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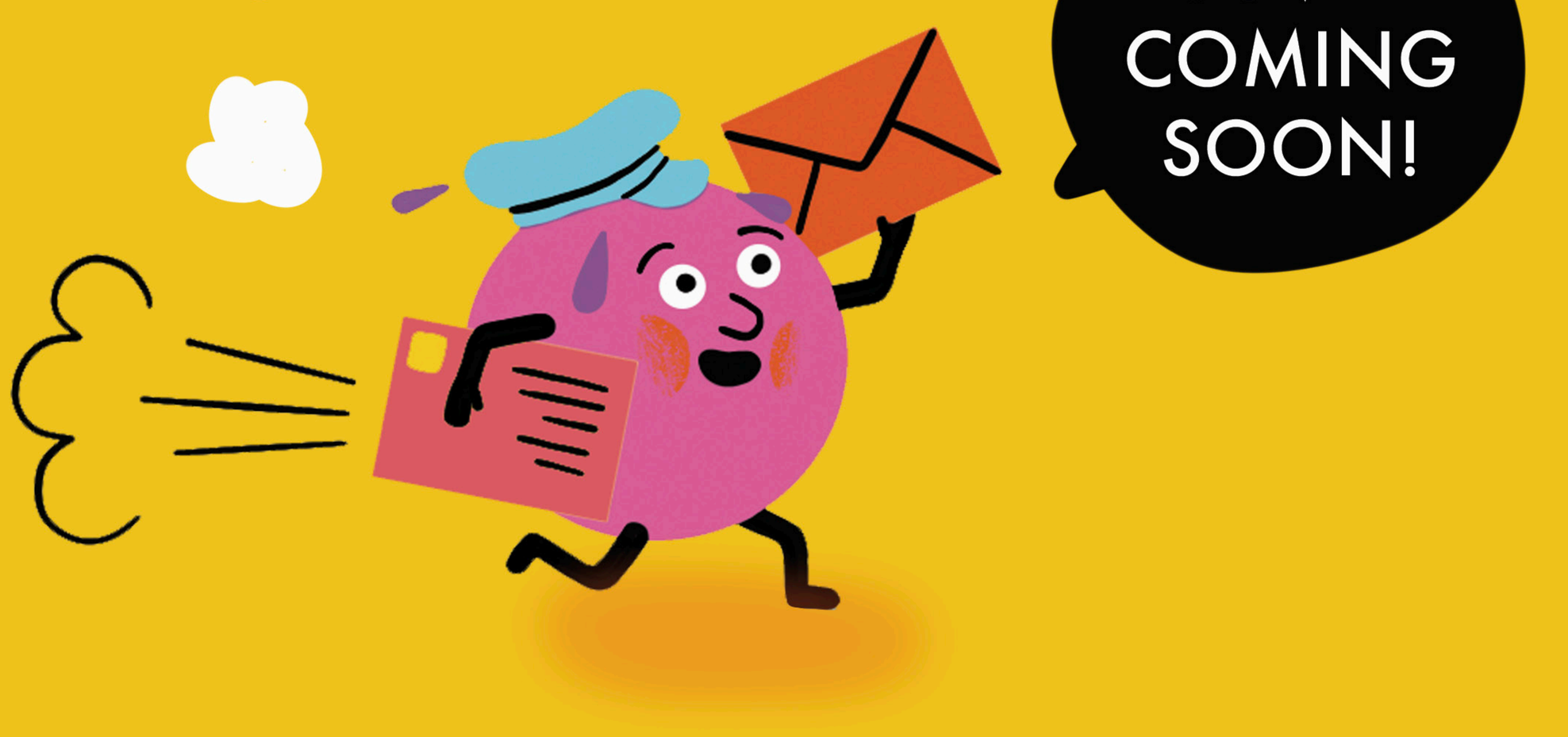
ALL IN THE MIND

A guide to the **AMAZING** brain

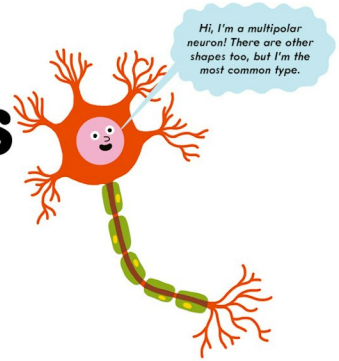


COVER COMING SOON!

COVER NOT FINAL

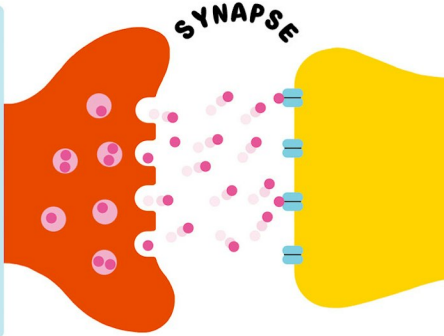
MEET YOUR BRAIN CELLS

Your brain is a soft, squishy lump of tissue protected by the bony skull and three layers of tough membrane called meninges. It's made of at least 85 billion (that's 85,000,000,000) tiny cells called neurons, and each one communicates with around 100,000 other brain cells. They don't do this by talking, of course, or it would be very noisy inside your head! They use chemicals or tiny electrical signals to 'speak' to each other. Let's meet some neurons . . .



