Fact or Myth?

Using the brain in ELT practice

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Pavilion ELT Live! June 22 2019

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1. "Neuromyths"
2. Spot the neuromyth
3. Why neuroscience?
4. Evidence-based teaching

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What is a "neuromyth"?

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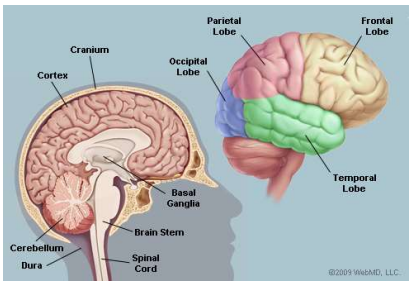

"misconception generated by a misunderstanding or misreading or a misquoting of facts scientifically established (by brain research) to make a case for the use of brain research in education or other contexts"

OECD in Howard-Jones, 2014 page 817

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Can you spot the neuromyths?

(Based on Howard-Jones, 2014)

1. **We mostly only use 10% of our brain.**
2. **Individual learners show preferences for the mode in which they receive information (e.g. visual, auditory, kinaesthetic).**
3. **Vigorous exercise can improve mental function.**
4. **Learning problems associated with developmental differences in brain function cannot be remediated by education.**
5. **Differences in hemispheric dominance (left brain, right brain) can help explain individual differences amongst learners.**
6. **Short bouts of co-ordination exercises can improve integration of left and right hemispheric brain function.**
7. **Individuals learn better when they receive information in their preferred learning style (e.g. visual, auditory, kinaesthetic).**
8. **Teaching to learning styles is more important in language learning than in other types of learning.**
9. **Extended rehearsal of some mental processes can change the shape and structure of some parts of the brain.**

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1 We mostly only use 10% of our brain.

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2 Individual learners show preferences for the mode in which they receive information (e.g. visual, auditory, kinaesthetic).

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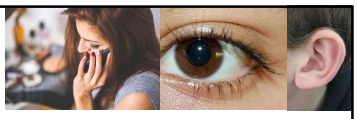
Krätzig and Arbuthnott (2006)



- Two ways to identify learners: self-report and questionnaire
- Less than 50% agreement between the learner and the questionnaire
- No correlation between the learning style and objective test performance
  - Eg 40% self-identified as visual learners
  - 60% identified as visual learners on questionnaire
  - Only 23% performed best on the visual test

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3 Vigorous exercise can improve mental function.

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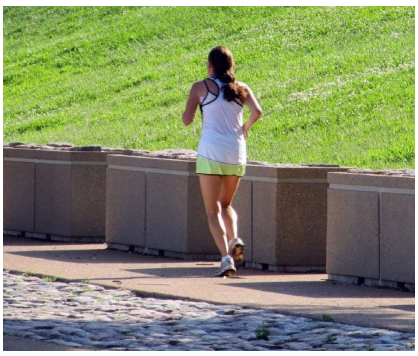
- BDNF
- Does that make all athletes smart?



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4 Learning problems associated with developmental differences in brain function cannot be remediated by education.

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5 Differences in hemispheric dominance (left-brain, right-brain) can help explain individual differences amongst learners.

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Left brain-right brain?

Both hemispheres are used for processing both logical *and* creative tasks.

Both hemispheres show activation in foreign language learning. (Qi et al, 2019).

There is no evidence that some people have better connected or more dominant left or right brain networks.

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"The pop culture idea (creative vs. logical traits) has no support in the neuroscience community and flies in the face of decades of research…" Anderson, 2017

http://www.bbc.com/news/blogs-trending-35640368

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Categorising learners as either left or right brained, and focusing teaching on developing one hemisphere over another are not considered to be useful educational methods.

(Holmes, 2016:109)

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6 Shout bouts of co-ordination exercises can improve integration of left and right hemispheric brain function.

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7 Individuals learn better when they receive information in their preferred learning style (e.g. visual, auditory, kinaesthetic).

