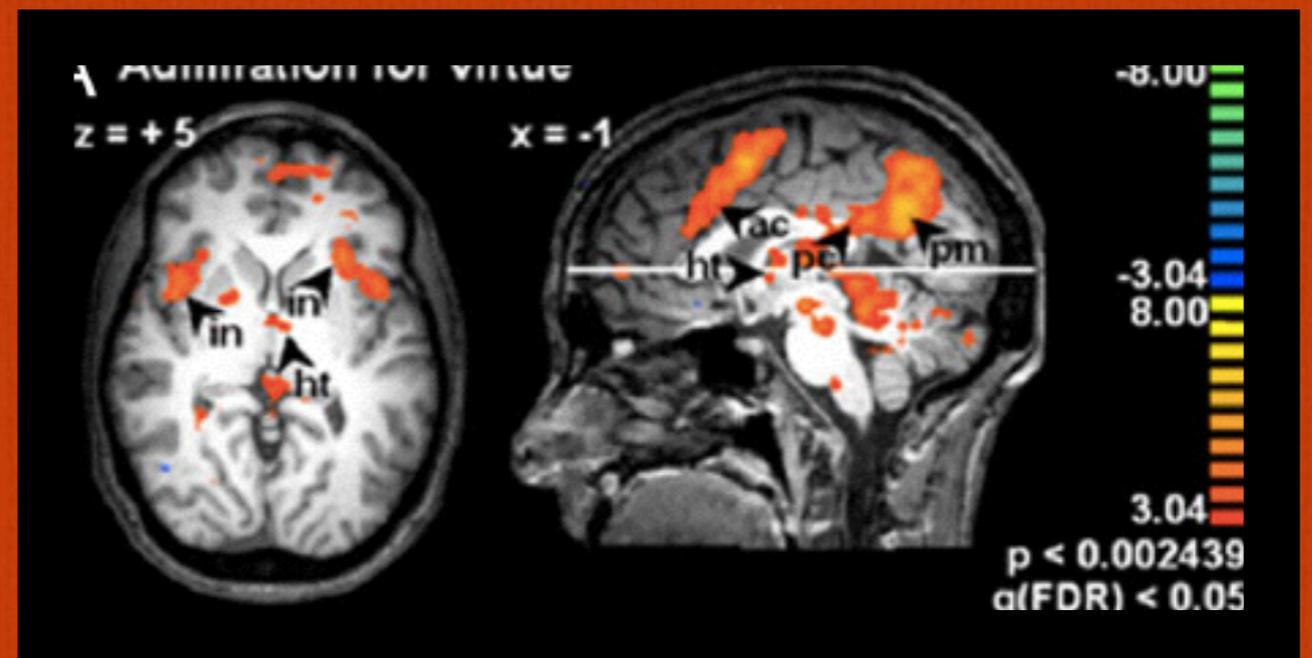


# NeuroELT:

*Exciting advice from neuroscience that will motivate you and your students!*



**NUFS:Afternoon Session**

**Robert S. Murphy**  
**University of Kitakyushu**



Harvard Graduate School of Education

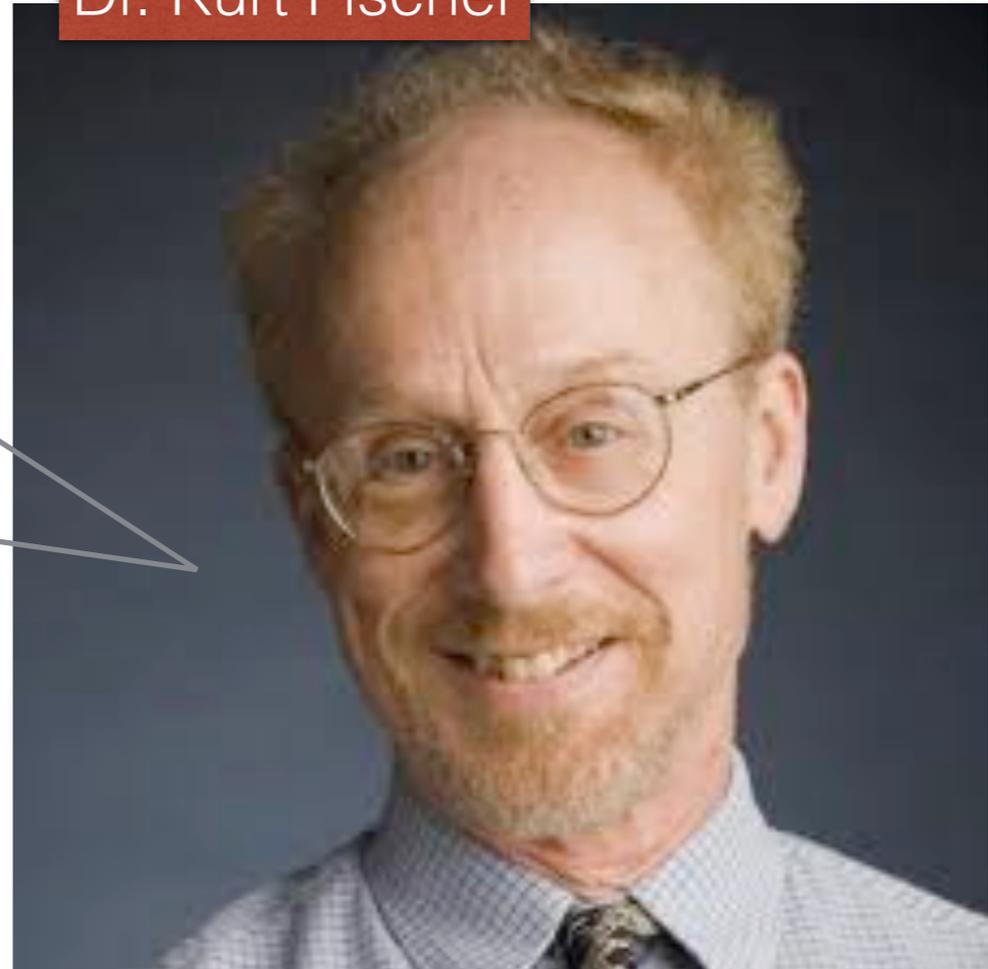
Dr. Kurt Fischer



# *Mind, Brain, and Education* Program

“What’s your problem?”

