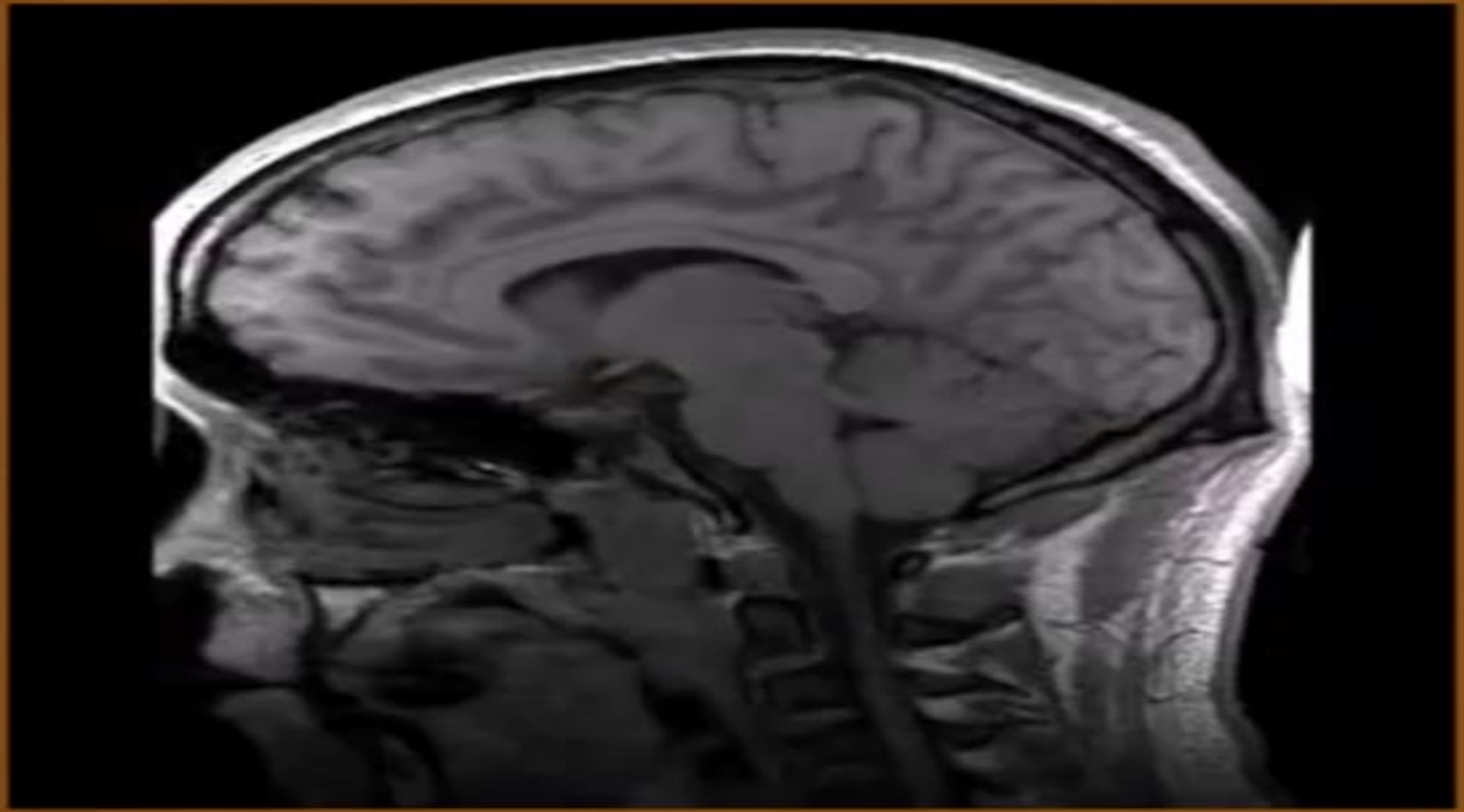
UC San Diego

coursera

MOHAMED ESSAM

What do you do when you just can’t figure something out?