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"This misconception is based on a valid research finding, namely that visual, auditory, and kinesthetic information is processed in different parts of the brain." (Dekker et al, 2012)

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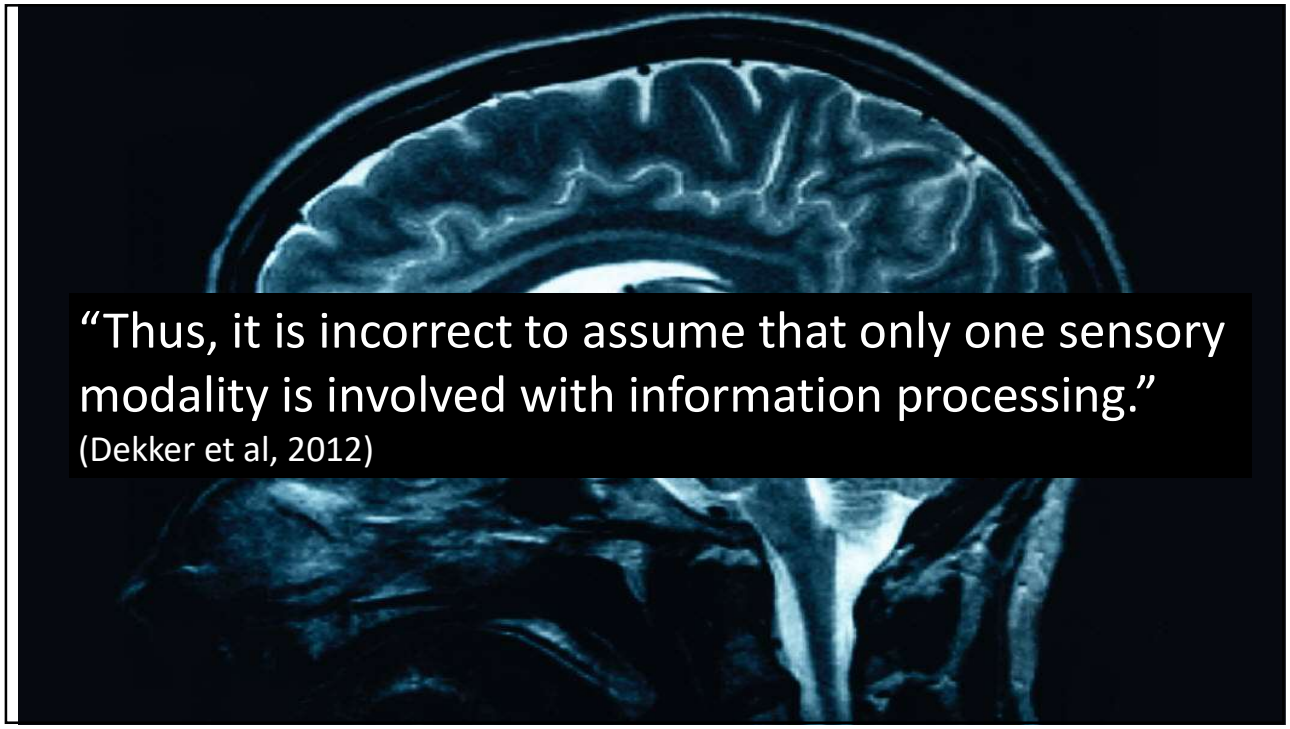
"Thus, it is incorrect to assume that only one sensory modality is involved with information processing."
(Dekker et al, 2012)