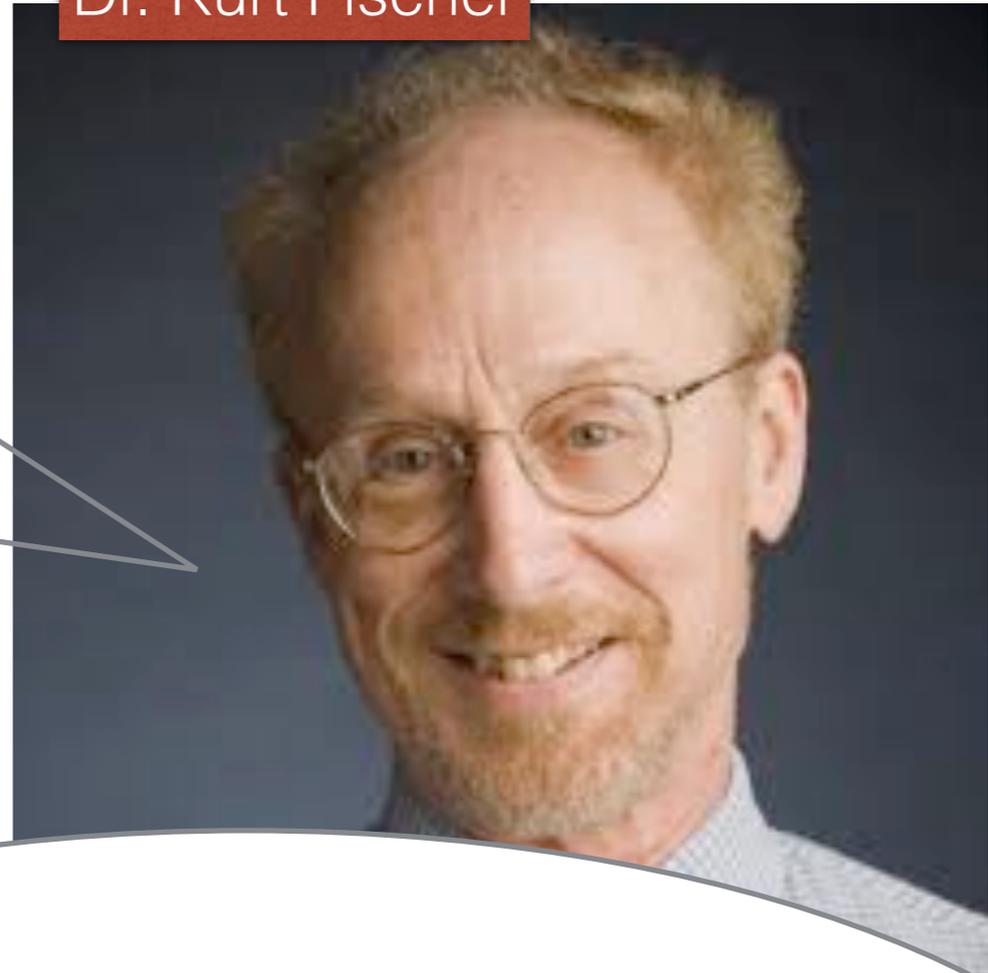
Dr. Kurt Fischer



“If you don’t have a problem to solve,  
then you don’t need to be here.”

“What’s your problem?”

Dr. Kurt Fischer



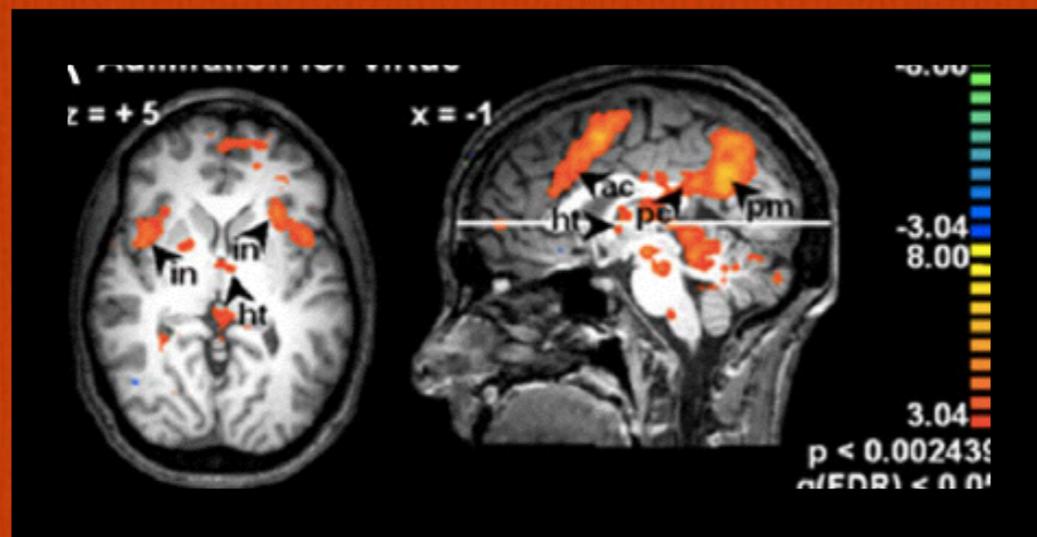
“The majority of English students in Japan don’t become fluent even after 6 years of public education.”



# What is your problem?



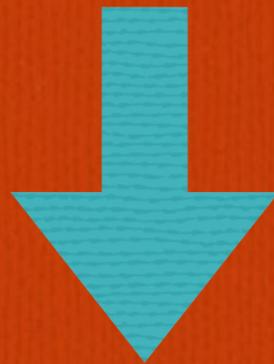
# Let's consider “Inquiry-based Learning”



**neuroELT**

**Raise confidence in  
inquiry-based learning**

*This is my  
job.*



**find the benefits of  
inquiry-based learning**

*This is your  
job!*

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# Raising Confidence in IBL

**3** necessities

- 1: Understanding IBL
- 2: Understanding the science
- 3: Understanding the criticisms

# 1: Understanding IBL

## What is Inquiry-based learning?

most basic form: allowing students let them go find answers to their own questions

Constructivists: Vygotsky, Dewey, Piaget...

Informally for thousands of yrs

Late 1800s to early 1900s

Why?

