

AP PSYCH Unit 7B.1

Cognition: Concepts & Solving Problems

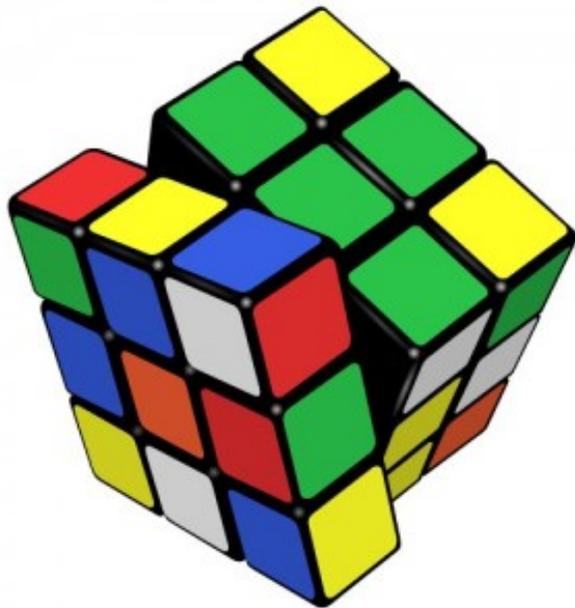
- List or describe as many different uses you can think of for this paper clip.



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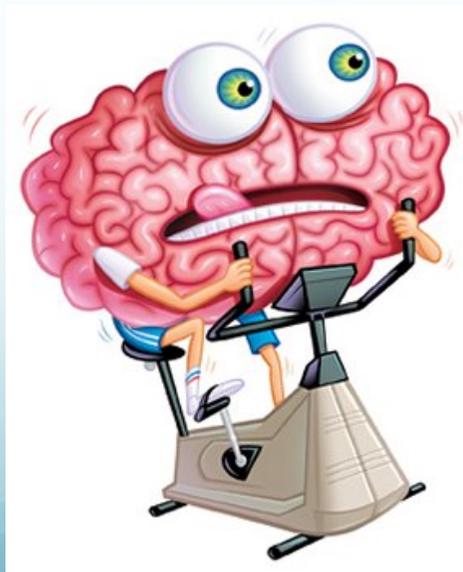
Cognition: Concepts & Solving Problems

1. What are the functions of concepts?
2. What strategies assist our problem solving?
3. What is creativity, and what fosters it?



Thinking & Cognition

- **Cognition** – all the mental activities associated with thinking, knowing, remembering, and communicating
- The logical and *illogical* ways we create concepts, solve problems, make decisions, and form judgments



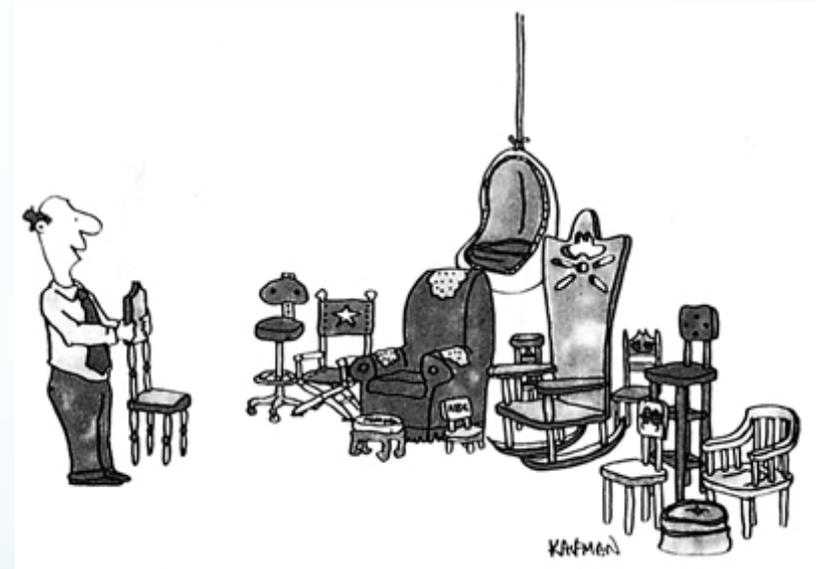
Concepts vs. Prototypes

1. Describe a triangle
2. Draw a triangle

1. Concept
2. Prototype

Concepts

- We simplify things when thinking about everything in the world
- **Concepts** – we form mental groupings of similar objects, events, ideas, and people – they share common features
- Concepts make life much easier, it simplifies things into classifications
- Concept of a chair: for sitting, 4 legs, etc



