

MEMORY AND THE BRAIN



How memory works



How can we remember more?



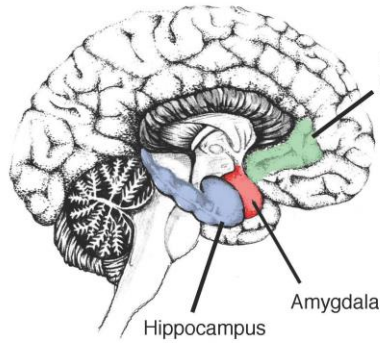
How can we stop forgetting...



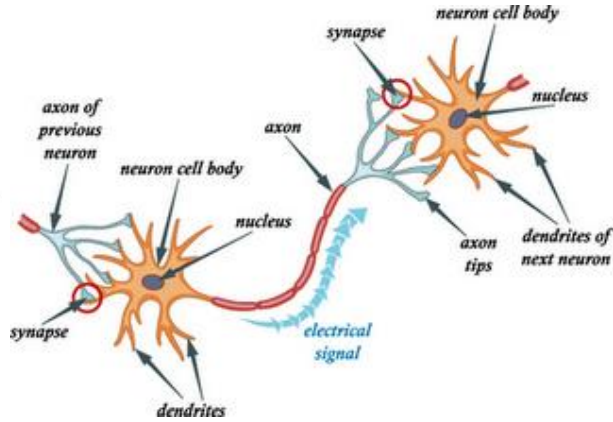
Our memory centre – the brain



Millions of neurons (nerve cells)



Hippocampus – new memories - neurons



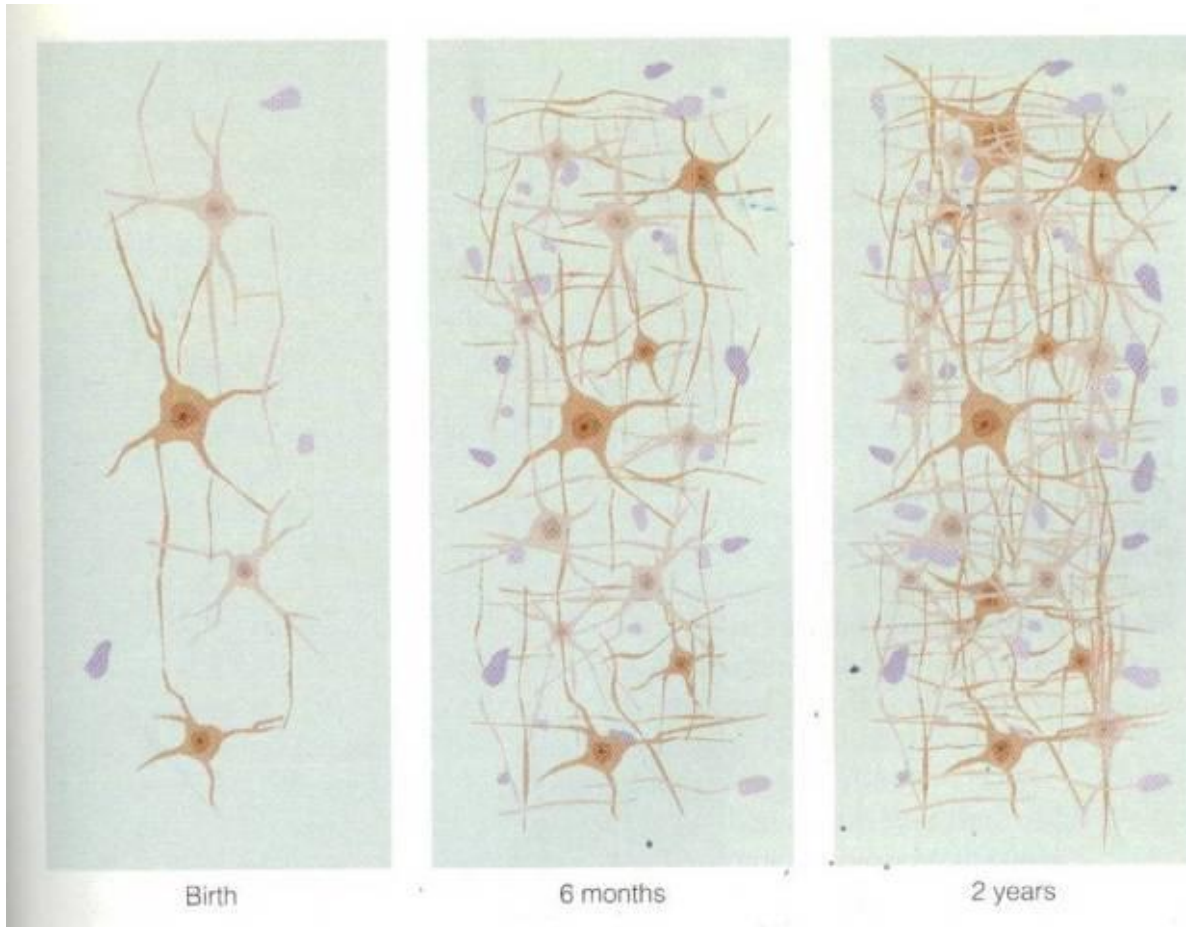
Neurons involved in making new memories; the more you have, the more neuron pathways available for retrieval



More practice in different ways – more neurons – more retrieval options

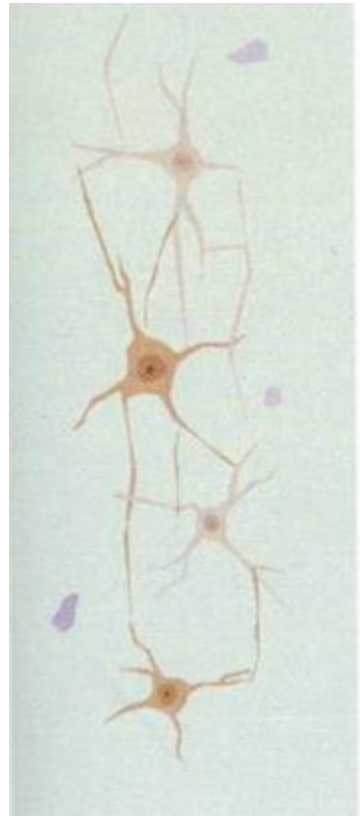


How memory works

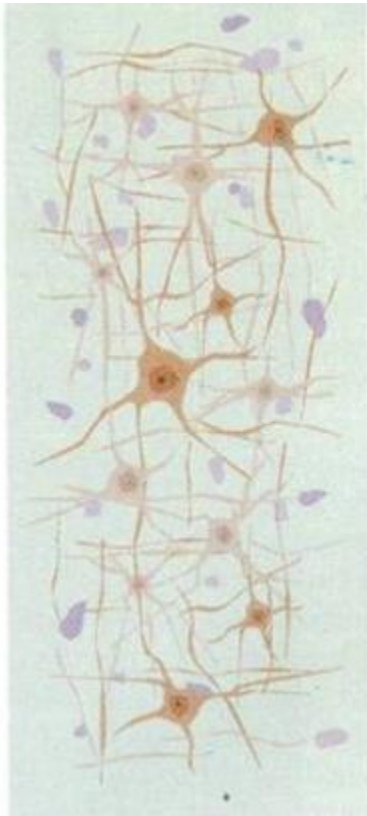


Neuron development from birth to toddlers highlights how neurons develop. The connections and growth of neurons get more, get stronger as the child develops and experiences the world and a larger variety of connectives between neurons can be seen.