Science should be taught as a process *and* way of thinking, *not* as facts to be memorized

**GIST:**  
Not “top-down” but “bottom-up”

**Why?** One reason...

**Lack of CONFIDENCE**

**Let's take a look at the science!**

**teach + memorize + test... get score**



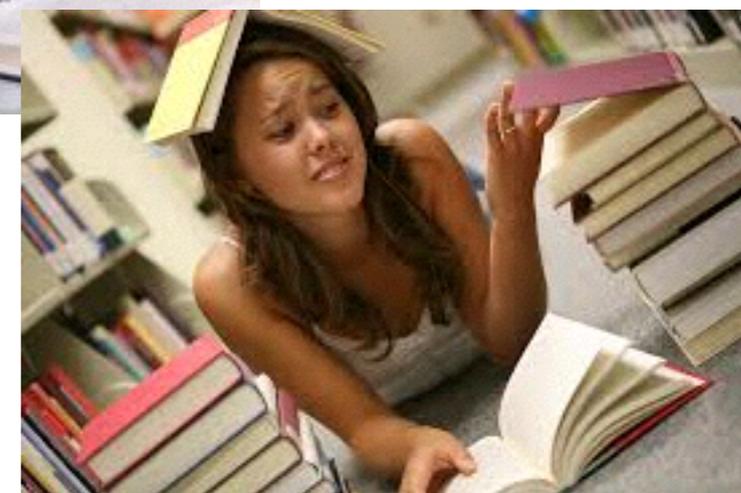
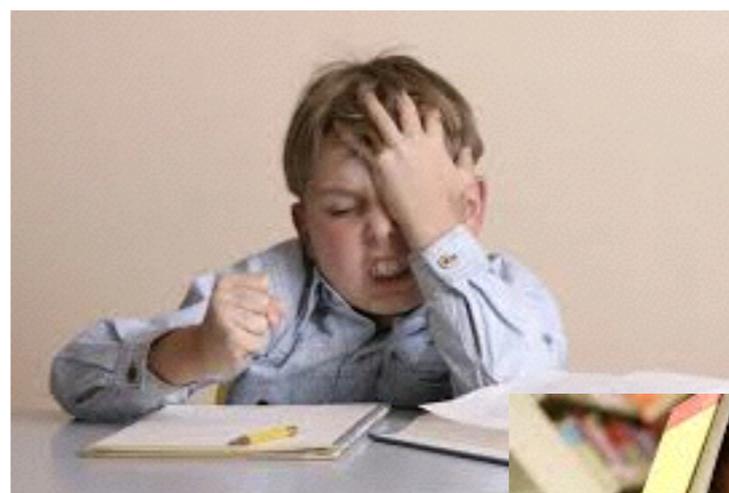
*Almost a quadrillion!*

# Neurons form networks

Quiz: How many synapses do we have?



With all those connections,  
why do students *still* not remember stuff  
from last week?

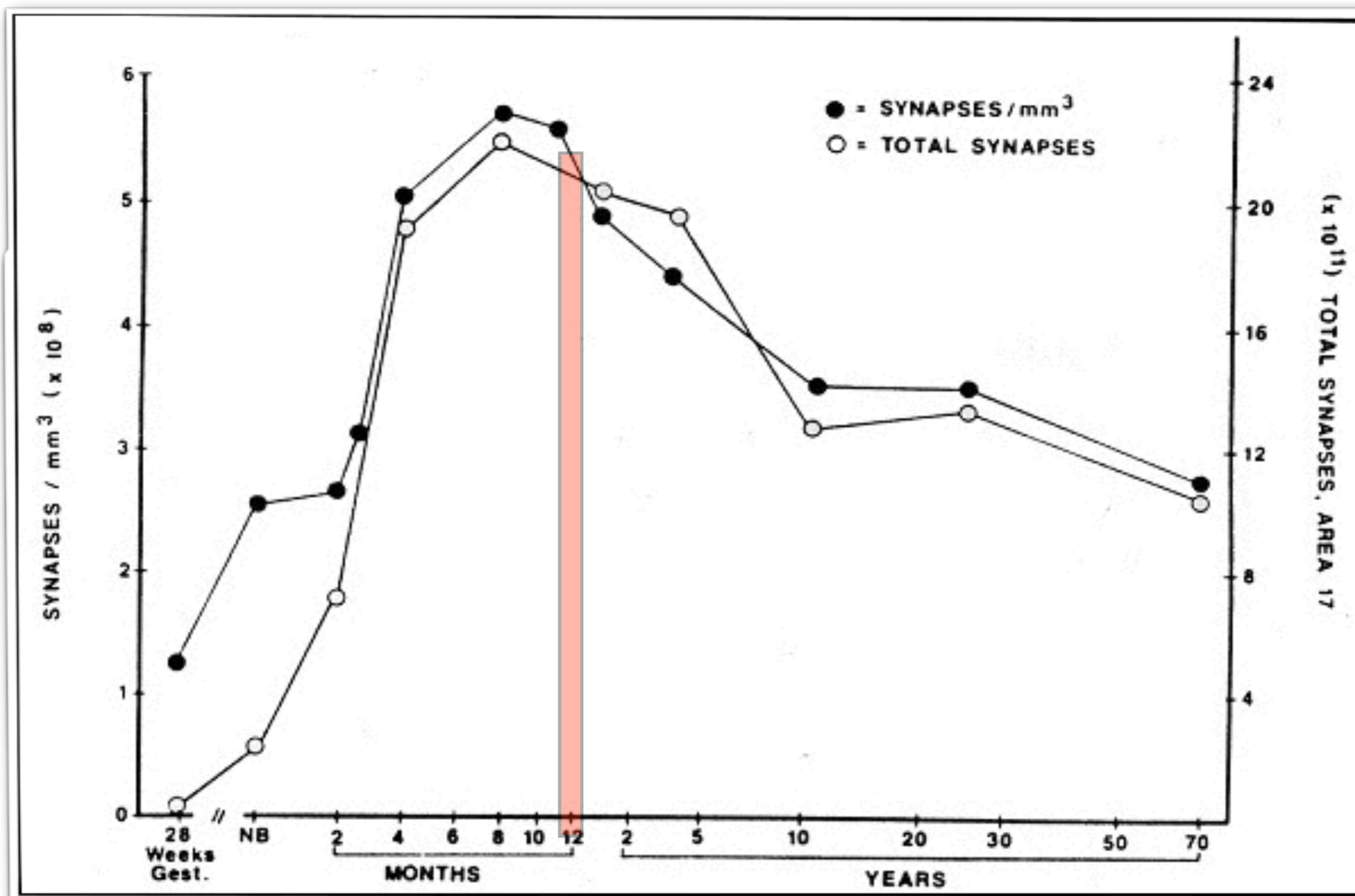


neuro-myth

~~Our brains record  
everything.~~

# Learning is a very personal experience.

- (Sousa, 2011; Tokuhamma-Espinosa, 2010; Medina, 2009)



Memory is like this in the brain...



