What has EdPsy Ever Done for Us?

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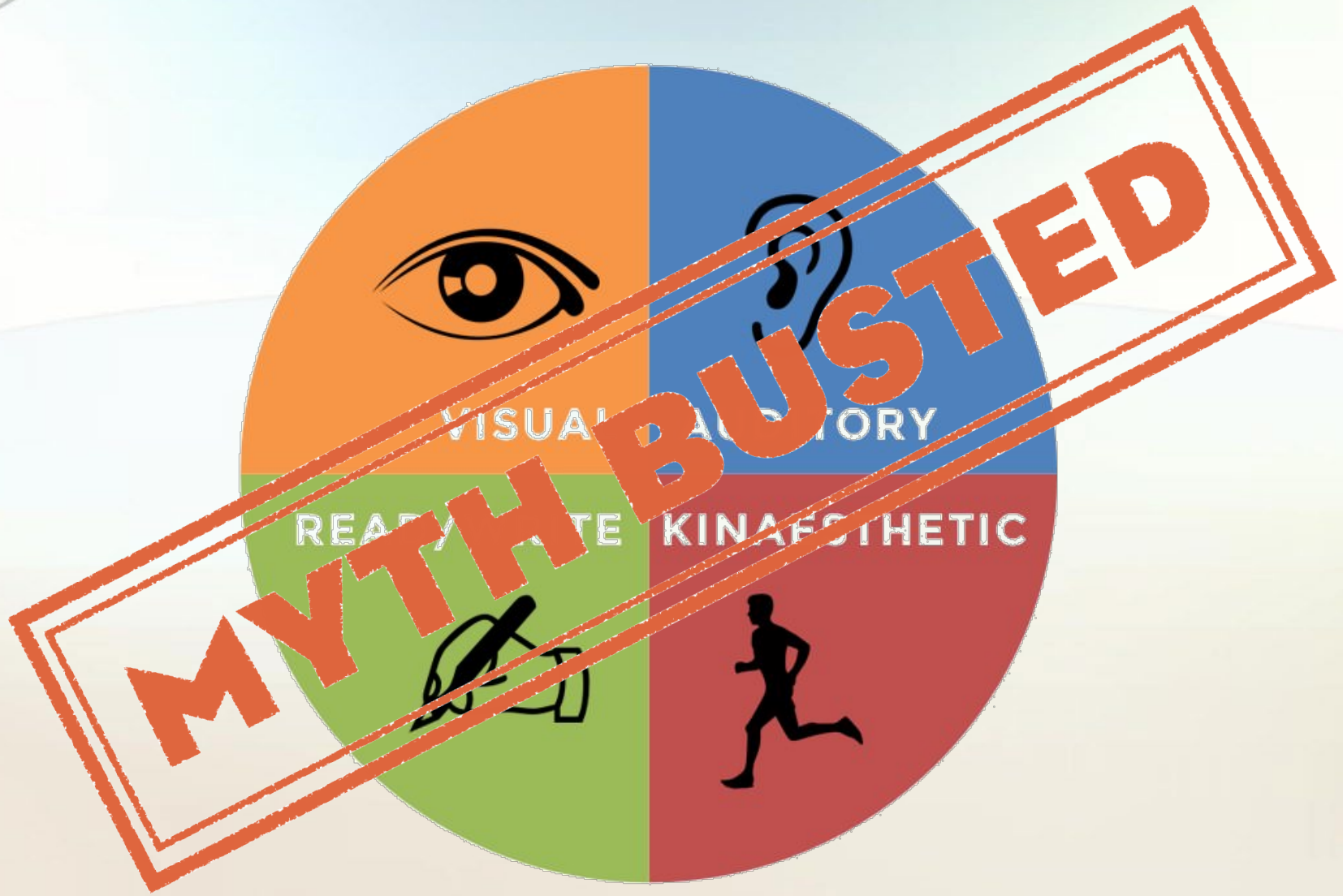

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But…

Neuromyth	Incorrect		Correct		Do not know	
	UK (%)	NL (%)	UK (%)	NL (%)	UK (%)	NL (%)
Individuals learn better when they receive information in their preferred learning style (e.g., auditory, visual, kinesthetic).	93	96	4	3	3	1
Differences in hemispheric dominance (left brain, right brain) can help explain individual differences amongst learners.	91	86	3	4	6	11

Neuromyth factor 1 items (ranked by % incorrect)	Correct answer	General public (N = 3,045) (%)	Educator (N = 598) (%)	High neuroscience exposure (N = 234) (%)
14. Individuals learn better when they receive information in their preferred learning style	FALSE	93[a]	76[b]	78[b]
26. Children have learning styles that are dominated by particular senses	FALSE	88[a]	71[b]	68[b]

Dekker, S., Lee, N.C., Paul, H-J, & Jolles, J. (2012). *Neuromyths in education: Prevalence and predictors of misconceptions among teachers*. Frontiers in psychology, 3, 1-8.

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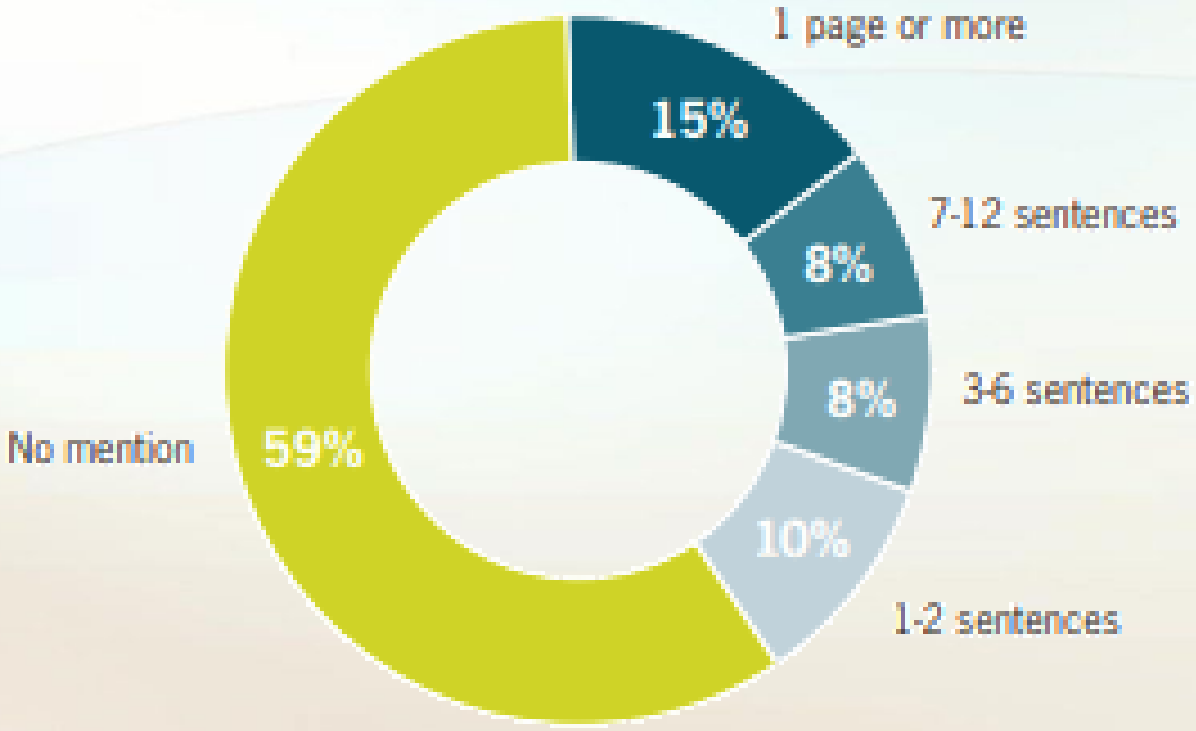
But…

Figure A. Frequency and length of mentions of any of the six fundamental instructional strategies (n=288)



Pomerance, L., Greenberg, J., & Walsh, K. (January 2016). *Learning about Learning: What every new teacher needs to know*. National Council on Teacher Quality

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http://www.isetl.org/ijtlhe/

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ISSN 1812-9129

Are University Faculty to Blame for the Prevalence of Educational Myths? A Cross-Sectional Study of Trainee Teachers

John Rogers
Education University of Hong Kong

Anisa Cheung
The Hong Kong University of Science and Technology

This mixed-methods study examined the beliefs, and their origins, of trainee teachers regarding a number of myths and misconceptions about teaching and learning. Using a cross-sectional experimental design, survey data were collected from 65 pre-service teachers enrolled in a high-profile Bachelor of Education program. 18 participants then took part in semi-structured interviews. The results indicate that trainee teachers' beliefs in educational myths and misconceptions may not change over the course of a five-year evidence based teacher preparation program. Further, the qualitative results suggest that beliefs in learning myths might become further entrenched over the course of study as a result of being actively promoted by faculty throughout the program.

Why do we need to know How Learning Happens?

If you don't know why you're doing something, then you have no idea if what you're doing means anything

Key to becoming a true reflective practitioner

What's Learning?

What's Learning?

- Change in long-term memory
- More or less permanent
- Result of cognitive processing of information

- Different from achievement!

A few Giants

- Baddeley & Hitch - Information Processing
- Sweller - Cognitive Load Theory
- Paivio – Dual Coding Theory
- Bjork - Desirable Difficulties
- Rosenshine - Direct Instruction

Information processing

Baddeley, A. & Hitch, G. (1974). Working memory. In G.H. Bower (Ed.), *The psychology of learning and motivation: Advances in research and theory* (Vol. 8, pp. 47–89). New York, NY: Academic Press.

