The Neuro Science of being and Effective Teacher

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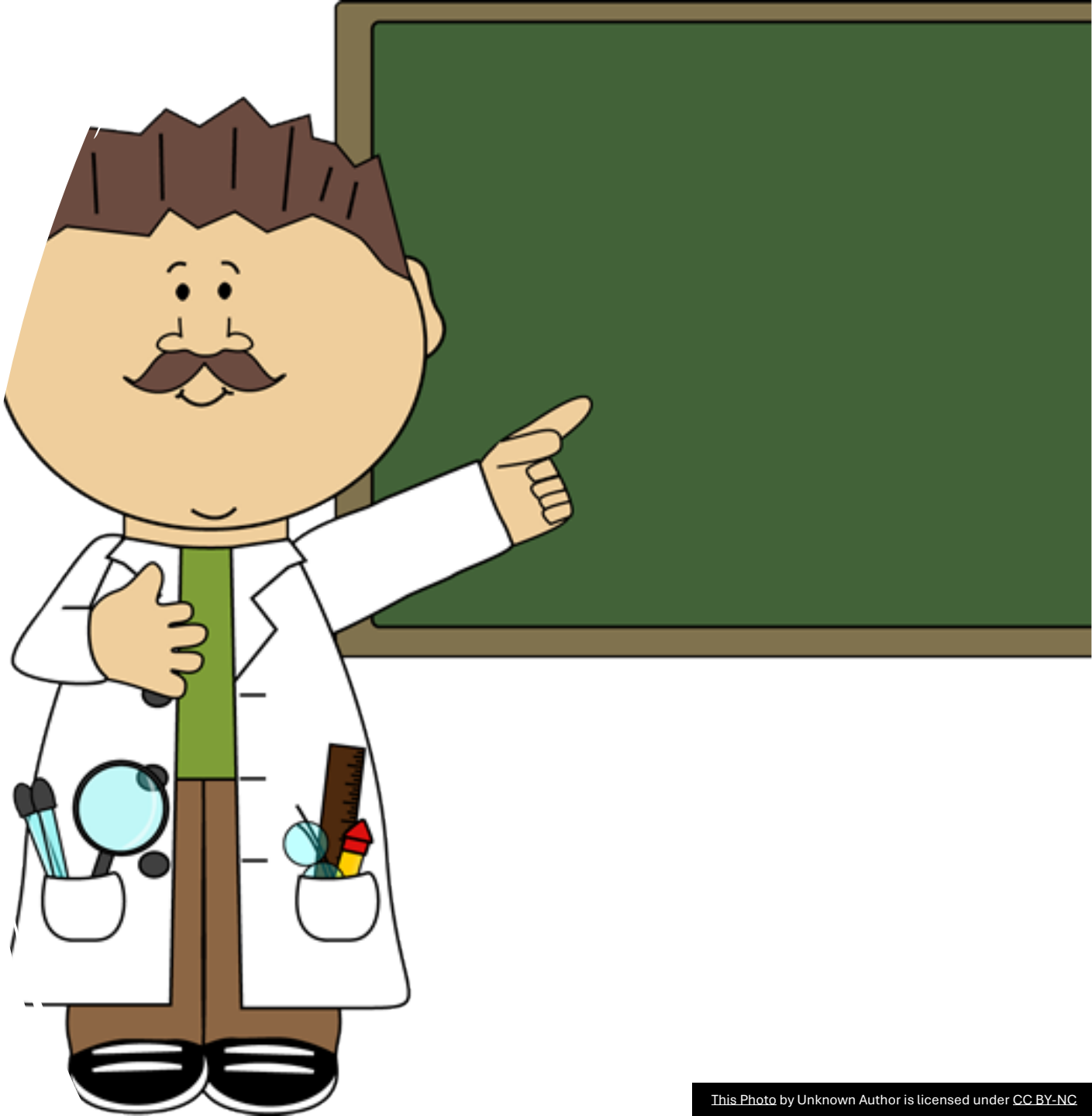
Effective Teaching

Lets Consider

- The Science behind Adult Learning

- How this knowledge makes us more effective teachers



What is Learning?

