

COGNITIVE VIEWS OF LEARNING

- Information Processing
- Piaget

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Epse 501

AGENDA

- Cognitive perspective of learning
 - Understanding
 - Memory
 - Schemas
- Piaget
 - Theory into practice
- Wrap-up



HISTORICAL CONTEXT: THE COGNITIVE REVOLUTION

- Behaviorism dominated until the 1960's,
- Then there was a marked shift back to questions of the mind:
 - What is consciousness?
 - How do we think?
 - How is knowledge formed?
 - How does cognition develop?



IS IT ALL THAT SIMPLE?

- Joti: At times, Chen moves away from cognitivist paradigm and shifts more to a behaviorism one. The lines between the two are often blurred within his research model.
- Sharissa: Although this article is listed as our reading for a cognitivist methodology, I struggle to find anywhere that the article strongly supports cognitivism.
- Kaitlin: I felt like Chen et al.'s article was supportive of a constructivist model rather than behaviourist or cognitivist approaches...However, the study ultimately had a behaviourist objective as they wanted to see if the interactions with the Kinect would alter the students' learning behaviours.





INFORMATION PROCESSING THEORISTS

- Interested in:
 - How and why we think
 - How children think
- Thinking as information processing
 - Task analysis
 - Declarative, procedural and conditional knowledge



Declarative knowledge

knowing what

**Semantic
memory**

**Episodic
memory**

**Procedural
knowledge**

knowing how

**Conditional
knowledge**

knowing when & why



ACTIVITY

- A Martian has landed in the middle of a snow storm, you give him a jacket but he has not clue what it is. He doesn't speak English but can read and understand each word individually.
 - Please write down explicit instructions on how to put on a coat.
- How could this activity been more interactive?
- Sheela: This appears to be a case of adding a layer of technology where it may not be warranted. It seems to remove the learner from interacting directly with their environment. The whole setup seems cumbersome for the purpose of learning. While two 30 student classes were involved, only 5 students could play at a time.



HOW CAN TEACHERS DETERMINE IF
STUDENTS HAVE LEARNED A CONCEPT?



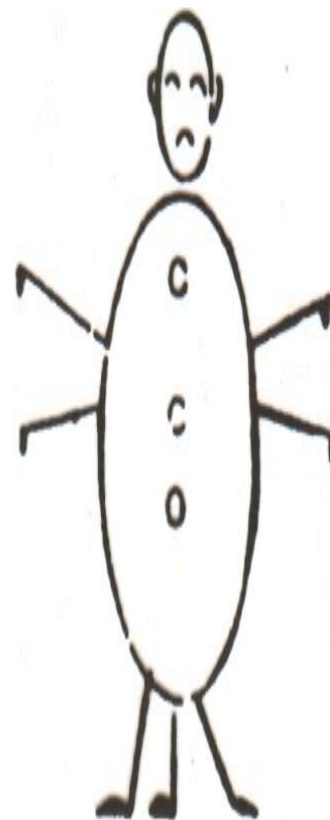
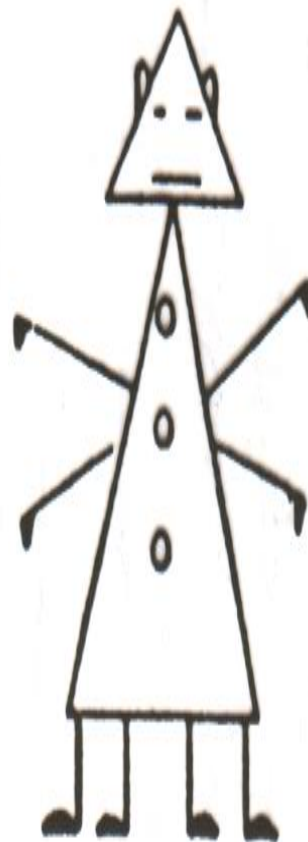
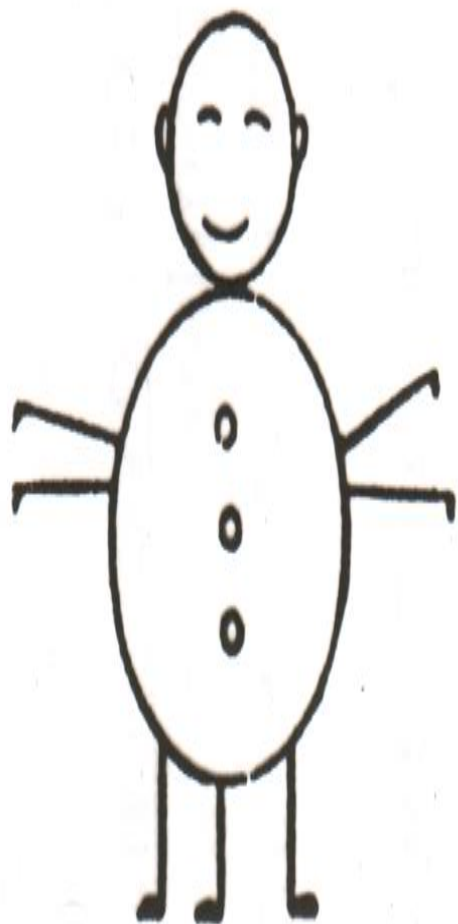
LOTS OF EXAMPLES:

- Less typical examples prevent undergeneralization (exclusion of a true member of a category)
- Non-examples prevent overgeneralization (inclusion of non-members in a category)

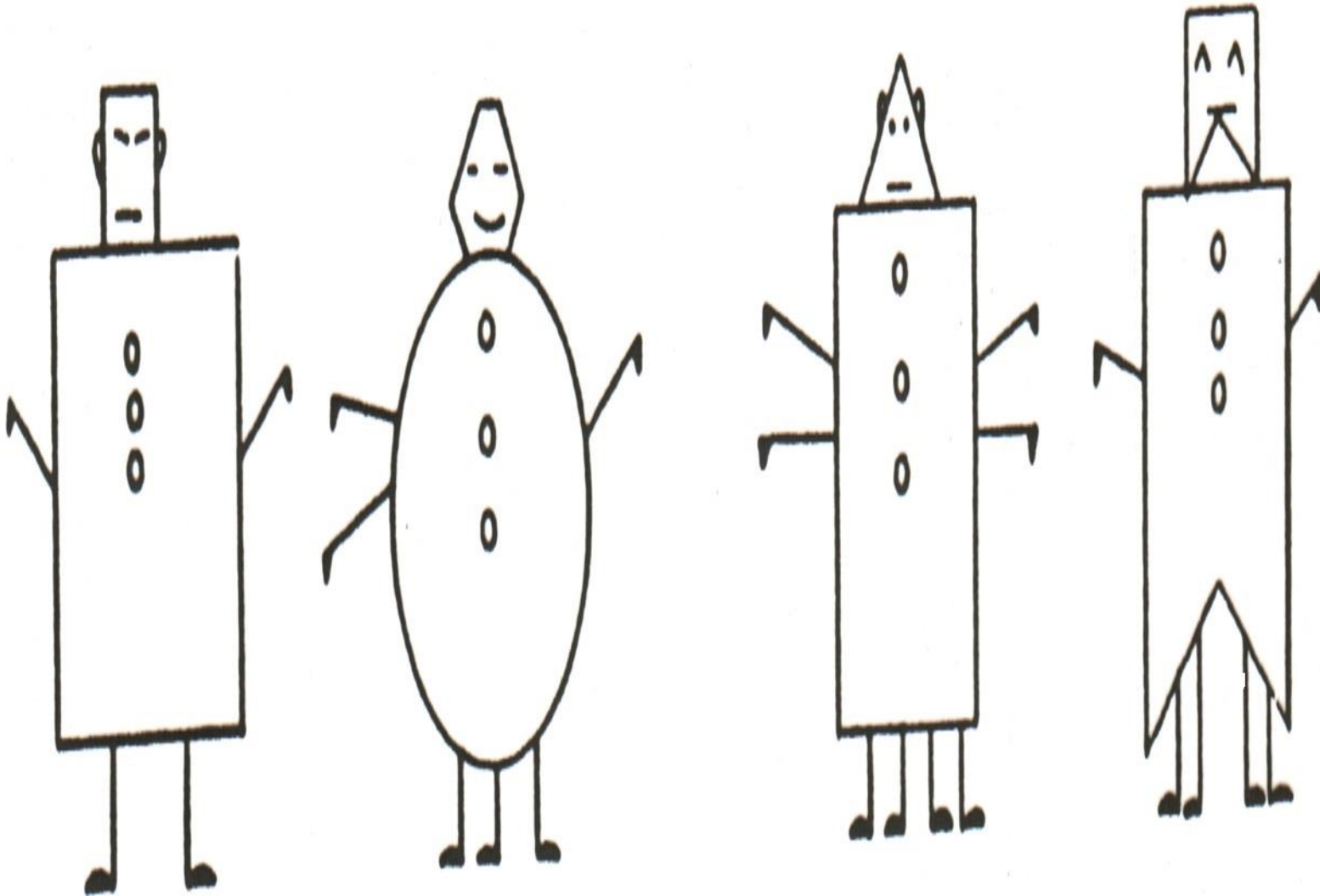


WEETAGS

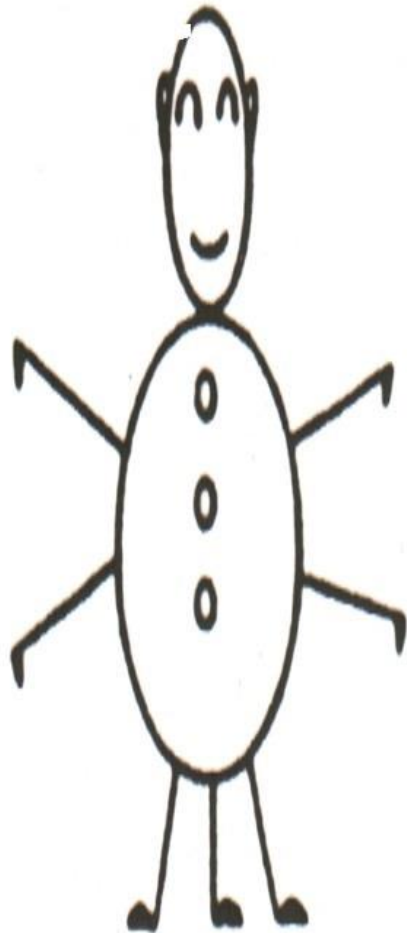
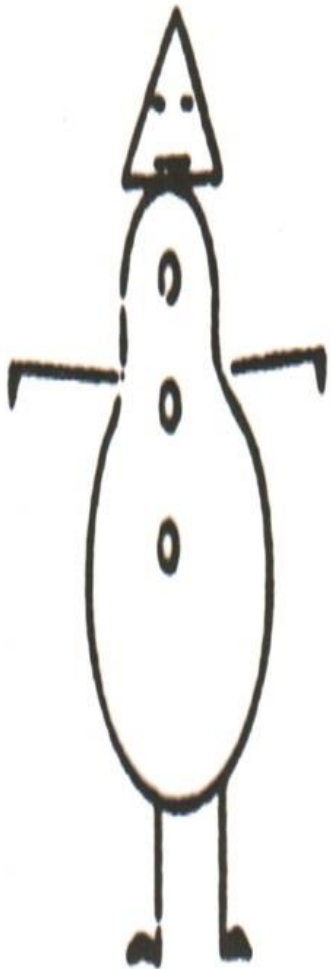
These are all WEETAGS