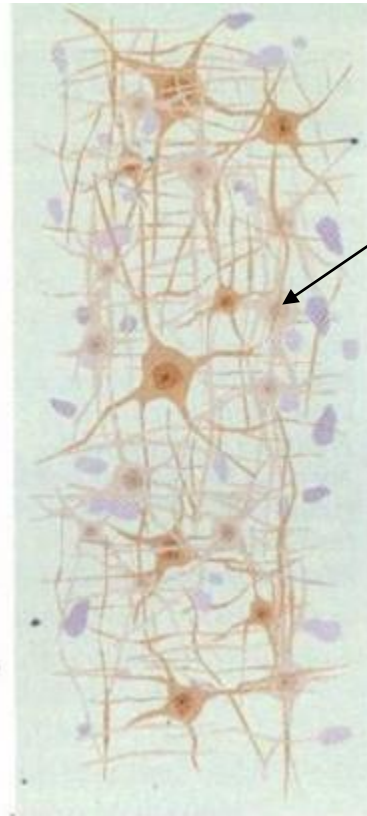
The broader the experiences, the more neurons, more neuron synapses are fired and memories develop



Initial retrieval – one route.



After several practices. A larger number of pathways



Numerous different rehearsals – network of connections

If one neuron is damaged or doesn't fire – there are other neuron options for retrieval



Why is it important to practice and expose the brain to a variety of stimuli?

Teenage brains start pruning!

They stop using unused neurons.

Practice and retrieval and activating neurons throughout puberty is essential...