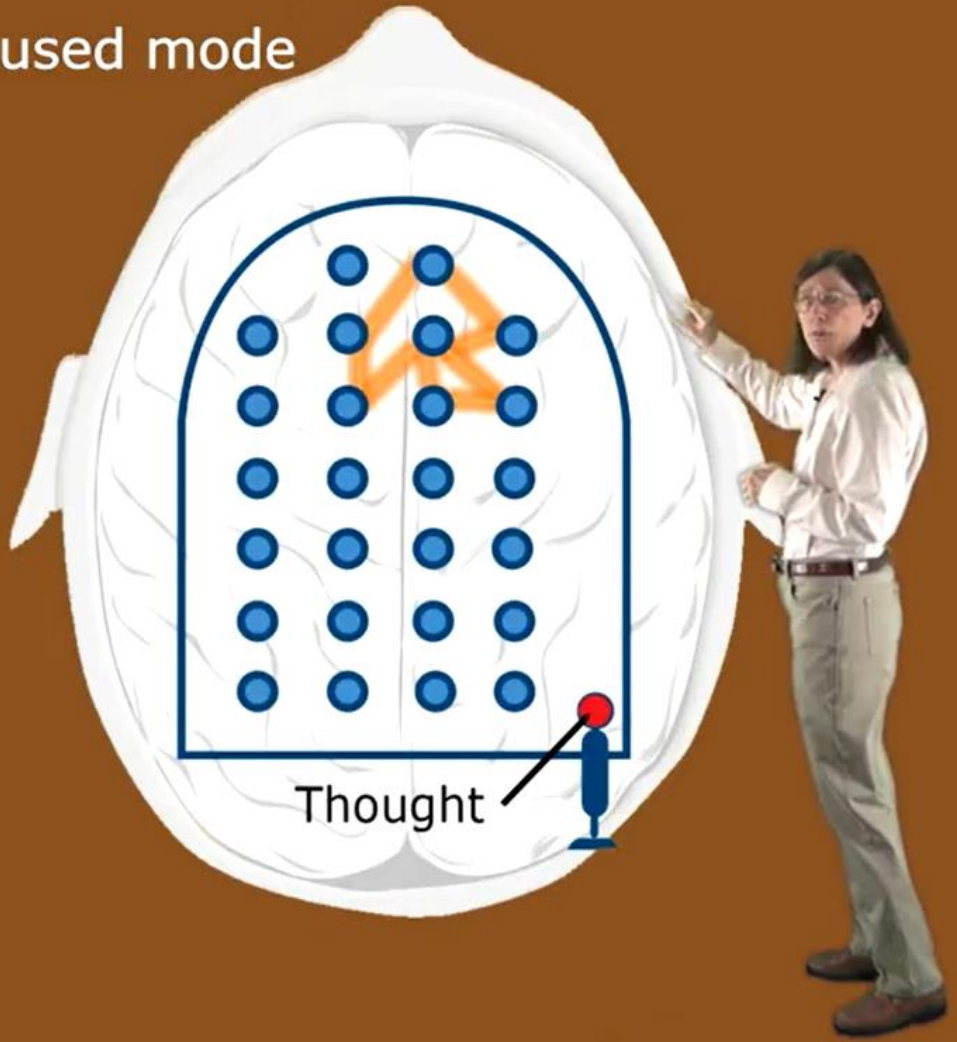


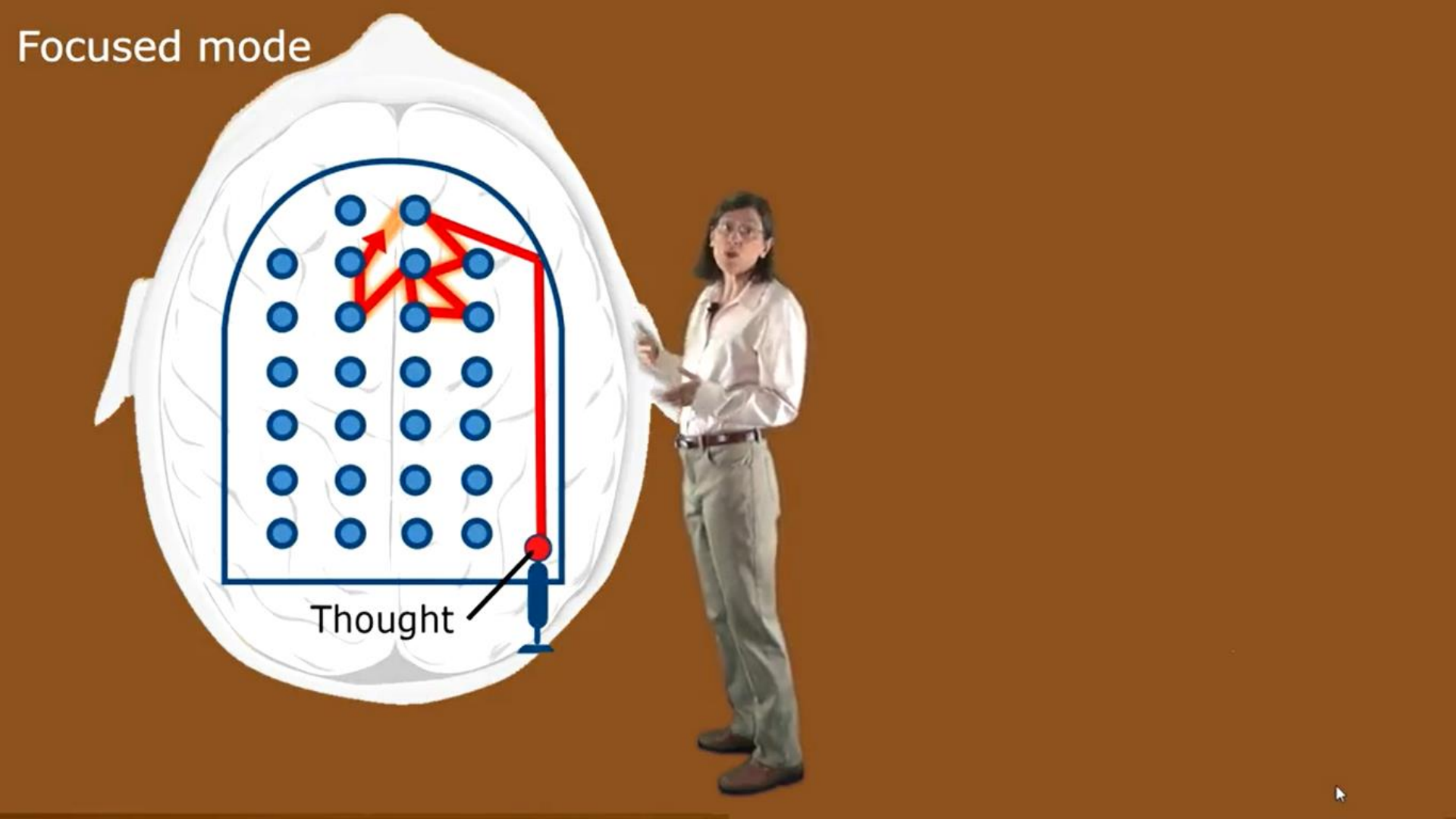


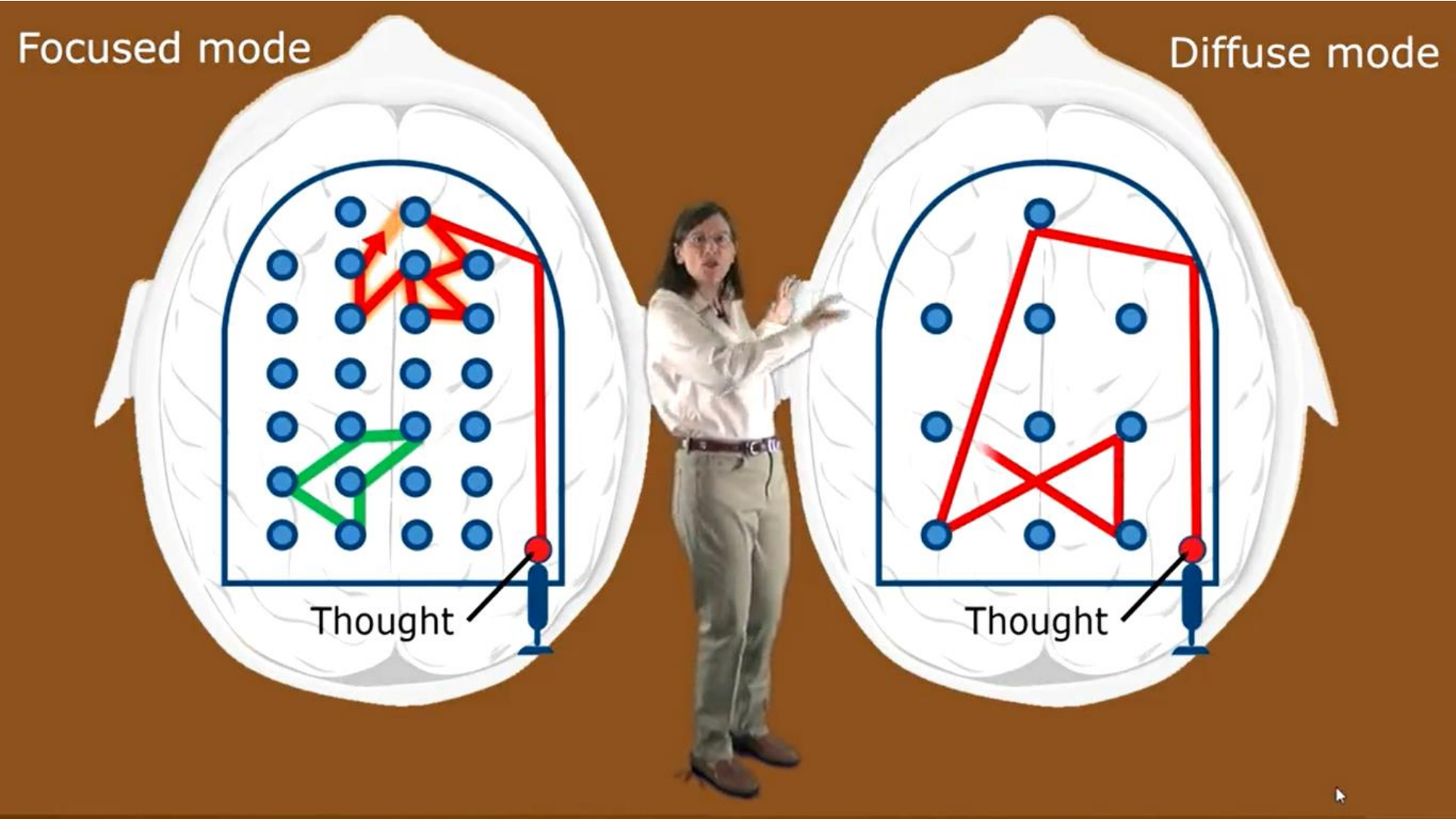
The Researches found that we have two fundamental different modes of thinking


Focused
Diffuse

Focused mode

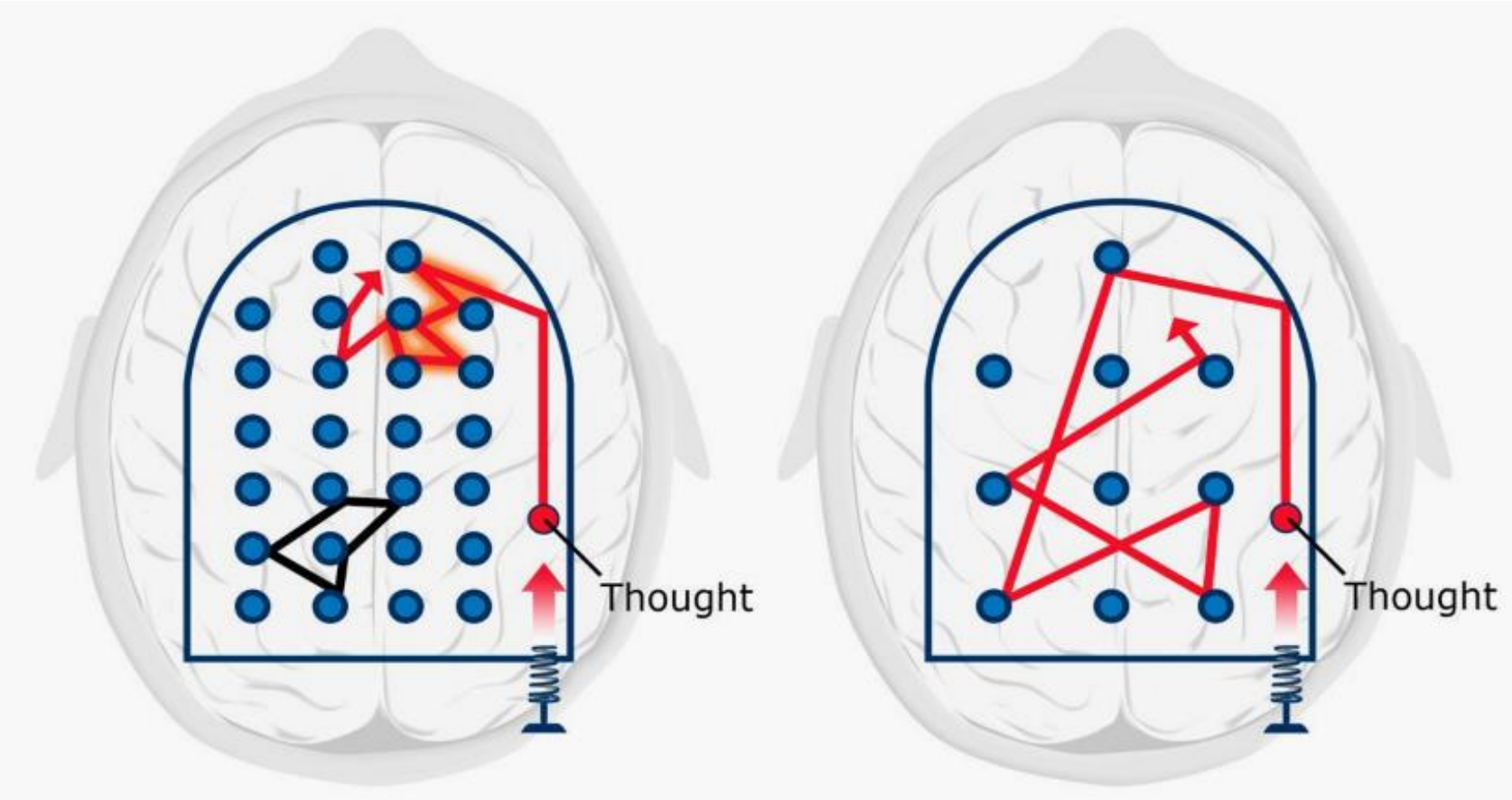



Focused mode
Thought


Focused mode
Diffuse mode
Thought
Thought

focused

diffuse

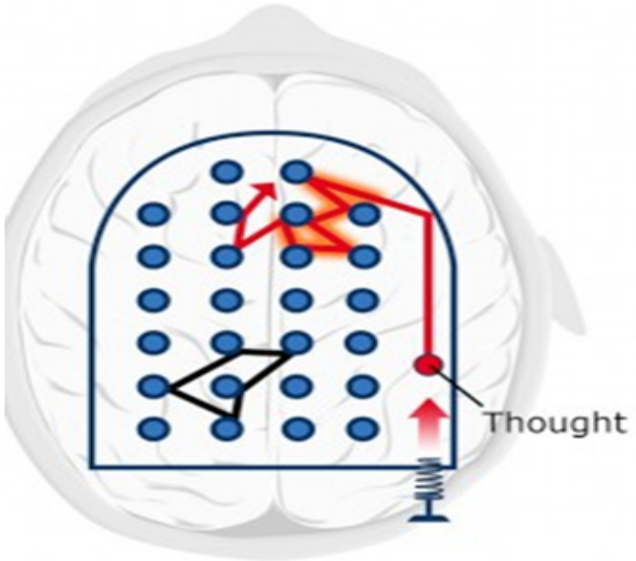


DIGITAL-HEART

The focused and diffused states

Focused Mode

- Requires deliberate effort and elimination of disturbances
- Can induce a 'flow' state
- Uses all 4-7 working memory slots in the frontal lobe
- The brain follows consciously recognized patterns of neural connections



Barbara Oakely, A Mind For Numbers

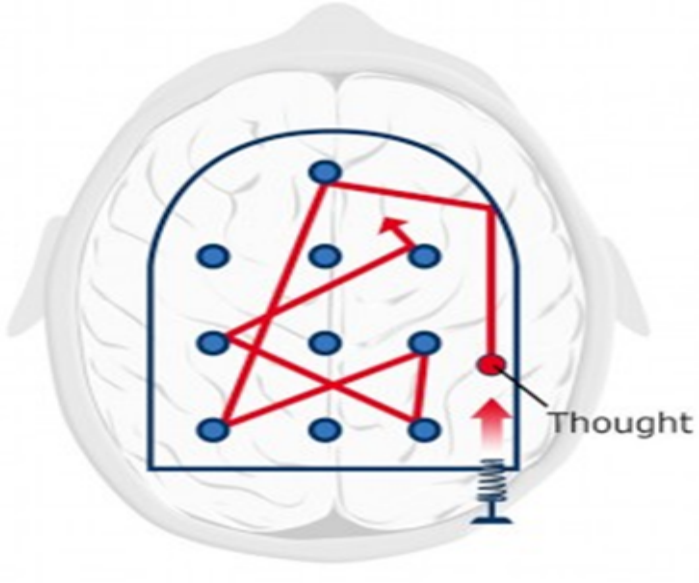
DIGITAL-HEART

The focused and diffused states *(2)*

Diffused Mode

- Happens during non-focused times such as:
  - ✓ Sleep
  - ✓ Exercise
  - ✓ Driving/walking
  - ✓ House-chores

- In the diffused mode, the brain goes over new neural connections as well as older ones and finds new links between them, strengthening understanding and allowing for creative solutions.