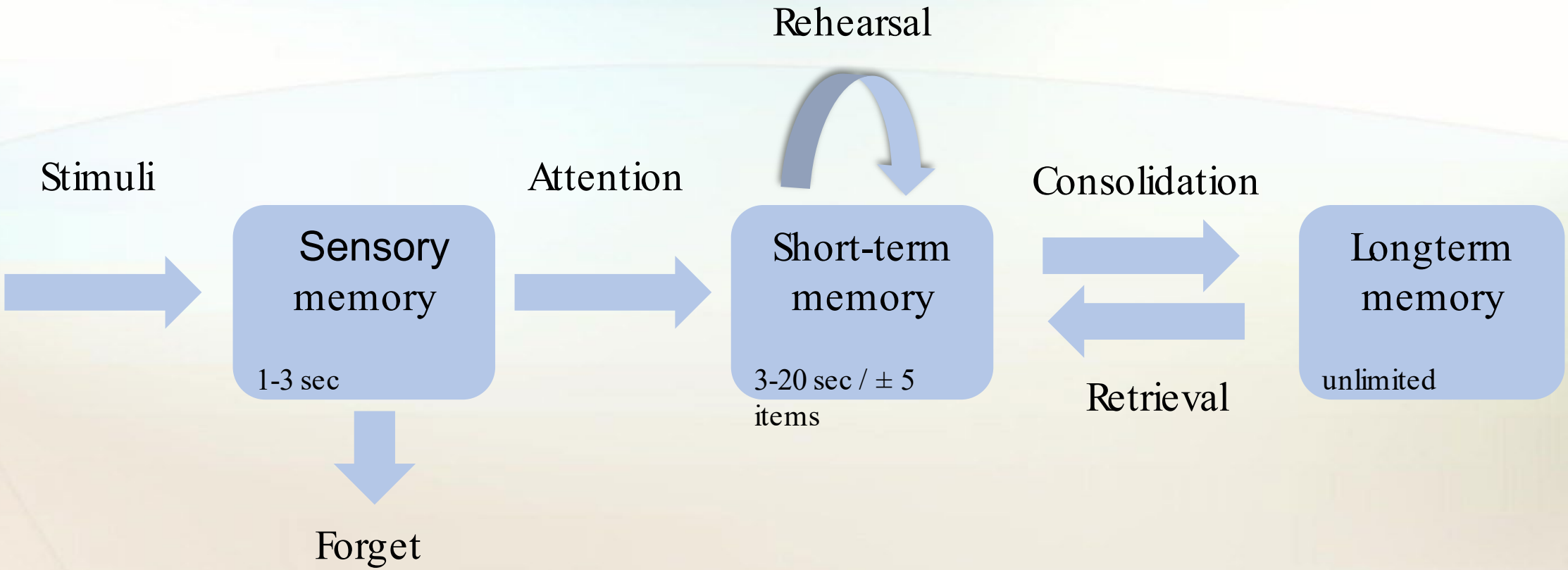
Learning depends on information processing

- No processing = No learning
- Some processing = Some learning
- Much processing = Much learning
- More and more different processing = Better learning & retention

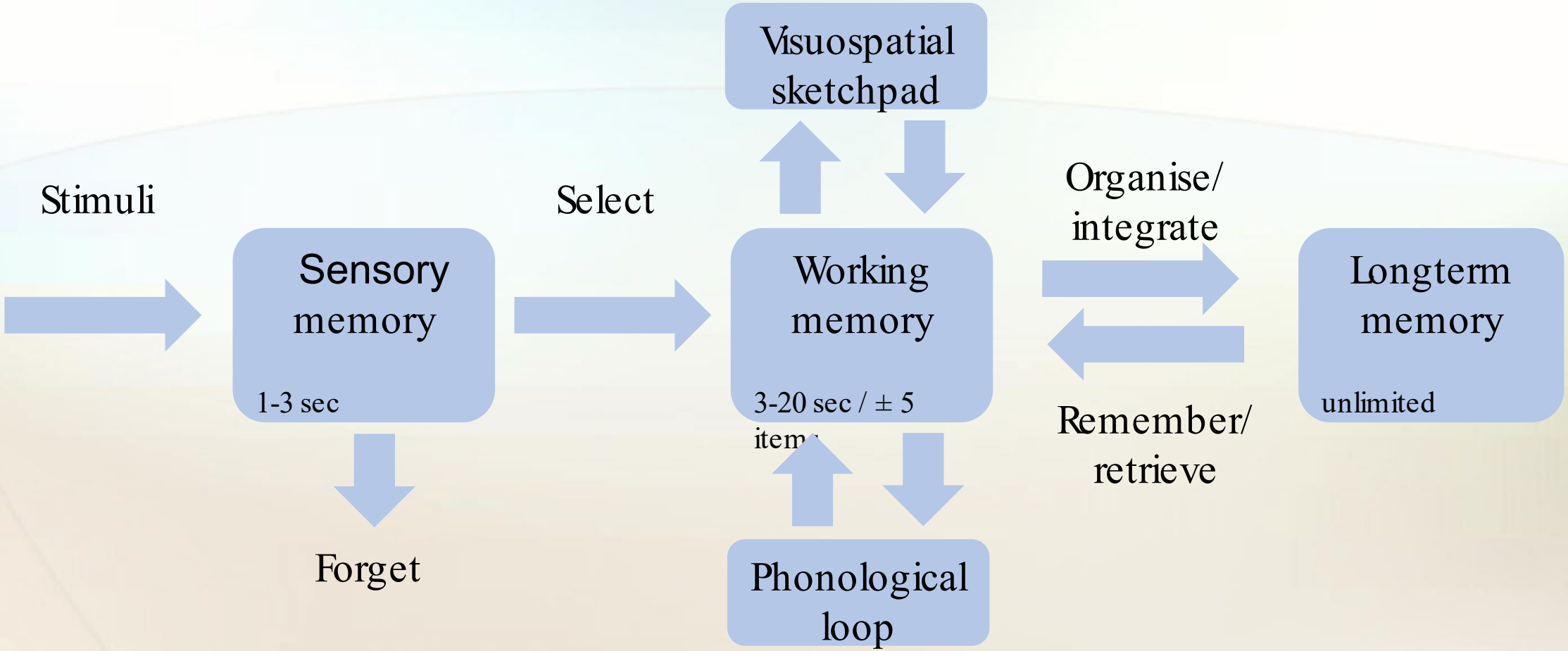
Information processing theory

$$\sum Storage + \sum Retrieval = \sum Learning/Retention$$

Atkinson & Shiffrin (1968) – Multi-store model



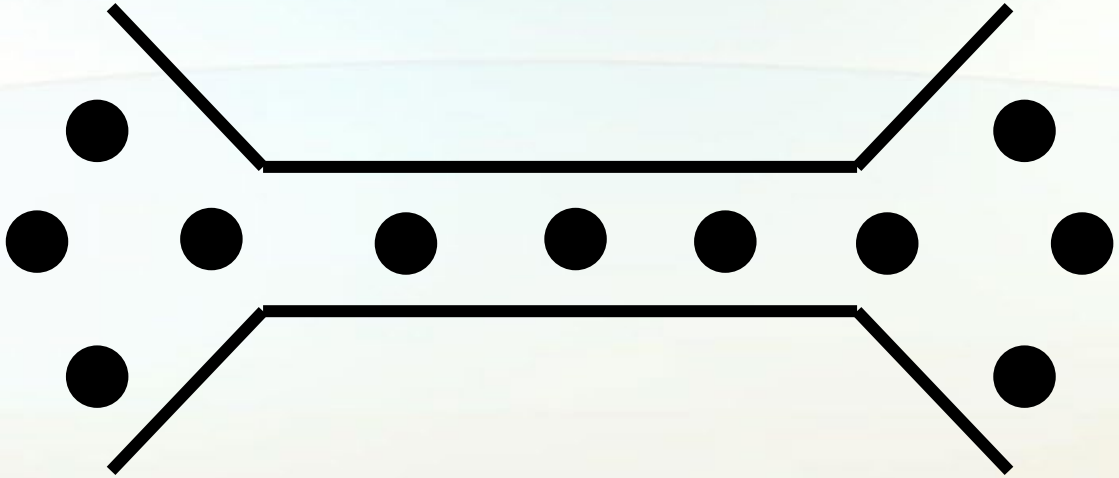
Baddeley & Hitch (1974) – Working memory model



Sensory Bandwidth / Stimuli

Sensory system	Total Bandwidth What comes in (bits/second)	Conscious bandwidth What we process (bits/second)
Eyes see	10,000,000	40
Ears hear	100,000	3
Skin feels	1,000,000	5
Mouth tastes	1,000	1
Nose smells	100,000	1

Working Memory is the Bottleneck



Sensory memory

Working memory
5±2 new items
2-20 seconds

Long term memory
Unlimited

Thanks Gert Verbrugghen and Oliver Lovell

Cognitive Load

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science, 12*, 257-285.

zie: https://achemicalorthodoxy.wordpress.com/2018/10/25/simplifying-cognitive-load-theory/

Cognitive Load (John Sweller)

$$\text{Cognitive Load} = \frac{\text{Mental effort required for the task}}{\text{Mental resources available for the task}}$$

Adam Boxer

Mental effort required for a task

Intrinsic effort / load inherent in a task

- Task complexity
  - Number of new information elements to be processed
  - Amount of interaction between the elements

Complexity

Simple (not easy!)

- Learning word pairs in native and foreign language
- No interaction: Word pairs don't interact with each other

Complex (not difficult!)

- Speaking/writing in foreign language
- Lots of interaction: Gender, article, number, conjugation , tense

Cognitive load of a task

- Task complexity
  - Number of new information elements to be processed
  - Amount of interaction between the elements

- Learner prior knowledge / expertise

Cognitive load of a task

Intrinsic effort / load inherent in a task

- Complexity
  - Number of new information elements to be processed
  - Amount of interaction between the elements
- Learner prior knowledge / expertise

Extraneous effort / load added to the task

- Chosen pedagogy / instructional approach

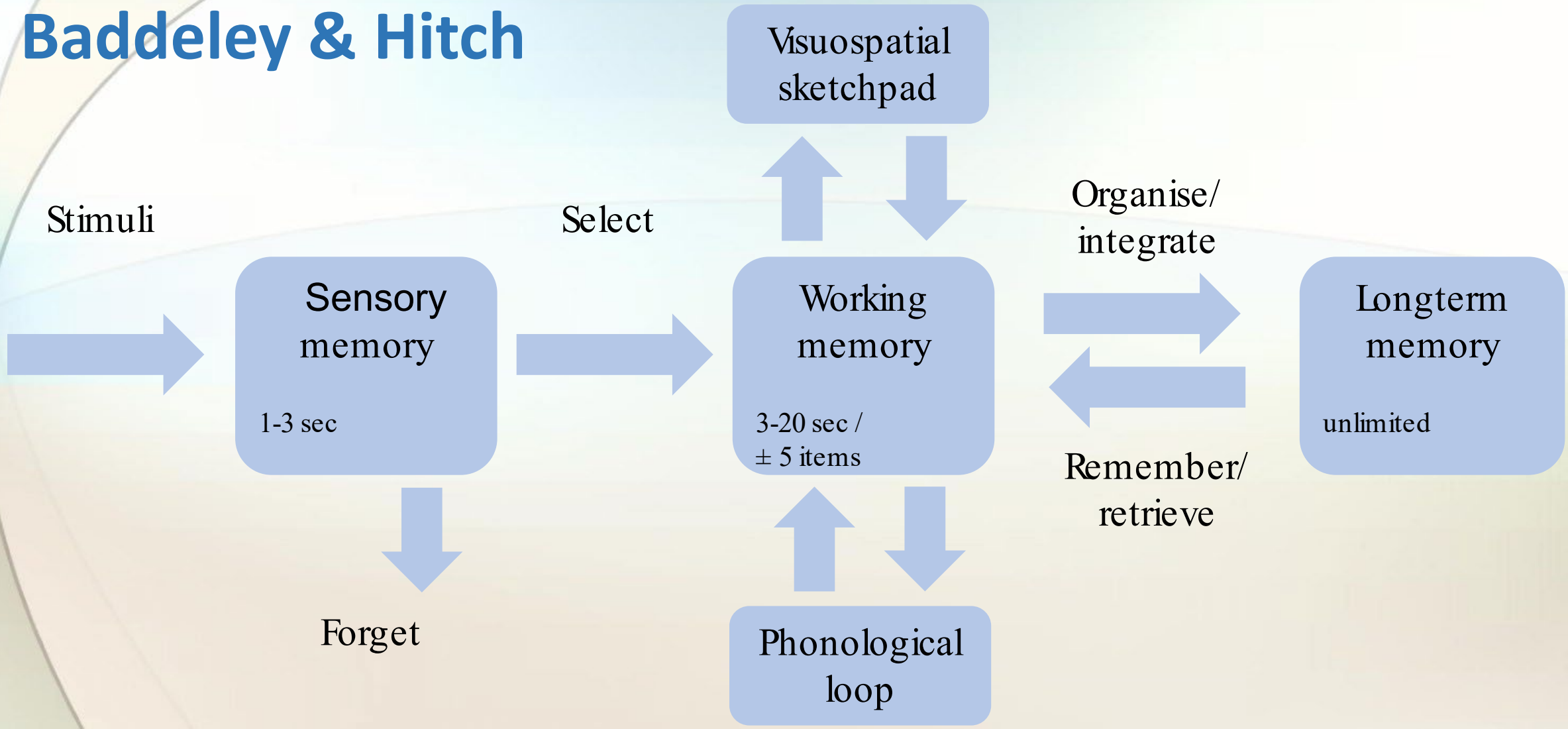
Goal?