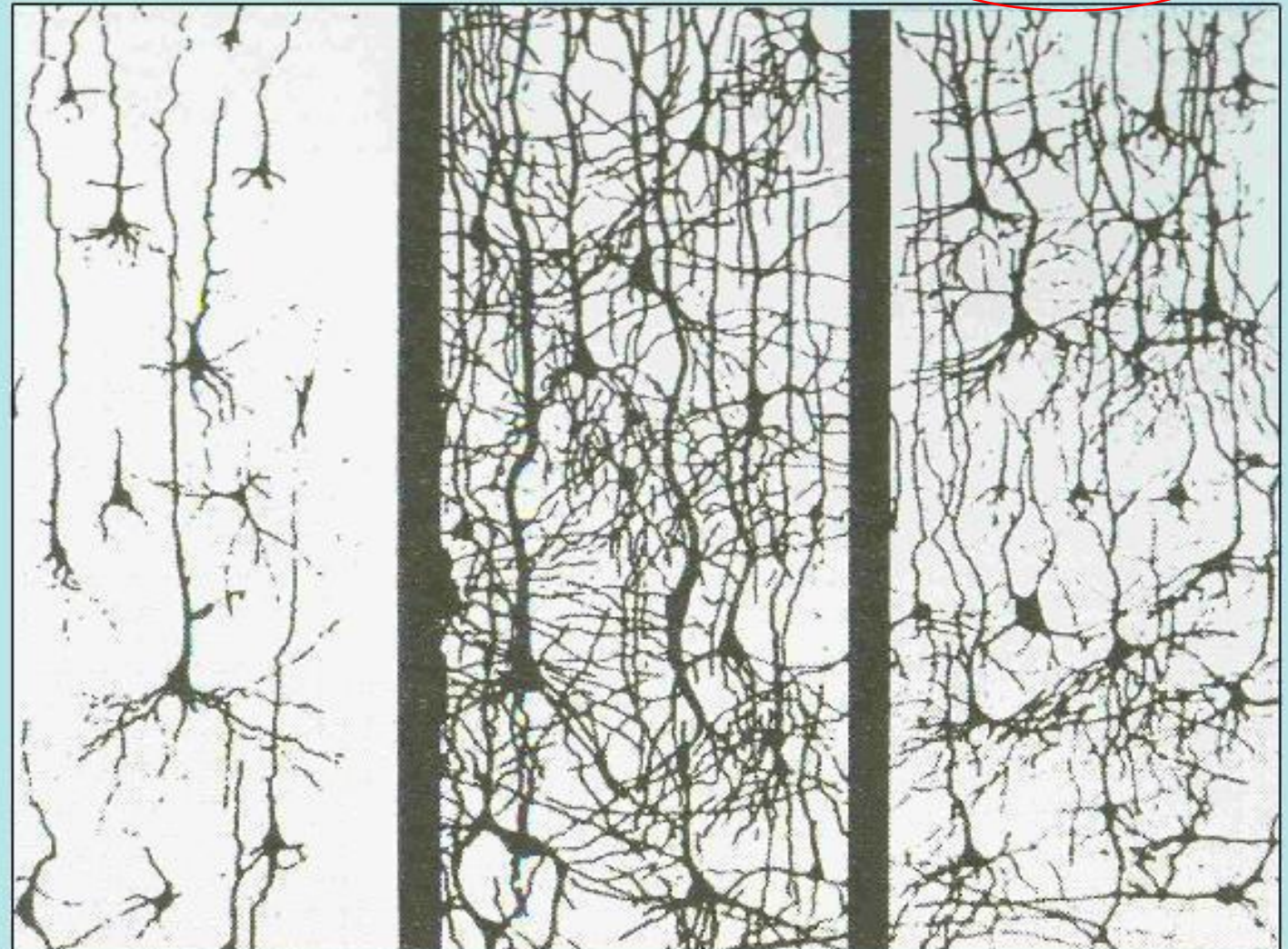
How
memory
works

Synaptic Density

At birth

6 years old

14 years old



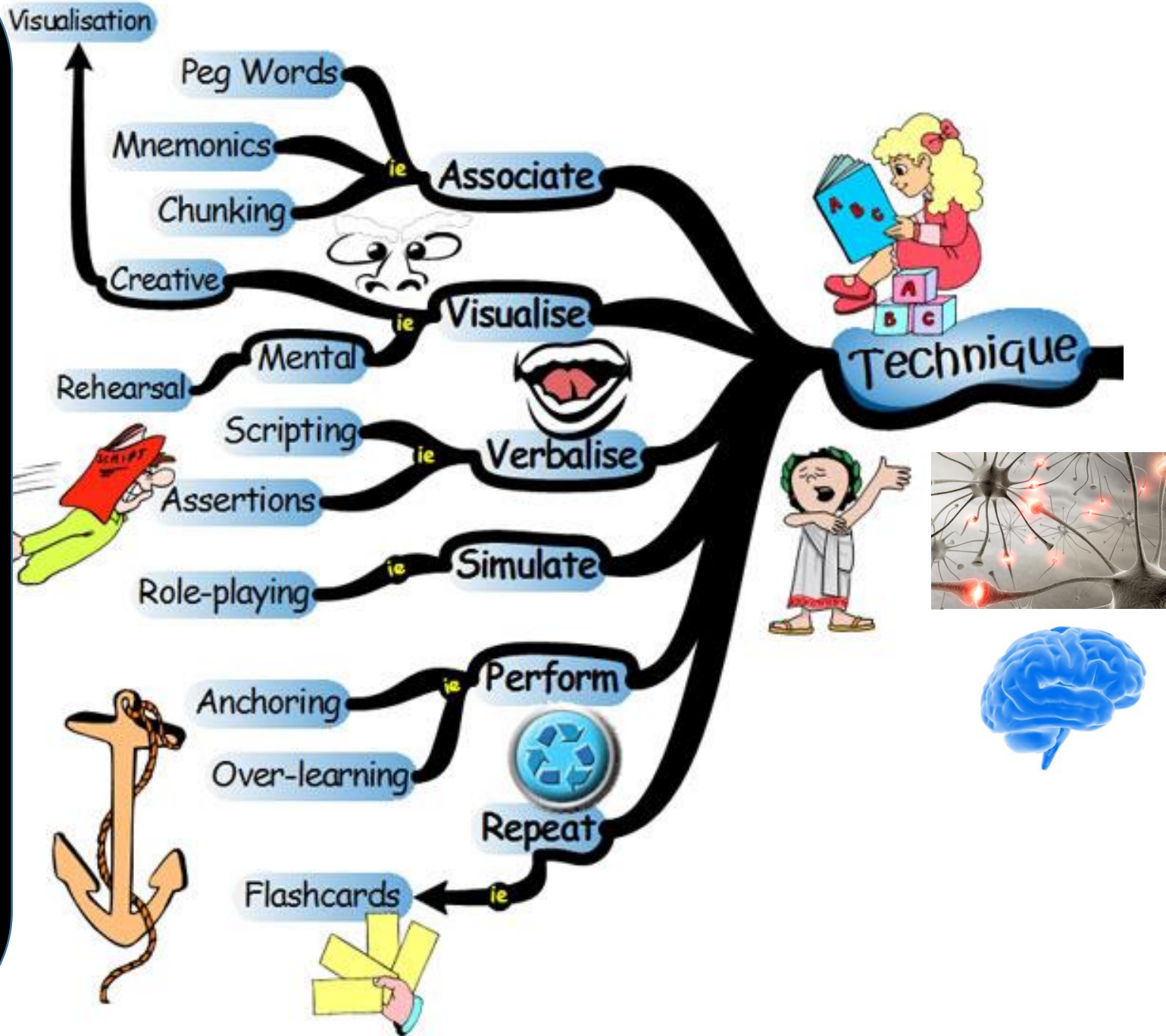
Source: Rethinking the Brain, Families and Work Institute, Rima Shore, 1997; Founders Network slide

Variety for learning

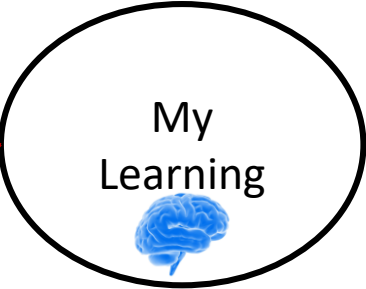
- Association
- Visualisation
- Verbalising
- Simulating/experiencing
- Performing
- Repeating

Variety for retrieval

- Association
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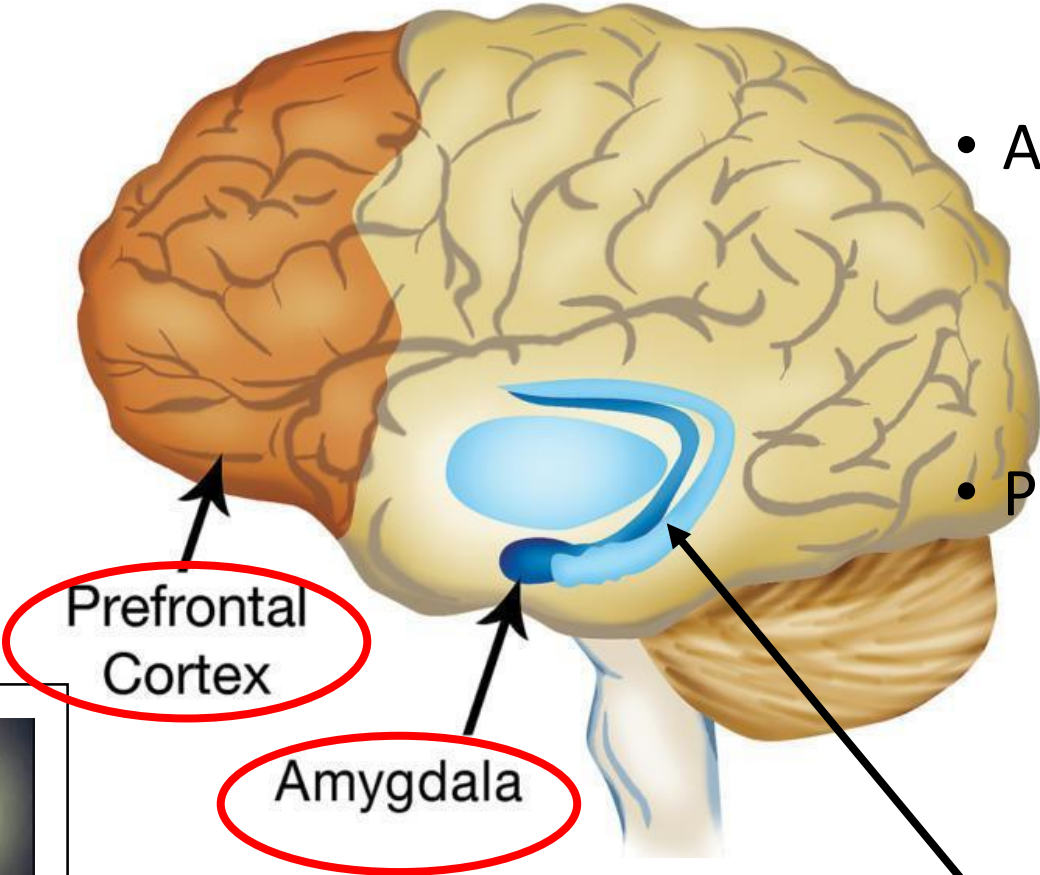


How many different techniques do I know how to use for practising retrieval – list them:



List some a few that you will try, to increase variety:

The teen brain – full of hurdles:



- Amygdala –

fight or flight centre
overactive during
the teen years


- Prefrontal Cortex

Decision making -
overrides the
amygdala with sense
and reason and is
**poorly developed in
teens** – not

fully

Hippocampus – making
new LTM

oped until 25

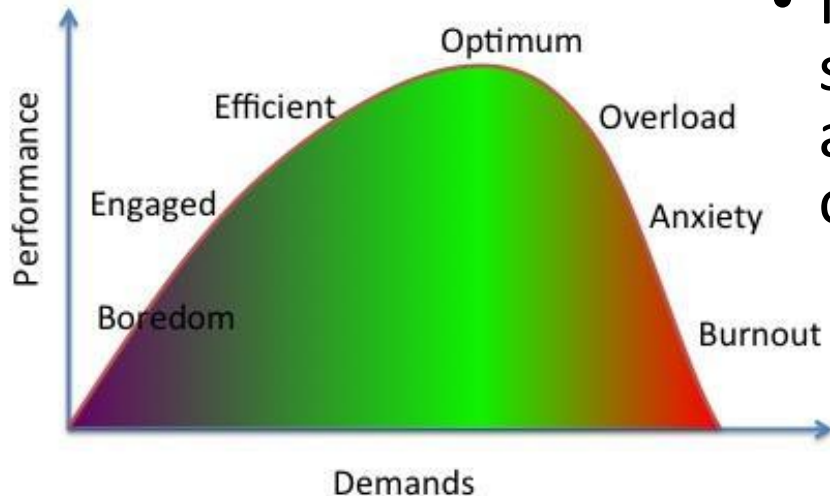


How
memory
works

Can we reduce the fight or flight response?



- Touch reduces cortisol (stress hormone)
- It increases oxytocin – a hormone released for clarity and calm - allowing the body to perform
- A cuddle, touch (not something teachers can do...but you can as parents)
- Making home a welcoming place, supportive, friendly and encouraging – it all helps to reduce cortisol and increase oxytocin. In turn this
 - Increases awareness
 - Increases the ability to memorise



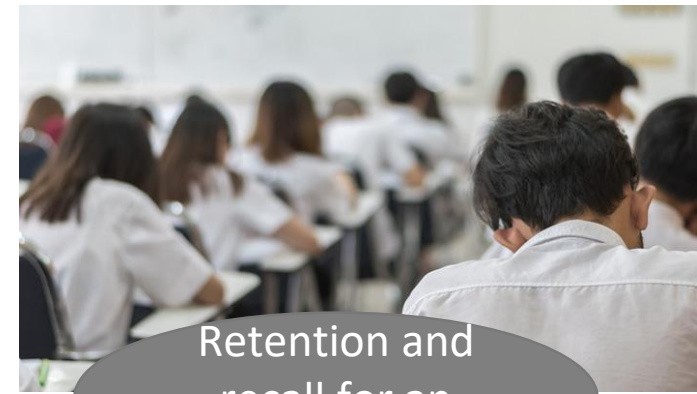
How
memory
works

I can
remember!

Why do we need to understand how the brain retains information?



Attention and capability in the classroom



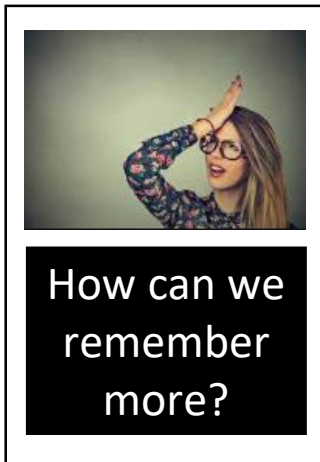
Retention and recall for an exam



- Limited capacity
- Limited duration

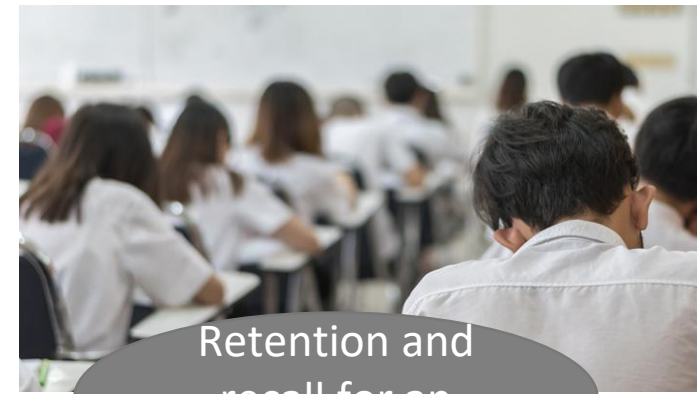
- Unlimited capacity
- Unlimited duration

Love Learning for Life



How can we remember more?

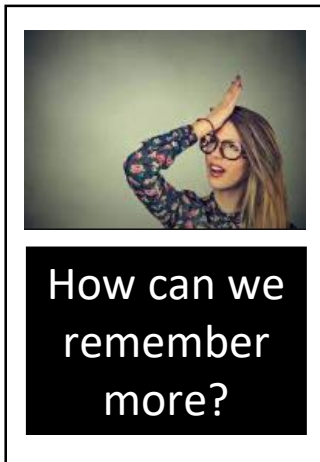
Why do we need to understand how the brain retains information?



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Love Learning for Life



The difference between **STM** and **LTM**

- **Short term memory (STM)** ...memory needed in the classroom?
- Paying attention to the teacher; completing a task
- Retaining information to carry out complex tasks
- Holding key information whilst working the next bit out
- Memorising key words by repeating them; hearing/reciting them over and again.



How can we remember more?



WORKING MEMORY
Processing information
Working on tasks

Activity One – complete the logic task...WAIT for the hidden rule:

1: B is followed by A
True/False BA

2: A is preceded by B
True/False AB

3: A is not followed by B
True/False BA

4: B follows A
True/False AB

5: B does not follow A
True/False BA

6: B is not followed by A
True/False AB

7: A follows B
True/False

8: B is not preceded by A
True/False AB

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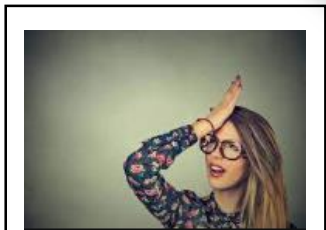
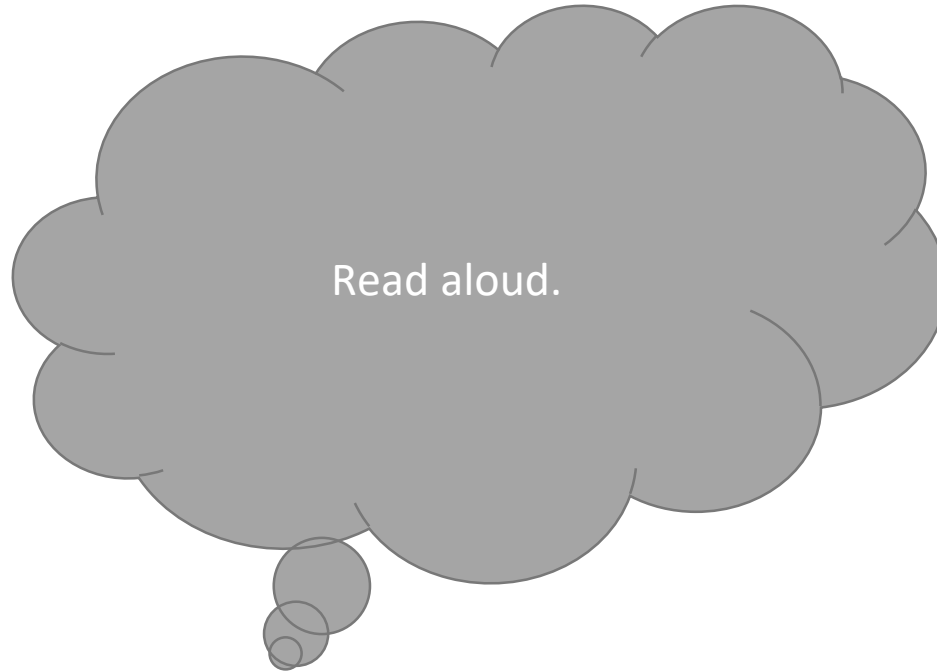


How can we remember more?