‘A *relatively* permanent change in knowledge, skills, attitudes or behaviour’

Results from the interaction between:

- what we already know
- the new information we encounter
- what we do as we learn

What is Teaching?

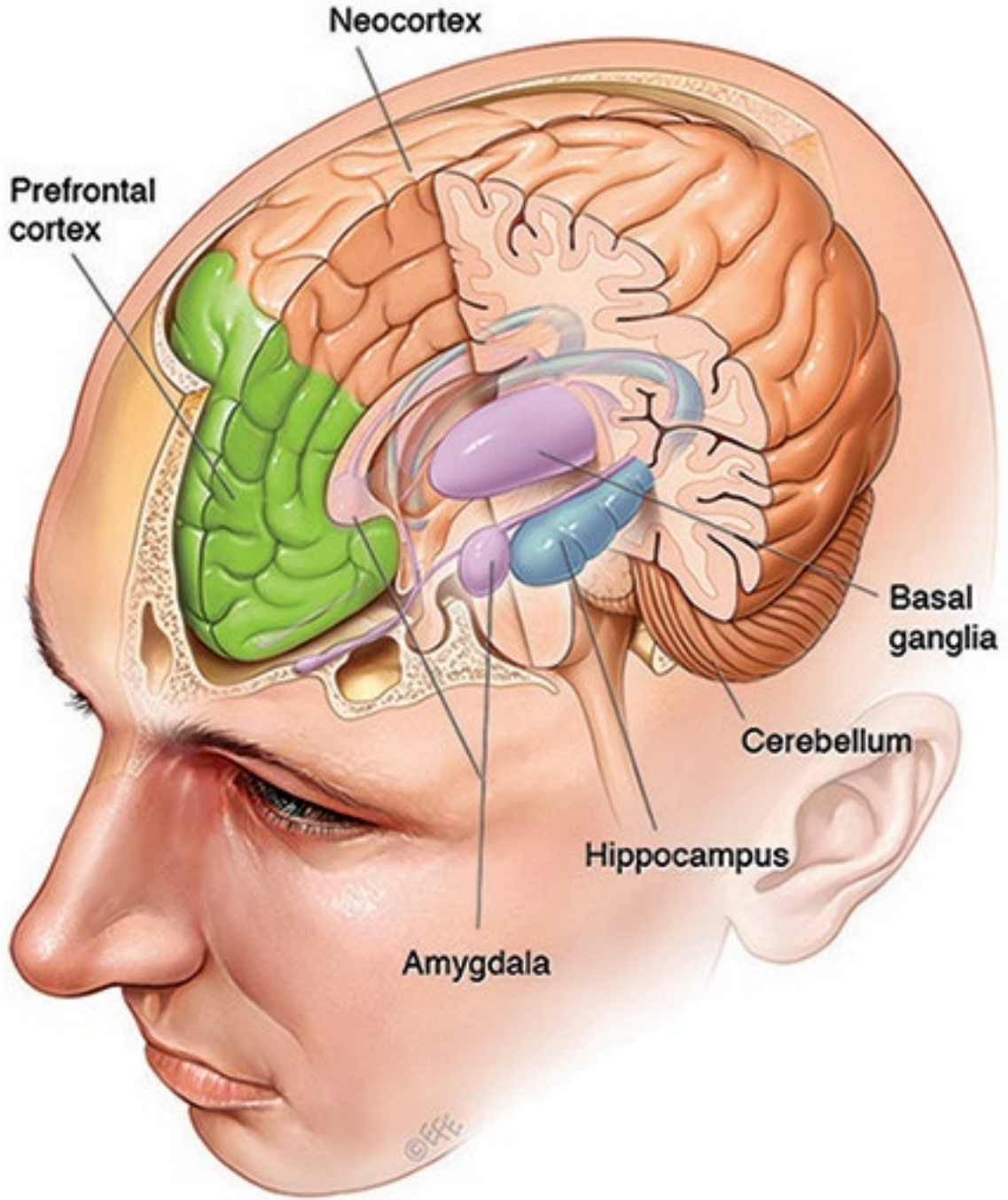
A planned experience that brings about change

Your job as a teacher is not just to teach.....it is to ensure people LEARN

Adults verses Children

What is the Neuroscience ?