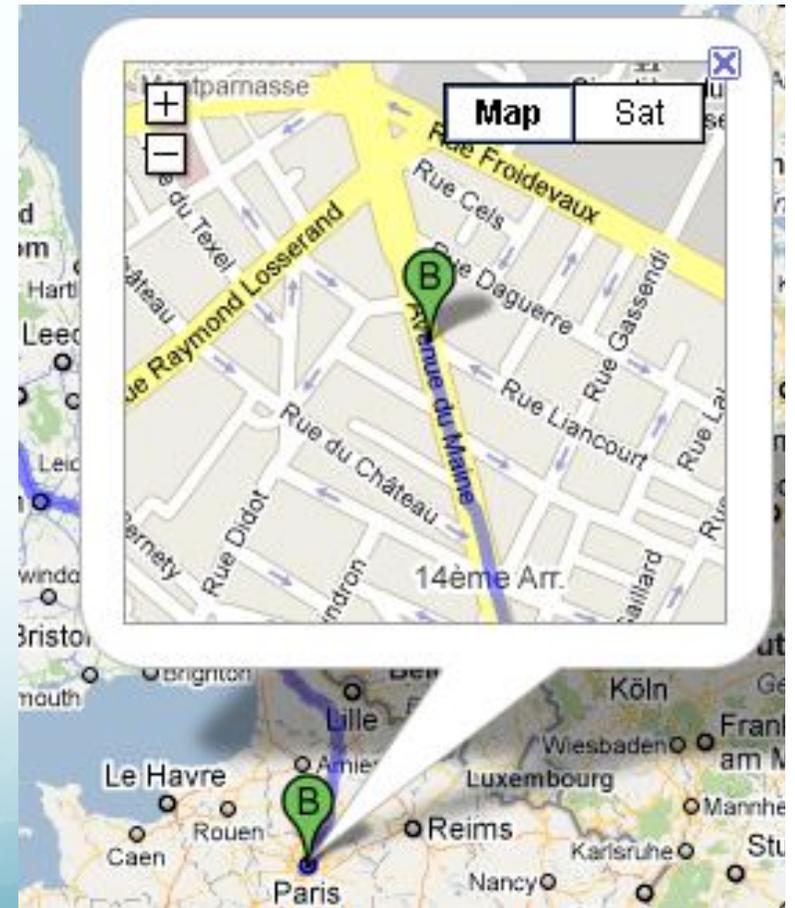
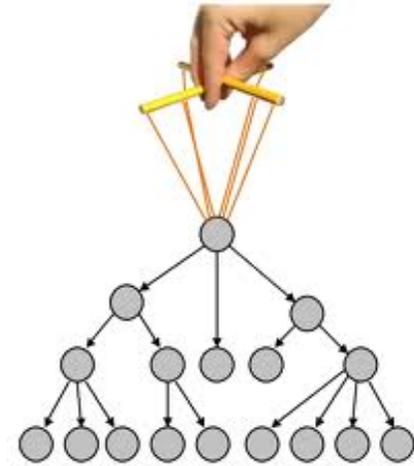
Prototypes

- **Prototypes** – we form our concepts by developing mental images or best examples that incorporate all the features associated with a category
- We match new items to an existing prototype to provide a quick and easy method for putting things into categories
- EX: Prototype of:
 - Triangles – anything with 3 sides
 - Birds – small, feathered, flying, comes from an egg



Hierarchies

- To further simplify things
- We organize concepts further into these hierarchies
- Think of major cities, organized first into geographical sectors, then neighborhoods, and then into individual streets – which helps you and cab drivers easily navigate
- These categories help us and we use them efficiently