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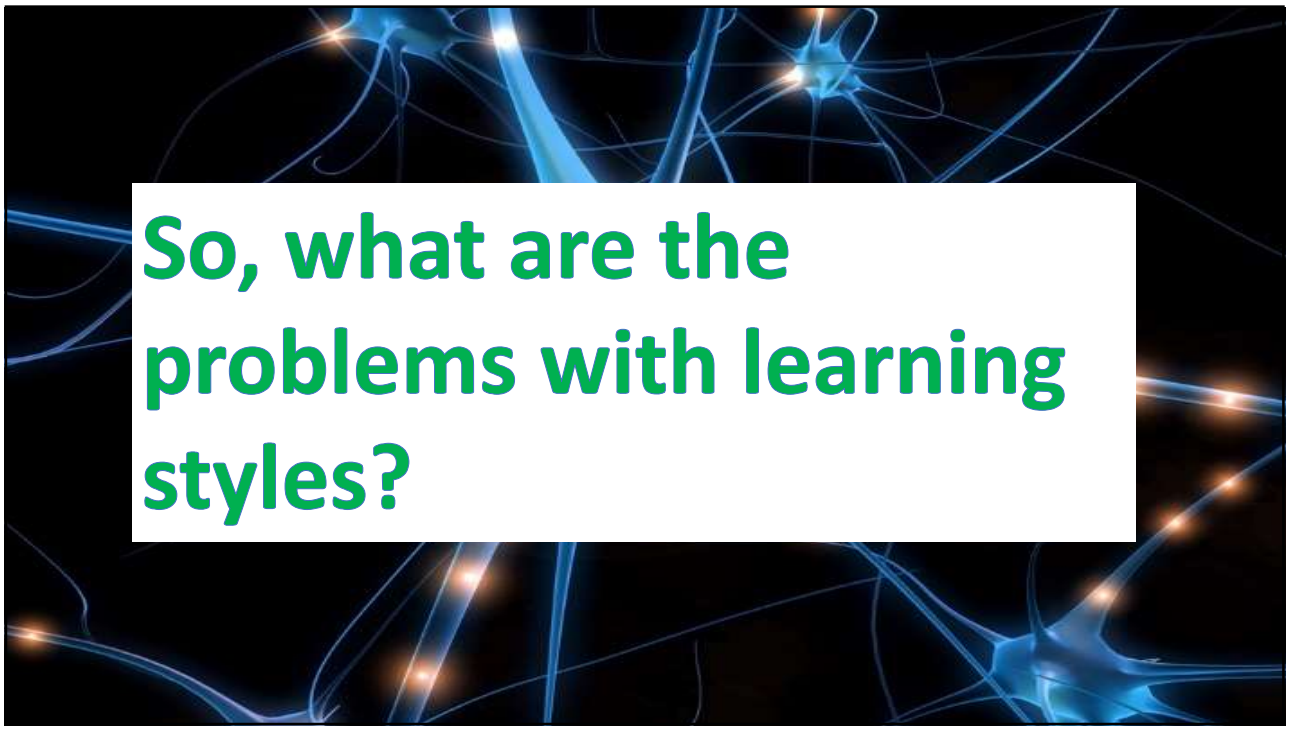

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So, what are the problems with learning styles?

1 Definition and assessment

Coffield et al (2004)

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So, what are the problems with learning styles?

2 There is no evidence that teaching to preferred learning styles enhances learning.
(the meshing hypothesis)

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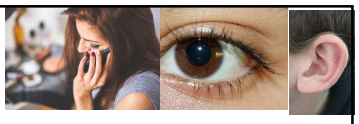

Rogowsky et al (2015)

- Attempts to test the 'meshing hypothesis' directly
- First ….
- Auditory and visual learning preferences determined through a standardized questionnaire
- Verbal comprehension aptitude test in both oral and written forms
- No relationship
- Second ….
- Participants randomly assigned to one of two groups – information through e-text or audiobook
- Tested immediately and after two weeks
- NO significant relationship between preferred mode of learning, teaching mode and results of the tests

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"In the current study, we failed to find any statistically significant, empirical support for tailoring instructional methods to an individual's learning style."

Rogowsky et al, 2015: 77

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8 Teaching to learning styles is more important in language learning than in other types of learning.