- Information is stored in Memory



Memory

- Memory is the reactivation of a specific group of neurons, formed from persistent changes in the strength of connections between neurons.

Four different phenomena

1. Encoding
2. consolidation
3. storage
4. recall

Plus the phenomena of Forgetting.

How the brain makes memories

Different stimuli: verbal, reading, writing, pictures

10 min max

Long Term Memory

Meaning

Attention increases

Working Memory

Immediate Memory

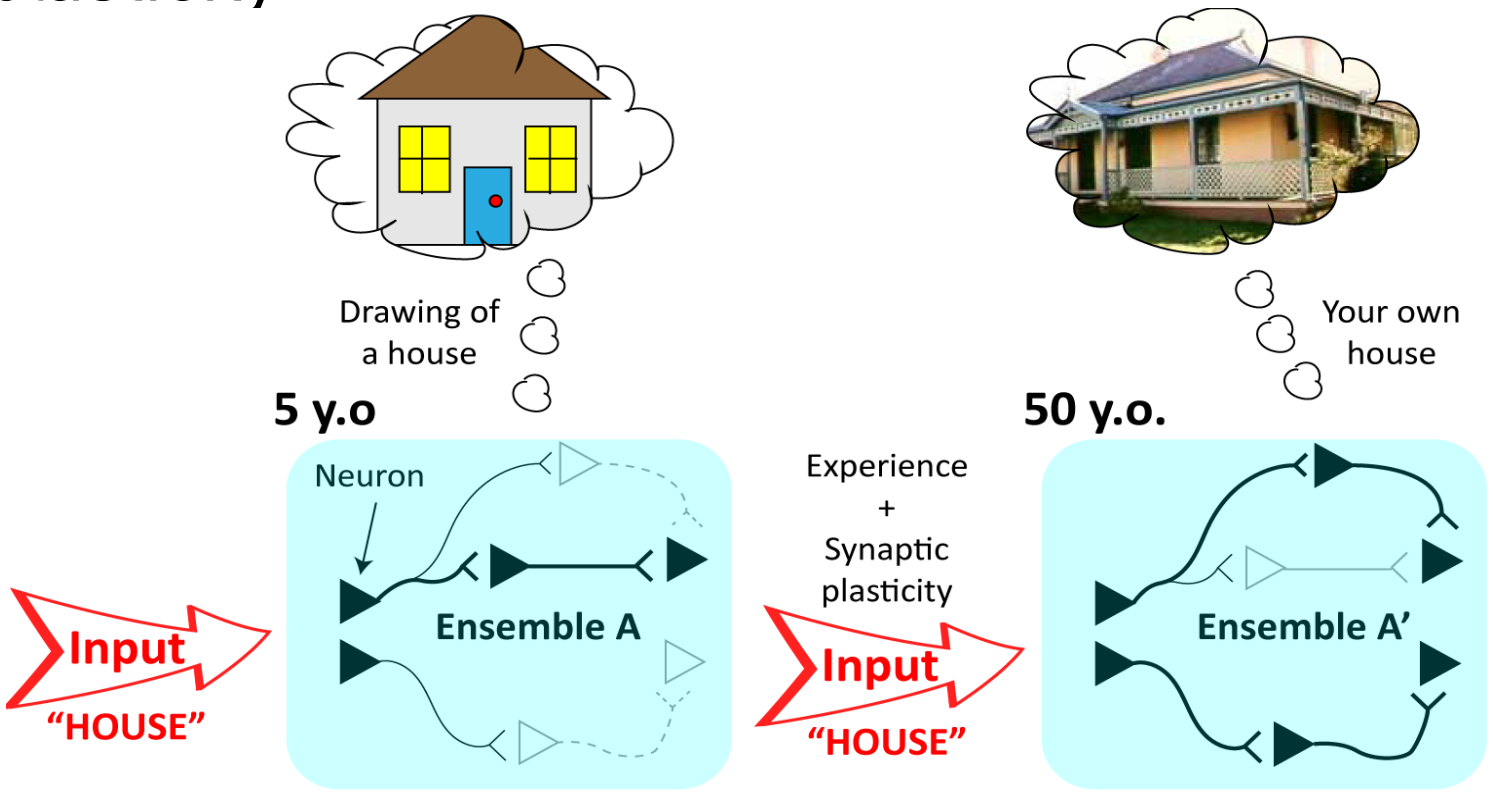
7 objects at the time

Fatigue reduces

Reduced by hunger, fear, anxiety distraction

Underlying Process

- Synaptic plasticity



This synaptic arrangement related to a memory is called an ENGRAM

Making an Engram

Groups of neurones communicate synaptically

The strength of these connections grows

Long Term Potentiation

Time scale = seconds to a few hours

Mechanism = modification of existing proteins via a Glutamate/Ca++ mechanism

Number and shape of dendrites is remolded

Lets all make an engram!

