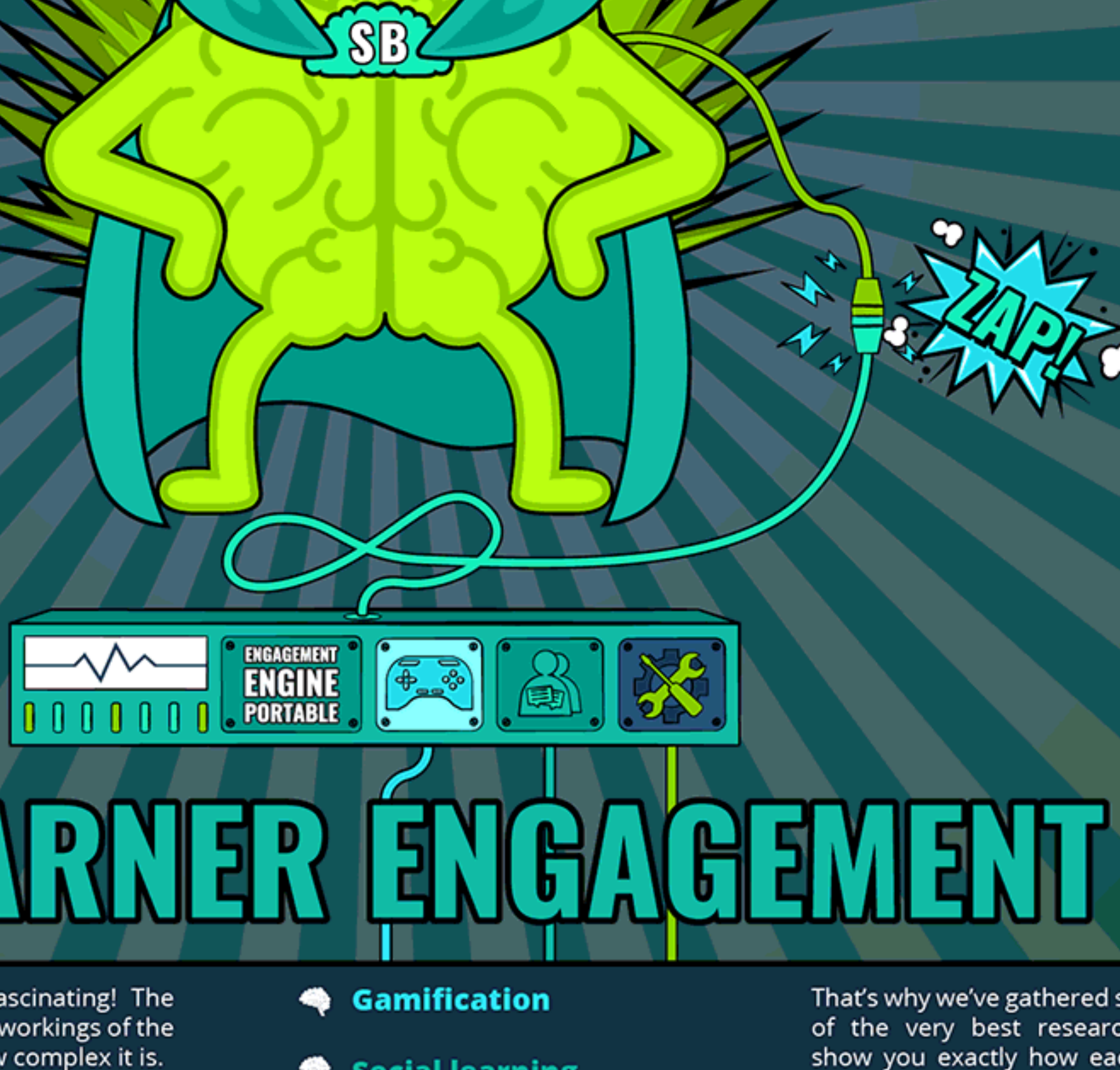


THE NEUROSCIENCE



OF LEARNER ENGAGEMENT

The human brain is absolutely fascinating! The more studies delve into the deeper workings of the brain, the more we realise just how complex it is.

At Growth Engineering, we focus on engaging learners through three key techniques:

- **Gamification**
- **Social Learning**
- **Personalised learning**

That's why we've gathered some of the very best research to show you exactly how each of these methods works to engage your learners where it matters - right between the ears!



GAMIFICATION

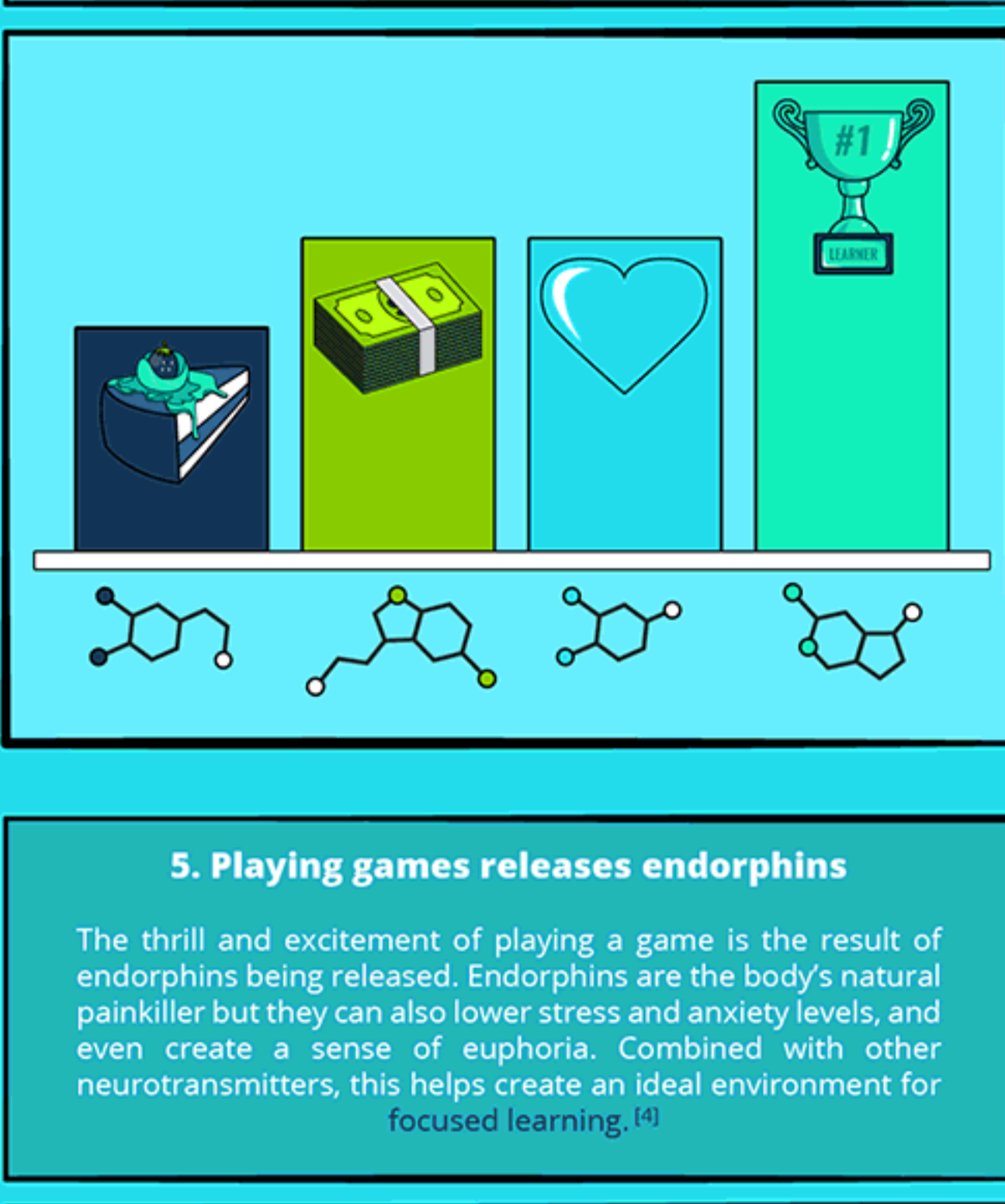


Gamified and game-based learning can have a massive effect on our brains. Here are a few of the things you'll find going on inside your learners' heads:

1. Gamification forges an emotional connection

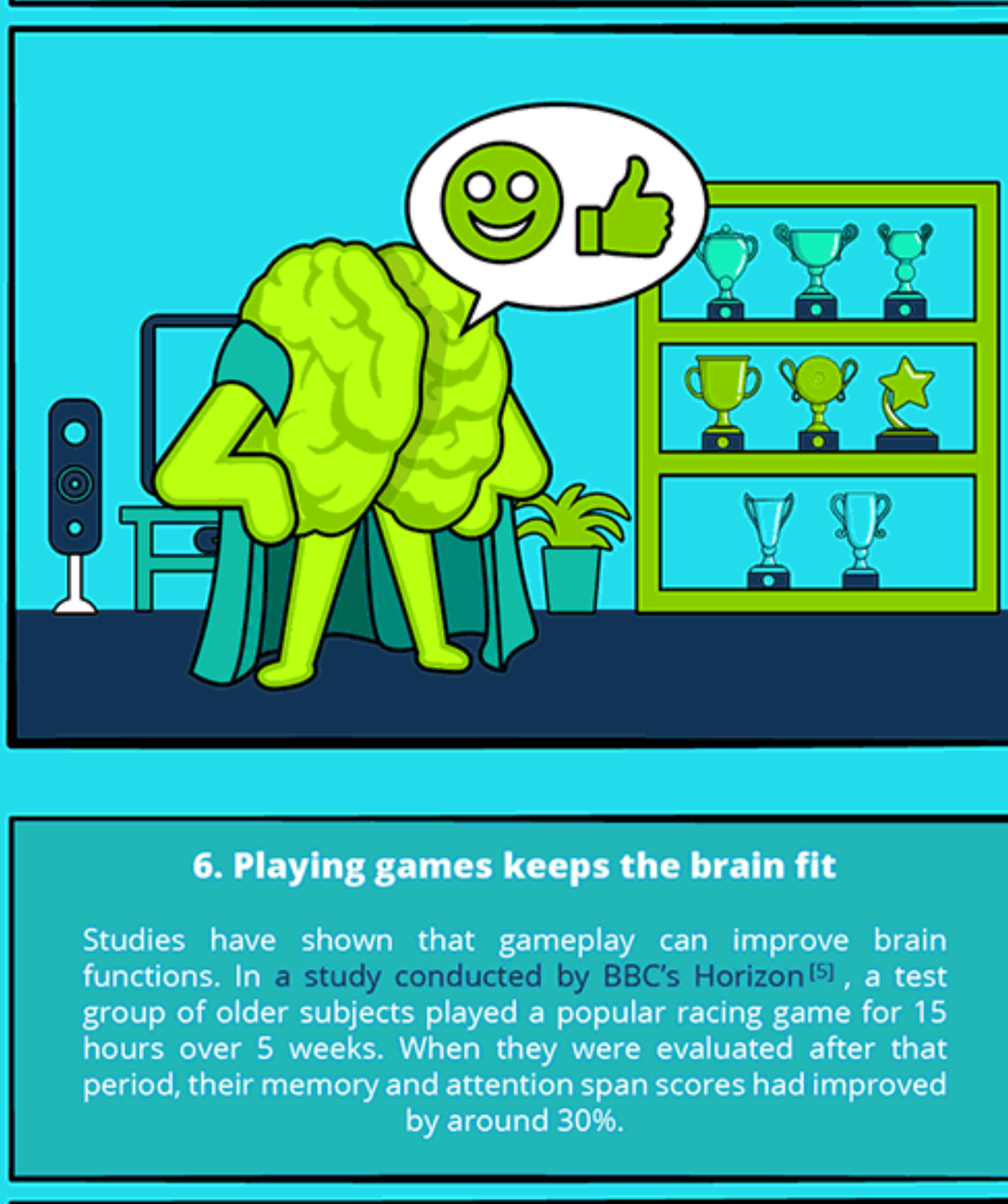
Gamification involves creating a narrative around the learning activity that describes why the task is relevant to the learner.

Research has found that attention spans are affected by the subject's emotional connection with the activity.^[1]



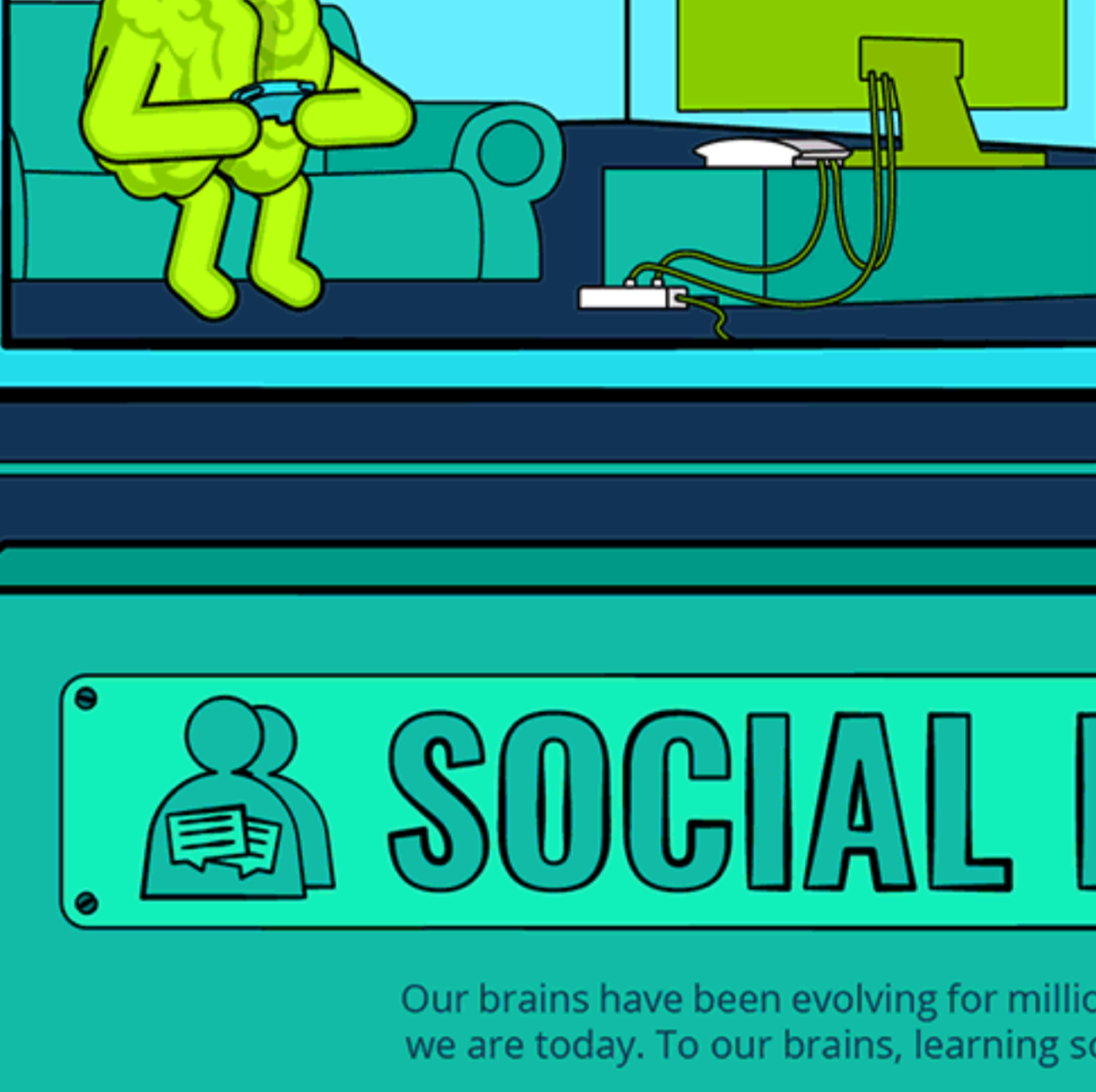
2. The hippocampus controls recall

The hippocampus is an area in the lower section of the brain which is largely responsible for knowledge recall. During learning, a strong hippocampal activation makes the content easier to remember and recall.^[2] In clinical tests, game play has been shown to stimulate these conditions.