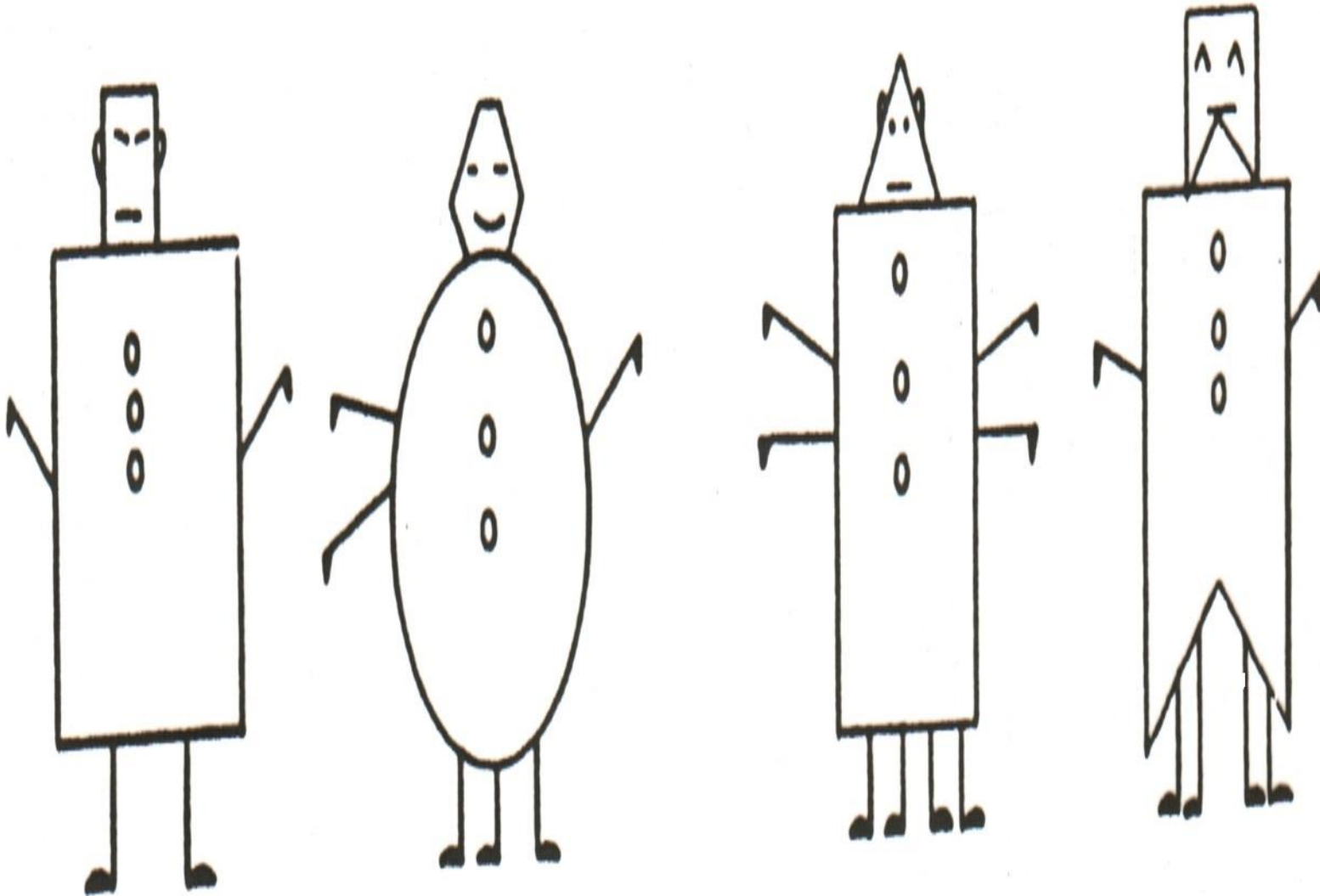
WHICH OF THESE ARE WEETAGS?



THESE ARE NOT WEETAGS



WHICH OF THESE ARE WEETAGS?