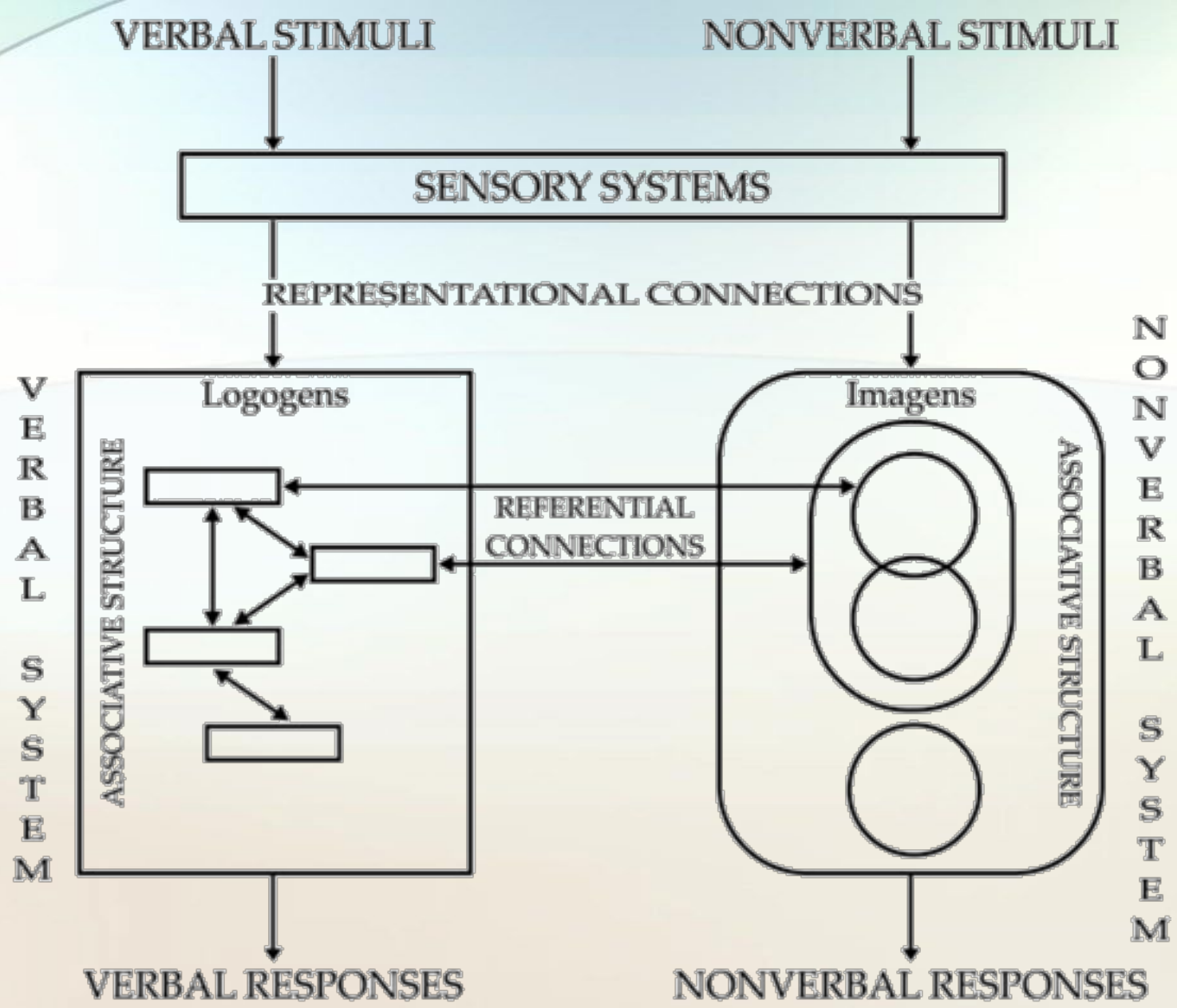
Optimise useful load, minimise irrelevant load