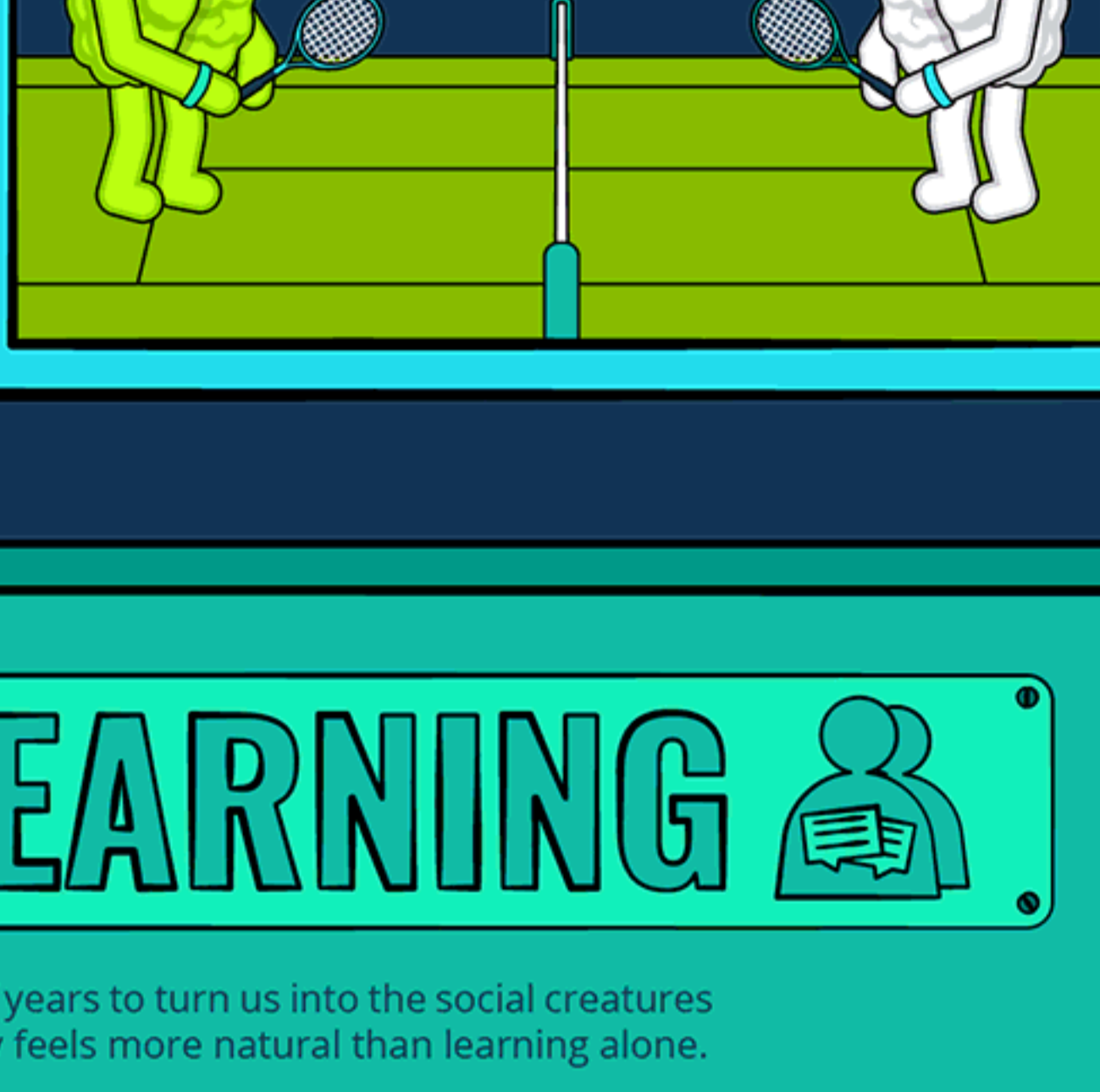
3. Dopamine creates positive associations with learning

Dopamine, or the feel-good hormone, is released whenever we are rewarded for a specific action. By giving virtual rewards for achieving learning goals, learners begin to associate the learning with positive emotions, prompting them to try to repeat it (i.e. seek out more learning).



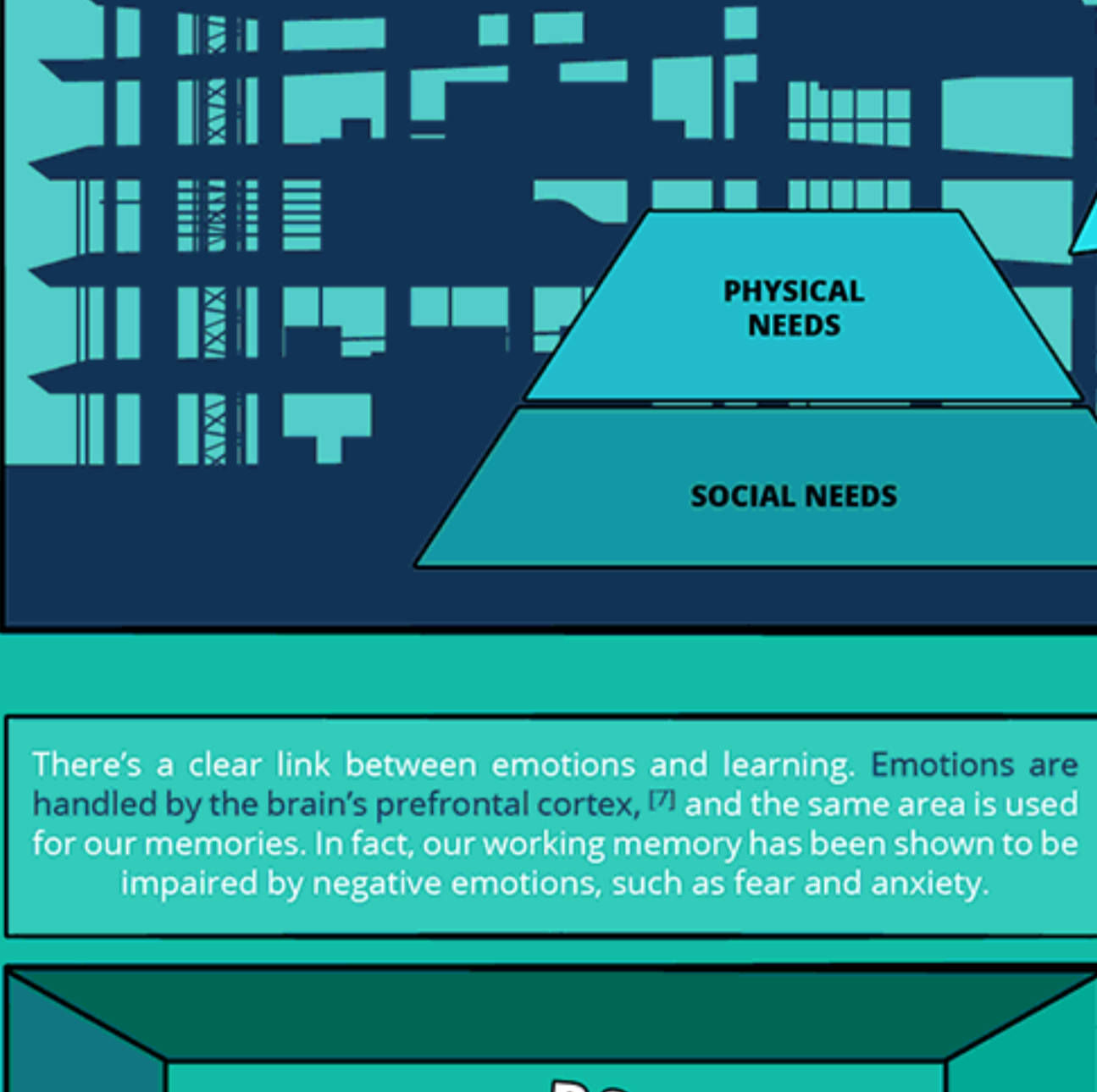
4. Badges and rewards can trigger serotonin release