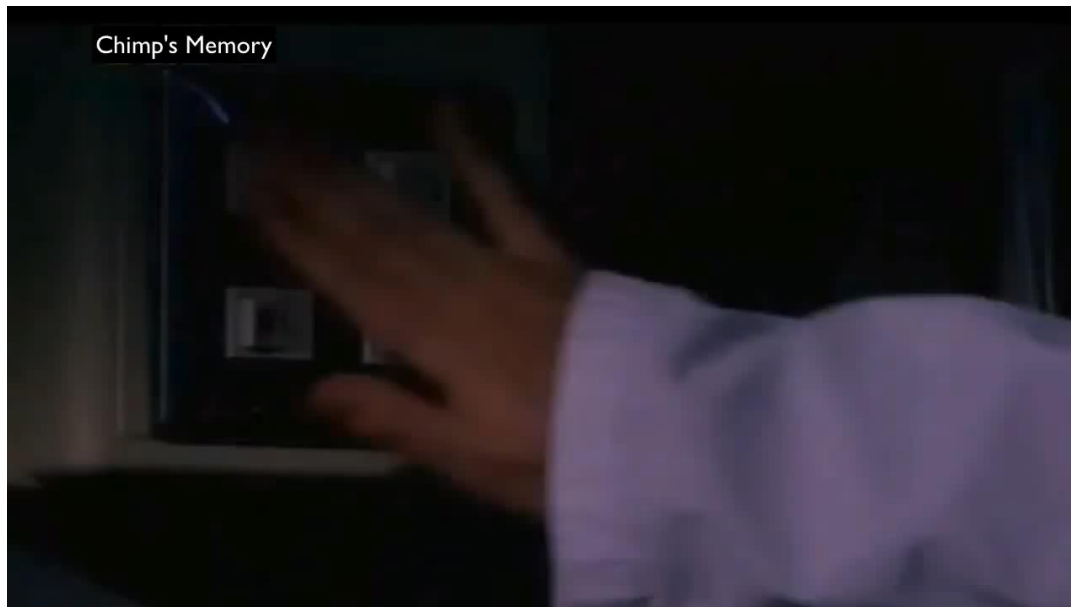


MEMORY

- 3 types:

- Sensory (SM)—fraction of a second to a few seconds
 - Close your eyes
- Working (short term) (WM)—up to 30 seconds
- Long term (LTM)—up to a lifetime