Cognitive Overload.

We can only cope with a limited amount in our working memory

Activity Two – read the text on the teen brain and working memory

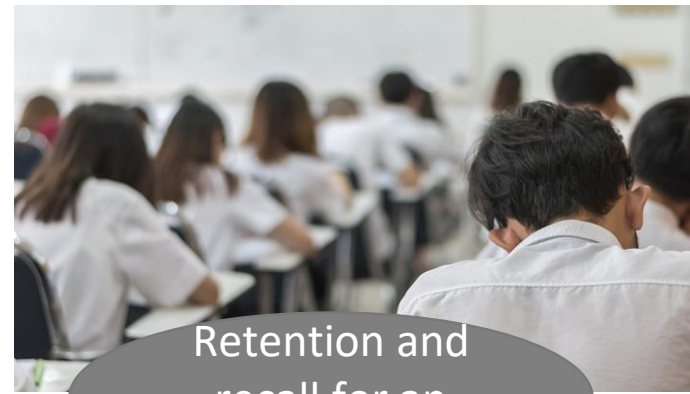


How can we remember more?

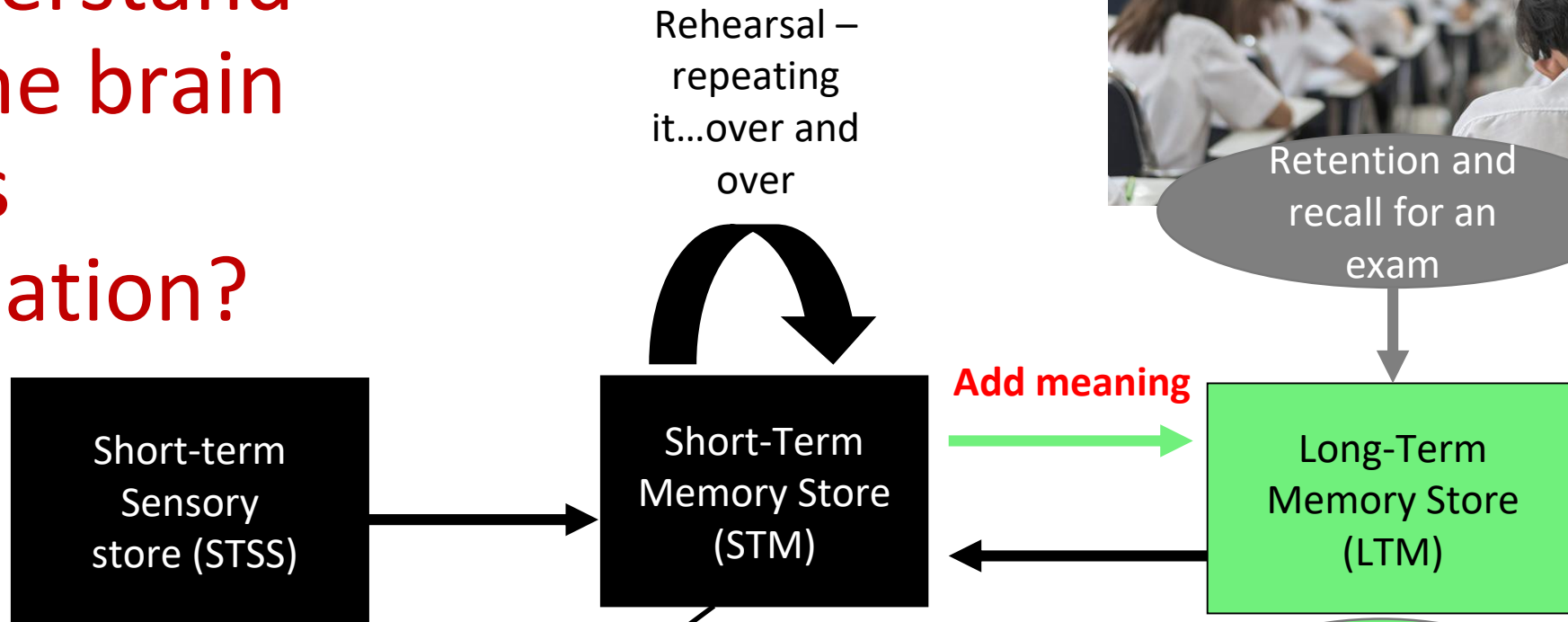
And now for some questions on the text?

How much have you understood ?

Why do we need to understand how the brain retains information?

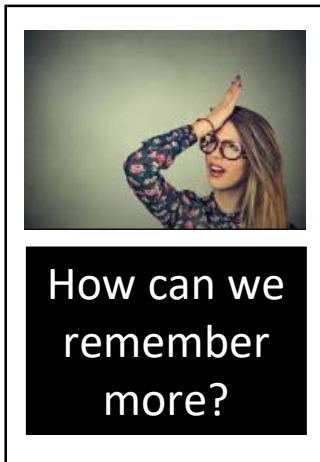
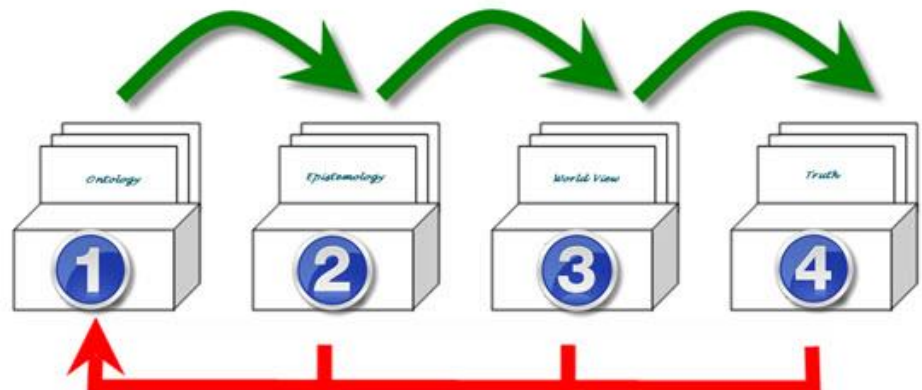


Retention and recall for an exam



Love Learning for Life

- Unlimited capacity
- Unlimited duration



How many different techniques do I know how to use for practising retrieval – list them:

How do I ensure I have a calm, purposeful, fully alert brain:

Why should I space my retrieval? Why should I regularly repeat retrieval and in different ways?:

Techniques
to help
with
Learning



List some a few that you will try, to increase variety:

Why is it important to keep up variety of learning techniques? Clue : shears:



How do I make my learning more interesting?
What stories could I use to help me visualise?
Which rooms should I use for each subject – the method of loci?:

Who are the experts at LTM?