**Lingering networks from past analyses**

A high-contrast, black and white graphic of a city street scene, possibly a collage or a stylized illustration. The image features various signs and buildings, including a 'SQUAD CAR' sign, a 'TOSHI' sign, a 'YAHOO!' sign, a 'New York Police Dept.' sign, and an 'at&t' sign. The scene is rendered in a high-contrast, almost binary style, with a dark background and bright white highlights. The overall effect is that of a dense, complex network of information and activity.

**Lingering networks from past analyses**

**and a real time process**



**Students' brains will never perceive your content verbatim!**

Because memory is a real-time process...  
based on lingering networks

**Reduce rote memorization.**  
Make the "understanding" visible.

*Expect & depend upon reconstruction!*

**This is a founding principle of IBL**

Everybody!

- Memory is a real-time process, *not concrete!*  
(You can stop pulling your hair out!)

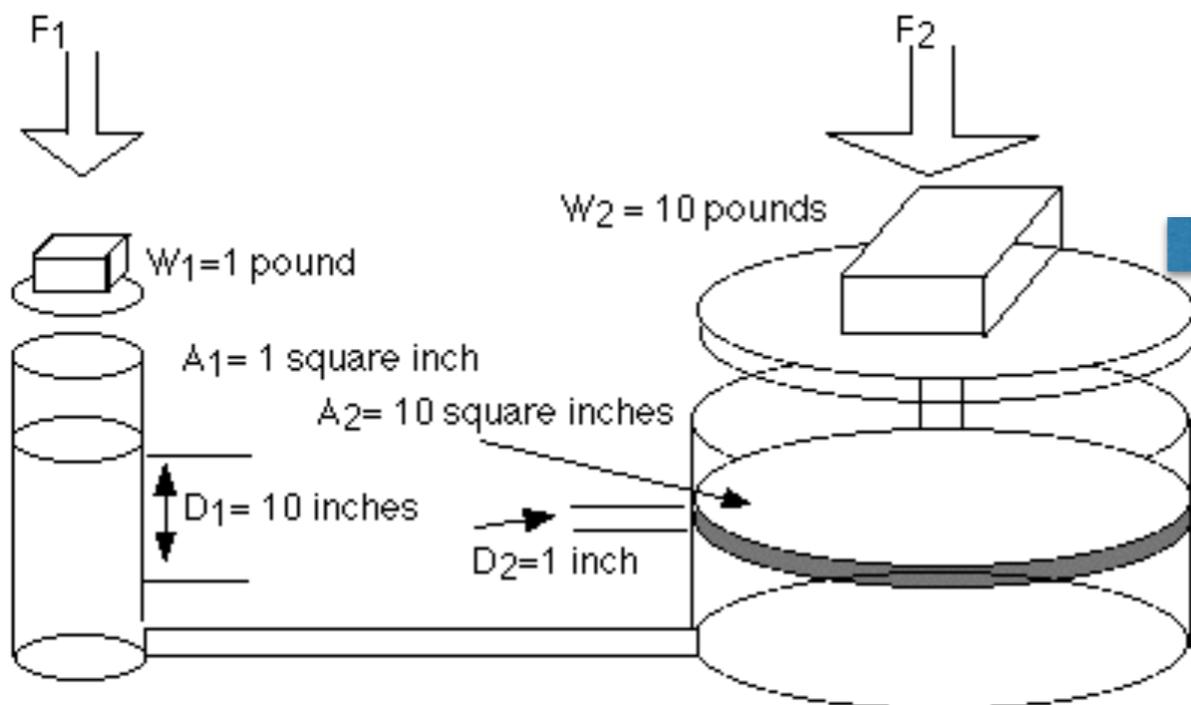


**(Dan Schacter)**

# Pop quiz!

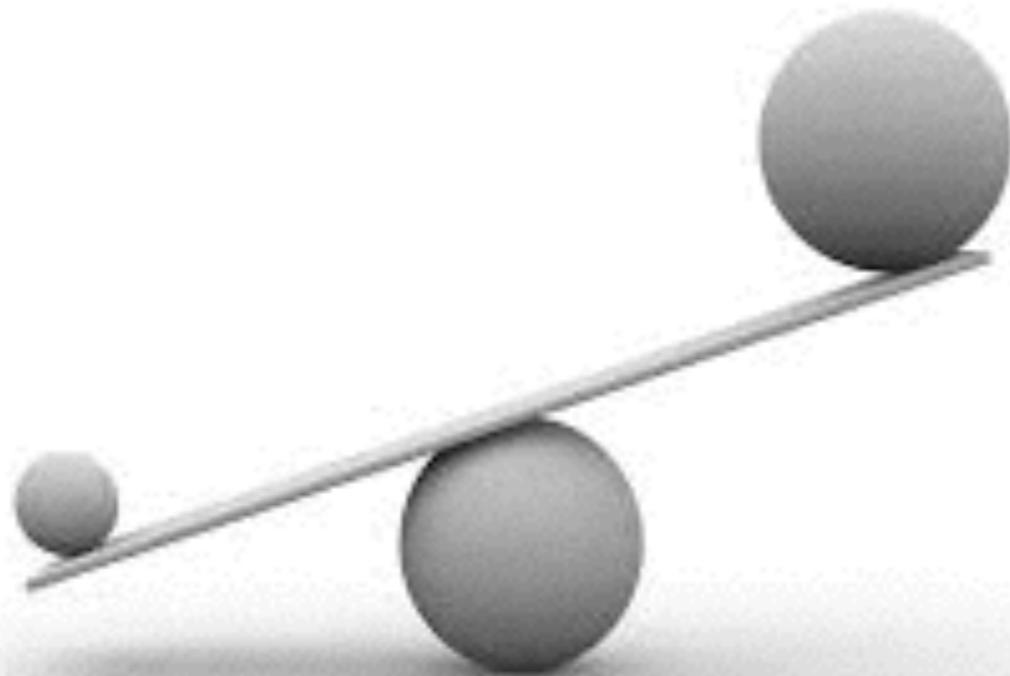
**What is the difference between learning and Understanding?**

- Learning is about ‘memorizing’ facts that are often taught ‘top-down’ in the classroom.
- Top-down teaching does not automatically translate into real-world usage for the student.
- In contrast, “Understanding” is demonstrated when knowledge is properly applied in the real-world.



Instead of 'neuronal networks' ...