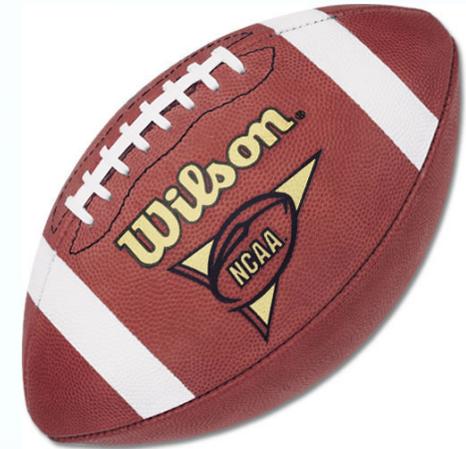
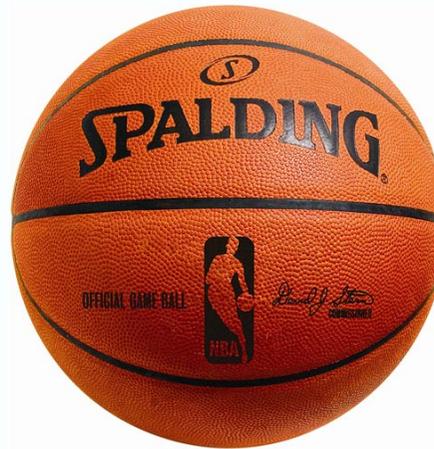
Prototypes

The robin on the left matches our prototype of a bird more easily, the penguin on the right takes a little longer to recognize as a bird because it doesn't exactly match our prototype of something small, feathery, and flying. The robin is "birdier"



Prototypes

Because of concepts & prototypes, it takes little time to identify each object as our prototype of a _____, except maybe the one on the top right...



Prototypes

- Fruit?

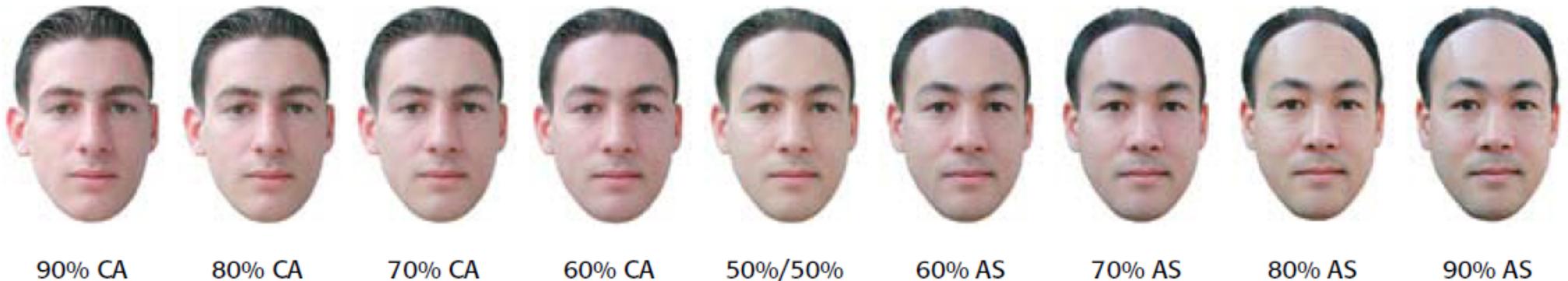


- Fish?



Prototypes

- Memory shifts after showing ethnically mixed faces
- If you see the 70% white face, later you might think you saw the 80 or 90% white face, and vice versa for the Asian face – because of our prototypes of what an Asian or white face looks like



Write down the first thing that comes to mind for each category

1. A bird

2. A color

3. Triangle (picture)

4. A motor vehicle

5. A sentence

6. A Hero

7. A heroic action

8. A game

9. A philosopher

10. Food

Were these your answers?