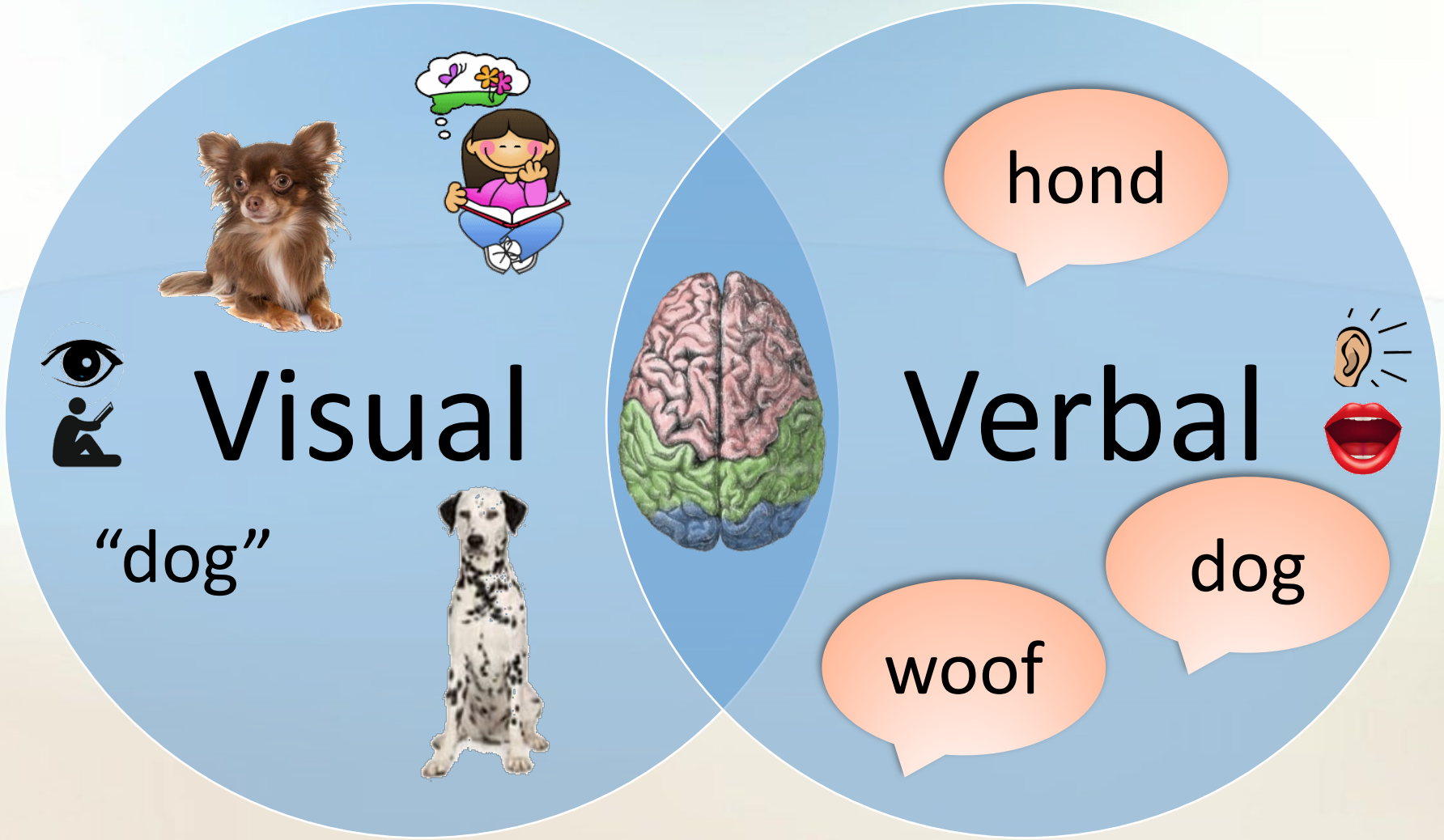
Dual Coding Theory

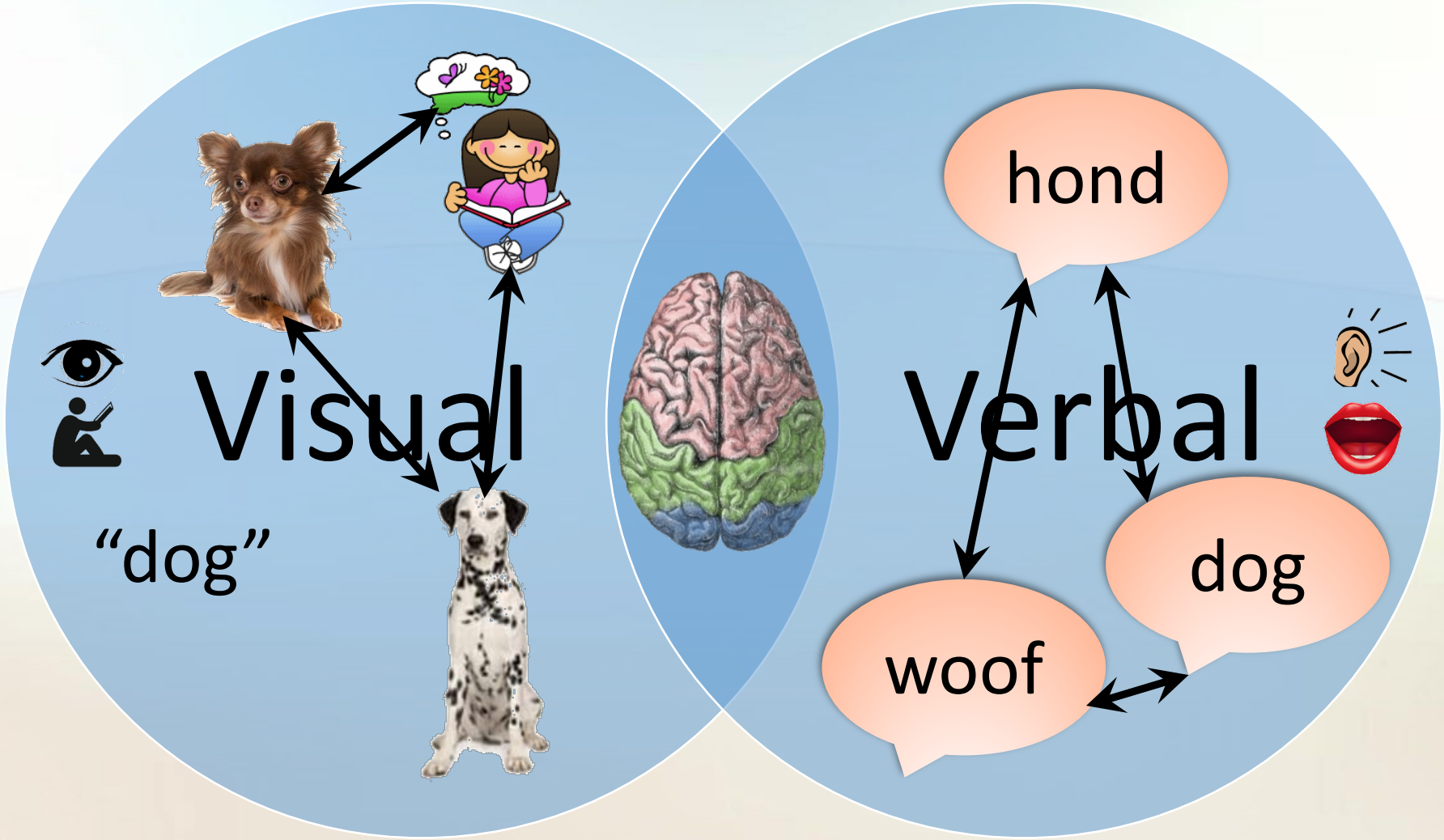
Paivio, A (1969). Mental Imagery in associative learning and memory. *Psychological Review, 76*(3), 241-263.

Baddeley & Hitch




VERBAL STIMULI
NONVERBAL STIMULI
SENSORY SYSTEMS
REPRESENTATIONAL CONNECTIONS
VERBAL SYSTEM
Logogens
ASSOCIATIVE STRUCTURE
REFERENTIAL CONNECTIONS
Imagens
ASSOCIATIVE STRUCTURE
NONVERBAL SYSTEM
VERBAL RESPONSES
NONVERBAL RESPONSES


Visual
"dog"
Verbal
hond
dog
woof


Visual
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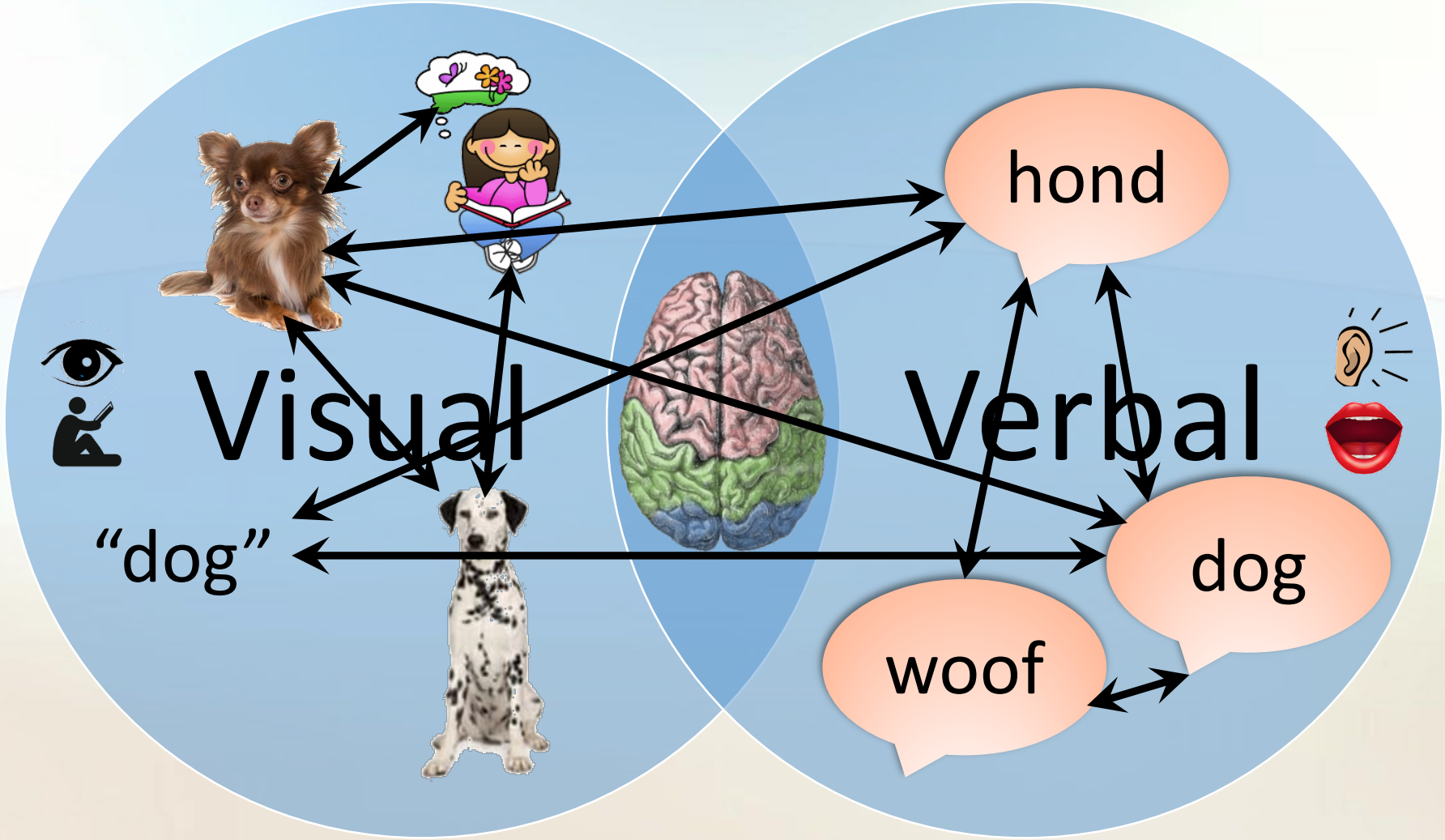
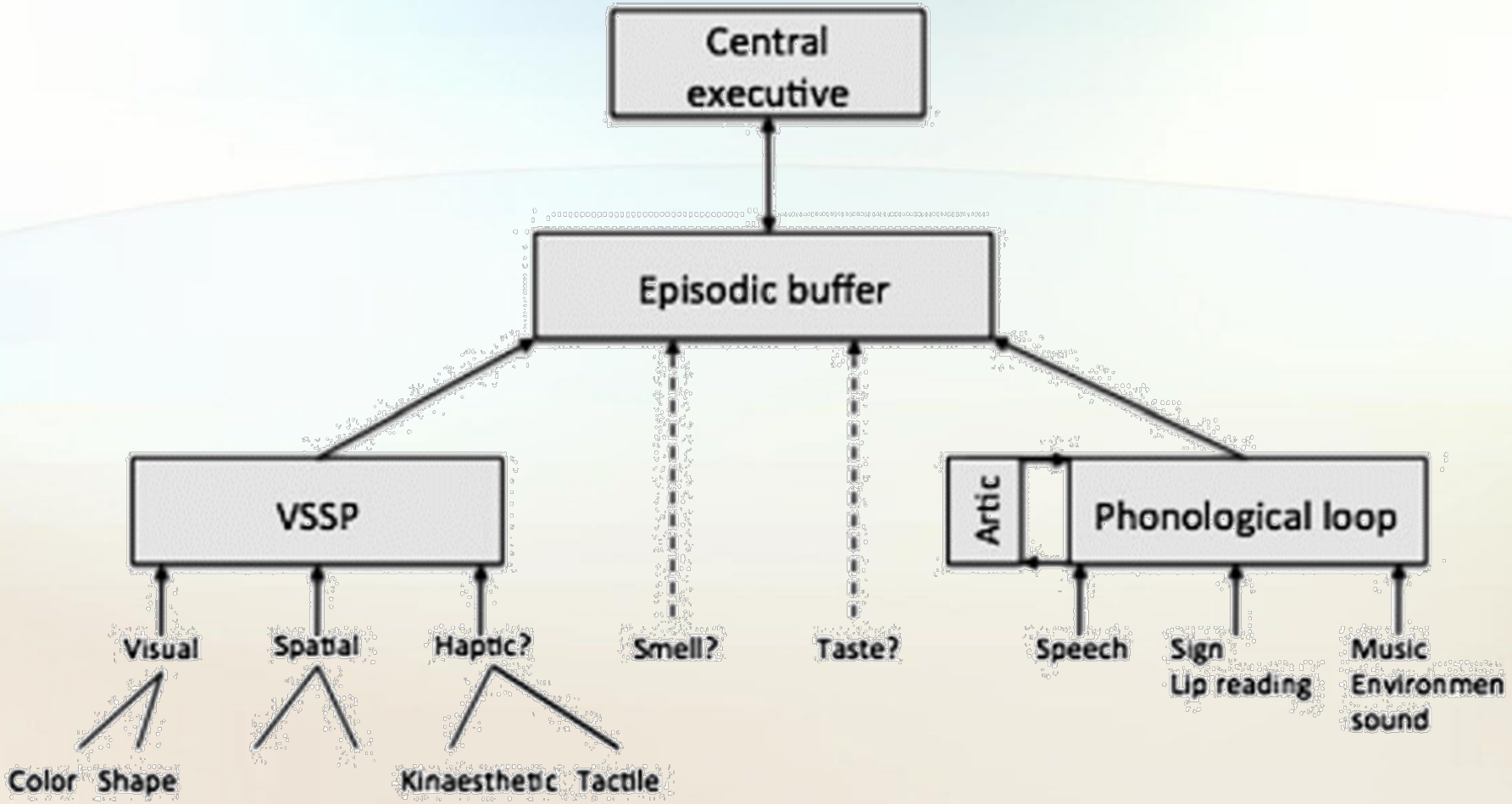

hond
Visual
Verbal
"dog"
dog
woof

Paivio's Expanded Model



Cognitive load of a task

Intrinsic effort / load inherent in a task

- Complexity
  - Number of new information elements to be processed
  - Amount of interaction between the elements
- Learner prior knowledge / expertise

Extraneous effort / load added to the task

- Chosen pedagogy **(sometimes more is better)**

Desirable Difficulties

Bjork, R. A. (1994). Memory and metamemory considerations in the training of human beings. In J. Metcalfe and A. Shimamura (Eds.), *Metacognition: Knowing about knowing* (pp.185-205). MIT Press.