7 5 3 2 3 8 7 3 0 8 9 2 8 0 5 6 1 9
4 7 5 3 4 3 1 8 1 1 3 3 5 9 7 9 5 8
3 2 3 0 7 6 2 1 8 3 3 0 7 9 6 1 2 7
7 0 9 3 4 3 8 9 4 0 2 9 5 9 4 9 4 1
5 2 4 0 5 2 0 9 8 6 0 5 6 4 5 6 5 0
7 9 4 1 8 6 0 8 6 4 1 3 2 6 1 4 7 2
6 1 3 8 6 2 5 2 5 2 2 6 0 8 0 5 2 2
0 5 5 3 3 8 7 6 1 3 0 5 5 1 9 3
1 1 0 6 0 5 7 0 2 5 0 7 9 7 6 8
5 0 2 6 1 1

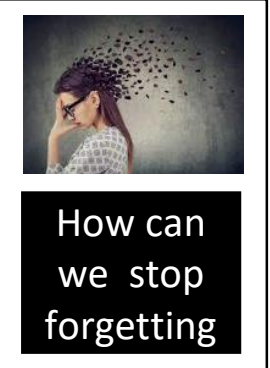
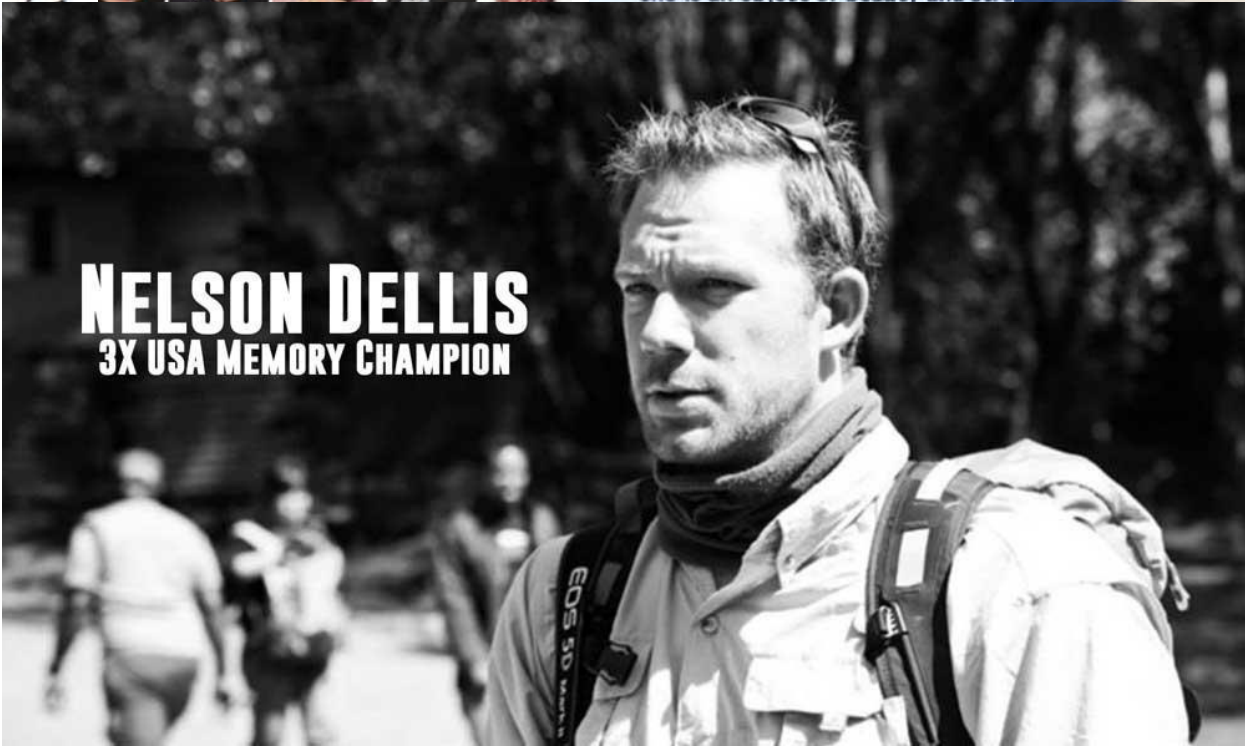
Hundreds of numbers in seconds



Gone From My Sight
by Henry Van Dyke
I am standing upon the seashore
A ship at my side spreads her white sails
to the morning breeze and steers
for the blue ocean.
She is an object of beauty and strength



The order of randomly shuffled packs of cards



• GENIUS?

How can we stop forgetting

Are they smart? Able? Genius'?

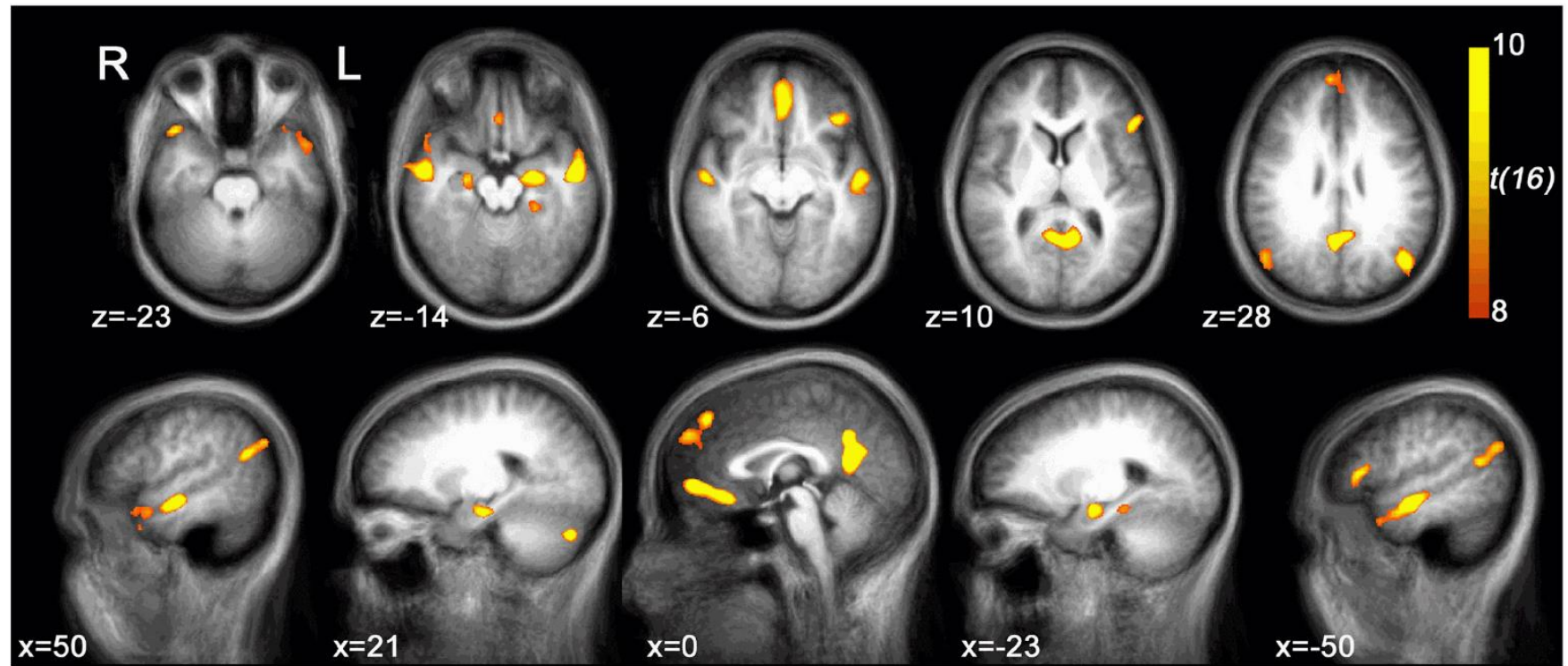
- Do they have better brains than us?
- Are there structural differences?
- Biological differences to their brains?
- Are they using areas of the brain the rest of us cannot reach?