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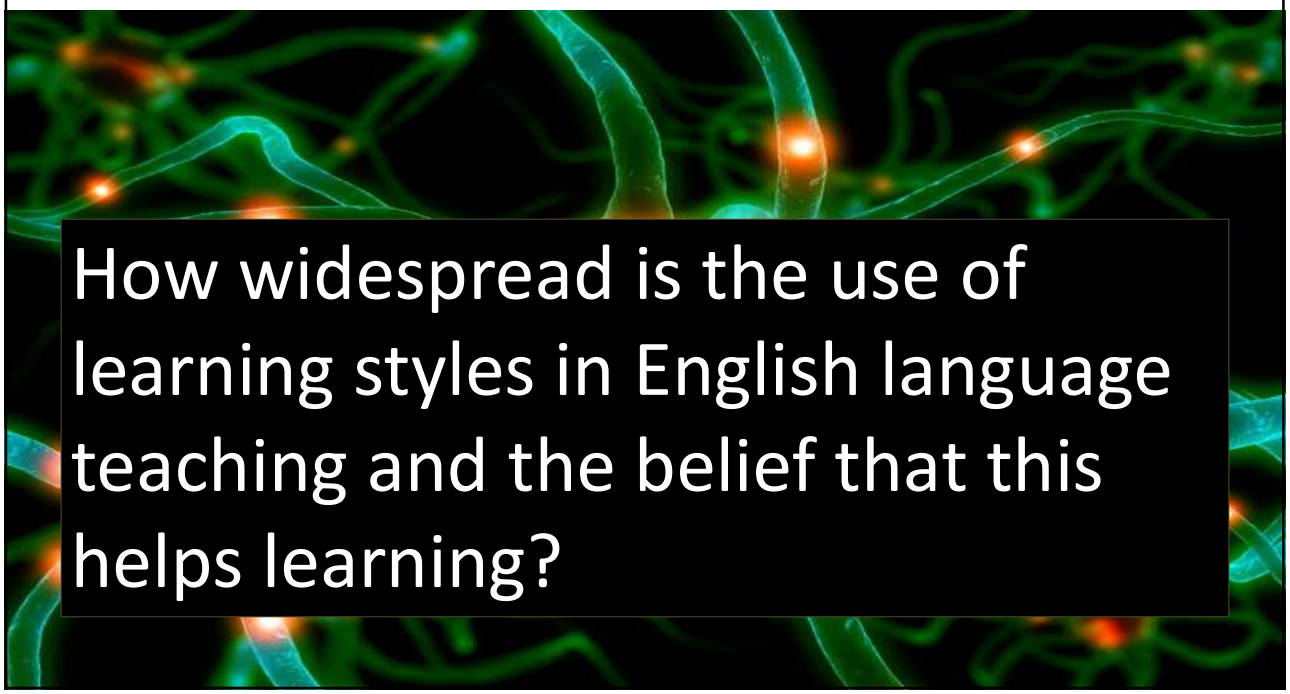

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Teachers' beliefs

Howard-Jones (2014) – 938 participants, 38 statements about the brain

Our surveys (2015 - 2016) - 332 English language teachers from the US, Canada, Mexico and Brazil

Nine statements about the brain and learning

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Beliefs in neuromyths about learning

5. Differences in hemispheric dominance (left brain, right brain) can help explain individual differences amongst learners.

7. Individuals learn better when they receive information in their preferred learning style (e.g. visual, auditory, kinaesthetic).

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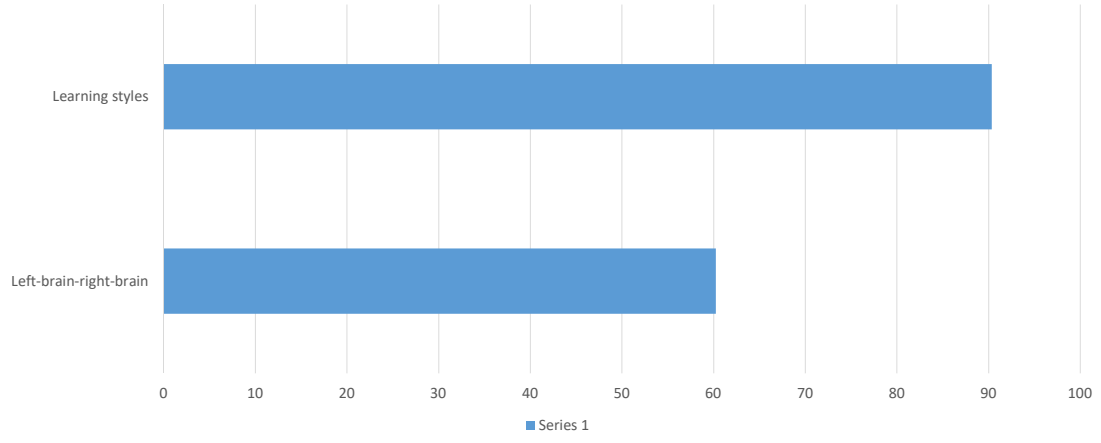
Beliefs in neuromyths: Lethaby and Harries (2015-2016): n = 332