- This is University College Hospitals NHS Trust
- In our Simulation centre we took theatre teams and taught them to use the WHO check list
- We then introduced the check list into practice
- We audited the completion and achieved 90 to 98% completion in the first 6 months

Influence of external Factors

- Learner’s needs
- Relevance
- Motivation
- Capacity to Learn

How to maintain the engram?

Long term memory requires the engram to persist

Recall requires the engram to be reactivated

Amnesia a fault of recall?

Consolidation

More engrams are formed if there is activation in other parts of the brain

Some synapses consolidate, others stay available for further learning.

The system consolidates by reorganisation can take weeks

The Hippocampus and the neocortex communicate together as part of this reorganisation, during periods of sleep.

Recall

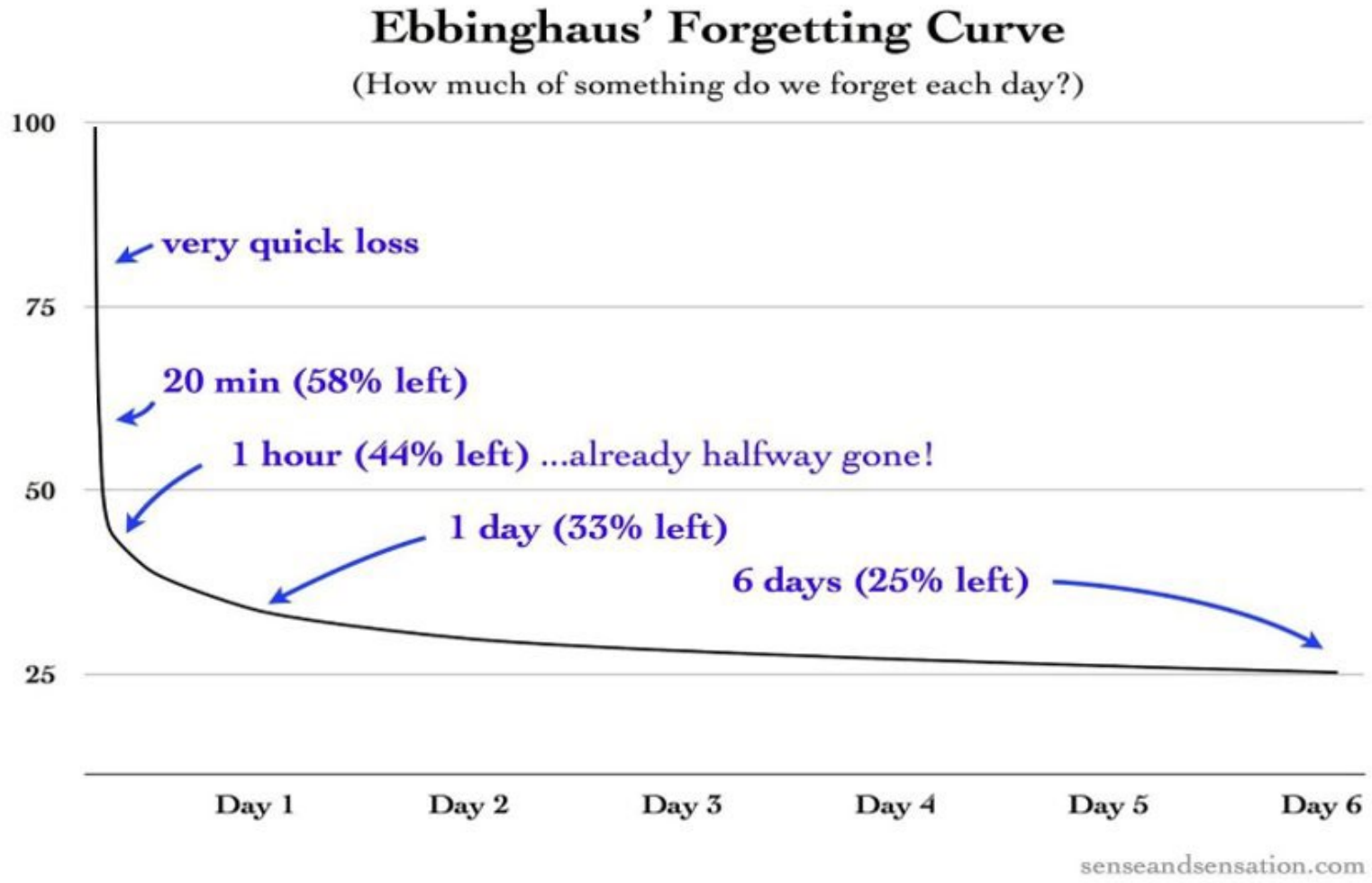
- Activating the engram
- Cue matched to encoding
- Matching words and pictures
- Emotional connections
- State dependent memory
- Gender:- verbal and non verbal cues