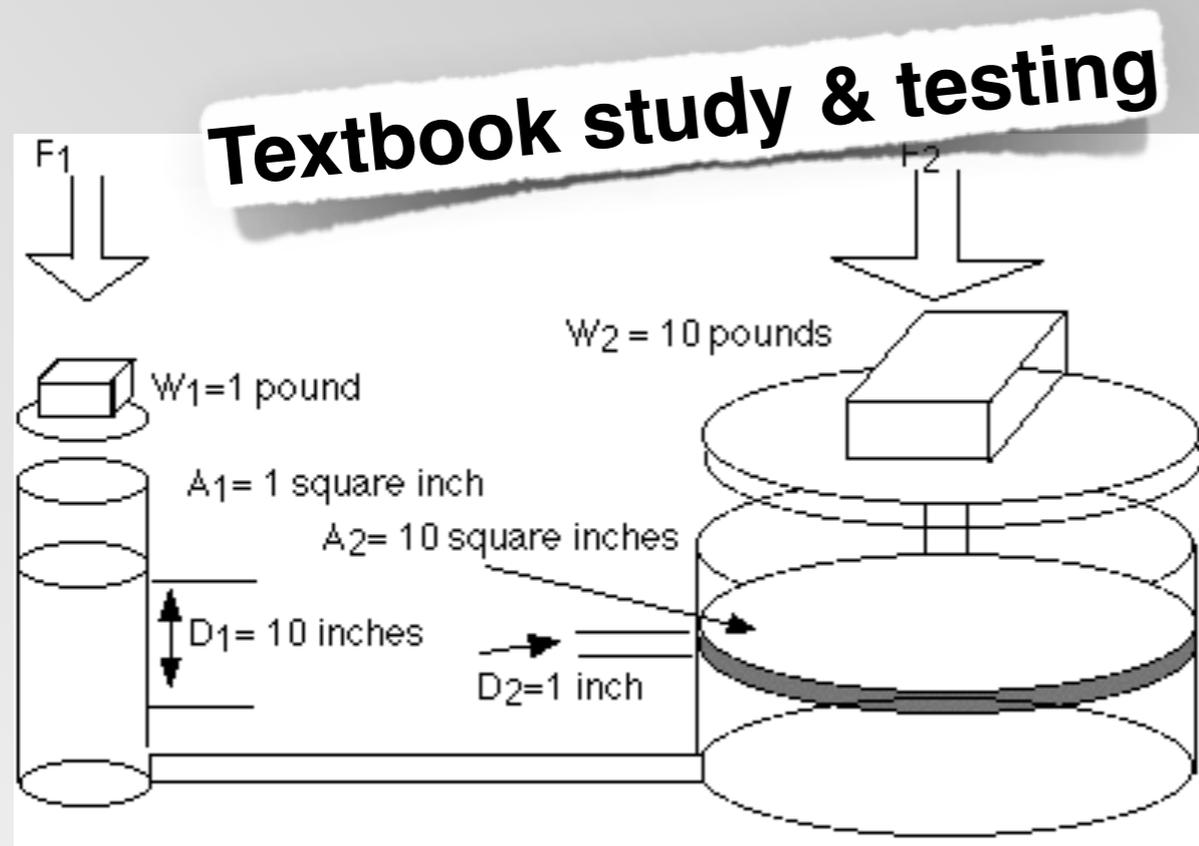
Dynamic  
acquisition-  
equilibrium  
Network



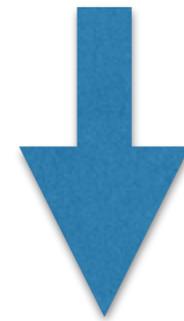
# DaeN

What does equilibrium mean?