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9 Extended rehearsal of some mental processes can change the shape and structure of some parts of the brain

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Why consider neuroscience in education?

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Neuroscience busts myths

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"our intuitions and beliefs about how we learn are often wrong in serious ways"

Pashler et al, 2009:117

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- Let's focus on interventions that *do* have a research base.

http://nyphotographic.com/

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Evidence-based teaching?

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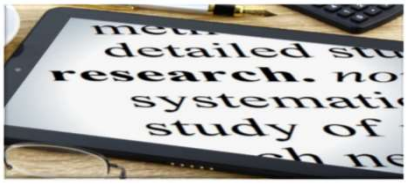
Why focus on research and evidence?

- We may be underusing strategies that have been shown to be effective
- We may be (over)using strategies that evidence shows are not really effective



http://nyphotographic.com/

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Where is the evidence?

http://nyphotographic.com/

- The Science of Learning
- "Neuroscience is one important source of insight into learning"
- Howard-Jones et al., 2018
- Includes: neuroscience, cognitive science, psychology, educational research = evidence derived from scientific method

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Where is the evidence?

Dunlosky, J., Rawson, K.A., Marsh, E.J., Nathan, M.J. & Willingham, D.T. (2013). Improving students learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest*, 14/1, 4-58. doi: 10.1177/1529100612453266

http://nyphotographic.com/

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Which of these strategies have you used as a teacher (or learner ☺)?

- Look at the techniques that follow and make a mental or written note about the ones you have used
- Have you felt they were useful for learning?

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Common learning techniques

- 1 Highlight and underline as you read.
- 2 Write a summary of a text in order to help you learn the contents.
- 3 Read a text more than once to learn the content.

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Highlighting and underlining 1

- Using highlighting and underlining as you read
- Rating: Low usefulness – doesn't seem to improve learning

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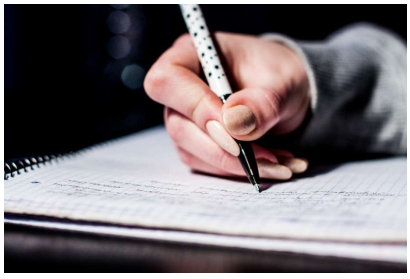
Summarizing 2

- Writing a summary of a to-be-learned text
- Rating: Low usefulness - hard to teach learners to do it and research findings aren't conclusive



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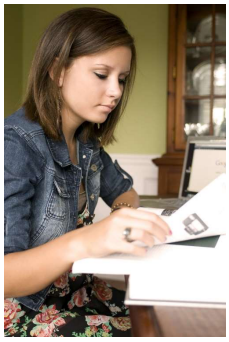
Re-Reading 3

- Re-reading: reading a text again
- Rating: Low usefulness; time could be better spent



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OK ….

…. So what *does* work?

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Evidence-based strategies:

- 1 Elaborative interrogation and Self-explanation
- 2 Distributed practice and Interleaved practice
- 3 Practice testing

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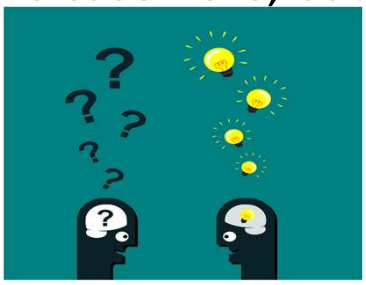
1. Elaborative interrogation

- Explaining why something is true

  "Why?"