1. A robin or eagle
2. Red or Blue
3. A picture of an equilateral triangle
4. A car
5. A short declarative statement: EX “the boy ran home”
6. Superman, Batman or a fireman
7. A single act by a *male*: Rescue by a fireman
8. A board game or video game
9. Socrates, Aristotle, Plato
10. Korean or American food

Prototype Activity Explained

- We tend to think in terms of the best example of a category or prototype.
- Within a given culture there tends to be considerable agreement or near consensus on some prototypes.

Solving Problems

- What is **problem solving**?
 - Is there a short cut around this traffic jam?
 - What do I do if I'm locked out of my house?
 - How can we solve the problem of climate change?

EX: Pine, Crab, Sauce

EX: SPLOYOCHYG

Solving Problems

- **Trial & Error**
- **Algorithms** – methodical, step-by-step procedures that guarantee a solution for solving a problem.
 - Takes time
- **Heuristics** – simple thinking strategy that often allows us to make judgments and solve problems efficiently
 - usually speedier but also more error-prone than algorithms

Algorithms vs. Heuristics

Unscramble

S P L O Y O C H Y G

- **Algorithm**
 - all 907,208 combinations
- **Heuristic**
 - throw out all YY combinations
 - other heuristics?

Algorithms vs. Heuristics

To search for hot cocoa at the grocery store, you could search:

every aisle (algorithm)

OR

check the breakfast, beverage, dessert, or baking supplies aisle (heuristics)

Heuristics is quicker, but algorithm guarantees you find it eventually



Problems with heuristics?



Insight

Insight – a sudden and often novel realization of the solution to a problem

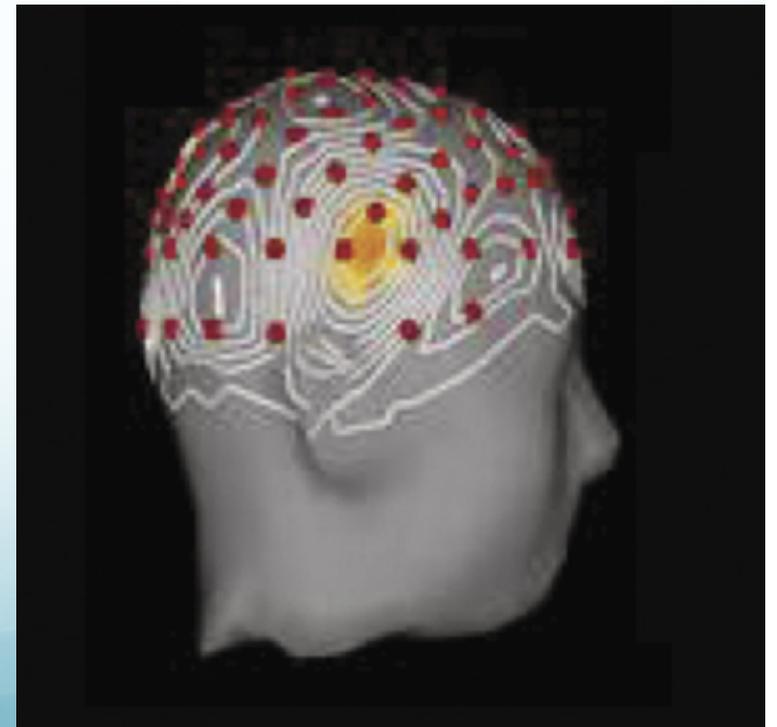
Not strategy based

Flash

This is the Aha moment!

Eureka!