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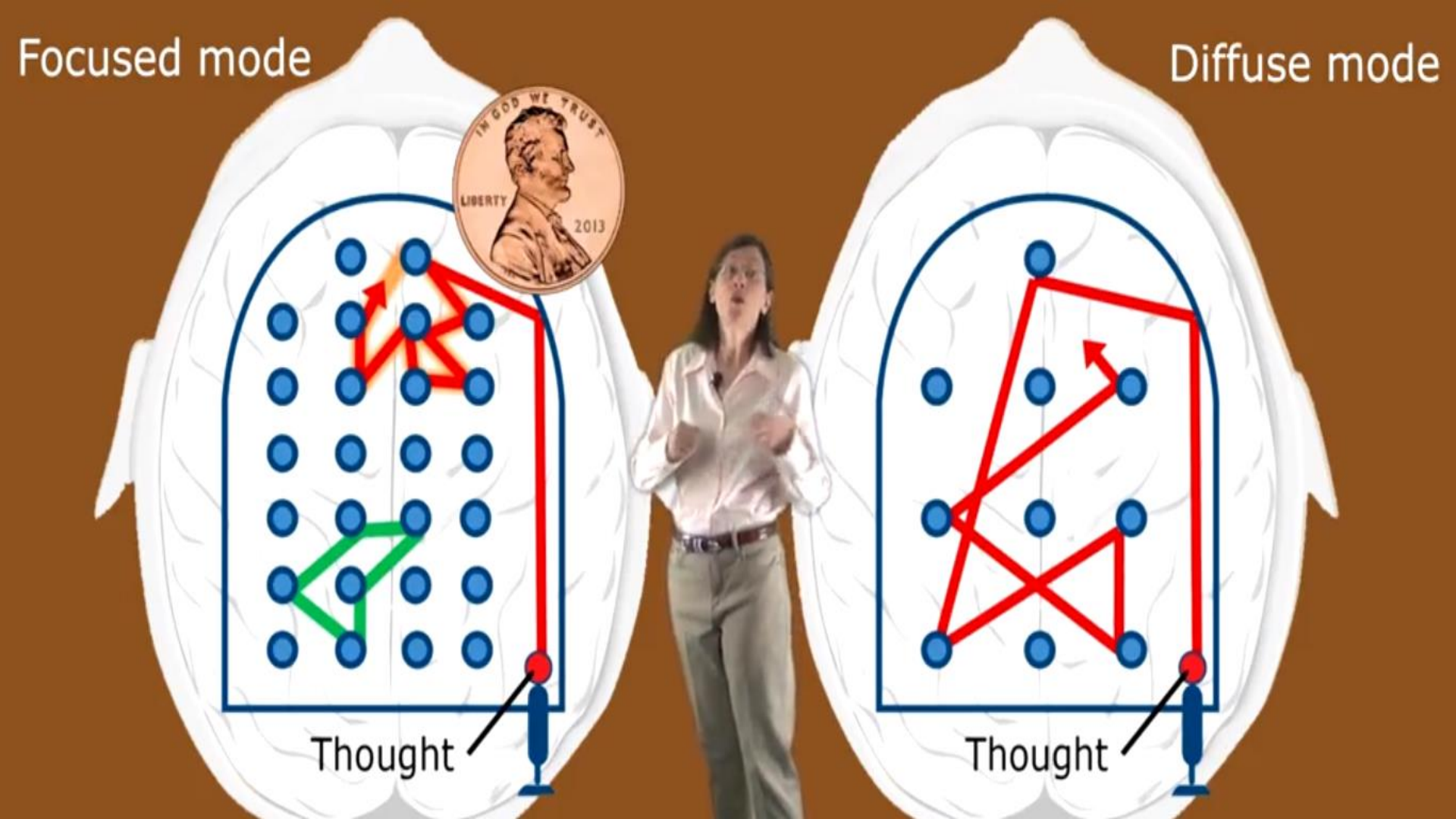
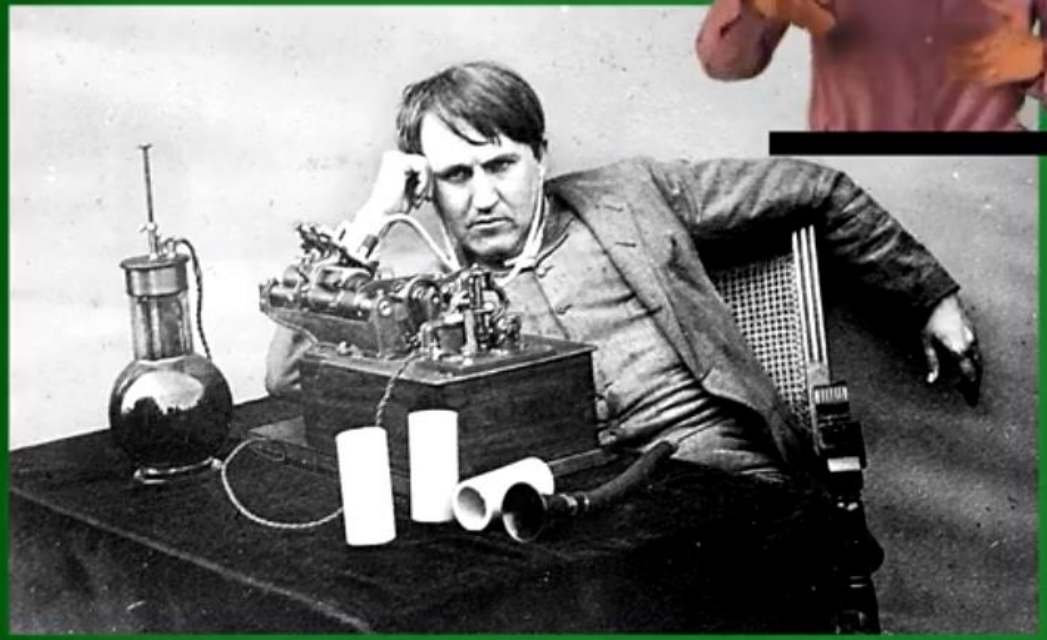
The focused mode (familiar pathways)

The focused mode is centered more in the prefrontal cortex, and it often seems to involve thinking about things you're somewhat familiar with. To solve a multiplication or find a word that rhymes with another one.

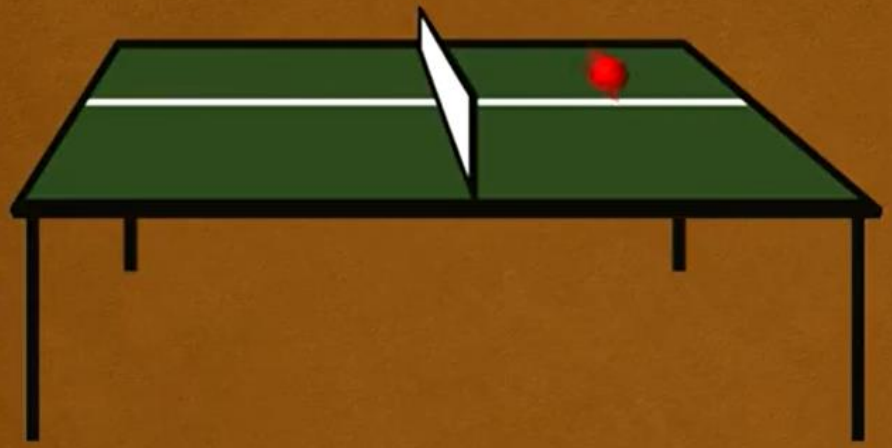
The diffuse mode (many neural resting states).

But if you're trying to solve or figure out something new, it often cries out for the more broad ranging perspectives of the diffuse mode.