  "Why is this true?"

  "Why is this the case here, but not here?"



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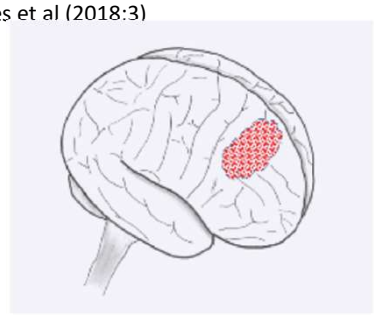
Research

- "Elaborative interrogation enhances learning by supporting the integration of new information with existing prior knowledge" Dunlosky et al (2013:6)
- " effortful, conscious processing" Howard-Jones et al (2018:3)
- "moderate utility" Dunlosky et al (2013)



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a Can you remember how to use *much, many*, etc? In pairs, choose the correct word or phrase for each sentence. Say why the other one is wrong.

1 How *much* | *many* cups of coffee do you drink a day?
2 I don't spend *much* | *many* time in the sun.
3 I eat *a lot of* | *many* chocolate.
4 Drinking *a few* | *a little* grape juice can be good for you.
5 I only have *a few* | *a little* computer games.

American English File Level 2 (2nd Edition) Latham-Koenig & Oxenden (2013:13) OUP

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Self-explanation

- Explaining features of your own learning to yourself
  - " How does it relate to what I already know?"
  - "What steps do I take to solve this problem?"
  - "How can I apply this in a different situation?"

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Self- explanation

- Reading and listening comprehension tasks – "How did I find the answers?"
- Student explains thought-processes to a partner
- Learners explain similarities and differences between new and previously studied material

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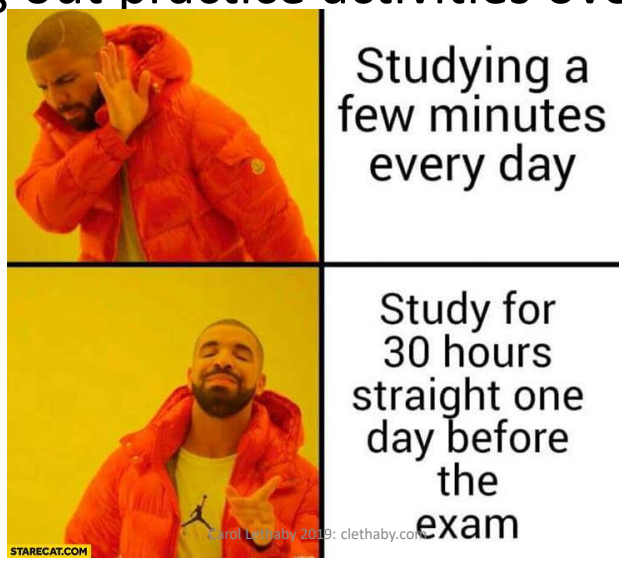
2. Distributed/spaced practice and interleaved practice

- spreading out practice activities over time



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Huge volume of research shows it leads to much greater long-term retention

- This "is one of the most general and robust effects from across the entire history of experimental research on learning and memory"

Bjork and Bjork in Coe et al (2014:17)

Ebbinghaus

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Distributed/spaced practice

- Recycle vocabulary with increasingly greater time spaces
- Begin each lesson with a practice of target language from a previous lesson
- Help learners plan their own study timetable

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Interleaved practice

- mixing up different practice activities in a single session

✗ AAA BBB CCC

✔ ABC CBA BCA

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Research

- Can improve brain's ability to tell concepts apart, lead to better transfer of skills and greater retention
- "moderate utility" Dunlosky et al (2013)

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Interleaved practice

- Mix language and skills practice up in class – don't be too predictable
- Mix up practice of language structures in one session
- Review material in a different order
- Timetabling – integrate skills & language
- Train learners to switch between learning topics when they study