# How do these DaeNs differ?

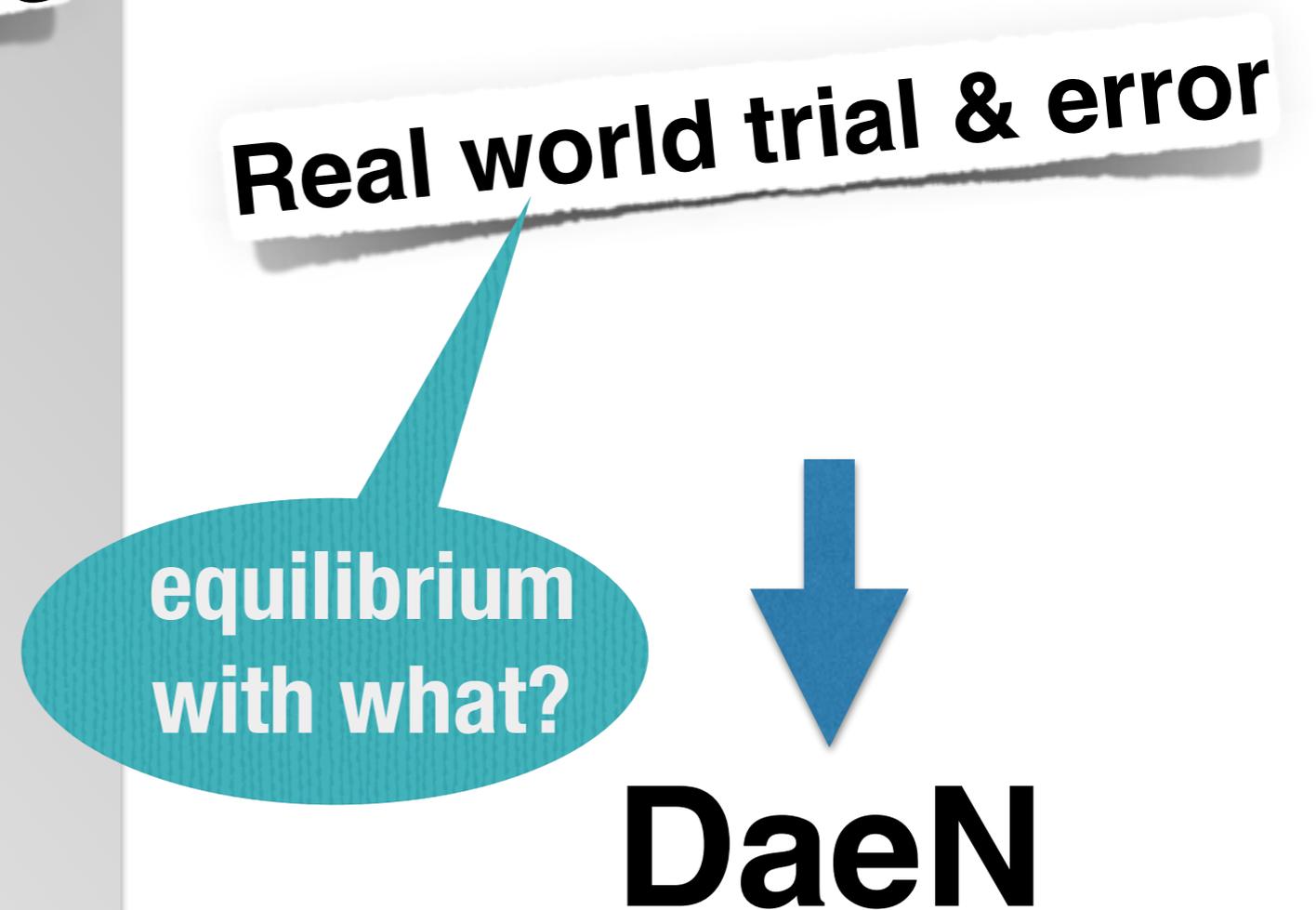
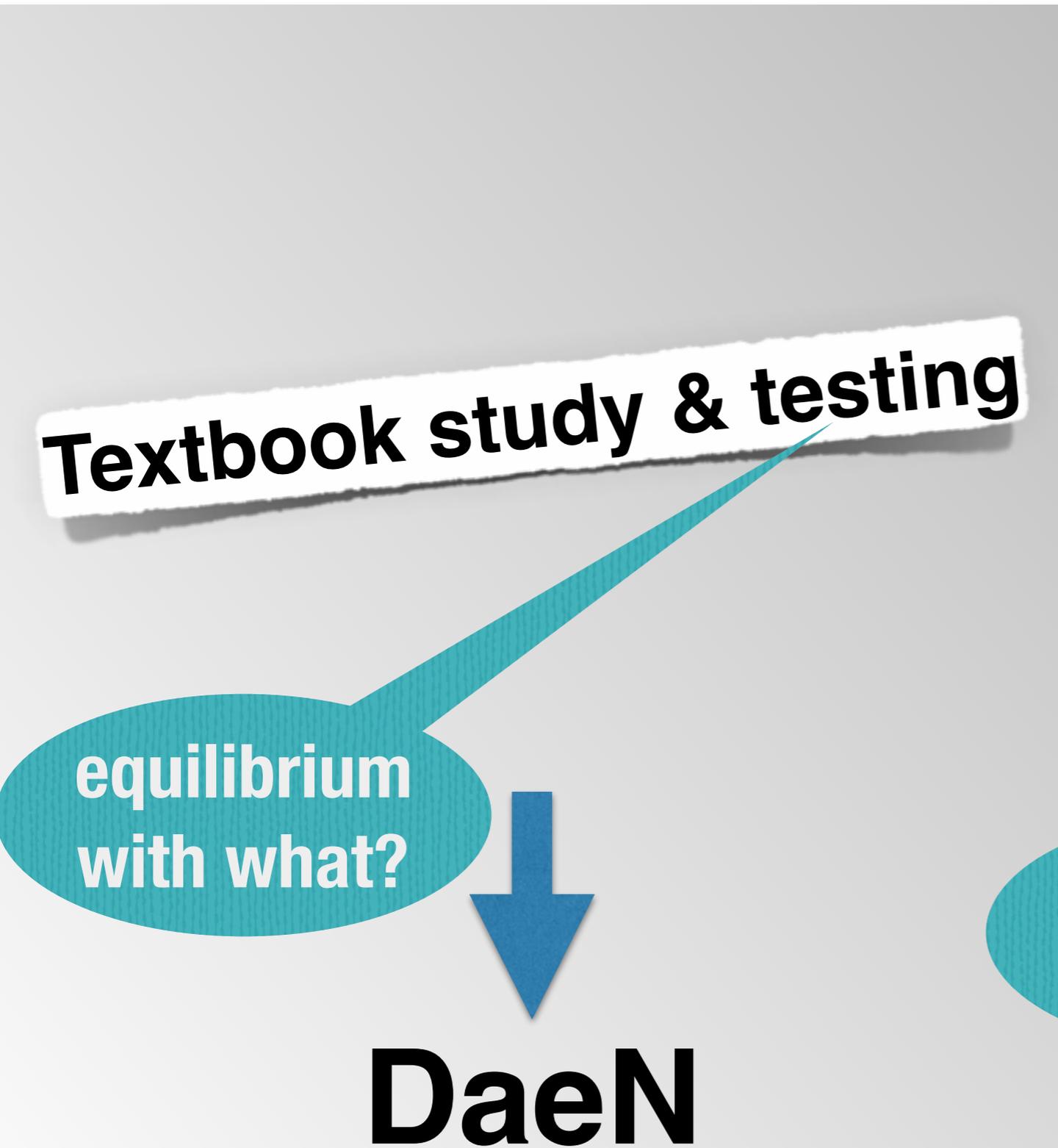


**DaeN**



**DaeN**

# How do these DaeNs differ?



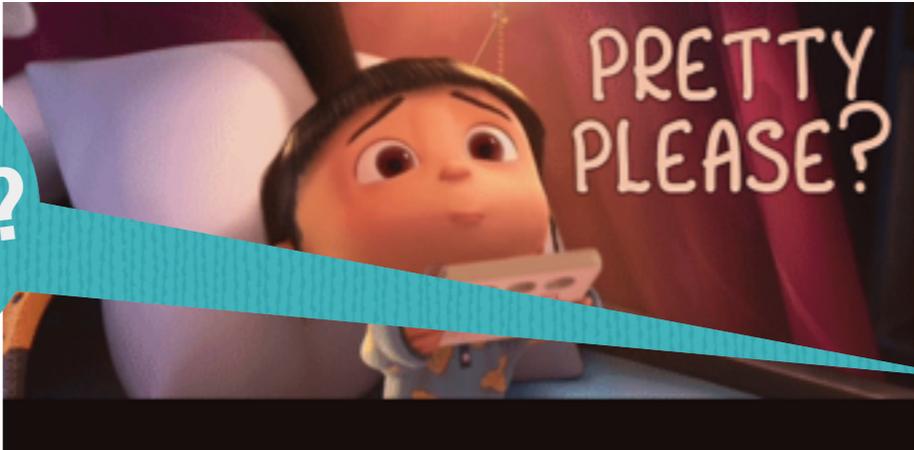
Remember this?  27

**In pairs, discuss what this means.**

“I got to know!”

Tap into the power of  
curiosity

What  
equilibrium?