Focused mode
Diffuse mode
IN GOD WE TRUST
LIBERTY
2013
Thought
Thought

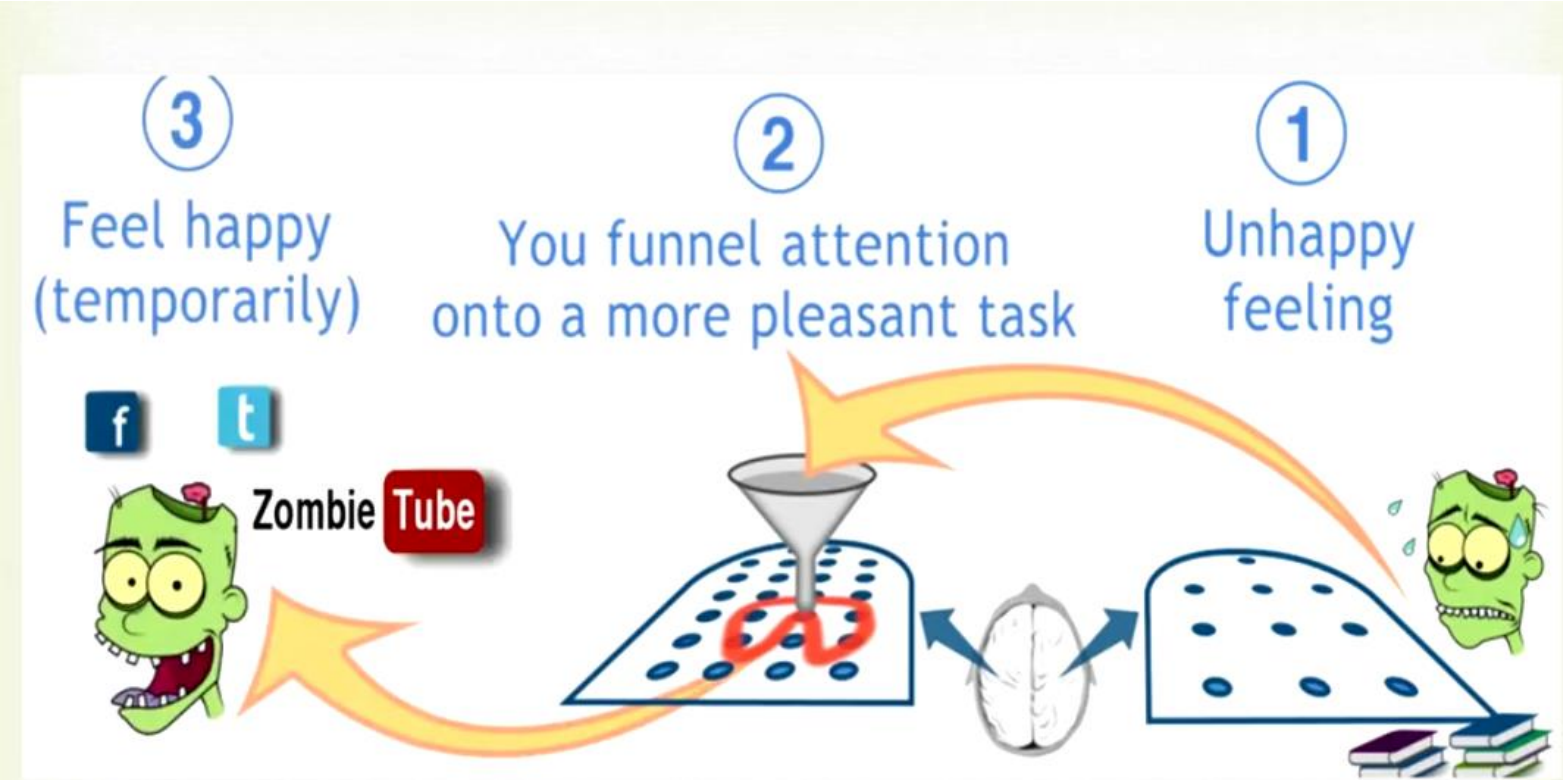


he was Salvador Dalí,



Similarly, to build neural structure,

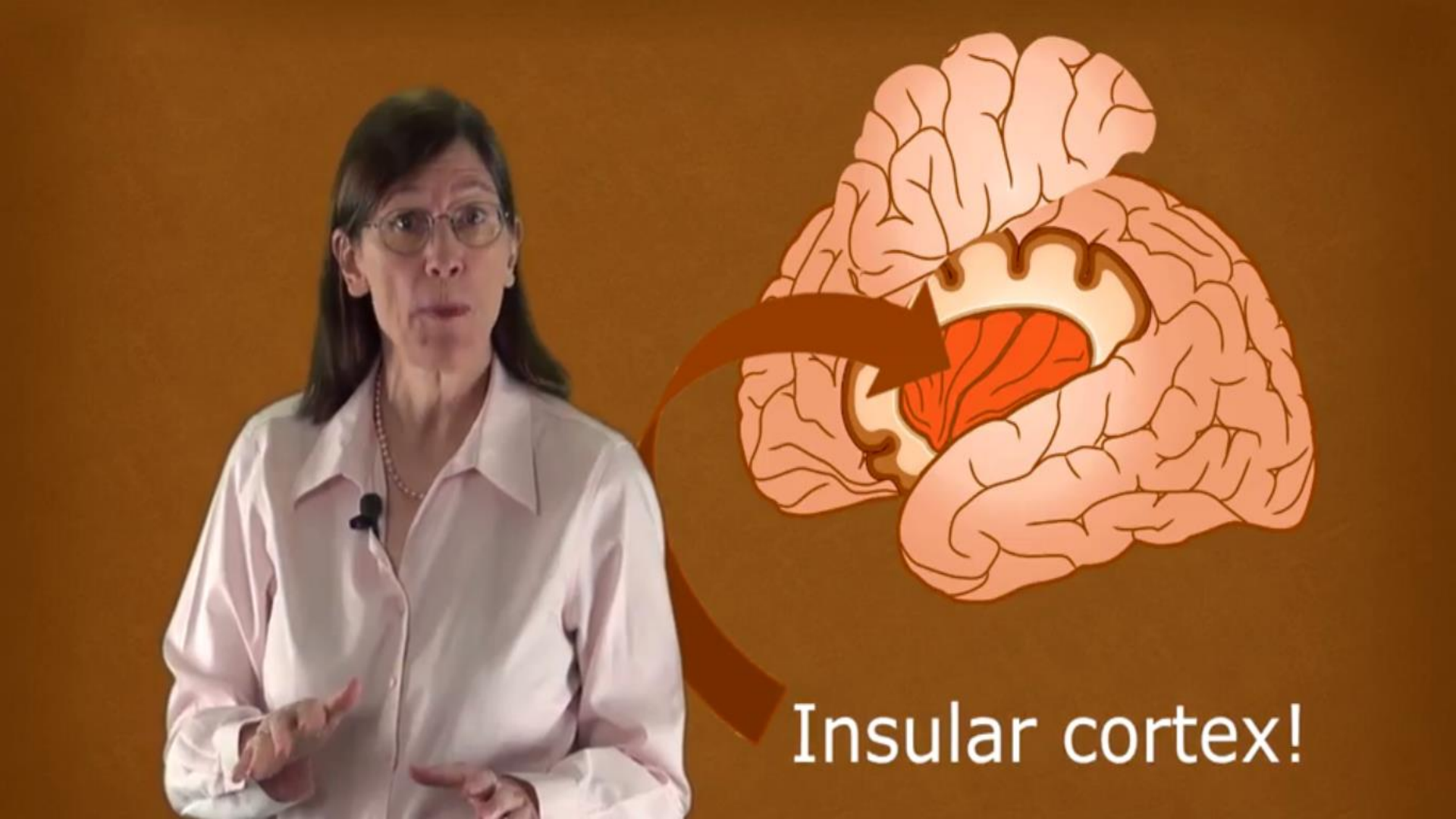
you need to do a little work every day,

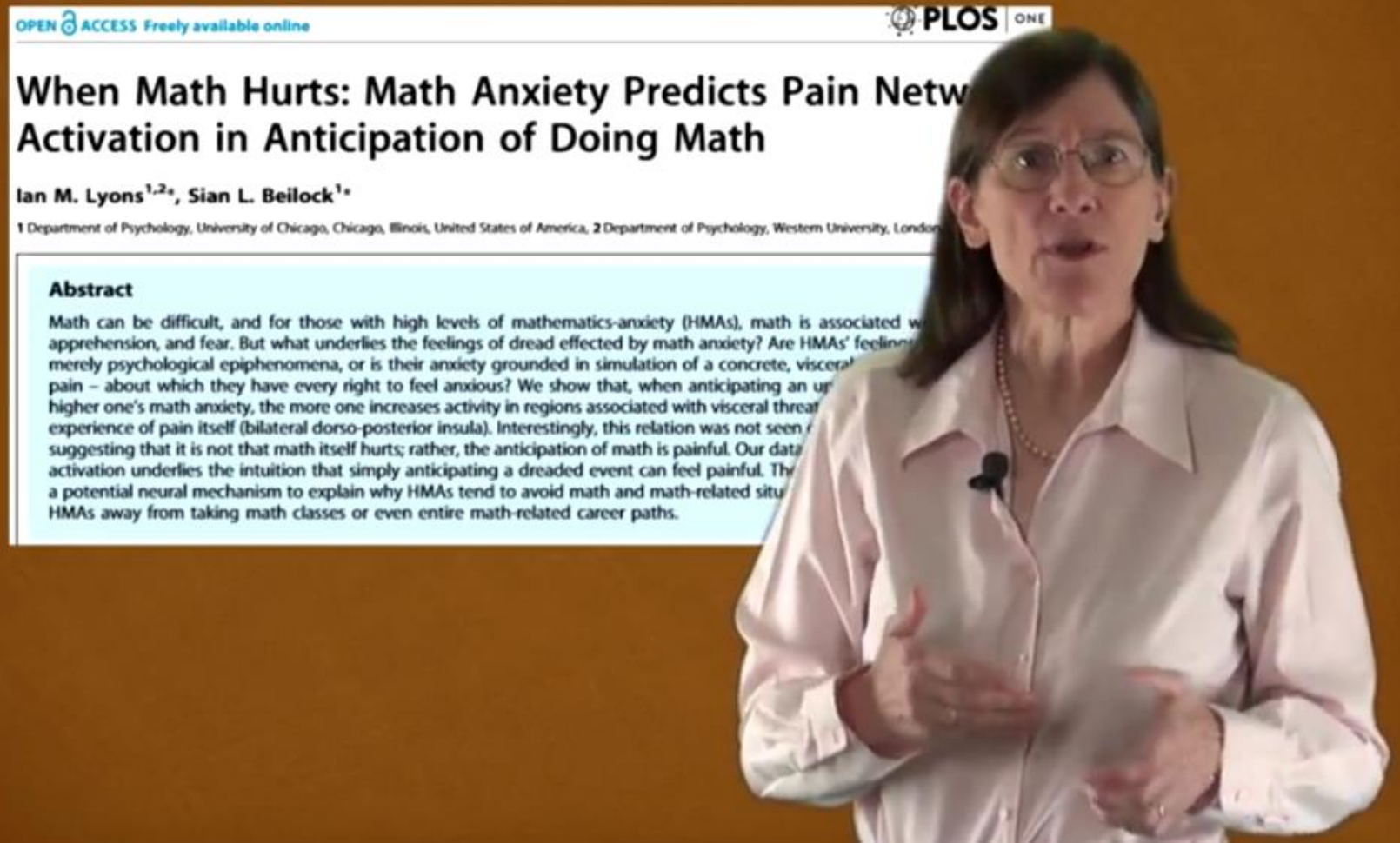

3
Feel happy
(temporarily)
2
You funnel attention
onto a more pleasant task
1
Unhappy
feeling
Zombie Tube

PROCRASTINATION

Procrastination

Procrastination is the practice of carrying out less urgent tasks in preference to more urgent ones, or doing more pleasurable things in place of less pleasurable ones, and thus putting off impending tasks to a later time, sometimes to the "last minute" before the deadline.


Insular cortex!



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PLOS ONE

When Math Hurts: Math Anxiety Predicts Pain Netw
Activation in Anticipation of Doing Math

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1 Department of Psychology, University of Chicago, Chicago, Illinois, United States of America, 2 Department of Psychology, Western University, London