Serotonin is a hormone that governs our overall mood. One way to trigger it is by remembering past successes.^[3] The badge cabinet of a gamified learning management system lets learners get a serotonin rush on demand whenever they look at the rewards they have earned.



5. Playing games releases endorphins

The thrill and excitement of playing a game is the result of endorphins being released. Endorphins are the body's natural painkiller but they can also lower stress and anxiety levels, and even create a sense of euphoria. Combined with other neurotransmitters, this helps create an ideal environment for focused learning.^[4]

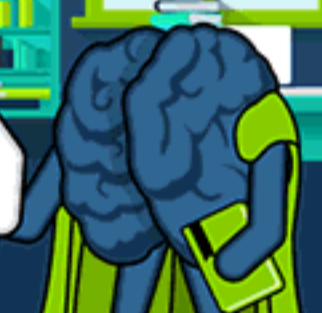


6. Playing games keeps the brain fit

Studies have shown that gameplay can improve brain functions. In a study conducted by BBC's Horizon^[5], a test group of older subjects played a popular rating game for 15 hours over 5 weeks. When they were evaluated after that period, their memory and attention span scores had improved by around 30%.



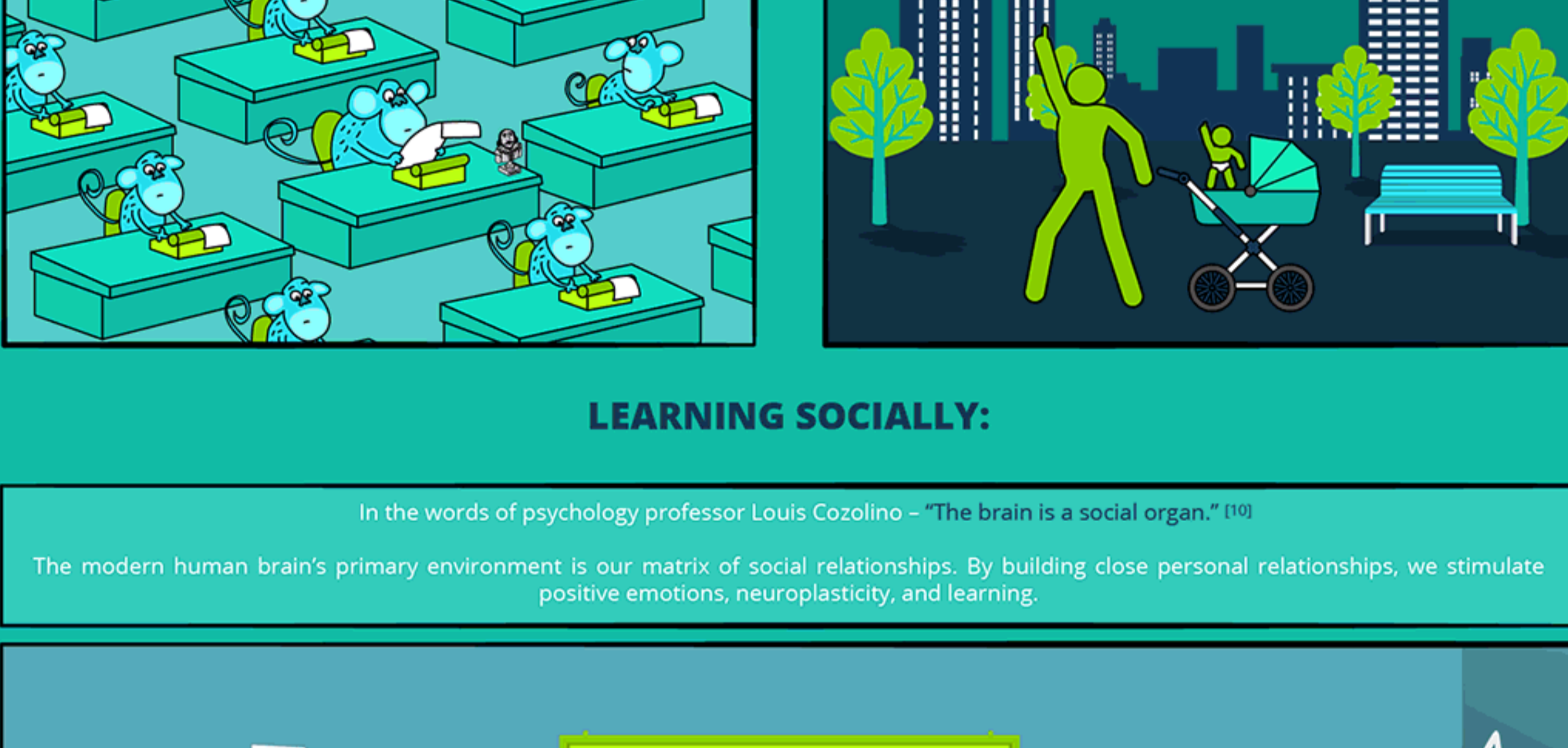
SOCIAL LEARNING



Our brains have been evolving for millions of years to turn us into the social creatures we are today. To our brains, learning socially feels more natural than learning alone.