Bjork, R. A. (1994). Institutional impediments to effective training. In D. Druckman and R. A. Bjork (Eds.), *Learning, remembering, believing: enhancing individual and team performance.* (pp.295-306). National Academy Press.

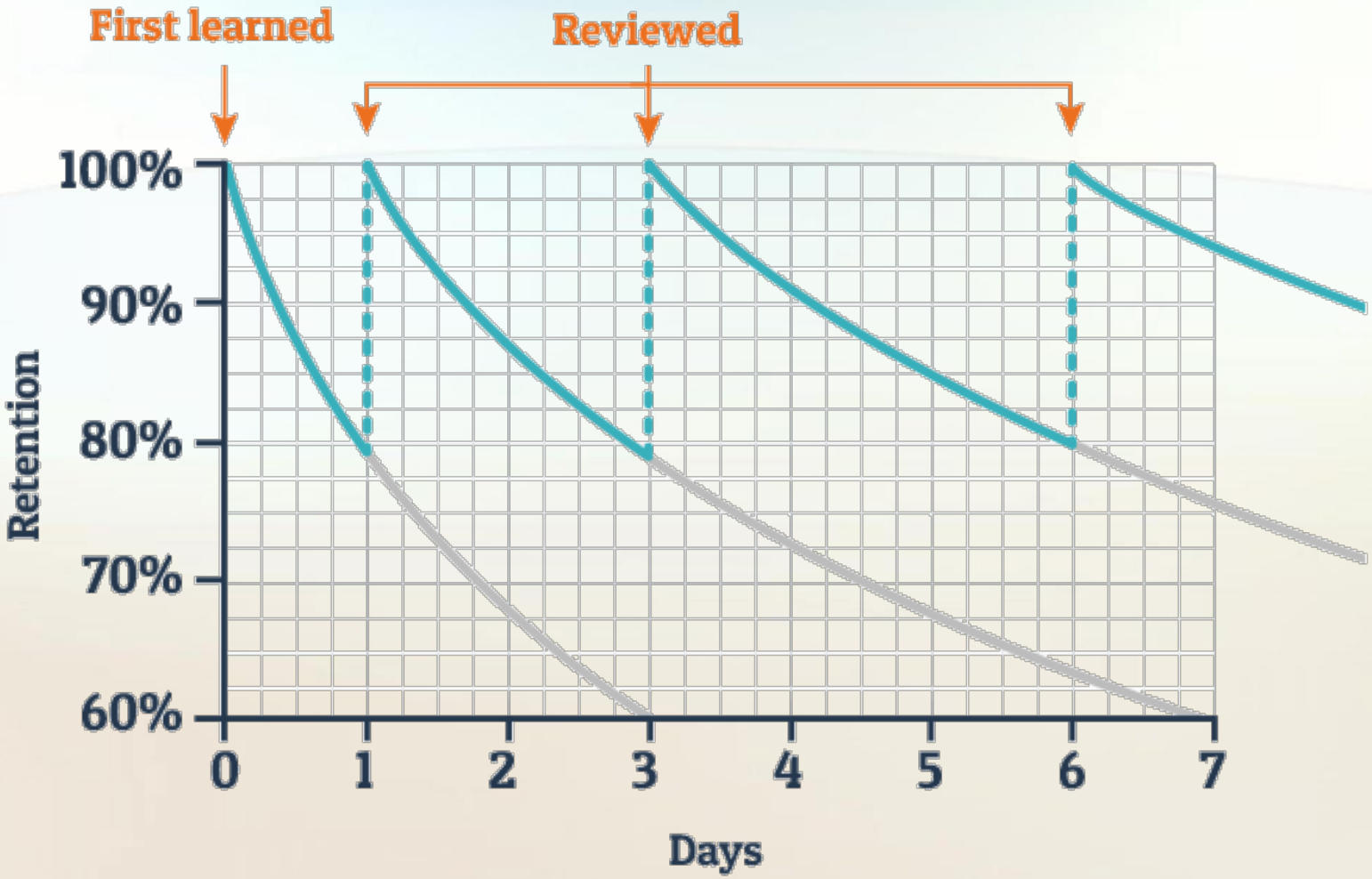
Desirable Difficulties

Learning events, approaches, and strategies that trigger encoding and retrieval processes that support learning, and include things such as varying the conditions of learning, interleaving instruction, spaced practice and testing. ...

Desirable Difficulties

- Spaced Practice – Hermann Ebbinghaus / Doug Rohrer

Typical Forgetting Curve for Newly Learned Information



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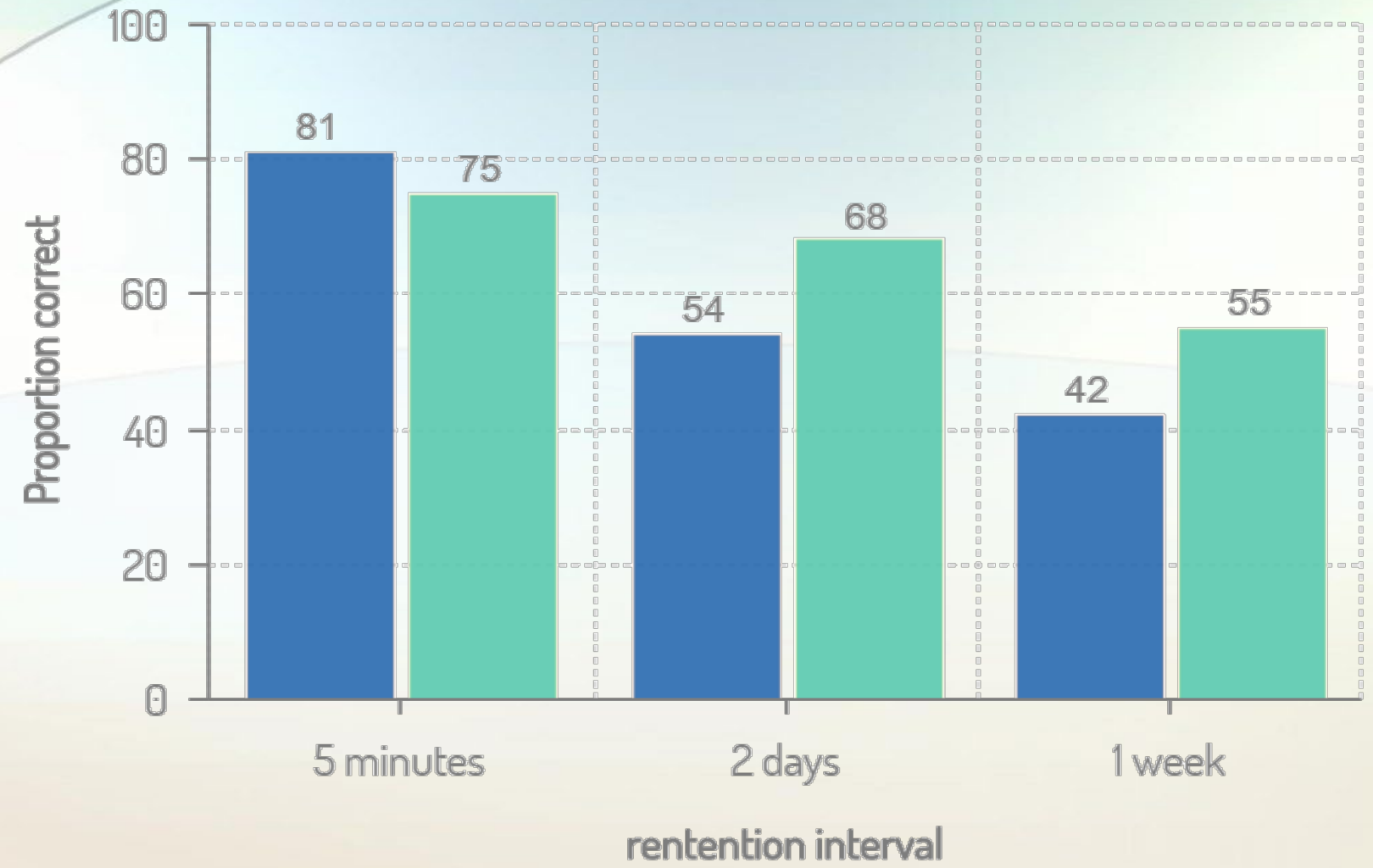
Desirable Difficulties

- Spaced Practice – Hermann Ebbinghaus / Doug Rohrer
- Retrieval Practice – Jeffrey Karpicke