How can
we stop
forgetting

fMRI scans of the Champions brains?

- Scans showed specific areas were highlighted more than a normal brain.
- Visual areas of the brain



How can
we stop
forgetting

They all used an ancient technique of VISUALISATION or
METHOD OF LOCI to help them memorise

**A guy
named
Baker**

**A guy who
is a baker**



How can
we stop
forgetting

Same word different amount of remembering

Associations, elaborative rehearsal...adding meaning

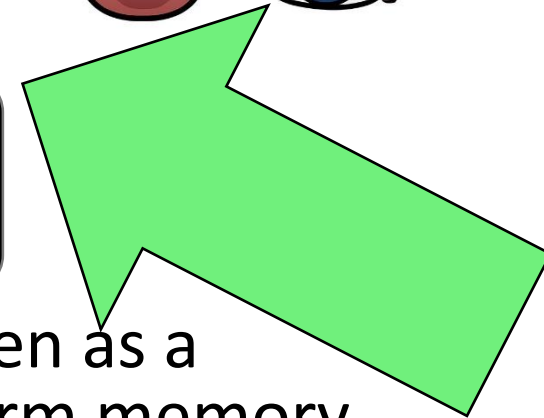
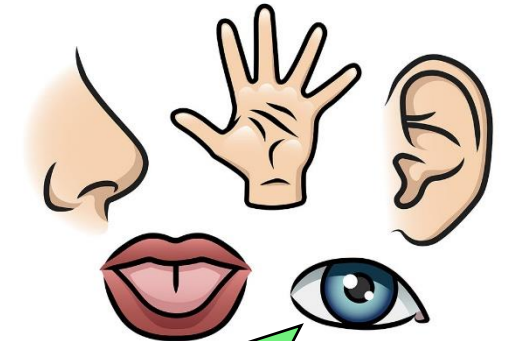
- How to we apply this to knowledge based learning?



Mr Baker – anyone, nothing particularly memorable about him.



A baker – a noun with so many hooks, associations, smells and memories



- Long been known for Long term memory – but now seen as a technique for improving working memory and short term memory capacity (transforming B to b)



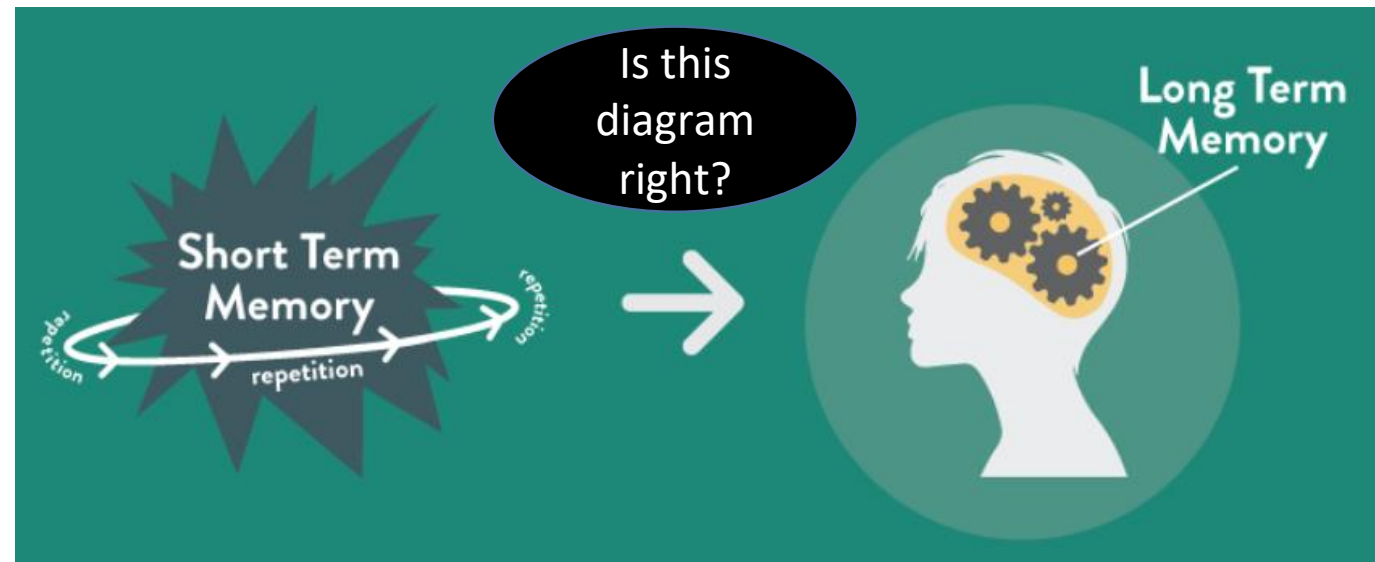
How can we stop forgetting

Method of loci (memory palace) is one way...there are many other techniques

- Changing the methods regularly
- Making hilarious, raunchy, bizarre, crazy links
- Using tricks and the basic principles for how our brains work
- Using tried and tested methods regularly
- Practising them... so that **THEY** can visualise