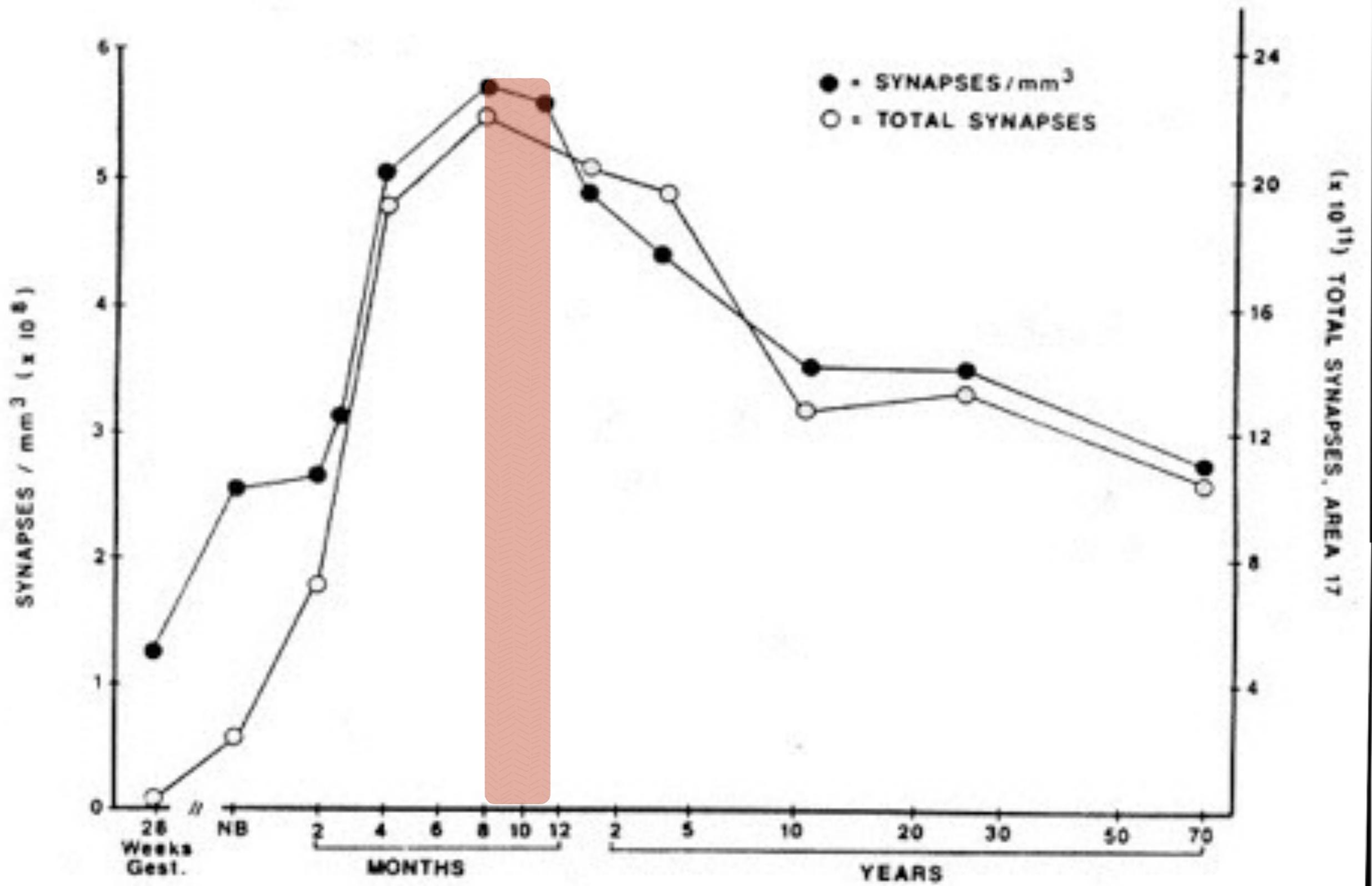


Addictive results  
Easy for the teacher  
Natural for the DaeNs

Everybody!

- Tap into the power of curiosity!  
(It's natural for the DaeNs!)





Everybody!

- Learning is a very personal experience!  
(DaeNs, driven by curiosity, connect the entire brain!)



## The science that supports IBL

- Memory is a real-time process, not concrete!  
(Put less emphasis on memory. Assess their creations.)
- Tap into the power of curiosity!  
(Allow for lots of bottom-up learning)
- Learning is a very personal experience!  
(Expect differences. Embrace differences!)
- “Understanding” is the application of  
“learning”. (Help foster DaeNs that will match  
their goals!)

**Can we make it even better?**



**My doctoral research:**

**Comparing two IBL-styled curriculums**

**Your task:**

**Understanding why IBL#2 did much better!**

**HINT!**

**IBL #2's revisions were based on  
common criticisms of IBL:**

**-students have too much freedom**

**-lacks accountability**

**-not easily assessed**

**(so, I made six changes!)**

**three times a semester!**

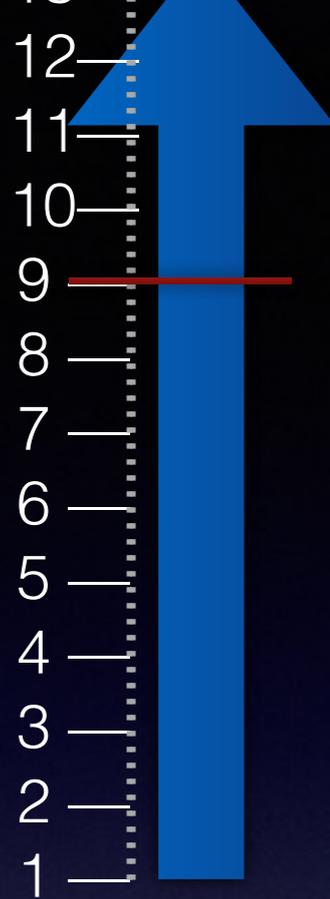
**Group Presentations**  
**peer-assessed**  
**self-assessed**  
**teacher-assessed**



**IBL#1, IBL #2**

**Pre and post test were administered to two groups**

**They were asked moral questions (Kohlberg's)**



**The cognitive complexity of the students' responses in the L2 (English) were compared. "Lectical Analysis"**

**In just one semester:**

**Group A: showed 0.01 growth (= 1/3 of native speed)**

**Group B: showed 0.08 growth (8X faster than Group A!)**

**Goal:**  
Do group presentation  
on topic of choice

**Difference?**  
addition of 6 activities



**Your task!**  
Understand why the revisions helped their  
L2 DaeNs grow 8x faster

why, how" questions.

Partner's answers

Q3. \_\_\_\_\_

Q4. \_\_\_\_\_

Feelings/emotions from the picture:

Performance of Understanding Time!



Discussion:  
"This picture makes me feel..."