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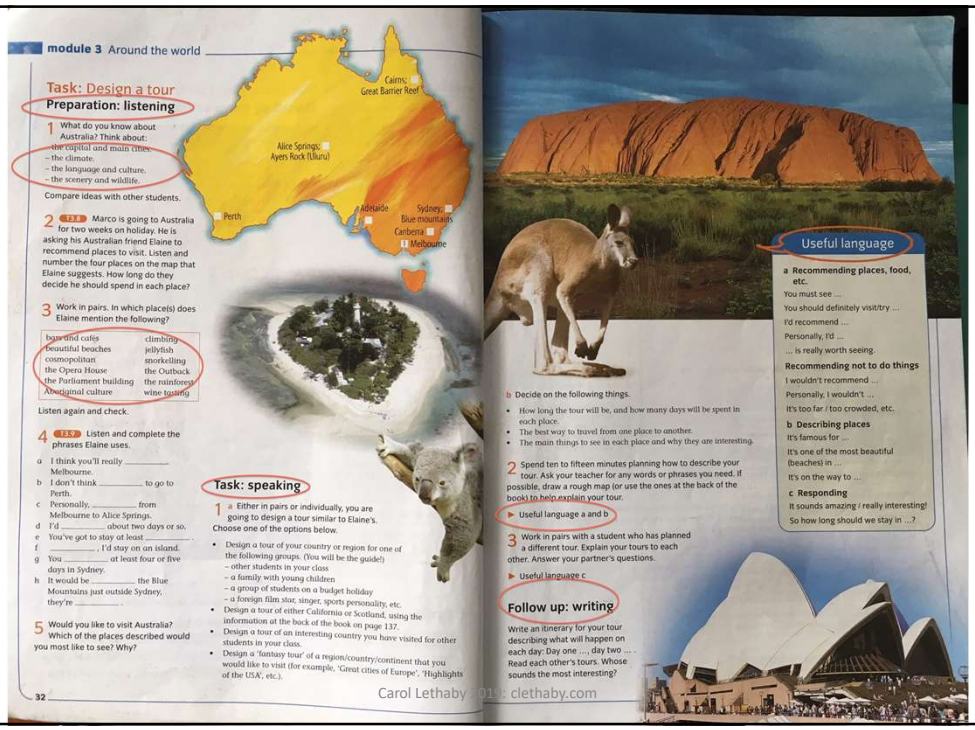
New Cutting Edge Intermediate Students' Book
Cunningham & Moor Pearson Longman 2005:32-33



module 3 Around the world

Task: Design a tour

Preparation: listening

1 What do you know about Australia? Think about:
- the capital and main cities.
- the climate.
- the language and culture.
- the scenery and wildlife.

Compare ideas with other students.

2 T 2.8 Marco is going to Australia for two weeks on holiday. He is asking his Australian friend Elaine to recommend places to visit. Listen and number the four places on the map that Elaine suggests. How long do they decide he should spend in each place?

3 Work in pairs. In which place(s) does Elaine mention the following?

bars and cafés	climbing
beautiful beaches	jellyfish
cosmopolitan	snorkelling
the Opera House	the Outback
the Parliament building	the rainforest
Aboriginal culture	wine tasting

Listen again and check.

4 T 2.9 Listen and complete the phrases Elaine uses.

a I think you'll really _____ Melbourne.
b I don't think _____ to go to Perth.
c Personally, _____ from Melbourne to Alice Springs.
d I'd _____ about two days or so.
e You've got to stay at least _____ .
f _____ , I'd stay on an island.
g You _____ at least four or five days in Sydney.
h It would be _____ the Blue Mountains just outside Sydney, they're _____ .

5 Would you like to visit Australia? Which of the places described would you most like to see? Why?

Cairns; Great Barrier Reef
Alice Springs; Ayers Rock (Uluru)
Perth
Adelaide
Sydney; Blue mountains
Canberra
Melbourne

Task: speaking

1 a Either in pairs or individually, you are going to design a tour similar to Elaine's. Choose one of the options below.