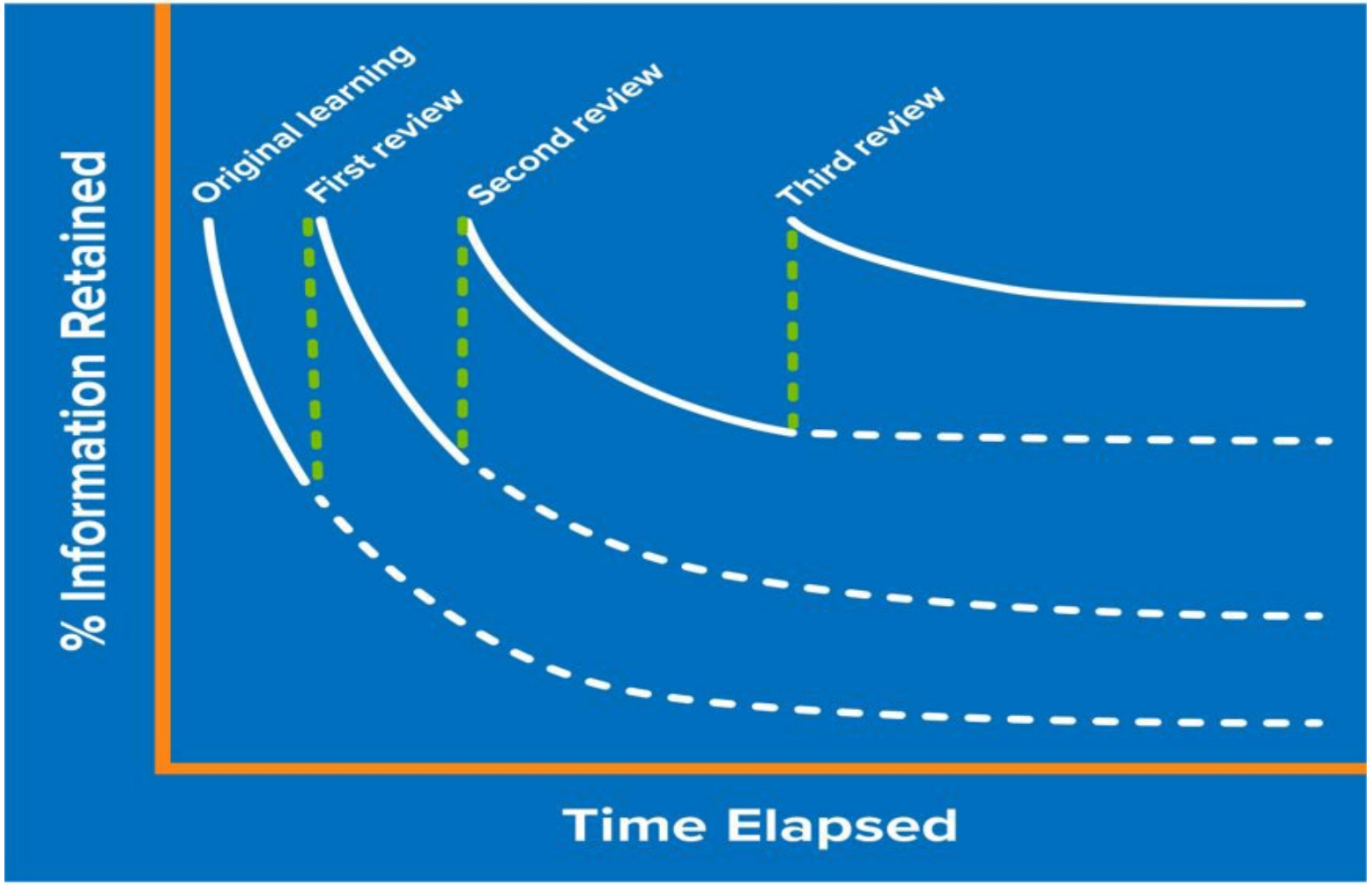
What was the name of the Hospital?