<https://www.youtube.com/watch?v=aAIGVT3N7B0>

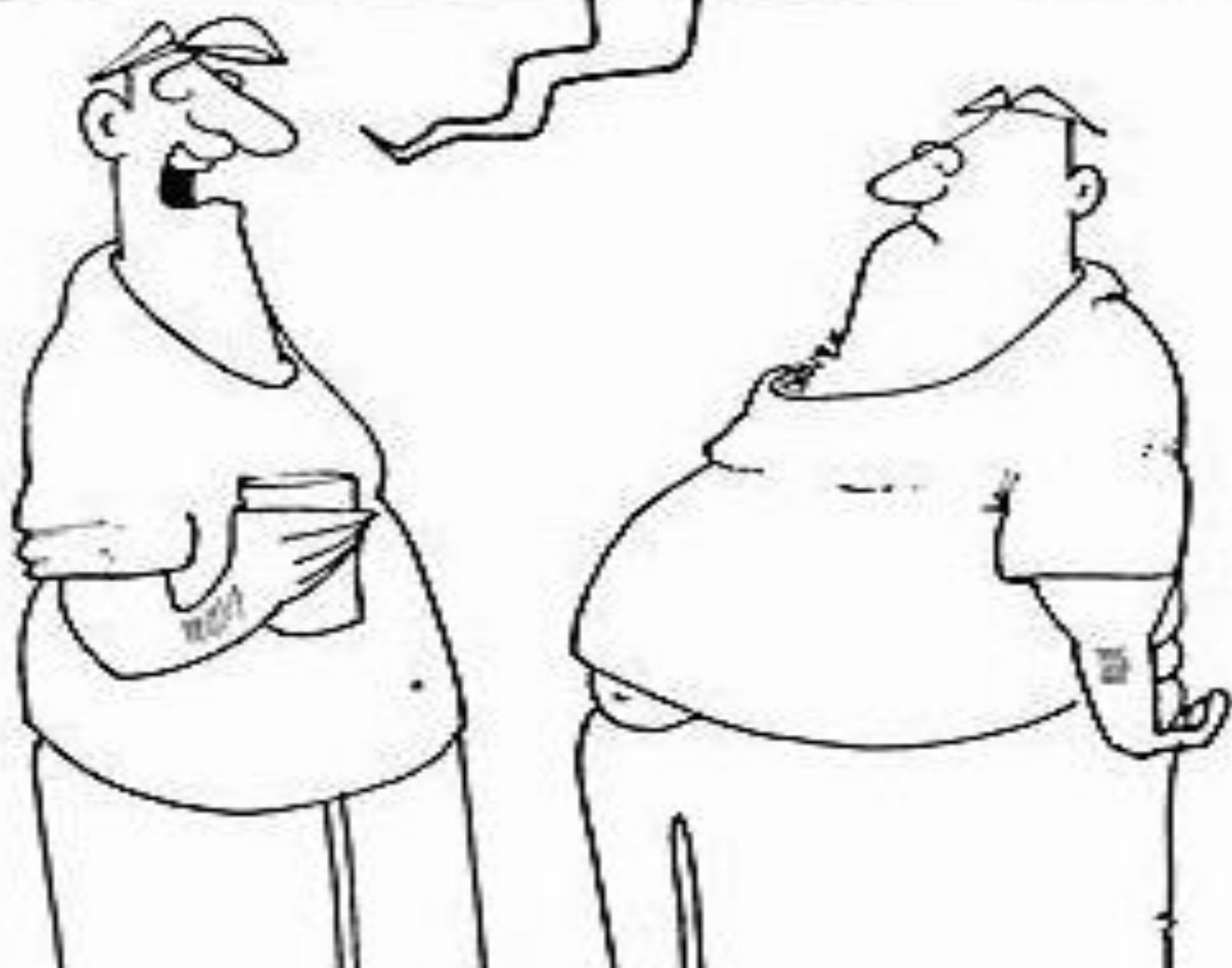


MEMORY

- As short term memory increases so does processing speed
 - Approximately 2 digits at 2-3 years, 5 digits at 7 years olds and 7 digits at 12-13 years
 - Short term memory has an effect on school achievement....why?



I CAN NEVER REMEMBER NAMES
-- DO YOU MIND IF I JUST CALL YOU
"FAT BASTARD"



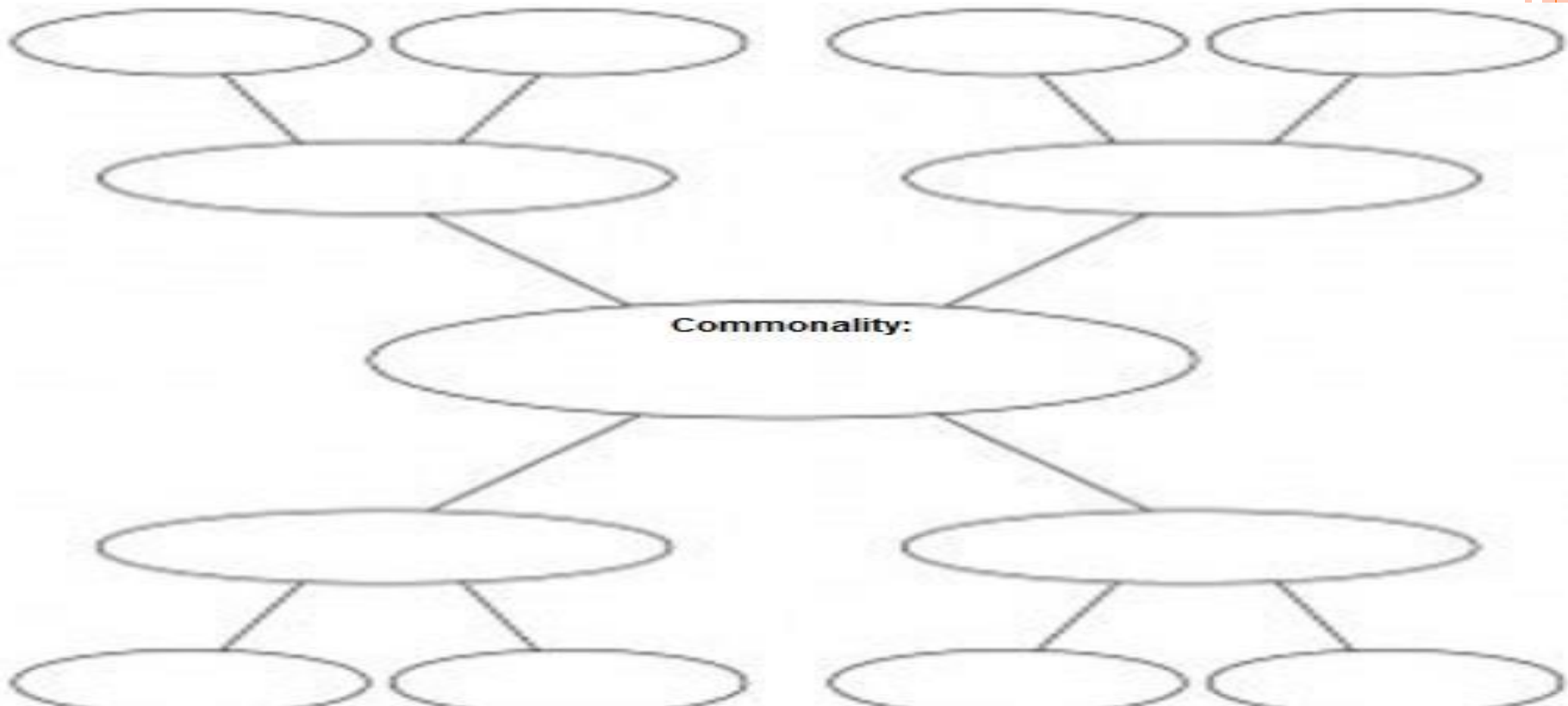
SCHEMAS:

- Are how memories are stored in LTM
 - LTM doesn't develop but schemas can
 - Many types of schemas
 - Scripts—schemas focusing on order of predictable events
 - Personal Schemas—we all have different connections



ACTIVITY

- Get into pairs and *Quickly* choose something you have in common (e.g. both are women, both have children, etc.)
- **Working on your own**—use the knowledge-web format below, write your commonality in the centre and fill in the rest



ACTIVITY

- **Working with your partner** compare your webs—are these similar? Different?
- What does this mean?