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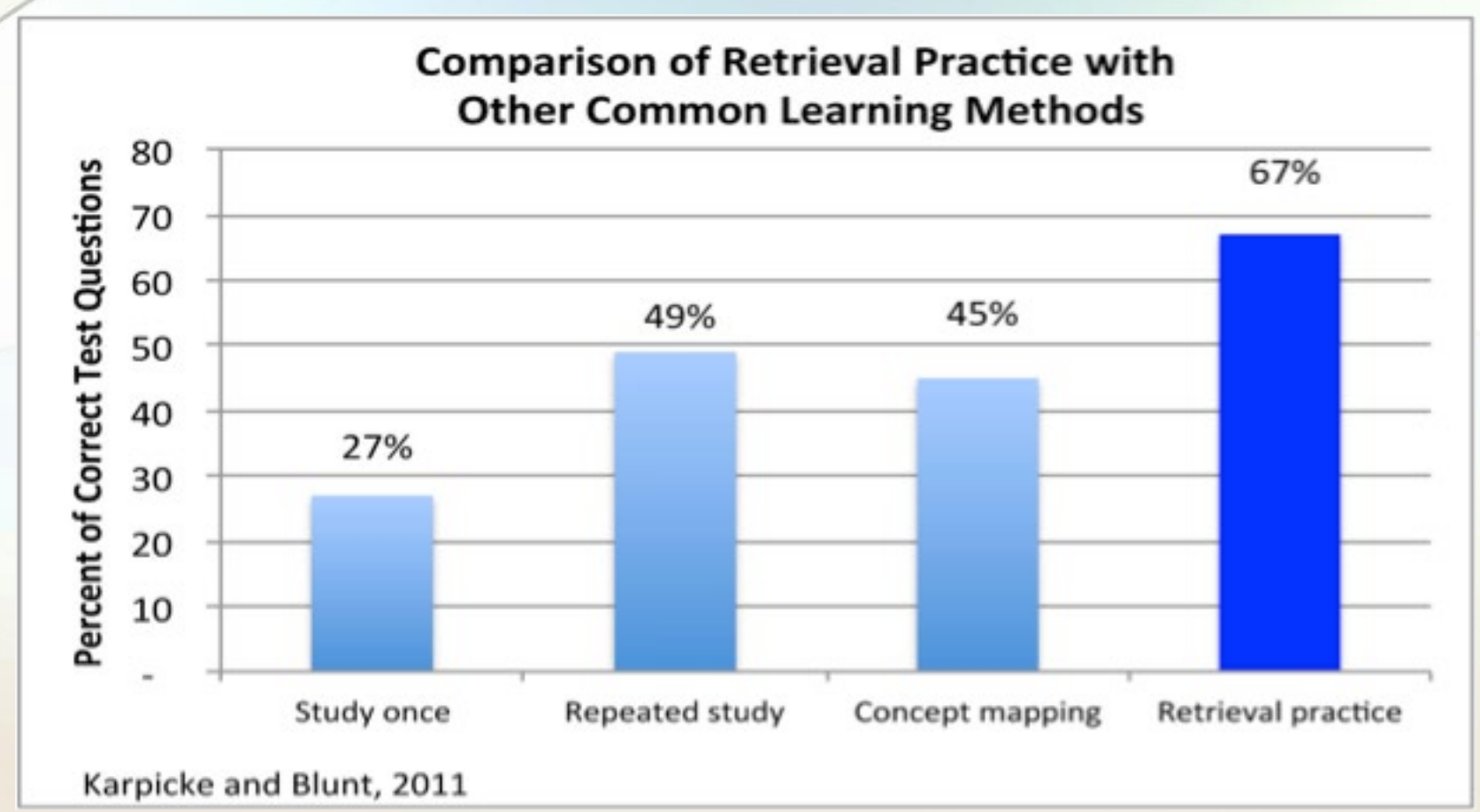
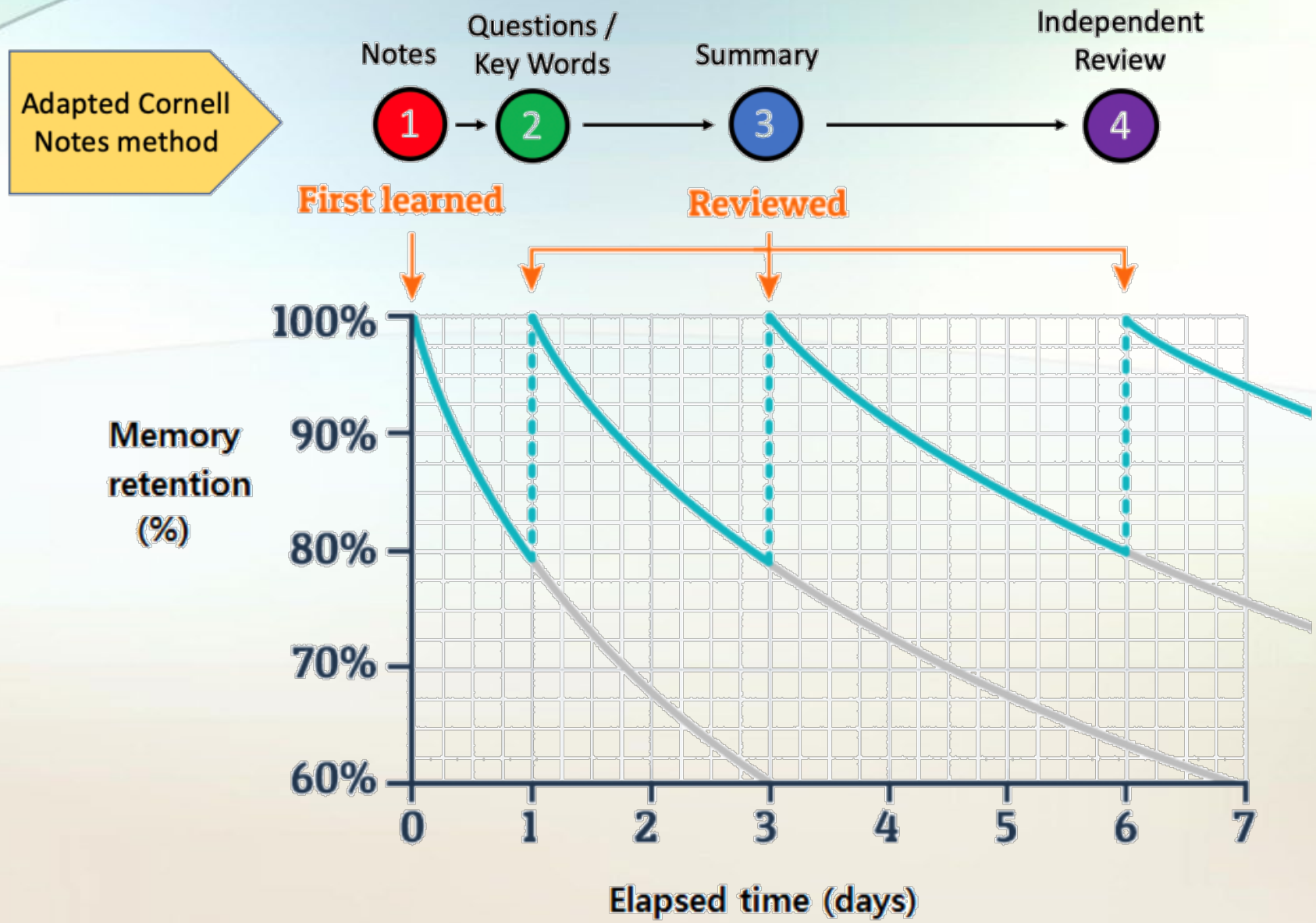

Comparison of Retrieval Practice with Other Common Learning Methods
Percent of Correct Test Questions
80
70
60
50
40
30
20
10
-
27%
49%
45%
67%
Study once
Repeated study
Concept mapping
Retrieval practice
Karpicke and Blunt, 2011

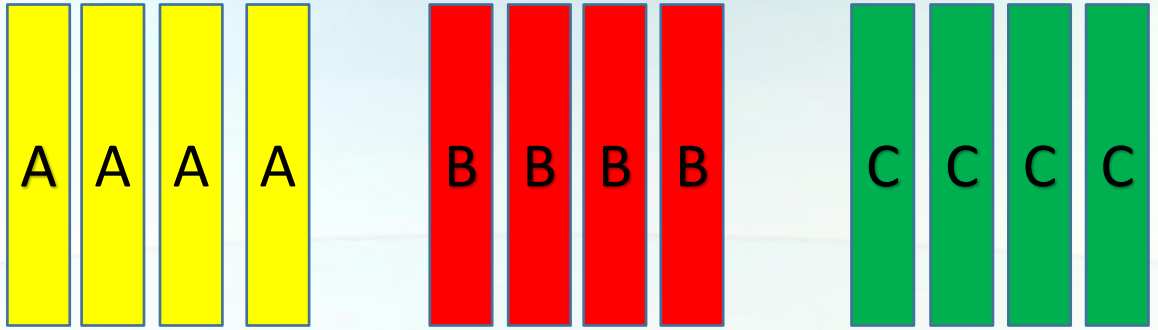


Gethyn Jones - https://emc2andallthat.wordpress.com/2020/08/26/cornell-versus-ebbinghaus/

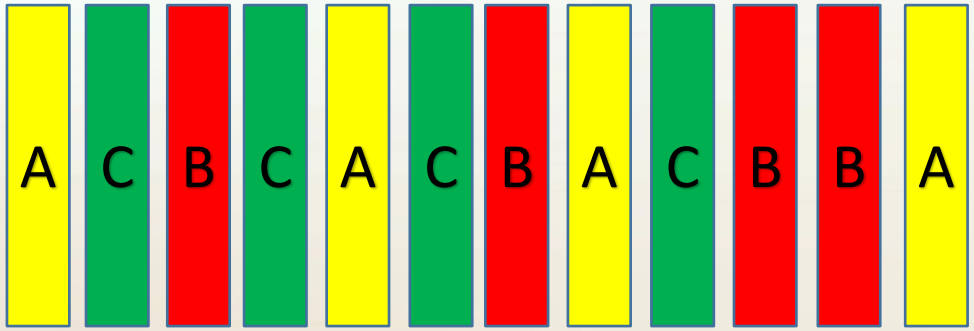
Desirable Difficulties

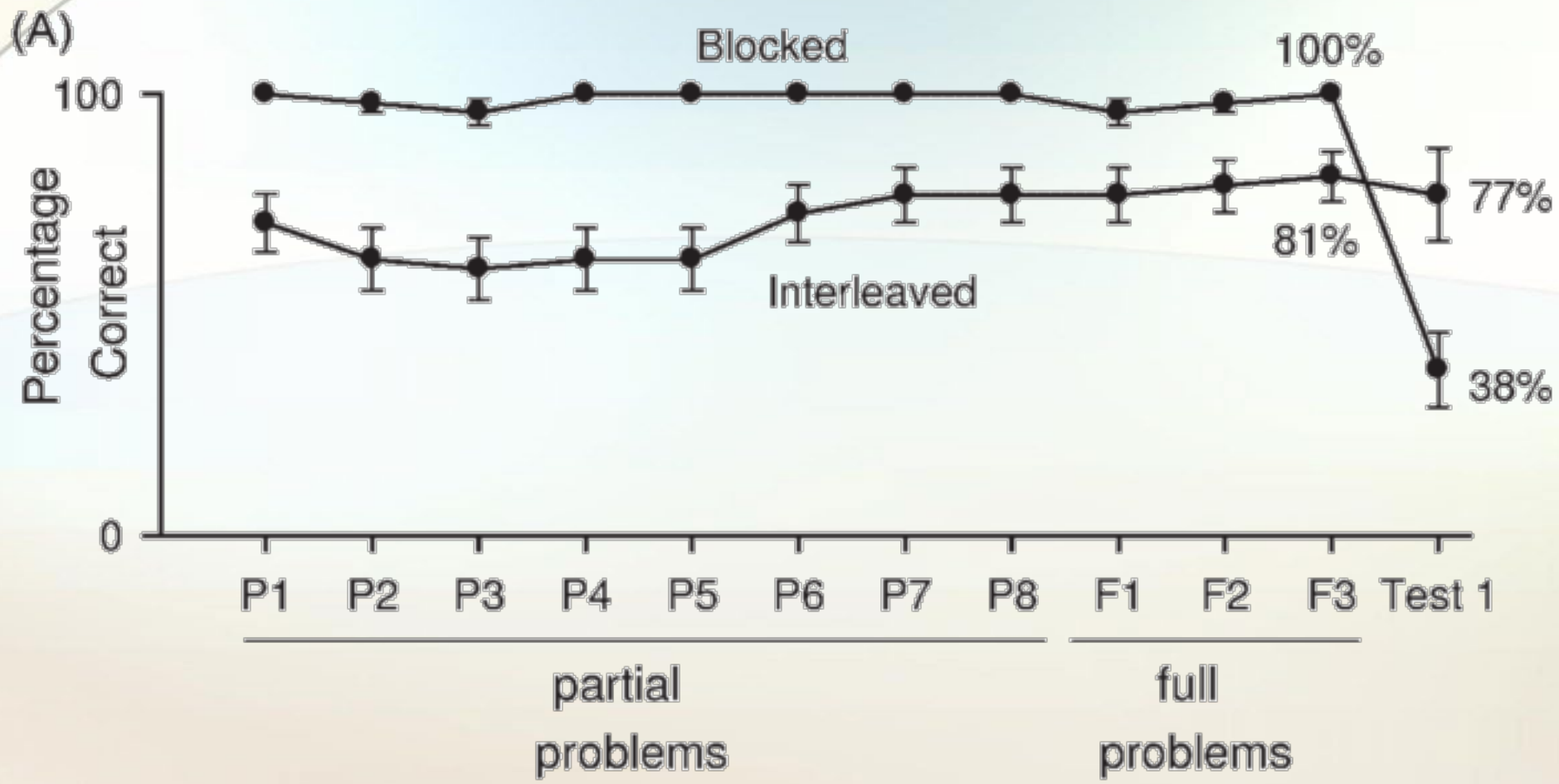
- Spaced Practice – Hermann Ebbinghaus / Doug Rohrer
- Retrieval Practice – Jeffrey Karpicke
- Interleaving / Variability of Practice – Henry Roediger / Jeroen van Merriënboer & Paul A. Kirschner