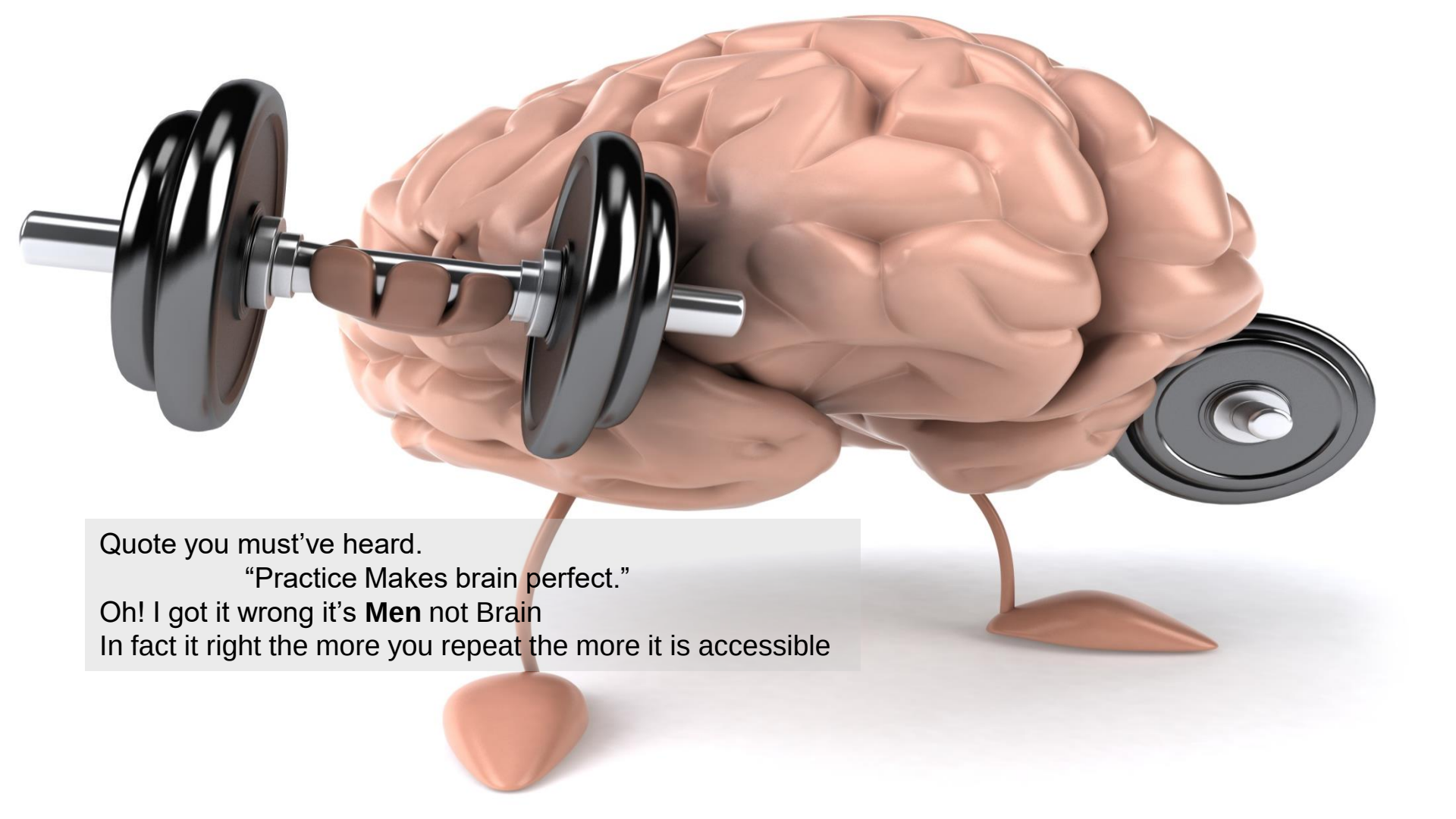
Abstract

Math can be difficult, and for those with high levels of mathematics-anxiety (HMAs), math is associated w
apprehension, and fear. But what underlies the feelings of dread effected by math anxiety? Are HMAs' feelin
merely psychological epiphenomena, or is their anxiety grounded in simulation of a concrete, viscer
pain – about which they have every right to feel anxious? We show that, when anticipating an u
higher one's math anxiety, the more one increases activity in regions associated with visceral threa
experience of pain itself (bilateral dorso-posterior insula). Interestingly, this relation was not seen
suggesting that it is not that math itself hurts; rather, the anticipation of math is painful. Our data
activation underlies the intuition that simply anticipating a dreaded event can feel painful. Th
a potential neural mechanism to explain why HMAs tend to avoid math and math-related situ
HMAs away from taking math classes or even entire math-related career paths.

Pomodoro

Pomodoro

- ✓25 minutes
- ✓no interruptions
- ✓focus
- ✓*reward!*



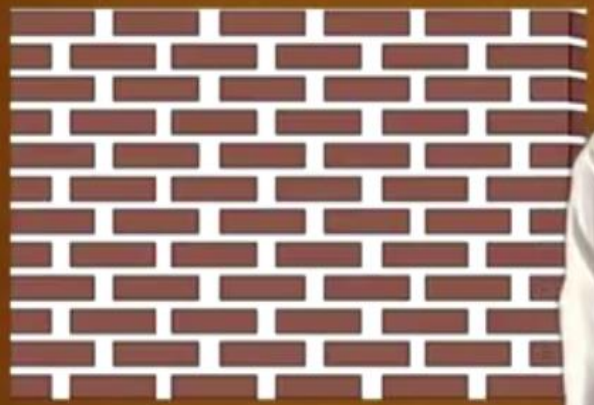
Quote you must've heard.

"Practice Makes brain perfect."

Oh! I got it wrong it's **Men** not Brain

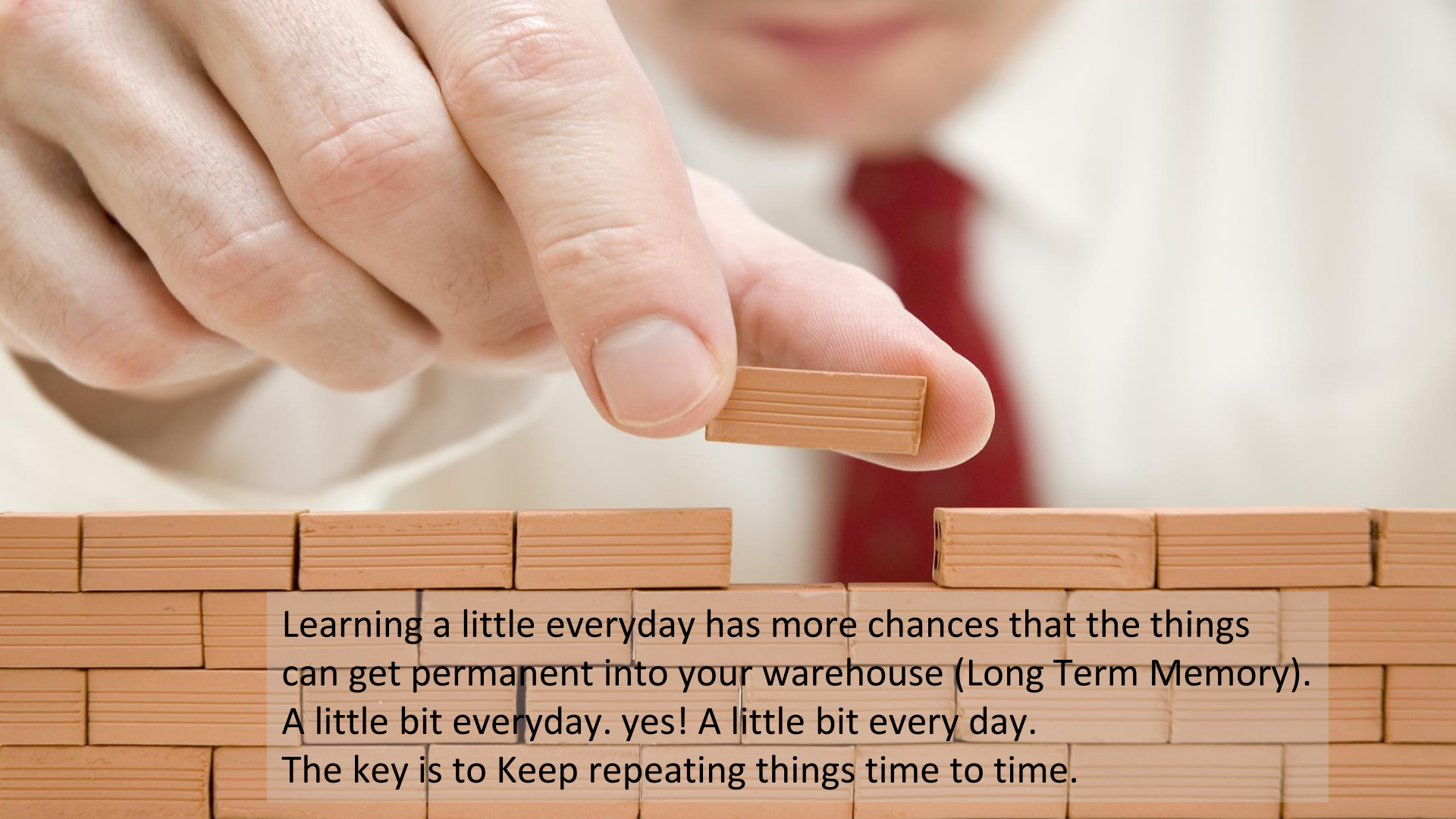
In fact it right the more you repeat the more it is accessible

Building strong neural structures



A little every day

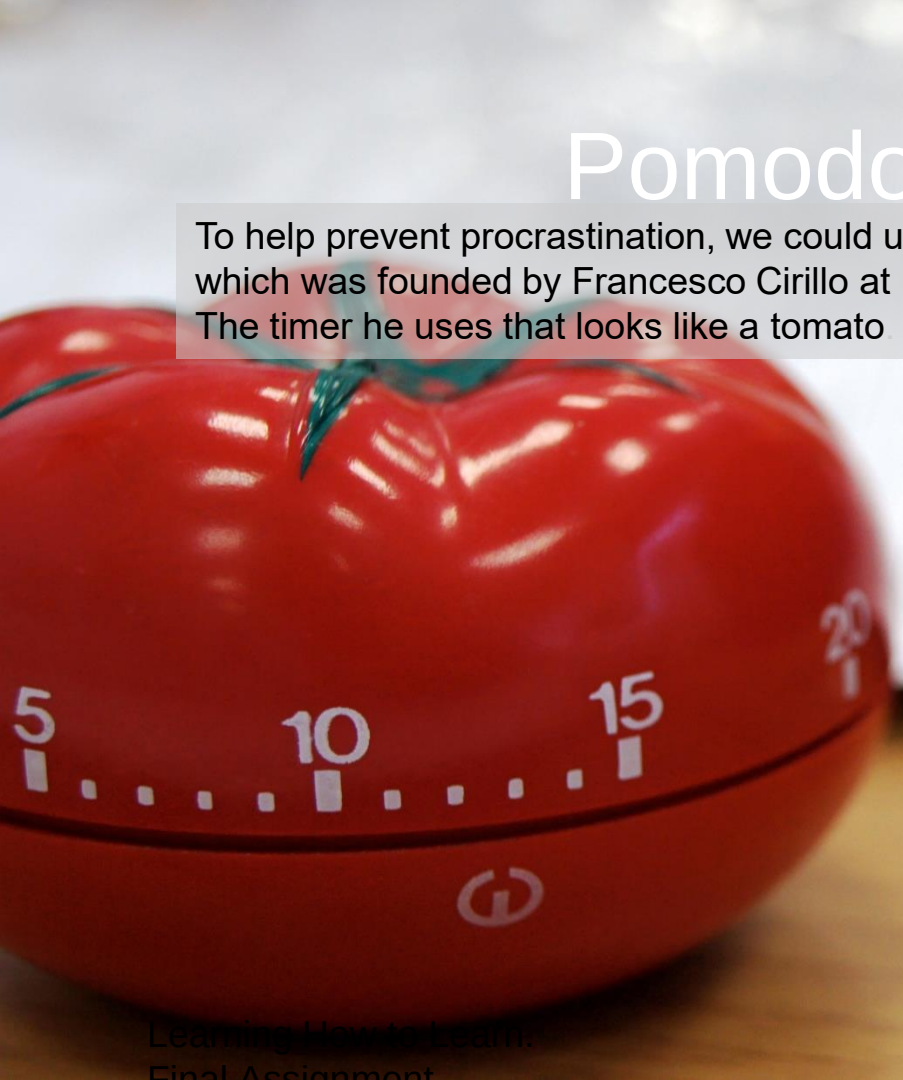
All at once



Learning a little everyday has more chances that the things can get permanent into your warehouse (Long Term Memory).
A little bit everyday. yes! A little bit every day.
The key is to Keep repeating things time to time.