# Cycle 6. Group-owned: Presentation!



In groups decide presentation content. Practice outside of class, too!  
ヒント：プレゼンの内容をよく話し合っ、楽しく教室外で何度も練習をしよう！

Slide 1

Slide 2

Theme: introduction  
Word/phrase list

Theme:  
Word/phrase list

### Cycle 5b. Production - Group Master List!

Create a **Master List** with your group! Mix your ideas with your teacher's ideas.  
ヒント：2つのリストを比べて、グループで話し合い、最強のリストを作るう！

Phrases	Culture	Feelings	Society

## MASTER LIST

List three of your best "Grammar Template" sentences for this topic. 文法の例文となる sentences!

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

Show this group list to the class with your teacher's help (on screen).

Partner's Approval 許可マーク





# Student designed tests

**Cycle 5b. Production - Group Master List!**

Create a **Master List** with your group! Mix your ideas with your teacher's ideas.  
ヒント：2つのリストを比べて、グループで話し合い、最適なリストを作るう！

Phrases	Culture	Feelings	Society

List three of your best "Grammar Template" sentences for this topic. 文法の例文となる sentences!

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

Show this group list to the class with your teacher's help (on screen).

Partner's Approval 許可マーク

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**Cycle 8. Group work: Design a test! (Page 1)** People of Today!

In your groups, design a test! Consider your Master Lists, your Grammar Boxes, and the Learning Points!

Name \_\_\_\_\_ Student Number \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

MODULE 1. TEST TITLE: \_\_\_\_\_

Section 1:



Students promote their test designs to the class

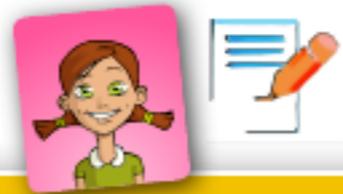


P2P assessment & vote for the best!



## Cycle 9. Choice: Best Test Design Award!

Use these charts to choose the best test for the class! 審査と受賞!



	Word choice	Difficulty	Design
Group A	1..2..3..4..5	1..2..3..4..5	1..2..3..4..5
Group B	1..2..3..4..5	1..2..3..4..5	1..2..3..4..5
Group C	1..2..3..4..5	1..2..3..4..5	1..2..3..4..5
Group D	1..2..3..4..5	1..2..3..4..5	1..2..3..4..5
	1..2..3..4..5	1..2..3..4..5	1..2..3..4..5
	1..2..3..4..5	1..2..3..4..5	1..2..3..4..5

Comments about the test:

Group D	
Group E	
Group F	

# Review past work

**Module 3**  
People of Today



**Cycle 1. Production: Word Map**  
Create a word map. Connect words like you see and use the ideas to help you.



**Cycle 2. Exchange: Partner's advice**  
Exchange your word maps with a partner. Think of better words and phrases.

**Cycle 3a. Production: Word categories**  
Write words into your word categories and use them in your presentations.

Cultural Connections	Feelings & Emotions

Connections to Society      Phrases & Idioms

**Cycle 4a. Exchange: Lexical Ideas from**

Cultural Connections	Feelings & Emotions

Connections to Society      Phrases & Idioms

**Cycle 4. Choose Best Test Results**

Test	Score	Comments

## Cycle 10. Testing, Reflection, and New Plans!

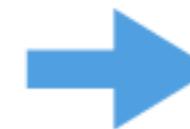
**PART A:** Take the **Master Test** that your class has chosen as the best test for you.

ヒント：みんなで選んだテストを受けよう。



People of Today!

My test score!



Score

**PART B:** Think about your **presentations** and the **test**. Write down advice for raising your skills further.

ヒント：プレゼンとテストの結果をみて、さらなる実力アップのためにできることを考えよう！

Learning point



Learning point



with your teacher. Write down new ideas. Make a learning plan.

ヒント：新たな学習プランを作成！次のレベルへステップアップ！

New Plan for Study	What do I need to do?



Teacher's Approval  
許可マーク



## Final Task:

What are the benefits of good IBL implementation?  
Why is the new syllabus 8x more effective?

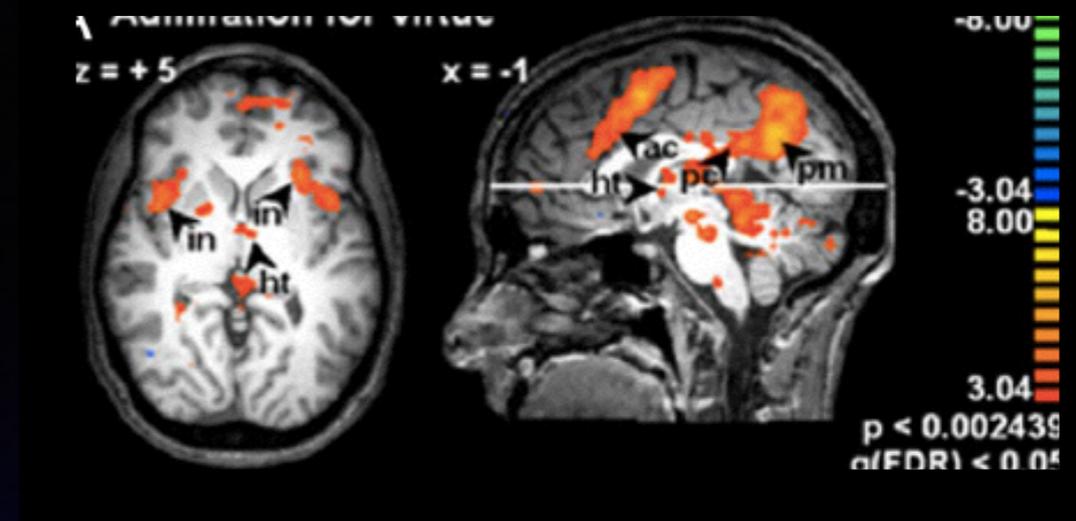
In just one semester: "Lectical Analysis"

Group A: showed 0.01 growth (= 1/3 of native speed)

Group B: showed 0.08 growth (8X faster than Group A!)

Consider the equilibriums being sought after:

teacher's examples —> master list design —>  
group work (prez design) —> P2P assessment —>  
group test design —> PR —> vote —> test —>  
design better strategies (x3)



**We covered a lot in this session!**

- **memory is fallible —reduce rote memorisation**
- **memory is a real-time process**
- **learning is not understanding**
- **we seek *equilibrium* with our contexts**
- **DaeNs!**
- **curiosity powerfully delivers us to equilibrium**
- **learning is very personal, not verbatim**
- **6 tweaks to an IBL course enhanced  
the speed of cognitive growth in their L2s (8x!)**

# So, what is your problem?

Let's work on your solutions together.

more on neuroELT?

[fab-efl.com](http://fab-efl.com)

*Thank you very much!*

**Robert S. Murphy**

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