Massed Practice

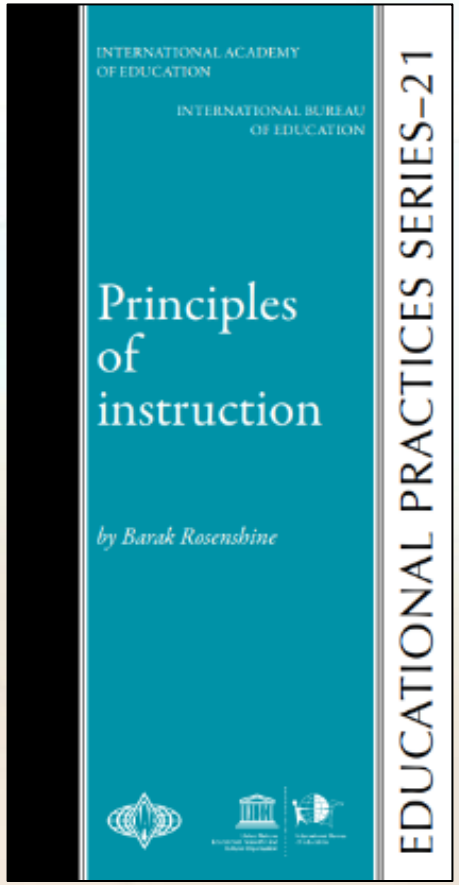


Interleaved Practice




(A)
Blocked
100%
100
Percentage Correct
77%
81%
Interleaved
38%
0
P1
P2
P3
P4
P5
P6
P7
P8
F1
F2
F3
Test 1
partial problems
full problems

Explicit Instruction



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Straw Man


4℃

LOOK RIGHT
LOOK LEFT

01 DAILY REVIEW

Daily review is an important component of instruction. It helps strengthen the connections of the material learned. Automatic recall frees working memory for problem solving and creativity.

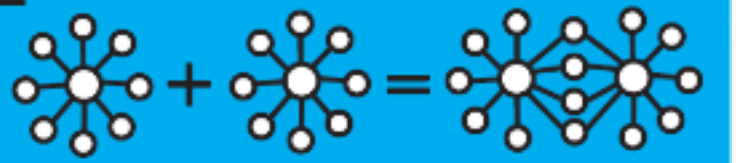
02 NEW MATERIAL IN SMALL STEPS

Our working memory is small, only handling a few bits of information at once. Avoid its overload — present new material in small steps and proceed only when first steps are mastered.

03 ASK QUESTIONS

The most successful teachers spend more than half the class time teaching, demonstrating and asking questions. Questions allow the teacher to determine how well the material is learned.

04 PROVIDE MODELS



Students need cognitive support to help them learn how to solve problems. Modelling, worked examples and teacher thinking out loud help clarify the specific steps involved.

05 GUIDE STUDENT PRACTICE

Students need additional time to rephrase, elaborate and summarise new material in order to store it in their long-term memory. More successful teachers built in more time for this.

06 CHECK STUDENT UNDERSTANDING

Less successful teachers merely ask "Are there any questions?" No questions are taken to mean no problems. False.
By contrast, more successful teachers check on all students.

07 OBTAIN HIGH SUCCESS RATE

A success rate of around 80% has been found to be optimal, showing students are learning and also being challenged. Better teachers taught in small steps followed by practice.

08 SCAFFOLDS FOR DIFFICULT TASKS

Scaffolds are temporary supports to assist learning. They can include modelling, teacher thinking aloud, cue cards and checklists. Scaffolds are part of cognitive apprenticeship.

09 INDEPENDENT PRACTICE

Independent practice produces 'overlearning' — a necessary process for new material to be recalled automatically. This ensures no overloading of students' working memory.

10 WEEKLY & MONTHLY REVIEW

The effort involved in recalling recently-learned material embeds it in long-term memory. And the more this happens, the easier it is to connect new material to such prior knowledge.