I HAVE A
PHOTOGRAPHIC
MEMORY.

IT TAKES AT
LEAST AN HOUR
TO DEVELOP.

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BASIC PROCESSES OF MEMORY

- Habituation: no longer paying attention to a stimulus



I CDNUOLT BLVEIEE TAHT I CLUOD AULACLTY
UESDNATNRD WAHT I WAS RDANIEG

Aoccdrnig to rscheearch at Cmabrigde Uinervtisy,
it deosn't mttar in waht oredr the ltteers in a
wrod are, the olny iprmoatnt tihng is taht the
frist and lsat ltteer be in the rghit pclae. The rset
can be a taotl mses and you can sitll raed it
wouthit a porbelm. Tihs is bcuseae the huamn
mnid deos not raed ervey lteter by istlef, but the
wrod as a wlohe.

Amzanig huh?

So hoo sez thet spelin iz impoartent!!



BASIC PROCESSES OF MEMORY

- Habituation: no longer paying attention to a stimulus
- Dishabituation: something changes so you need attention
- Automaticity: processing information with little or no effort



MEMORY STRATEGIES

YOU WILL HAVE 30 SECONDS TO REMEMBER
THE FOLLOWING 10 NUMBERS.

1

2

3

4

5

6

7

8

9

10



MEMORY STRATEGIES

YOU WILL HAVE 30 SECONDS TO REMEMBER THE
FOLLOWING 10 NUMBERS.

1 --ichi

2 --ni

3 --san

4 --shi

5 --go

6 --roku

7 --shichi

8 --hachi

9 --kyuu

10 --juu

1 --אֶחָד

2 --שְׁתַּיִם

3 --שְׁלוֹשׁ

4 --אַרְבַּע

5 --חֲמִשׁ

6 --שֵׁשׁ

7 --שִׁבְעַ

8 --שְׁמוֹנֶה

9 --תֵּשַׁע

10 --עָשָׂר



BASIC PROCESSES OF MEMORY

- Attention: concentrating a focusing mental resources to a task
- Selective attention: ability to focus on important parts while blocking out other stimuli
 - How can we get student's attention?
 - How do we maintain that attention?
 - Angela: Active learning in foreign language acquisition is effective and it's great to include new games, activities, and technologies which engage students but I find it's a short-term strategy.



STRATEGIES:

- Cognitive process that aren't automatic (work and effort required)
- These can be taught
 - How do you try to remember things?
 - Rehearsal
 - Organization
 - Elaboration (e.g. keyword/imagery, mnemonics)
 - Meaning making is key!



REVIEWING

A Few Things About Reading and Memory:

(Rozakis, 2003)

The average adult can't remember
50% of what s/he has just read.

The next day, s/he can only recall
20 – 30%.



THE ROLE OF REVIEWING IN MEMORIZATION

(WWW.BRAINWEB.US-COM)

After this # of days	Recall with NO REVIEW	Recall WITH REVIEW
7	33%	83%
63	14%	70%

EXAMPLE

- Spanish Vocabulary test after 8 years
 - Two practice sessions separated by:
 - 720 hours (30 days)
 - 48 hours
 - 24 hours
 - Zero hours
 - After 8 years recall was significantly better the greater the distribution of practice



CONTENT KNOWLEDGE

The ability to remember new information is highly related to the amount of knowledge already acquired

Key: The more you know the smarter you get.



FINAL ACTIVITY

You will have about one minute to study the following numbers:

7 4 2

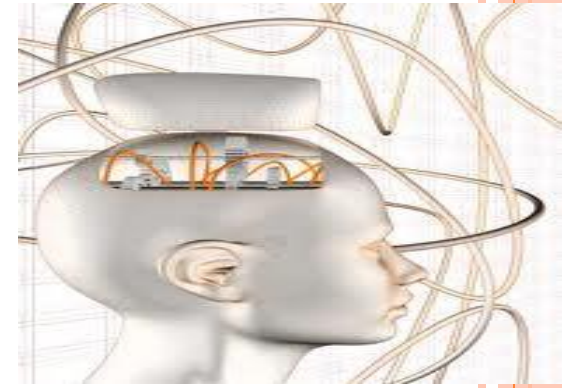
Your assignment is to *forget* these numbers.



BRAIN BREAK

Stretching your brain:

- Read the following words out-loud (ignoring the actual color of the word)



green

blue

yellow

blue

blue

black

red

blue

black

green

black

green

yellow

red

red

yellow

yellow

yellow

yellow

red

yellow

yellow

red

red

yellow

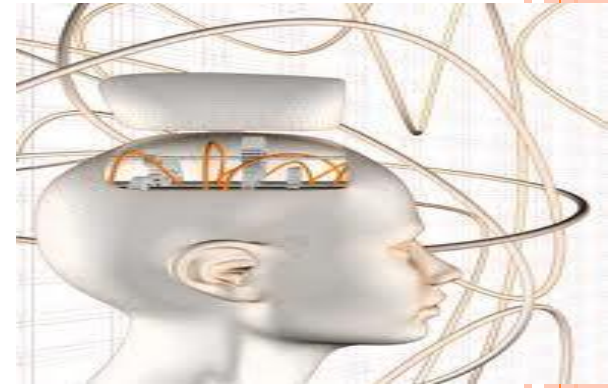
black

yellow

blue

BRAIN BREAK

Stretching your brain:



- Now, try saying the color no matter what the word says

green

blue

yellow

blue

blue

black

red

blue

black

green

black

green

yellow

red

red

yellow

yellow

yellow

yellow

red

yellow

yellow

red

red

yellow

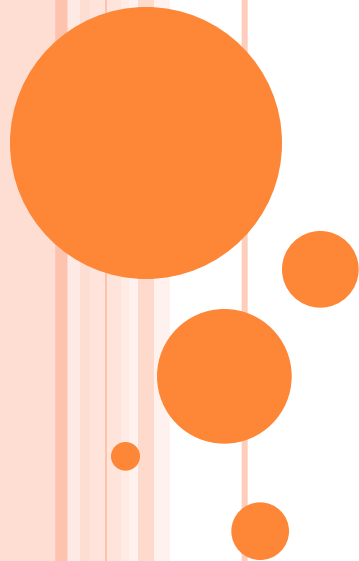
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PIAGET'S COGNITIVISM/CONSTRUCTIVISM



PIAGET SAW CHILDREN AS ACTIVE LEARNERS, HE:

- Studied children in their natural environments
- Saw learning as a constructive process
- Was fascinated by children's incorrect responses
- Proposed that cognitive growth takes place in developmental stages



Piaget's Stages of Cognitive Development

SENSORIMOTOR STAGE

(Age 0–2)
The child begins to interact with the environment.



PREOPERATIONAL STAGE

(Age 2–6 or 7)
The child begins to represent the world symbolically.



CONCRETE OPERATIONAL STAGE

(Age 7–11 or 12)
The child learns rules such as conservation.



FORMAL OPERATIONAL STAGE

(Age 12–adulthood)
The adolescent can transcend concrete situations and think about the future.



CONCRETE OPERATIONAL STAGE EXAMPLE

○ Conservation

- <http://www.youtube.com/watch?v=qYtNhNP69lk&feature=related>



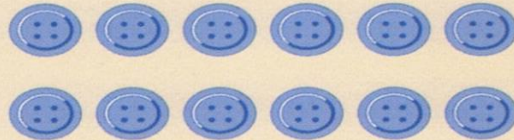
Conservation Task

Original Presentation

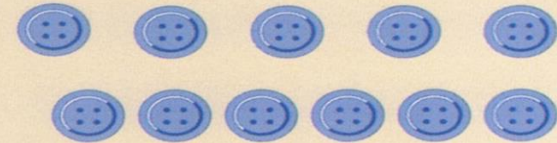
Transformation

Number

Are there the same number of buttons in each row?



Now are there the same number of buttons in each row, or does one row have more?



Length

Is each of these sticks just as long as the other?



Now are the two sticks each equally as long or is one longer?



Liquid

6-7 years

Is there the same amount of water in each glass?



Now is there the same amount of water in each glass, or does one have more?



Mass

6-7 years

Is there the same amount of clay in each ball?



Now does each piece have the same amount of clay, or does one have more?



Volume

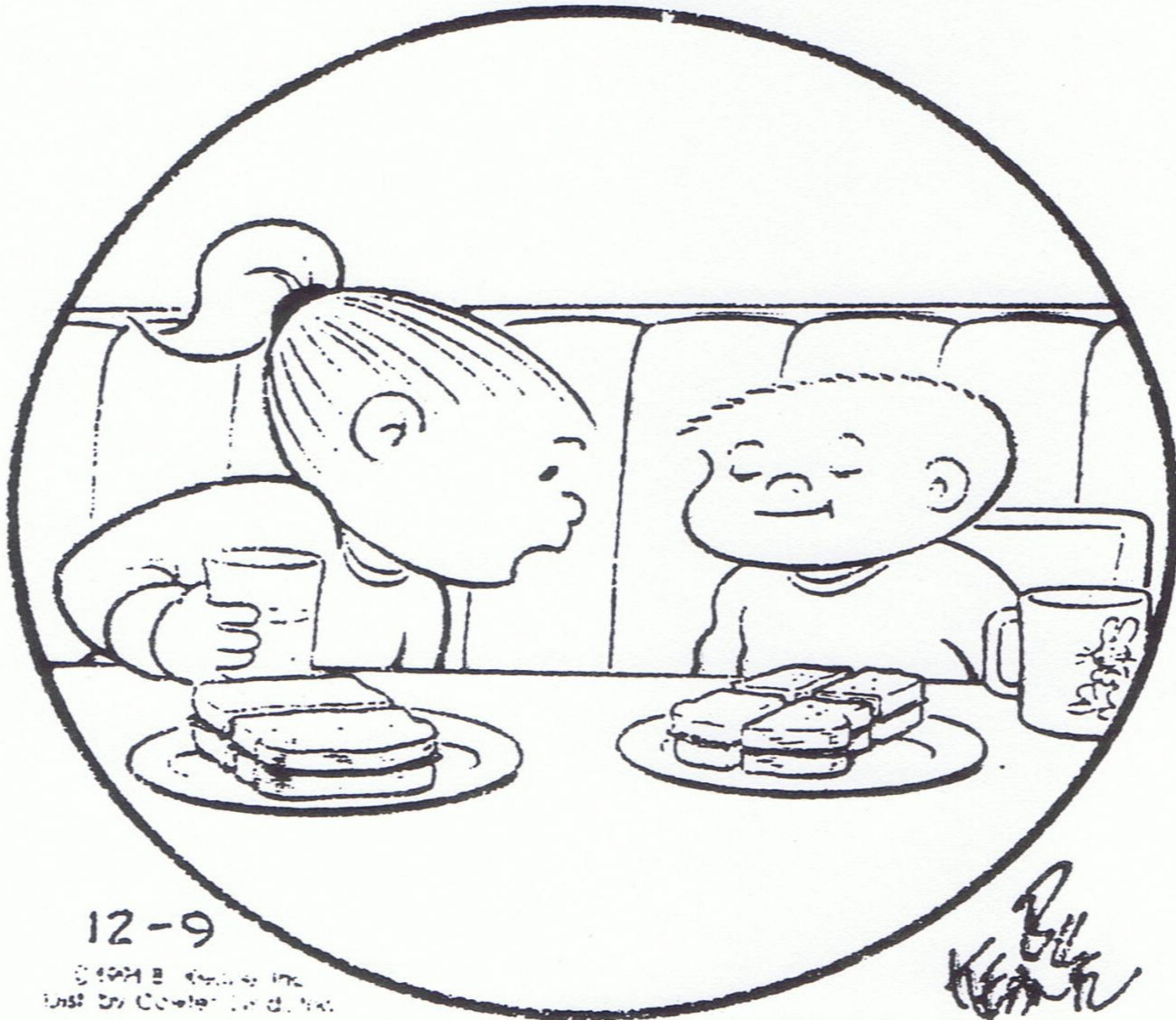
Does the water level rise equally in each glass when the two balls of clay are dropped in the water?