Pomodoro Technique

To help prevent procrastination, we could use what is called as *Pomodoro* technique, which was founded by Francesco Cirillo at 1980's. *Pomodoro* is Italian for tomato. The timer he uses that looks like a tomato



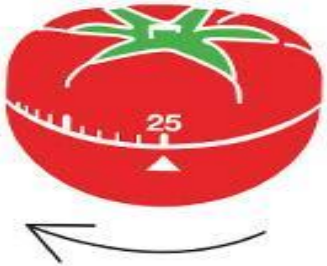
Pomodoro technique is:

- Setting your timer to 25 minutes
- No interruption during the time
- Focus on the task during the time
- A little reward during 5 minutes after a *Pomodoro* (25 minutes) session, the rewards could be a little stretch, taking a coffee, and rest

www.pomodorotechnique.com

CHOOSE A **TASK** TO BE ACCOMPLISHED

SET THE POMODORO TO **25 MINUTES**

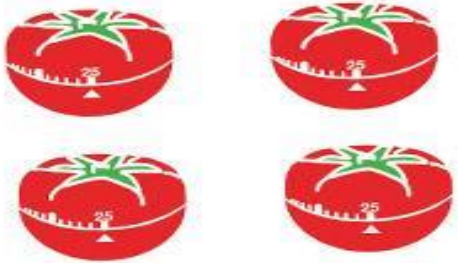


WORK ON THE TASK UNTIL THE **POMODORO RINGS**

THEN PUT A **CHECK** ON YOUR SHEET OF **PAPER**

TAKE A **SHORT BREAK** (5 MINUTES IS OK)

EVERY **4 POMODOROS** TAKE A **LONGER BREAK**



Practice and repetition

The easiest way to tackle procrastination is to use the Pomodoro Technique.

That brief 25 minute stretch of focused concentration, followed by a bit of mental relaxation. It's through practice and repetition that we can help enhance and strengthen the neural structures we're building as we're learning something new

Memory

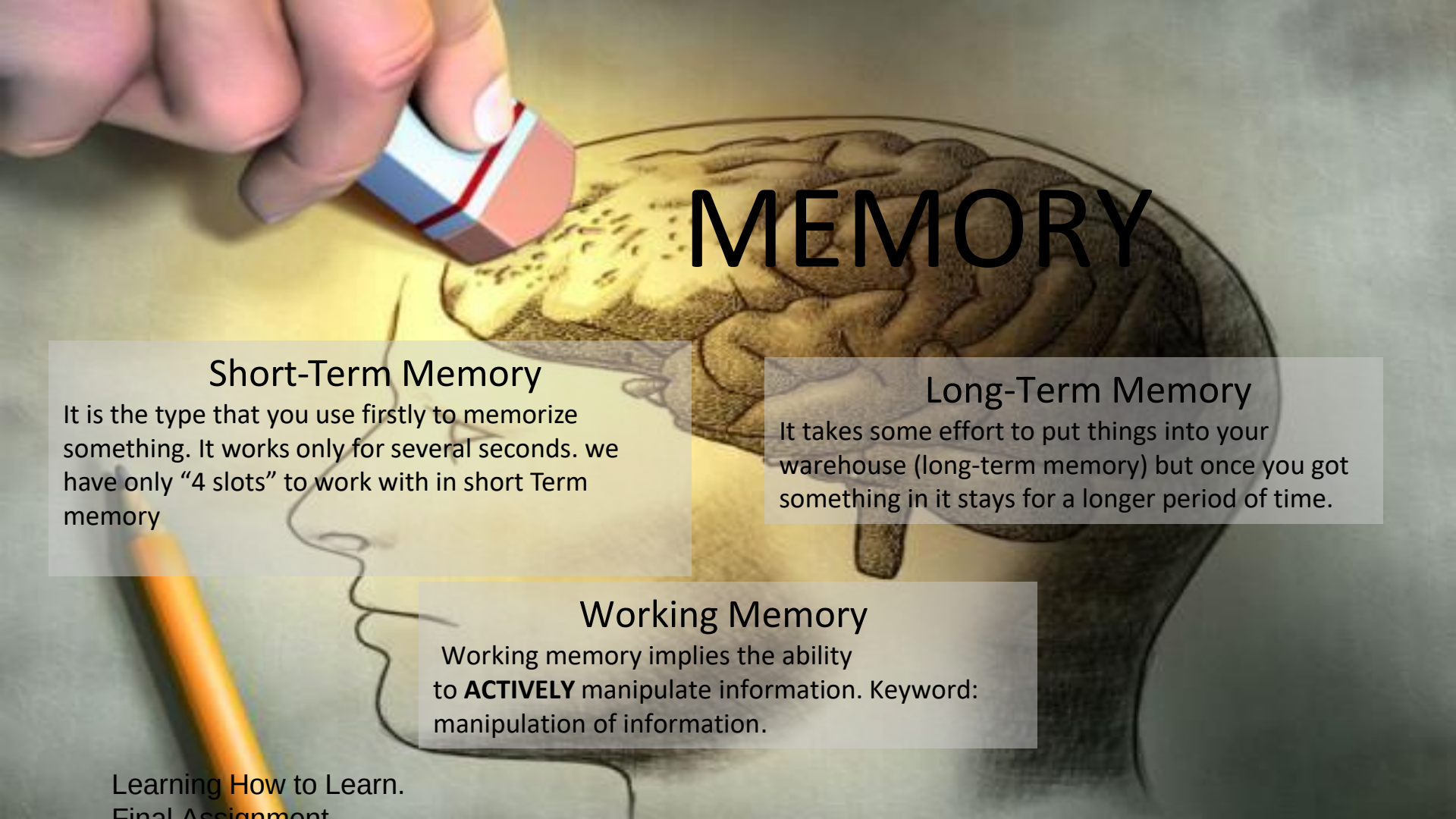
If you practiced and repeated something well enough to get it into long term memory, you can usually call it up later if you need it. It's never a good idea to cram your learning by repeating things many times all in one day.There's no time for solid structures to grow.

Working memory and long term memory.

Memory is an important aspect of learning. There are four slots in our working memory.Things can fall out of those slots unless we keep repeating them to hold them in mind. In that sense, working memory is like a not very good blackboard. Long term memory, on the other hand, is like a storage warehouse.

Sleep

We've also learned of the importance of sleep in washing away the toxins that develop during our day's activities.
You want to avoid taking tests or doing anything difficult with little sleep the night before, because it's like trying to think with poison on the brain.



MEMORY

Short-Term Memory

It is the type that you use firstly to memorize something. It works only for several seconds. we have only “4 slots” to work with in short Term memory