https://teachinghow2s.com/docs

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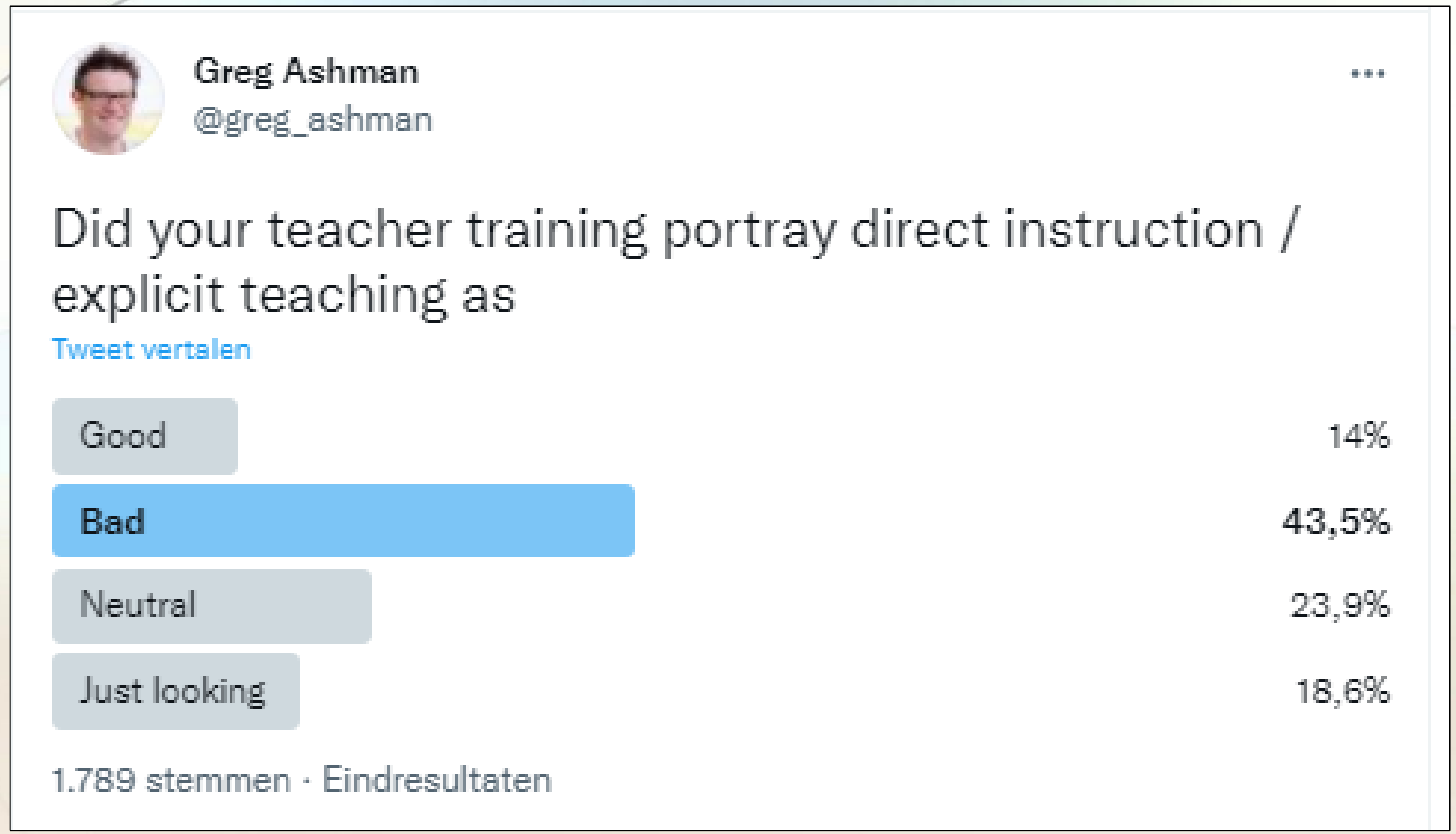
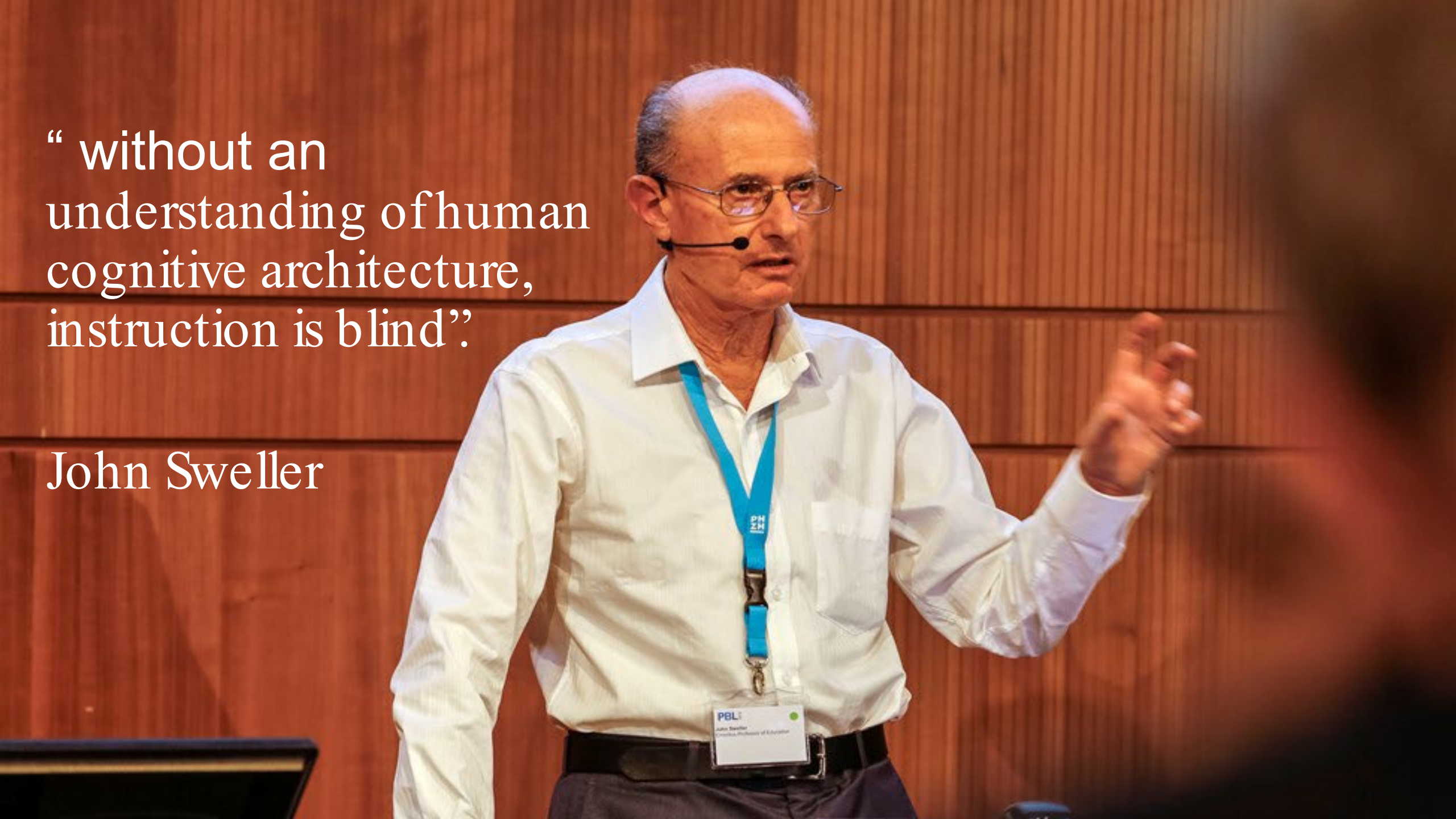
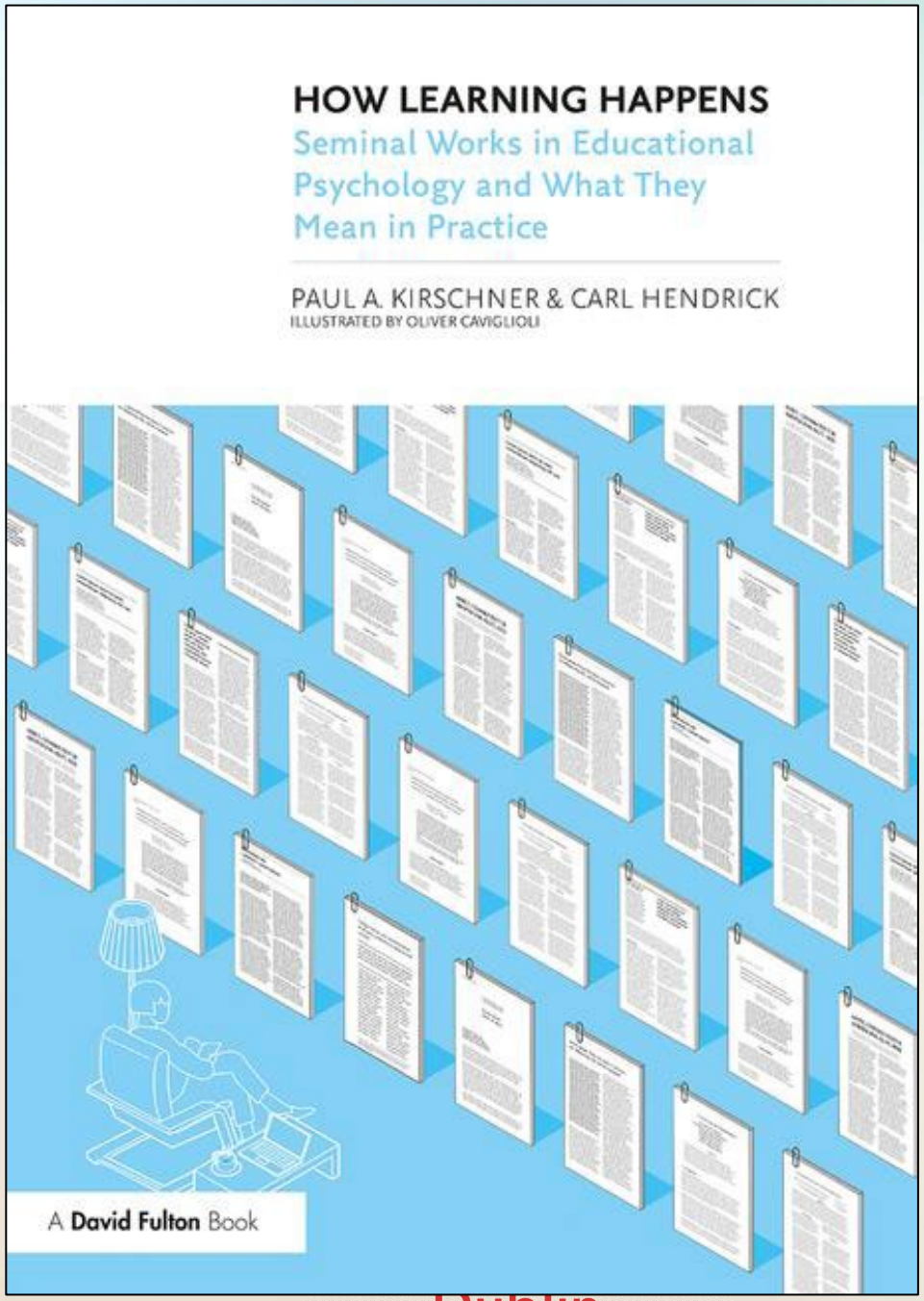

Greg Ashman
@greg_ashman
Did your teacher training portray direct instruction / explicit teaching as
Tweet vertalen
Good
14%
Bad
43,5%
Neutral
23,9%
Just looking
18,6%
1.789 stemmen · Eindresultaten


“ without an understanding of human cognitive architecture, instruction is blind”.
John Sweller



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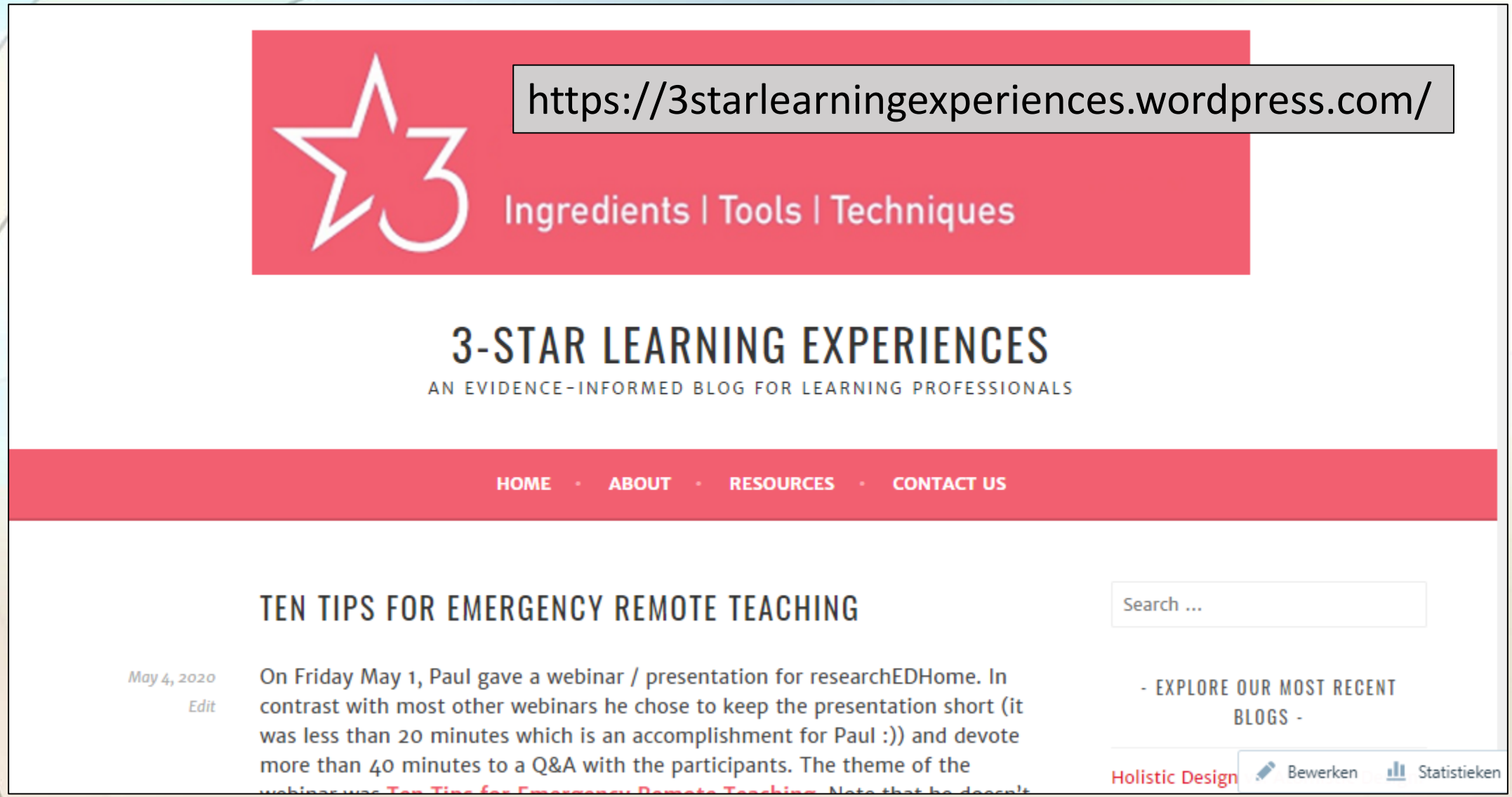
https://3starlearningexperiences.wordpress.com/



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