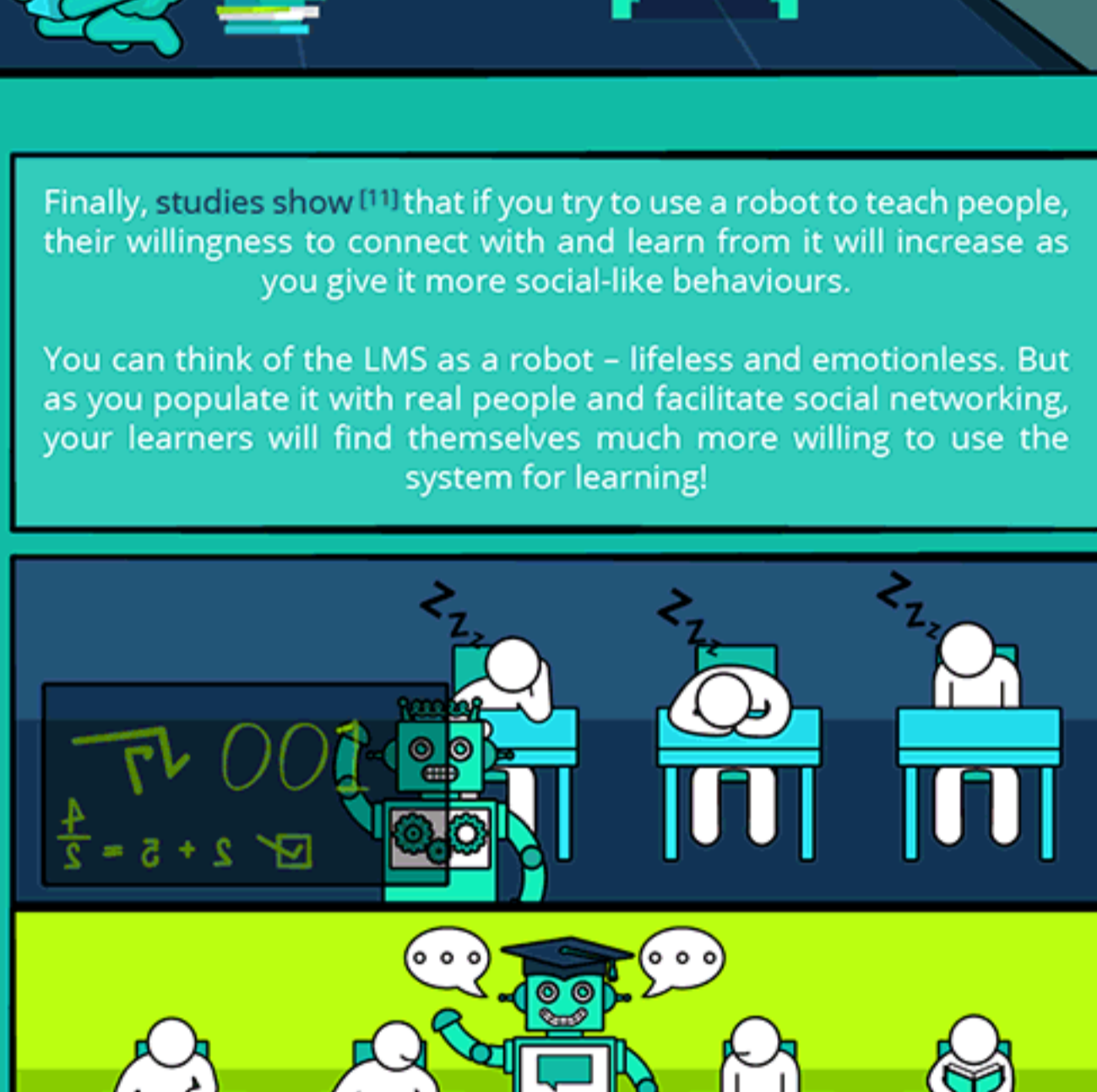
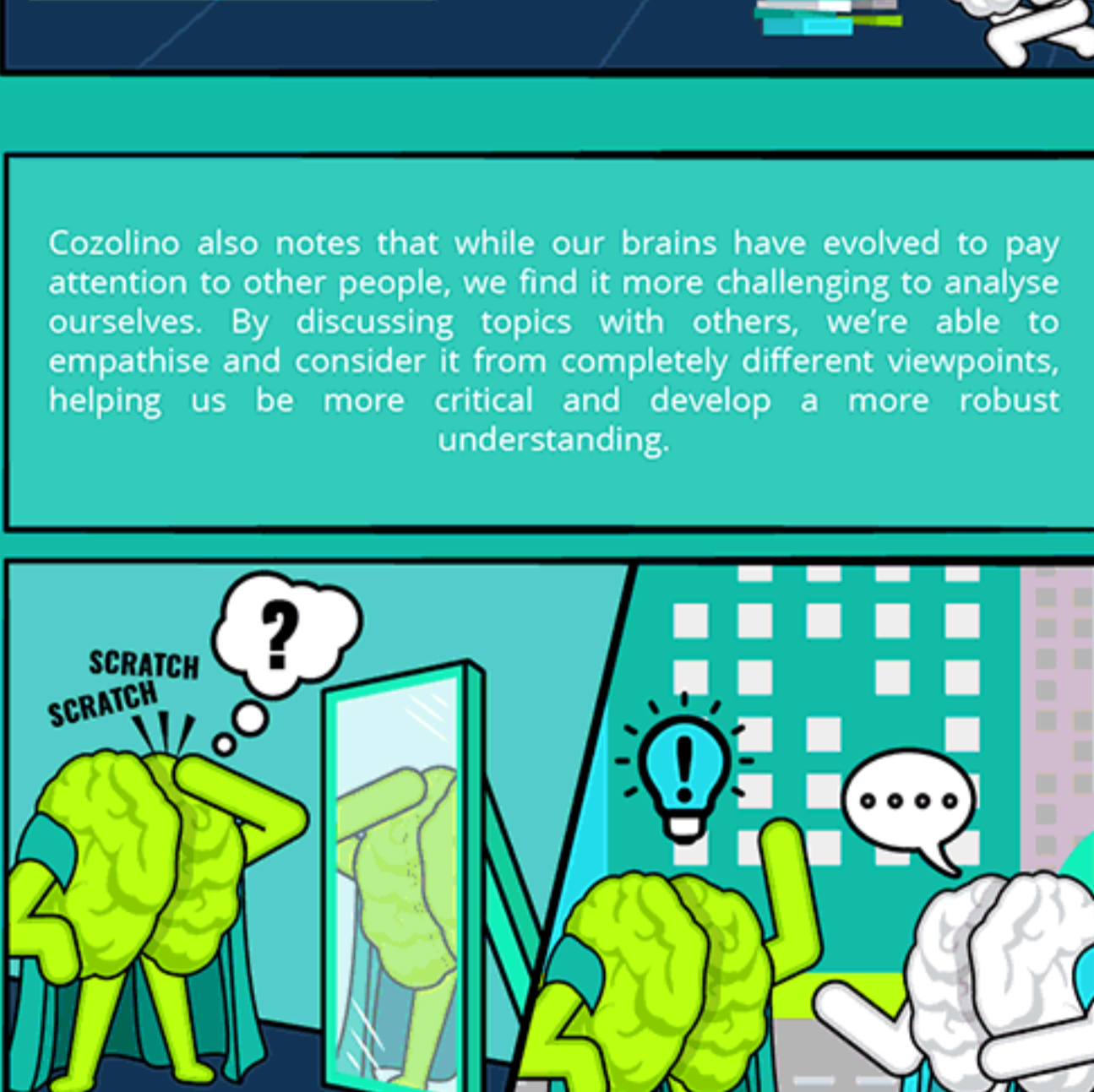
SOCIAL NEEDS:

UCLA professor Matthew Lieberman has challenged Abraham Maslow and his famous hierarchy of needs,^[6] placing social needs at the bottom of the pyramid. This makes them more essential than food and water!



There's a clear link between emotions and learning. Emotions are handled by the brain's prefrontal cortex,^[7] and the same area is used for our memories. In fact, our working memory has been shown to be impaired by negative emotions, such as fear and anxiety.

Psychologist Daniel Goleman says^[8] that by building social and emotional learning programmes, we can pave the way for more effective learning. Building caring relationships with teachers and other students increases the desire to learn.



MIRROR NEURONS:

Discovered in monkeys, these neurons fire when one monkey watches the actions of another. So, by watching another monkey (or human) use a hammer, it will start to learn how to use it itself.