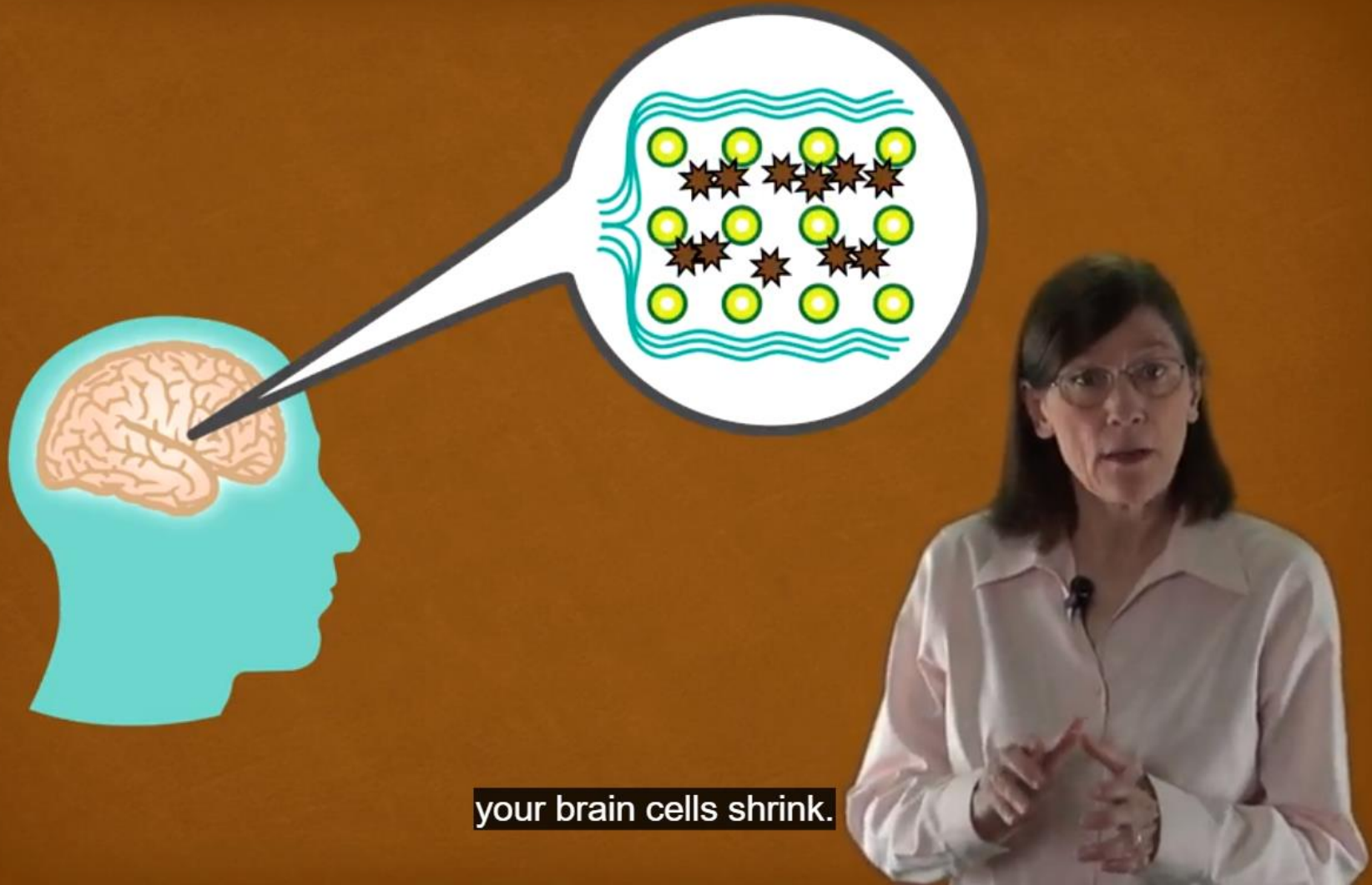
Long-Term Memory

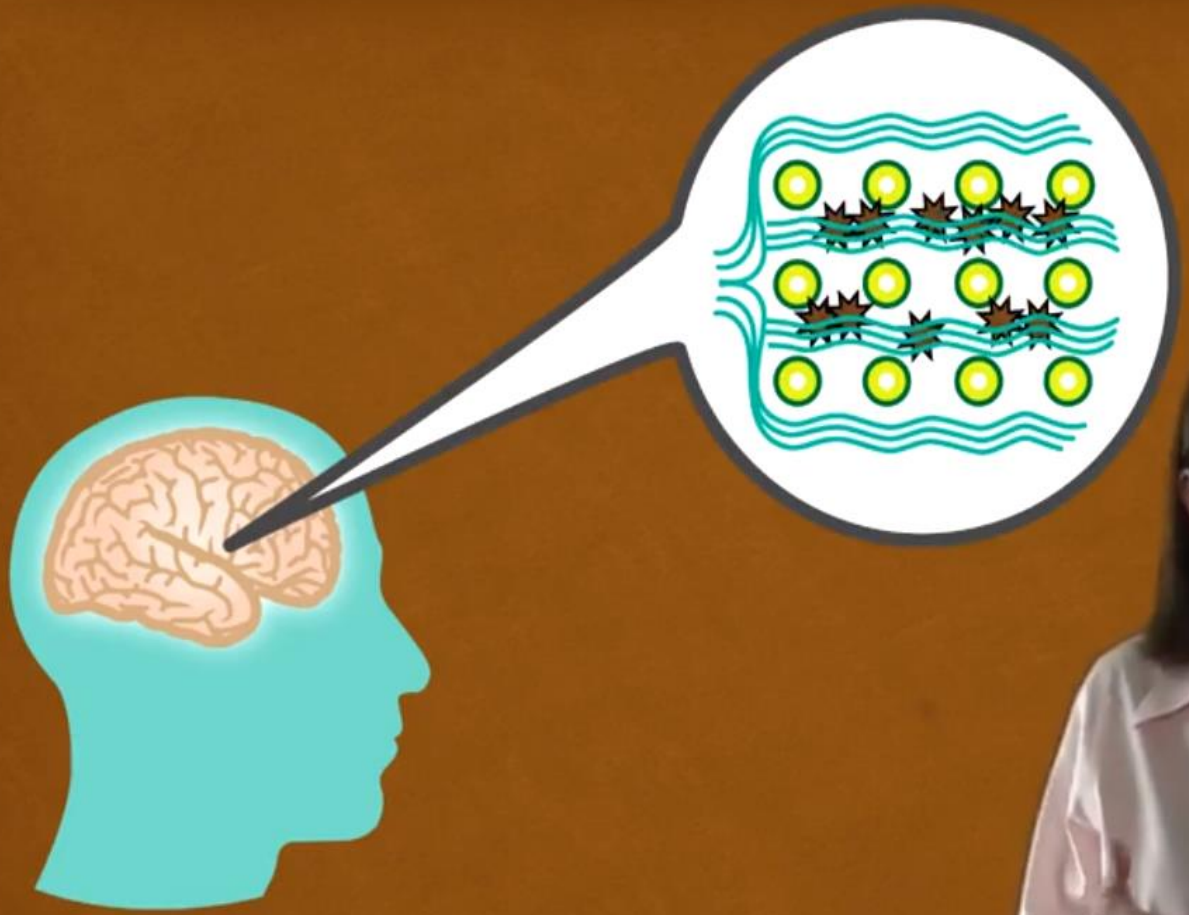
It takes some effort to put things into your warehouse (long-term memory) but once you got something in it stays for a longer period of time.

Working Memory

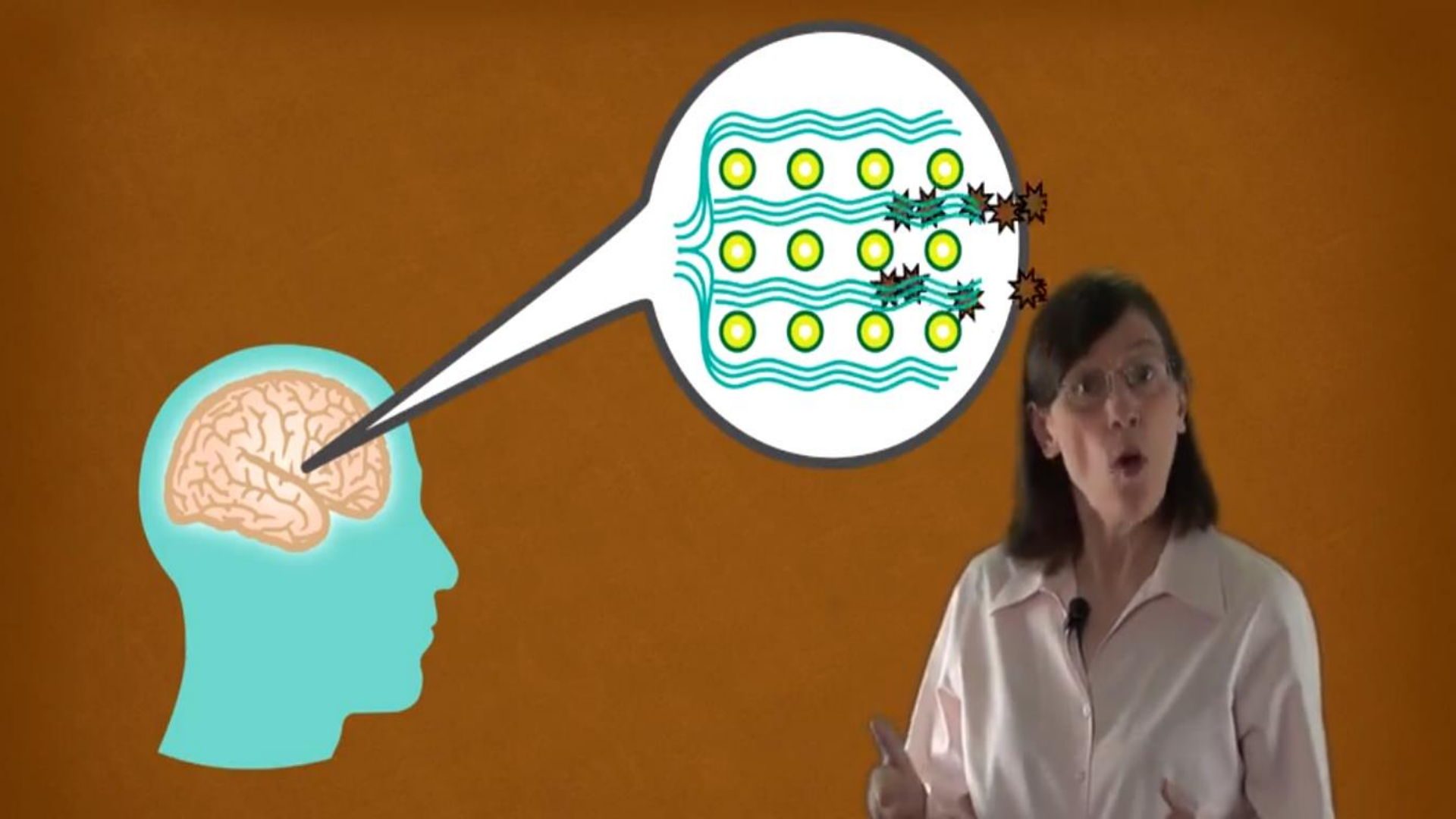
Working memory implies the ability to **ACTIVELY** manipulate information. Keyword: manipulation of information.

Learning How to Learn.
Final Assignment


your brain cells shrink.



Fluid can flow past these cells and wash the toxins out.



Chunking

When we are trying to learn new things we face neural large chunks and we look towards the one are better at that. Thereafter our mind start making a puzzle/pattern by repeating the activity day by day our mind starts forming neural mini chunks and smooth path to remember.

- Learning how to play Chess.
- Learning how to Drive a Car or Ride a Cycle.

Every new thing that we do creates chunks.

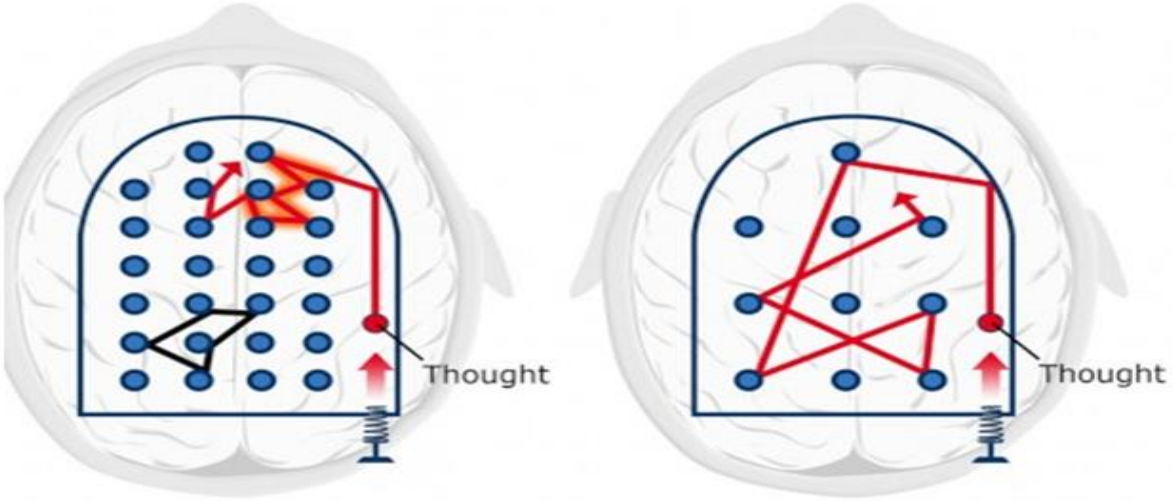
Access to modes

Creative thinkers throughout history, whatever their discipline, have found ways to access the diffuse mode, often more directly and quickly. But we all access this mode quite naturally when we do things like go for a walk or take a shower or even just drift off to sleep.

DIGITAL-HEART

The focused and diffused states *(3)*

Recommendation: Short bursts of focus followed by rest or change of focus are recommended to allow the brain to use different processes that can strengthen neural connections and increase understanding.



Barbara Oakely, A Mind For Numbers

Working out

It’s often a good idea, once you've focused directly on the situation, to let things settle back, and take a bit more time.
That way, more neural processing can take place,often below conscious awareness in the diffuse mode.

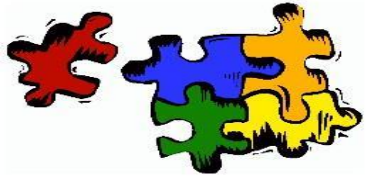
Resolving

The thing is, it often takes time for neural processing to take place, and time as well to build the new neural structures that allow us to learn something new. This is why tackling procrastination is so very important.

Exercise

And just as importantly, exercise is surprisingly valuable in helping improve both our memory and our ability to learn.It's exactly what you need, what our brain needs. It needs that moment of pause of, of using your muscles rather than your brain. We have new neurons being born, and surviving in our hippocampus.

Chunking



Chunks are pieces of information, neuroscientifically speaking, that are bound together through use and often through meaning. You can think of a chunk as a scintillating network of neurons that compactly synthesizes key ideas or actions.