HOW NEURONS TALK TO EACH OTHER

Messages pass through neurons as tiny chemical and electrical signals. They're very fast – in some neurons they can travel over 100m/s. The place where two neurons meet is called a synapse. The neurons don't actually touch each other at a synapse, althoughthe gap between them is very small (about 20 nanometres – that's 0.00002mm).



Neurons are shaped like magic wands and have hundreds of branches called dendrites, each of which connects with another brain cell, so even small numbers can build up very complicated communication networks. It's as though you had hundreds of hands and could shake hands with hundreds of other people at the same time and they each had a hundred hands too!

Can you imagine how complicated it gets with billions of neurons? And has it occurred to you that you're using your neurons to think about your neurons!

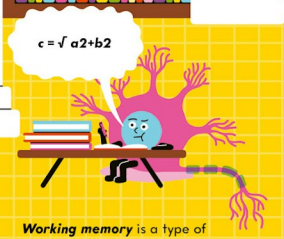
Most neurons use chemicals called neurotransmitters to carry the message to the next neuron. Other neurons have an even smaller gap at their synapses (about 3.8 nanometres or 0.0000038mm) and they send messages across this tiny space as an electrical signal. These signals are faster than chemicals, so this type of synapse works well for when lots of neurons respond at once, or to trigger a fast response, like when an animal needs to escape.

MEMORY

What's your earliest memory? Your most vivid memory? Your favourite memory? Memories are how your brain stores information about what you experience – and this is what allows you to learn.

Short term memory can store a small amount of information for about a minute, for instance the face of someone you've just met, or what happened in the last couple of pages as you read a book. After that, the information either goes into long term memory or is forgotten.

Long term memory can store an unlimited amount of information for many years. When you remember a holiday you had years ago or a grandparent tells you about their childhood, the information has been stored in long term memory.



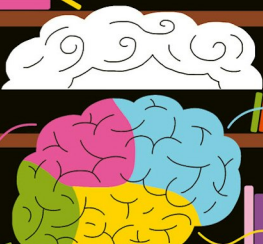
Working memory is a type of short-term memory that allows you to remember information while you work with it, for instance numbers you have to add in your head, or a code you need to put into your phone.

MEMORY DIRECTORY

Memories are stored in different parts of the brain, depending on what type of memories they are.

The ***neocortex*** stores memories we could call 'general knowledge' – for instance, ice will make your drink colder, dogs can bark.

Memories of specific events like holidays or films are stored in the ***hippocampus.***



If you learn to ride a bicycle or play an instrument, the memory of the movements involved is stored in the cerebellum.

Memories involving strong emotions – love, grief and especially fear – are stored in the ***amygdala.***

REMEMBER, REMEMBER!

Why not test your memory? Get a piece of paper and something to write with, set a timer for thirty seconds, then turn to pxx and follow the instructions!

PUZZLES & BRAIN TEASERS

CONFUSE YOUR BRAIN!

You might fall over when you try this, so find somewhere safe and have something soft to fall onto. Or keep one hand against a wall . . .

1

Stand on your left leg. 'Draw' small clockwise circles in the air with your right leg. Okay, that's fairly easy.

2

Now keep doing that, but at the same time draw small clockwise circles in the air with your right hand. Still pretty easy?

3

Now keep the clockwise circles going with your leg but change the direction of your hand and try to draw anticlockwise circles.

4

Finally, draw clockwise circles with your right leg and anticlockwise circles with your left arm. Easier? Thought so.

What's going on? The right side of your brain controls the left side of your body, and the left side of your brain controls the right side of your body. The left side of your brain gets confused if it has to try to make two parts of the right side of your body move in different directions.

In the final part of the experiment, because each side of your body is controlled by the opposite side of the brain, the two sides of your brain only have to send out one set of instructions each, so they don't get confused.

MEMORY TESTS

Look at the picture of objects below for thirty seconds, then close the book and write down as many as you can remember. No cheating! Don't check your answers yet . . . Wait for 30 minutes without looking at the pictures or the answers you wrote before, then write down the objects you can still remember. Now you can check your answers. The objects you remembered right away were in short term memory. The ones you remembered later on went into your long term memory.

IT'S THE STROOP EFFECT!

Want to see the Stroop effect in action? Don't have a strop – try this out! Time yourself reading out the names of the animals in the pictures. The first group is easy because the word agrees with the picture. The second group takes longer to read because the two sets of information conflict with each other.