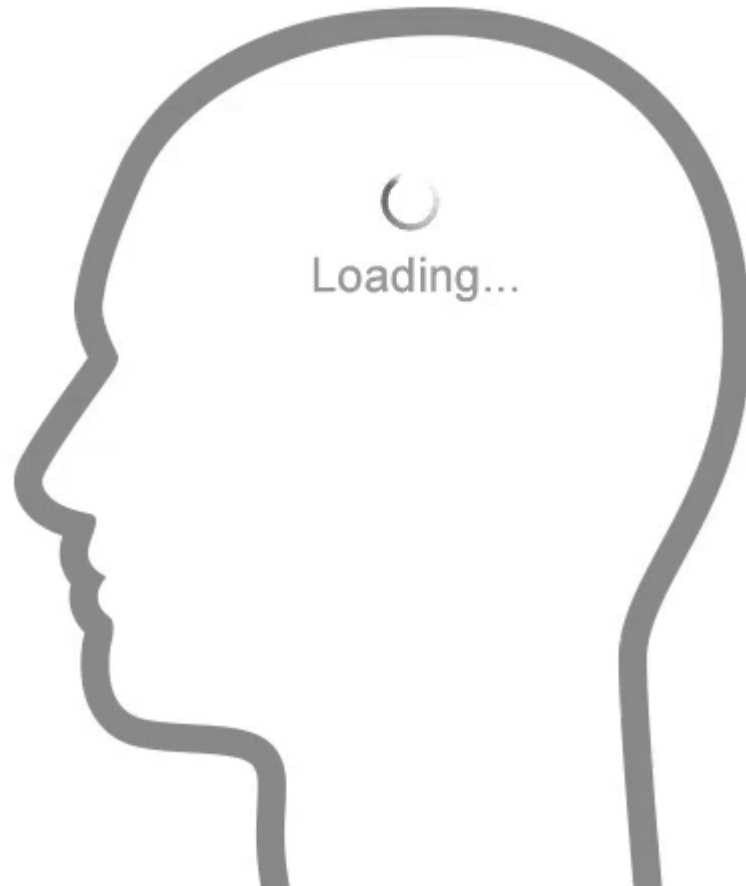


How can we stop forgetting

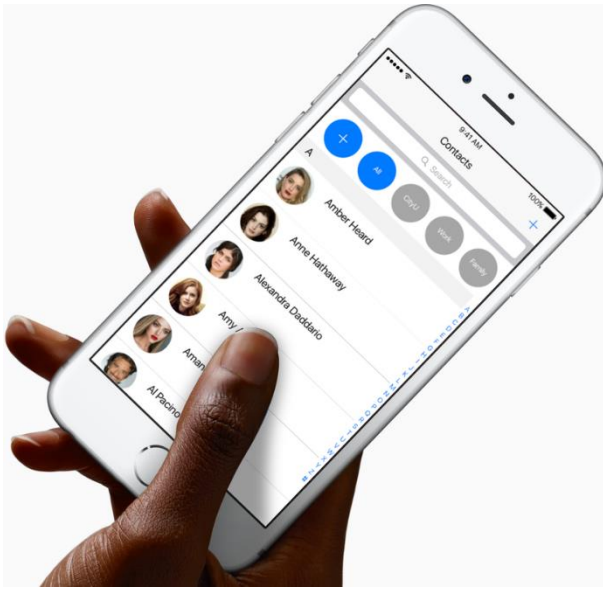


Ultimately some things have to be learnt **by rote** – but students don't have time to do this for everything. They need visualisation techniques

Why are we needing to train ourselves and students how to use their brains?



How can
we stop
forgetting



Contacts

vs

memorising
telephone numbers



Search Engine

vs

memorising
alphabetical placings
and looking up in an
encyclopaedia or
dictionary



Map apps

vs

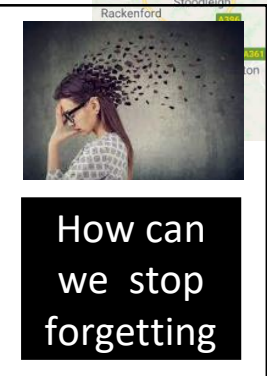
memorising
directions



**Homework
apps**

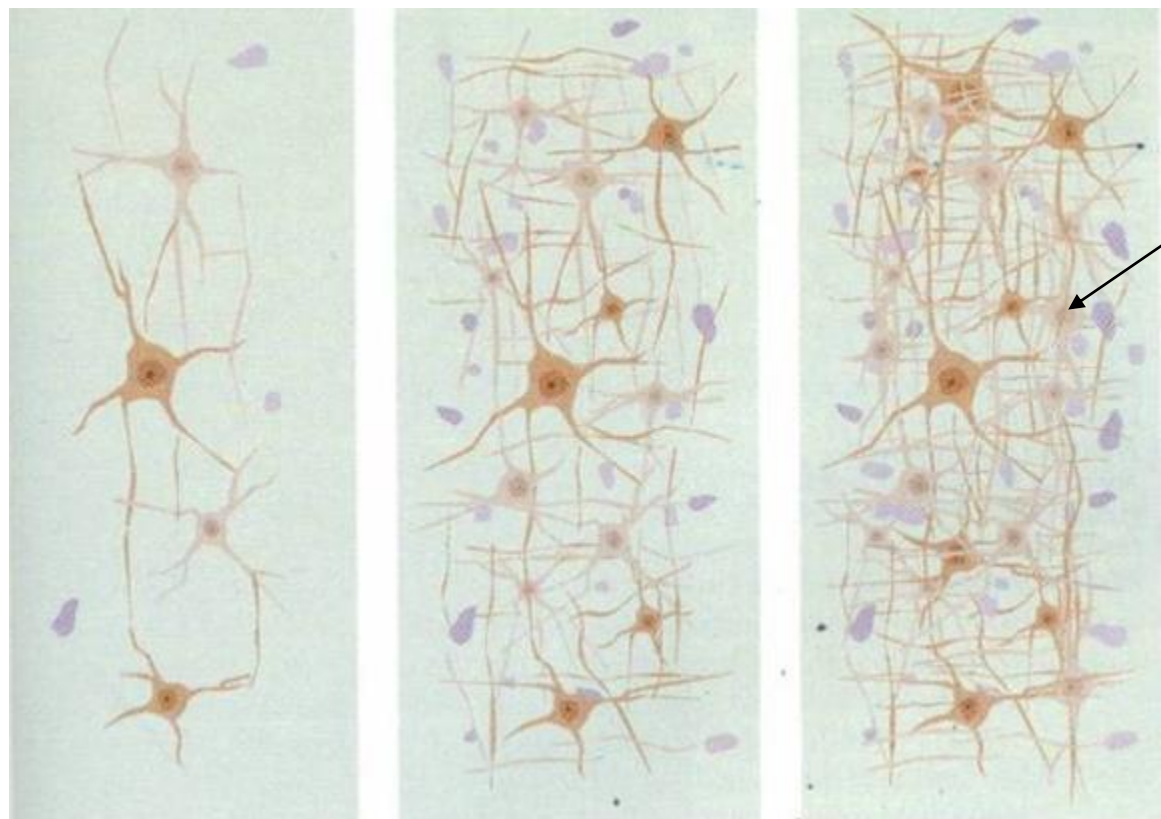
vs

Remembering
things you need
to do



How can
we stop
forgetting

Shopping apps; birthday reminders; alerts to book the dentist; doctors appointment;



Understanding the science behind the learning can sometimes help with the justification of your suggestions



Different rehearsal techniques, more rehearsal and retrieval is only making the neural connections bigger, stronger and more varied!