How to form a chunk

The first step on chunking is simply to focus your undivided attention on the information you want to chunk. You're making new neural patterns and connecting them with preexisting patterns. If *you're looking up every few minutes to check or answer your phone messages it means you're going to have more difficulty in making a chunk.*

How to form a chunk (II)

The second step in chunking is to understand the basic idea you're trying to chunk. Understanding is like a superglue that helps hold the underlying memory traces together. It creates broad encompassing traces that can link to other memory traces.

How to form a chunk (III)

The third step to chunking is gaining context, so you can see not just how, but also when to use this chunk. Context means going beyond the initial problem and seeing more broadly, repeating and practicing with both related and unrelated problems, so that you can see not only when to use the chunk, but when not to use it.

How to form a chunk (IV)

Ultimately, practice helps you broaden the networks of neurons that are connected to your chunk, ensuring it's not only firm, but also accessible from many different paths. Chunks are very important, but they don't necessarily build flexibility, which is also important in becoming an expert with the material.

Illusions of competence in learning

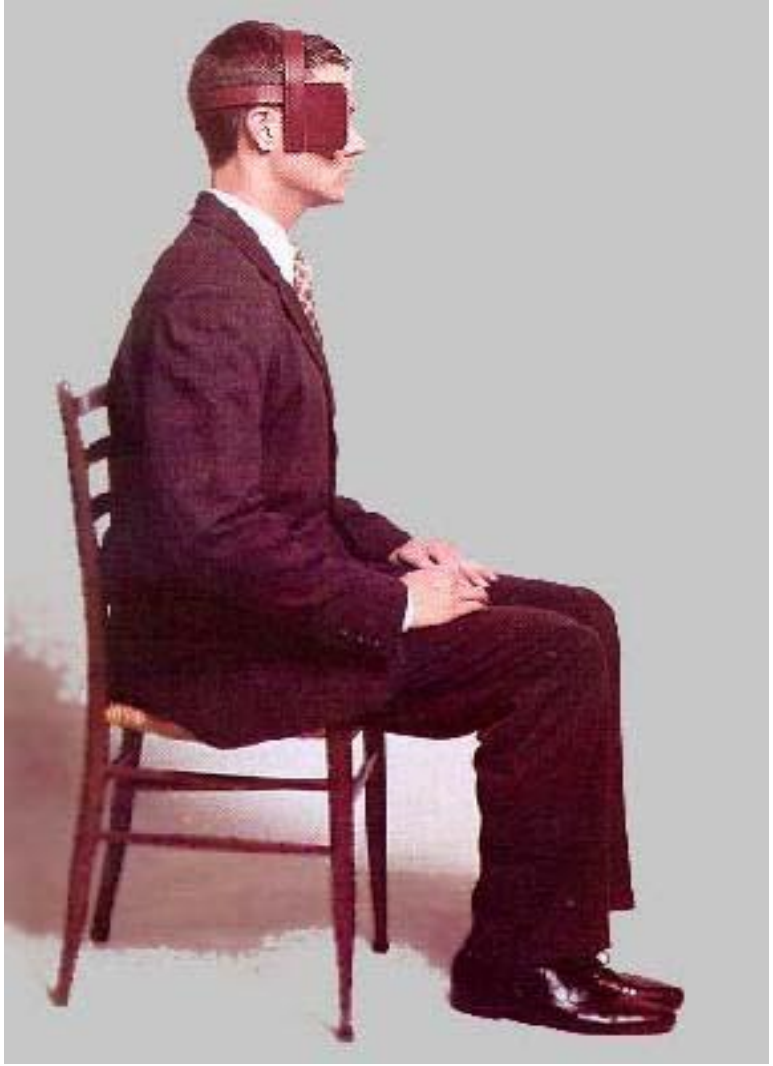
Learn to recognize when you're fooling yourself about whether you're actually learning the material. Test yourself frequently. Using little mini-tests to see whether you're actually learning the material, or whether you've been fooling yourself, thinking you're learning when you're actually not.

Illusion of competence (II)

Mistakes are a good thing to make when you're learning. Avoid practicing only the easy stuff, which can bring the illusion that you've mastered the material.
Deliberately practice what you find more difficult to gain full mastery of the material.

Einstellung

is when your initial thought, an idea you've already had in mind, or a neural pattern you've already developed well and strengthened, prevents a better idea or solution from being found.Or keeps you from being flexible enough to accept new, better, or more appropriate solutions.



Interleaving

Although practice and repetition is important in helping build solid neural patterns to draw on, it's interleaving that starts building flexibility and creativity.

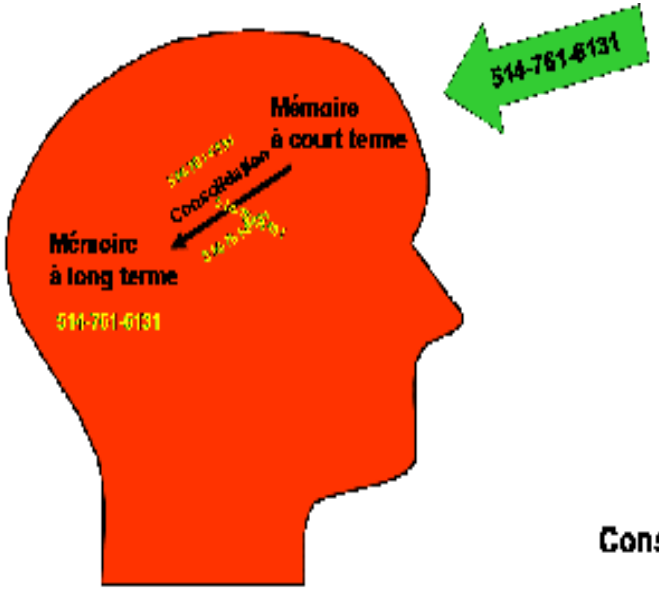
When you interleave within one subject or one discipline, you begin to develop your creative power within that discipline.

The Law of Serendipity

Lady Luck favors the one who tries.
Just pick one tiny thing out to learn, then another. Just keep trying and you'll be pleasantly surprised at the results.

Procrastination and memory.Two seemingly different ideas.

Building solid chunks of long term memory, chunks that are easily accessible by your short term memory, takes time. It's not the kind of thing you want to be putting off until the last minute.



Consolidation

How procrastination happens (I)

We procrastinate about things that make us a little bit uncomfortable.You think about something you don't particularly like and the pain centers of your brain light up so you shift and narrow your focus of attention to something more enjoyable.

How procrastination happens (II)

This causes you to feel better. At least temporarily but sadly the long term effects of habitual avoidance can be nasty.

When you put off your studies it can become even more painful to think about studying it.

How procrastination happens (III)

You can choke on tests because you haven't laid the firm neural foundations you need. Procrastination can be a single monumentally important keystone bad habit that influences many important areas of your life. It shares features with addiction.It offers temporary excitement and relief from boring reality.

Trackling procrastination.

The reason that learning to avoid procrastination is so important is that good learning is a bit by bit activity. By putting the same amount of time into your learning but spacing that learning out by starting earlier you'll learn better.

Trackling procrastination

If you're troubled by procrastination you may even start telling yourself that procrastination is an innate unchangeable characteristic. The higher you go in your studies however the more important it is to take control of procrastination. Habits that worked in earlier years can turn around and bite you.

Trackling procrastination. Key aspects.

- Keep a planner journal so you can easily track when you reach your goals and observe what does and doesn't work.
- Commit yourself to certain routines and tasks each day.

Trackling procrastination. Keys

- Write your planned tasks out the night before so your brain has time to dwell on your goals and help ensure success.
- Arrange your work into a series of small challenges.
- Make sure you get lots of rewards.Deliberately delay rewards until you've finished.

Trackling procrastination. keys

- Try putting yourself in new surroundings with few procrastination cues, such as the quiet section of a library.
- Gain trust in your new system, so that when it comes time to relax, you actually relax without feelings of guilt or worry.
- Eat your “frogs” first every day.

How to become a better learner

1.-One of the best things you can do to not only remember but more easily understand concepts in many different fields, is to create a metaphor or analogy for them.

2.- Change your thoughts, change your life.

One thing is becoming clear, we can make significant changes in our brain by changing how we think.

S.R. y Cajal felt the key to his own success was his perseverance.What he called the virtue of the less brilliant, coupled with his flexible ability to change his mind and admit errors.

3.- Approaching material with a goal of learning it on your own.

Often no matter how good your teacher and textbook are, it's only when you sneak off and look at other books or videos that you begin to see what you learn through a single teacher, or book, is a partial version of the full three dimensional reality of the subject, which has links to still other fascinating topics that of your choosing.

4.-Taking responsibility for your own learning.

Have a deep understanding, not only of how to conduct your subject but also of how people just interact with one another.
The greater your achievement, the more other people will sometimes attack and demean your efforts.

5.- People are often just as competitive as they are cooperative.

We're often told that empathy is universally beneficial.But it's not.
It's important to learn to switch on an occasional cool dispassion that helps you to not only focus on what you're trying to learn, but also to learn to tune people out if you learn that their interests lie in undercutting you.

6.-Take pride in who you are.

Especially, in the qualities that make you different.
And use them as a secret talisman for success.
Use your natural contrariness to defied the always present prejudices from others about what you can accomplish.

7.-The value of stepping back and recheck.

Remember your brain is a team: The right hemisphere serves as a sort of devil's advocate to question the status quo and look for global inconsistencies.While the left hemisphere instead tries to cling tenaciously to the way things were. When you step back and recheck, you're allowing for more interaction between the hemispheres.

The problem with the focus, sometimes.

The more left centered focus mode has associated with a desire to cling to what you've done. It provides for an analytical and upbeat approach, but abundant research evidence suggests there's a potential for rigidity, dogmatism, and egocentricity.

8.-Trackling overconfidence.

Keep in mind that when you whiz through a test question and you don't go back to check your work, you're acting a little like person who's refusing to use parts of your brain.You're not stopping to take a mental breath and then revisit what you've done with the bigger picture in mind to see whether it makes sense.

9.-The first principle is that you must not fool yourself.

And you are the easiest person to fool.
One of the best ways to catch your blind spots and errors is to brainstorm and work with others who are also smartly focused on the topic.I t's sometimes just not enough to use more of your own neural horsepower.
After all, everyone has blind spots.

10.- Do some of your studying with friends.

You can more easily catch where your thinking has gone astray. Friends and teammates can serve as sort of an ever questioning larger scale diffuse mode outside your brain that can catch what you missed, or what you just can't see.And of course, explaining to friends helps build your own understanding.

Final helpful hints for tests.

If you're a stressed out test taker, keep in mind that the body puts out chemicals such as cortisol when it's under stress.The story you tell yourself about why you're stressed makes all the difference.If you shift your thinking from, this test has made me afraid, to this test has got me excited to do my best.It can really improve your performance.

Success is no accident.
It is hard work, perseverance,
learning, studying, *sacrifice*
and MOST of all,
love *of what you are doing.*
-Pele