- Design a tour of your country or region for one of the following groups. (You will be the guide!)
  - other students in your class
  - a family with young children
  - a group of students on a budget holiday
  - a foreign film star, singer, sports personality, etc.
- Design a tour of either California or Scotland, using the information at the back of the book on page 137.
- Design a tour of an interesting country you have visited for other students in your class.
- Design a 'fantasy tour' of a region/country/continent that you would like to visit (for example, 'Great cities of Europe', 'Highlights of the USA', etc.).

b Decide on the following things.

- How long the tour will be, and how many days will be spent in each place.
- The best way to travel from one place to another.
- The main things to see in each place and why they are interesting.

2 Spend ten to fifteen minutes planning how to describe your tour. Ask your teacher for any words or phrases you need. If possible, draw a rough map (or use the ones at the back of the book) to help explain your tour.

▶ Useful language a and b

3 Work in pairs with a student who has planned a different tour. Explain your tours to each other. Answer your partner's questions.

▶ Useful language c

Follow up: writing

Write an itinerary for your tour describing what will happen on each day: Day one ..., day two ... . Read each other's tours. Whose sounds the most interesting?

Useful language

a Recommending places, food, etc.
You must see ...
You should definitely visit/try ...
I'd recommend ...
Personally, I'd ...
... is really worth seeing.

Recommending not to do things
I wouldn't recommend ...
Personally, I wouldn't ...
It's too far / too crowded, etc.

b Describing places
It's famous for ...
It's one of the most beautiful (beaches) in ...
It's on the way to ...

c Responding
It sounds amazing / really interesting!
So how long should we stay in ...?

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3. Practice testing

- Practice testing: low/ no stakes and self-testing
- Rating: High usefulness – overwhelmingly shows improved learning

By German.aiflc - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=35405949

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- Experiments in language learning - retrieval practice is a powerful means of improving retention in learning foreign language vocabulary
- (e.g., Karpicke & Smith,2012; Pyc & Rawson, 2010),

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Practice testing

- Applications to ELT: vocab tests, test yourself, practice tests
- formative assessment and continuous assessment, self-testing at different stages

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D 2.2 Complete the days of the week. Put them in order, 1-7. Listen to check.

[4] Wed n e s d a y	☐ Mon _ _ _
☐ Sun _ _ _	☐ Thu _ _ _ _ _
☐ Fri _ _ _	☐ Tue _ _ _ _
☐ Sat _ _ _ _ _	

E Race the clock! In pairs, race to say the days in order. Do it alone, then simultaneously.

Sunday, Monday, …

Only ten seconds! Well done!

From: English ID 1 by Seligson, Lethaby and Gontow Richmond Publishing

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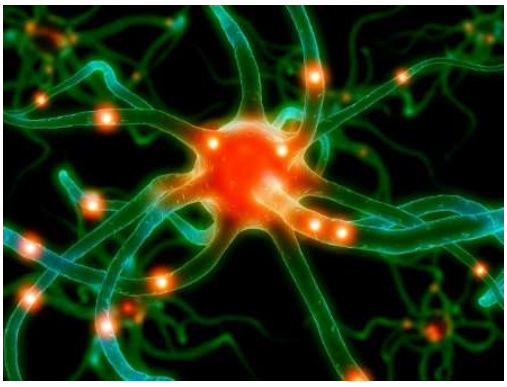
Evidence-based strategies:

- 1 Elaborative interrogation and Self-explanation
- 2 Distributed practice and Interleaved practice
- 3 Practice testing



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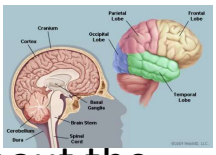
Conclusions



- There's a connection between what we know about the brain, how we learn, and teaching. Watch for pervasive neuromyths!
- Evidence-based teaching strategies exist – we should be aware of them – and what the research says.
- Evidence can both expose practices that are not supported *and* validate practices that are supported.
- More specific research is needed in English language teaching – and teachers need to be involved.

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