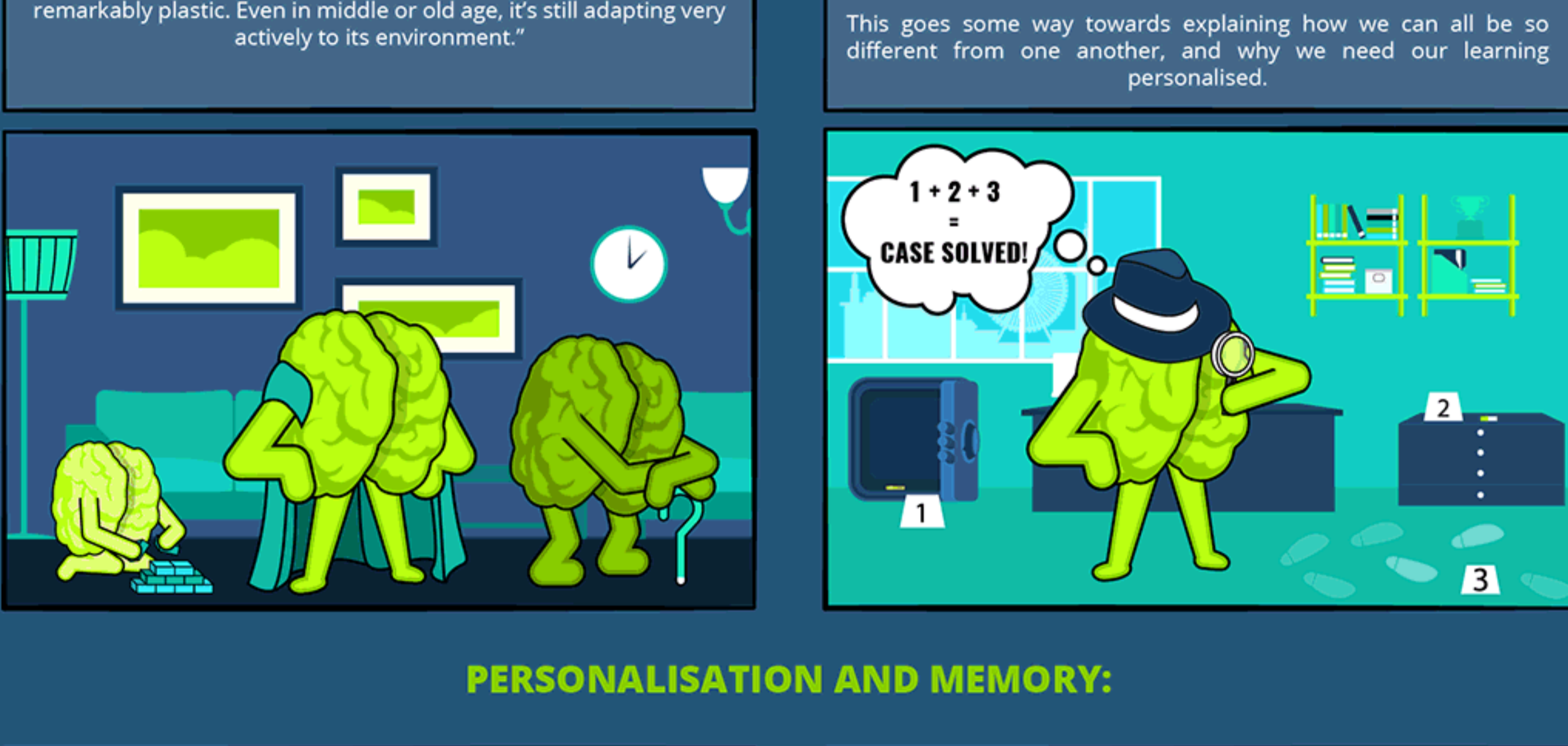
Studies show that newborn babies are able to imitate the body movements of other people.^[9] This can happen as early as 40 minutes after birth, meaning that before an infant even sees its own face in a mirror, it is able to mirror the behaviour of other humans.



LEARNING SOCIALLY:

In the words of psychology professor Louis Cozolino - "The brain is a social organ."^[10]

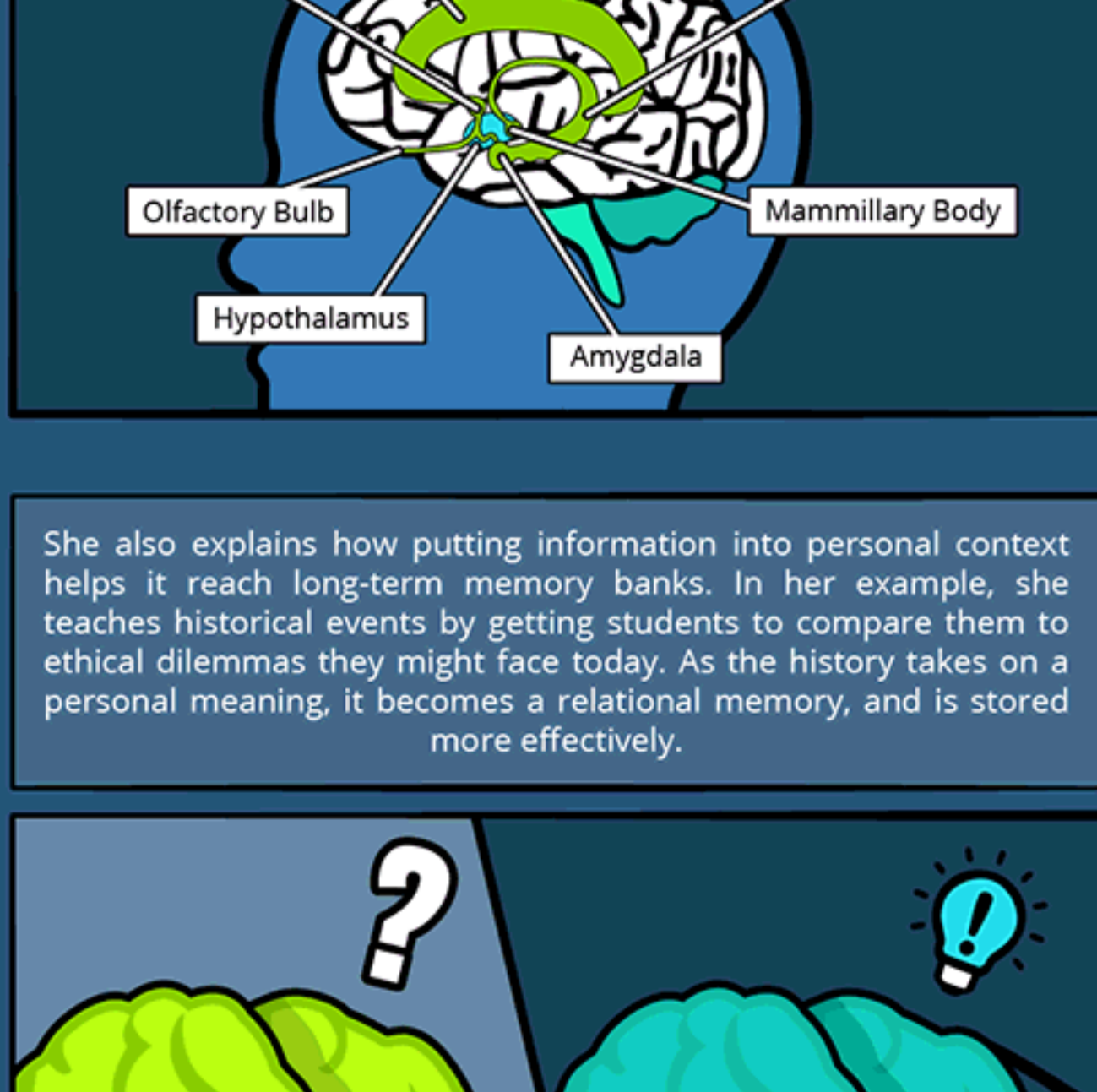
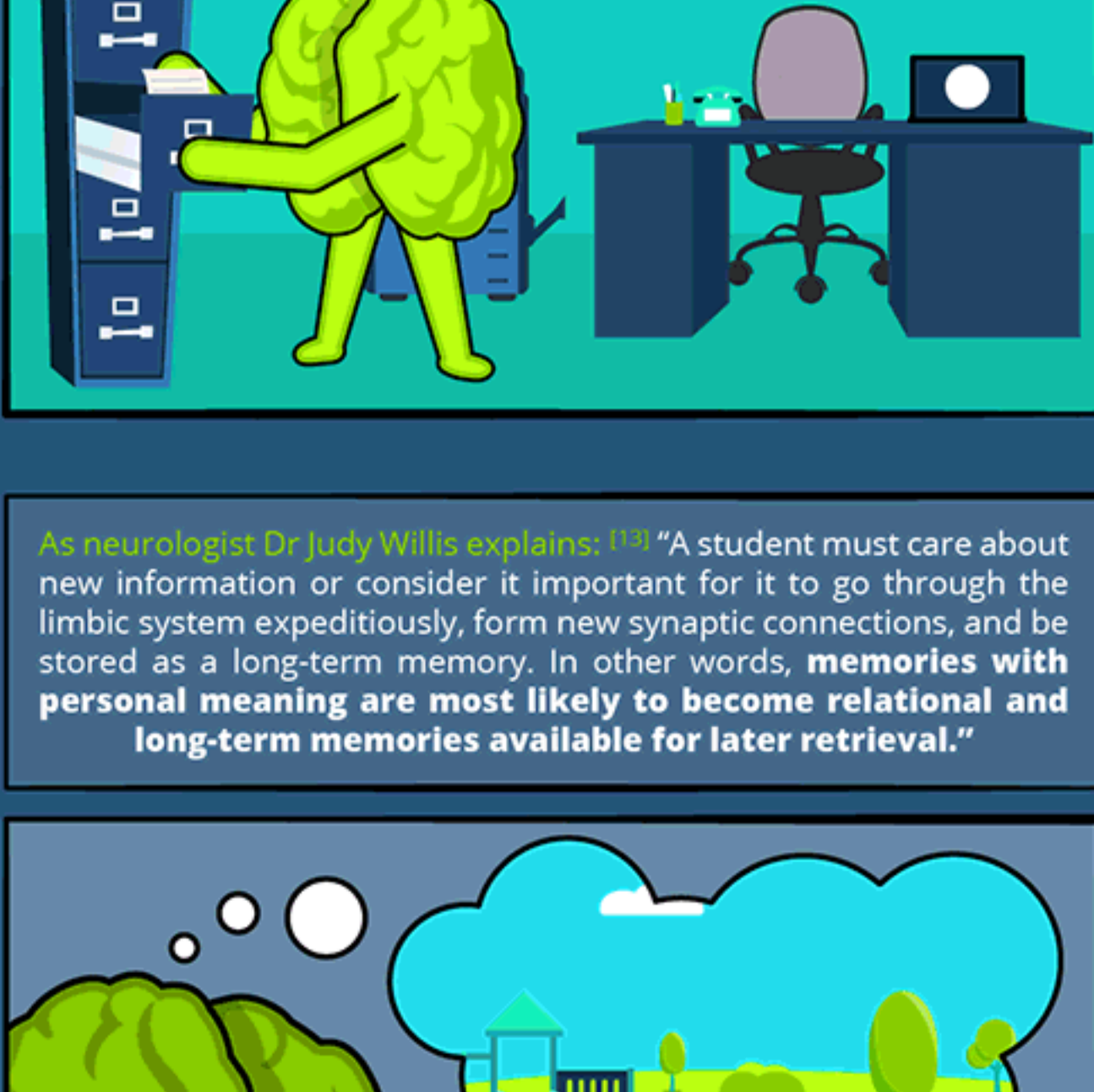
The modern human brain's primary environment is our matrix of social relationships. By building close personal relationships, we stimulate positive emotions, neuroplasticity, and learning.