- What did they introduce using the Simulation centre?

Forgetting

- We lose information from short term memory rapidly
- Loss of Consolidation
- Repurposing of neurones in engrams no longer used?


Ebbinghaus' Forgetting Curve
(How much of something do we forget each day?)
100
75
50
25
very quick loss
20 min (58% left)
1 hour (44% left) ...already halfway gone!
1 day (33% left)
6 days (25% left)
Day 1
Day 2
Day 3
Day 4
Day 5
Day 6
senseandsensation.com


% Information Retained
Original learning
First review
Second review
Third review
Time Elapsed

Consolidating by repetition

- We can improve retention of learning by interrupting the forgetting mechanism
- Returning to the learning objectives over time improves retention
- Strengthens the synapses and promotes system organisation of the engrams.

Applying the Science to Practice

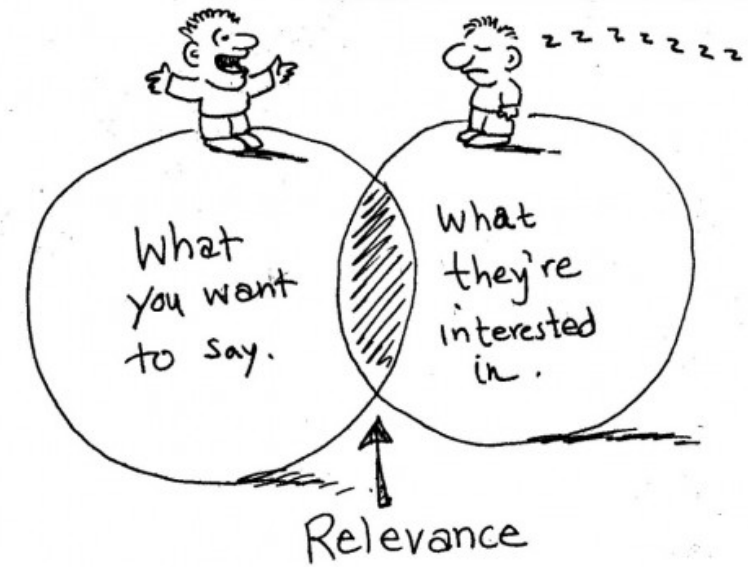
Maslow's hierarchy of needs

Adult Learning

Active, involved interactive learning

Which is:-

- Experiential, based on what they know already and experience
- Motivated ‘why do I need to learn this?’
- Contextualised ’this is appropriate to what I do’
- Clear goals ‘what will I have at the end?’



Adult Learning

Consolidated by

Feedback

add meaning and interrupt forgetting

Reflection

enhance long term memory

Effective Teaching

- The underlying science informs

    1. Planning teaching

    2. supporting long term remembering

    3. enhancing recall

Questions?

Finally

Summary

- Adult learners have specific needs to enhance learning
- Basic science can demonstrate some of the mechanisms that underly learning
- When Planning Adult learning consider the science of memory and forgetting.