Now (after one piece of clay is removed from the water and reshaped) will the water levels rise equally, or will one rise more?



THE FAMILY' CIRCUS



12-9

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Bill Keane

"How come PJ got 4 sandwiches
and I only got 2?"



ACCORDING TO PIAGET:

- Each stage qualitatively different
- Follow a regular sequence
- experience and time is needed to progress



WHAT ARE THE EDUCATIONAL IMPLICATIONS OF PIAGET'S THEORY?

- Cognitive development in any one stage depends on activity.
- Children must engage in appropriate activities in order to learn
- Cognitive growth occurs through the process of adaptation and proceeds through the process of assimilation and accommodation



WHAT IS THE DIFFERENCE BETWEEN ASSIMILATION AND ACCOMMODATION?

- Assimilation: The process of taking within, or internalizing one's environmental experience (incorporating new information into existing knowledge).
- Accommodation: The adjustment the individual makes when incorporating external reality (when a student adjusts to new knowledge)



Schemes of Learning



Banging is a favorite **scheme** used by babies to explore their world...



...And **assimilation** occurs when they incorporate new objects into the scheme.



Accommodation occurs when the new object doesn't fit the existing scheme.

EQUILIBRATION

- Is the process of balancing what we already know (assimilation) and what we may be asked to learn that doesn't quite fit (accommodation)
- Individuals seek equilibrium or balance in their cognitive systems, when this balance is disrupted they seek to restore equilibrium (disequilibrium is cognitive conflict)
- Explains how we go from one stage to the next: Through cognitive conflict and disequilibrium



HOW WOULD AN INSTRUCTOR HEAVILY INFLUENCED BY PIAGET STRUCTURE HIS/HER TEACHING?

- Creating conceptual change requires that an instructor challenge student's existing concepts so as to create cognitive disequilibrium.
- Providing students with evidence that contradicts their initial beliefs will require them to modify cognitive structures on the basis of new information. Through this process of adaptation, students build new cognitive structures.



ACTIVITY IS KEY!



-opposite of drill and kill

WHAT DO WE MEAN BY ACTIVITY??

- Iren: Although this study examines active learning, I believe the focus is primarily on having students being physically active in the lesson, as opposed to being mentally active to process information.
 - On the other hand:
- Amy: I believe that Chen et al make some extremely valid points in regards to cognitive views of learning. Using body movements and multimodal learning in the classroom can certainly improve how students' receive, organize, store, and retrieve information.
- Jen: The term embodied cognition is something that is new to me. I have often considered active learning as important for student engagement, but have not extensively considered how the body itself becomes an actual part of cognitive processes.



Impact on Education



- Children think differently than adults.
- Children must be developmentally ready to learn.
- Teachers should use developmentally appropriate practices to enable children to learn.



CALLAHAN

By John Callahan



"Of course I'm a Narcissist - I'm only 3 years old!"



OVERALL LESSONS:

- Belinda: Active learning with technology has many possibilities.
- Renuka: I recognize in my classroom Behaviourism, Cognitivism are both present in my practice.
- Peter: In my experience, it is important for teachers to implement movement within their daily instruction to enhance learning.
- Todd: The information that we teach our students is so varied that we cannot help but use all learning methods. As long as we make sure that we do not focus on a single method of delivery with a lack of consideration of the others, we will provide a balance experiences for our students.



WRAP UP

- What were the numbers that you were supposed to forget?
 - 742
- What might you add to your Cmap? Talk to the person beside you.
- Cmap Questions...