Cozolino also notes that while our brains have evolved to pay attention to other people, we find it more challenging to analyse ourselves. By discussing topics with others, we're able to empathise and consider it from completely different viewpoints helping us be more critical and develop a more robust understanding.

Finally, studies show^[11] that if you try to use a robot to teach people, their willingness to connect with and learn from it will increase as you give it more social-like behaviours.

You can think of the LMS as a robot - lifeless and emotionless. But as you populate it with real people and facilitate social networking, your learners will find themselves much more willing to use the system for learning!



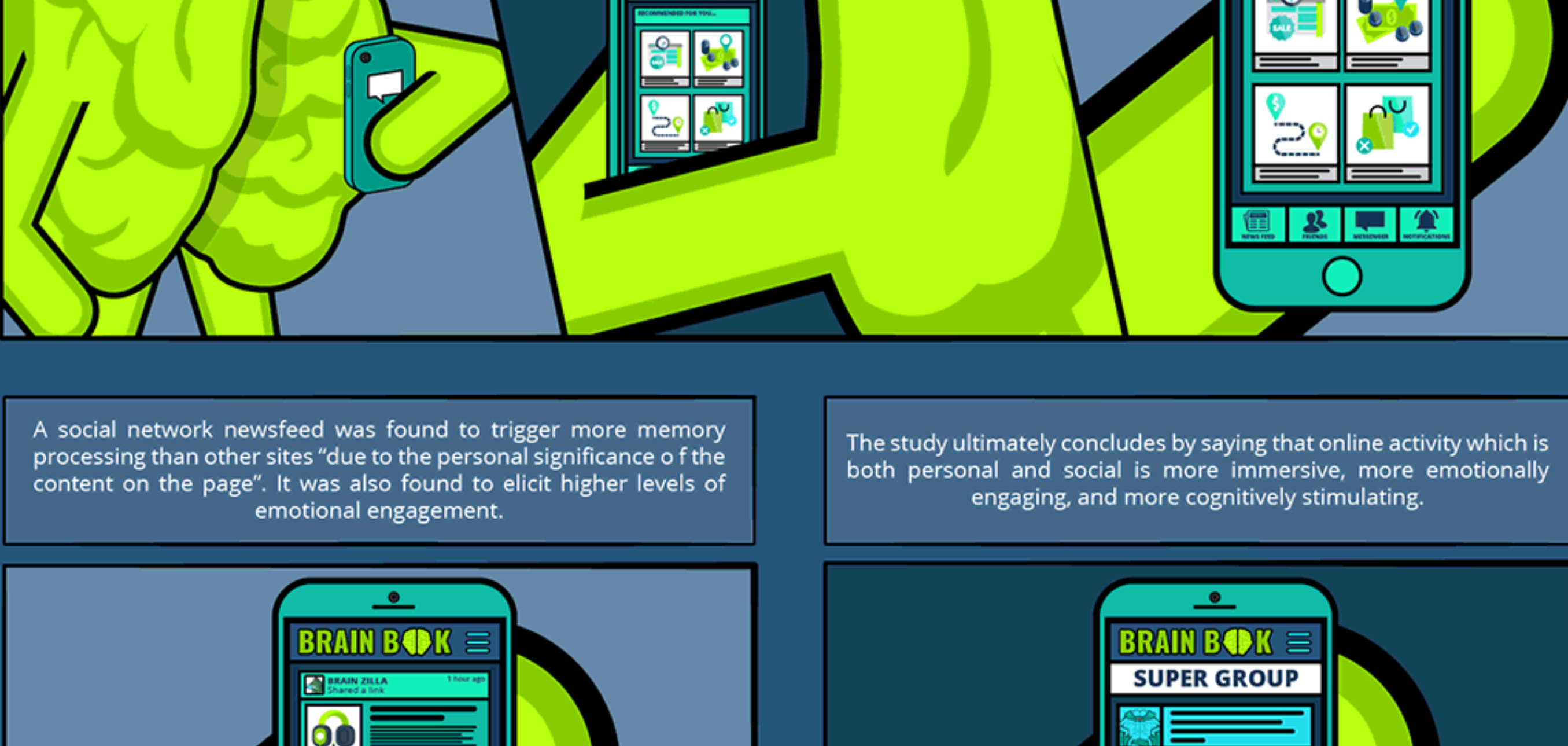
PERSONALISED LEARNING



Personalised learning is all about tailoring the training experience to make it more relevant for your audience. Here's how it affects your learners' brains:

PLASTIC BRAIN:

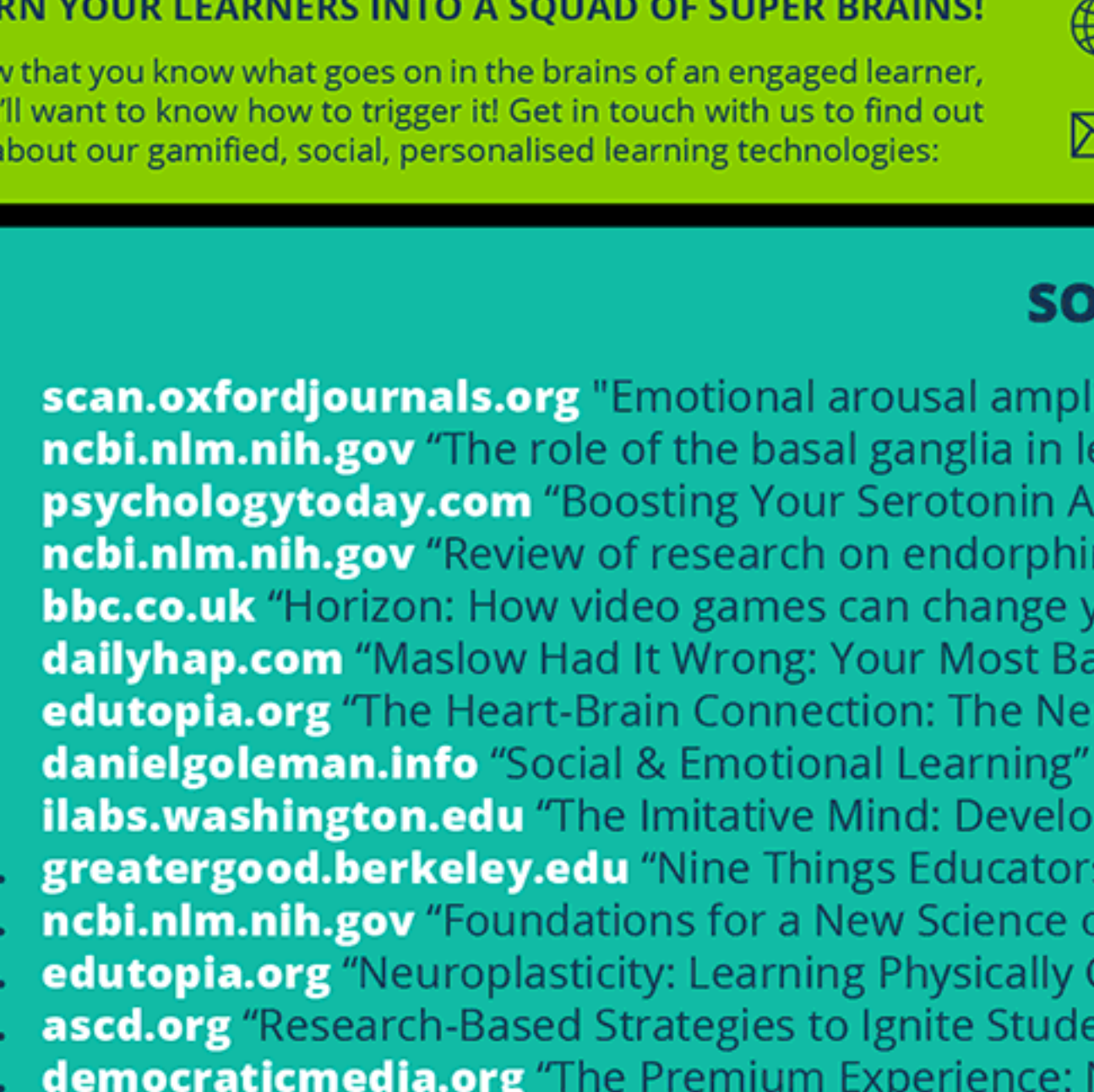
Did you know: our brains are each as physically distinctive as our fingerprints?



The physiology of our brains is constantly changing. As Kurt Fischer, education professor and director of the Mind, Brain, and Education Program at Harvard University explains^[12] "The brain is remarkably plastic. Even in middle or old age, it's still adapting very actively to its environment."

This concept is known as 'neuroplasticity'. As we experience and learn, groups of neurons fire together, creating electrochemical pathways between each other. In other words, your brain is physically shaped by your experiences!

This goes some way towards explaining how we can all be so different from one another, and why we need our learning personalised.



PERSONALISATION AND MEMORY:

Personalisation plays a big role in allowing new information to reach the right areas of the brain and be stored effectively.

When it comes to learning and forming long-term memories, one of the most important areas of the brain is the limbic system, which includes the amygdala and the hippocampus. Neural imaging shows that information has to pass through the amygdala to reach the hippocampus, from where it can be sent to long-term memory storage.

An neurologist Dr Judy Willis explains^[13] "A student must care about new information or consider it important for it to go through the limbic system expeditiously, form new synaptic connections, and be stored as a long-term memory. In other words, memories with personal meaning are most likely to become relational and long-term memories available for later retrieval."

She also explains how putting information into personal context helps it reach long-term memory banks. In her example, she teaches historical events by getting students to compare them to ethical dilemmas they might face today. As the history takes on a personal meaning, it becomes a relational memory, and is stored more effectively.

ONLINE PERSONALISATION:

A fascinating study by Neurofocus^[14] looked into how consumers respond to and engage with different websites.

The study found that "memory scores tend to be higher when stimuli are personally meaningful and provide opportunities for learning".

A social network newsfeed was found to trigger more memory processing than other sites^[15] due to the personal significance of the content on the page". It was also found to elicit higher levels of emotional engagement.

The study ultimately concludes by saying that online activity which is both personal and social is more immersive, more emotionally engaging, and more cognitively stimulating.

TURN YOUR LEARNERS INTO A SQUAD OF SUPER BRAINS!

Now that you know what goes on in the brains of an engaged learner, you'll want to know how to trigger it! Get in touch with us to find out about our gamified, social, personalised learning technologies.

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SOURCES

1. scan.oxfordjournals.org "Emotional arousal amplifies the effects of biased competition in the brain", 2013
2. ncbi.nlm.nih.gov "The role of the basal ganglia in learning and memory: Insight from Parkinson's disease", 2011
3. psychologytoday.com "Boosting Your Serotonin Activity", 2011
4. ncbi.nlm.nih.gov "Review of research on endorphins and learning", 1983
5. lbb.co.uk "Horizon: How video games can change your brain", 2015
6. dailyhap.com "Maslow Had It Wrong: Your Most Basic Need is Something Else", 2013
7. edutopia.org "The Heart-Brain Connection: The Neuroscience of Social, Emotional, and Academic Learning", 2008
8. danielgoleman.info "Social & Emotional Learning"
9. labs.washington.edu "The Imitative Mind: Development, Evolution, and Brain Bases", 2002
10. greatergood.berkeley.edu "Nine Things Educators Need to Know About the Brain", 2013
11. ncbi.nlm.nih.gov "Foundations for a New Science of Learning", 2009
12. edutopia.org "Neuroplasticity: Learning Physically Changes the Brain", 2010
13. ascd.org "Research-Based Strategies to Ignite Student Learning", 2006
14. democraticmedia.org "The Premium Experience: Neurological Engagement on Premium Websites", 2011