Burst of activity in frontal lobe, then right temporal lobe, just above the ear



Insight – Sultan the Chimp

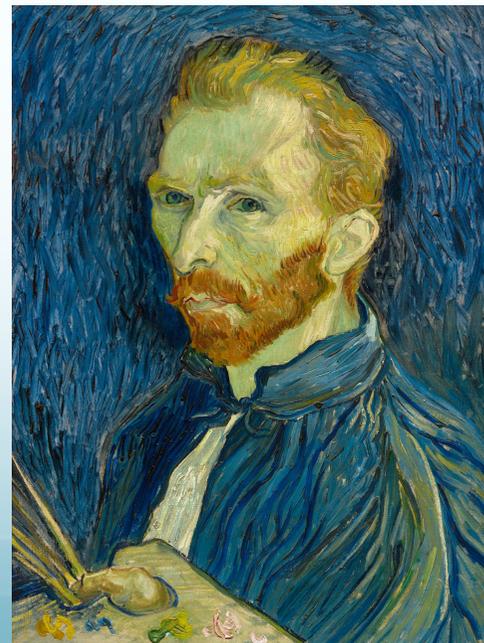
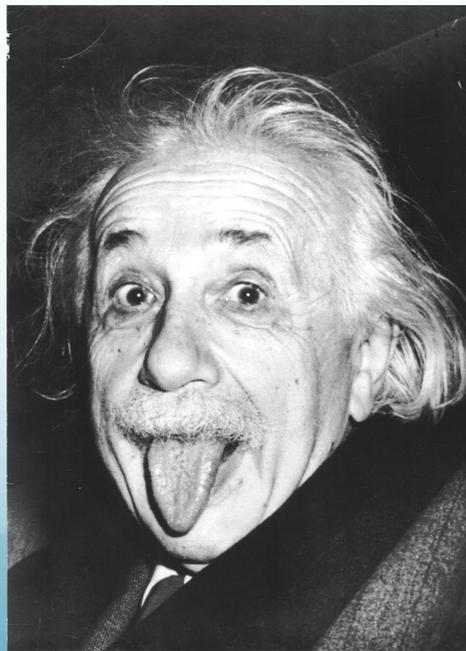


Creativity

- What is your definition of creativity?

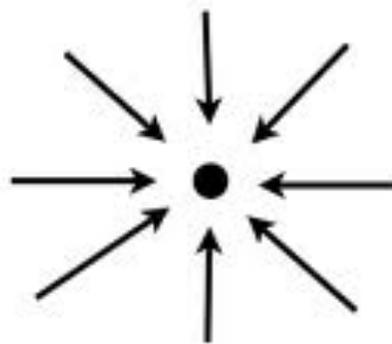
Creativity

- **Creativity** – ability to produce new and valuable ideas
 - Certain level of aptitude or talent, but not knowledge, is part of creativity
 - World's most creative people aren't any smarter than you or me

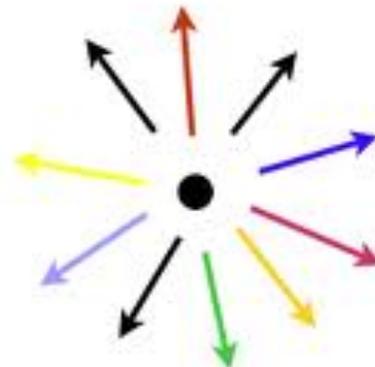


Creativity – Convergent vs. Divergent Thinking

- **Convergent Thinking** – IQ tests, tests that require a single correct answer
 - Damage to left parietal lobe damages convergent thinking
- **Divergent Thinking** – Creativity tests, *how many uses can you think of for this paper clip?*
 - Damage to frontal lobe leaves convergent thinking abilities intact but damages imagination



Convergent Thinking



Divergent Thinking

Creativity

- Cartoonists are creative – they see things in new ways, make new and unusual connections



Creativity



- Sternberg's five components
 1. Expertise
 2. Imaginative thinking skills
 3. A venturesome personality
 4. Intrinsic motivation
 - Are kids in Asia pushed so hard by their parents (extrinsically) that they lack creativity in Western schools?
 5. A creative environment

Obstacles to Problem Solving

- Many cognitive tendencies that we think are taking us in the right direction can often give us wrong answers



Problem Solving

- A bat and a ball cost \$1.10 in total. The bat cost a dollar more than the ball. How much does the ball cost?



- The answer is \$1.05 for the bat and \$.05 for the ball.
- It's ok 50% of Princeton students get this question wrong!
 - They get this question wrong because they usually go with their intuition!



**PRINCETON
UNIVERSITY**

- A man bought a horse for \$60 and sold it for \$70. Then he bought the same horse back for \$80 and again sold it, for \$90. How much money did he make in the horse business?



- Most people say \$10.
- The correct answer is \$20.

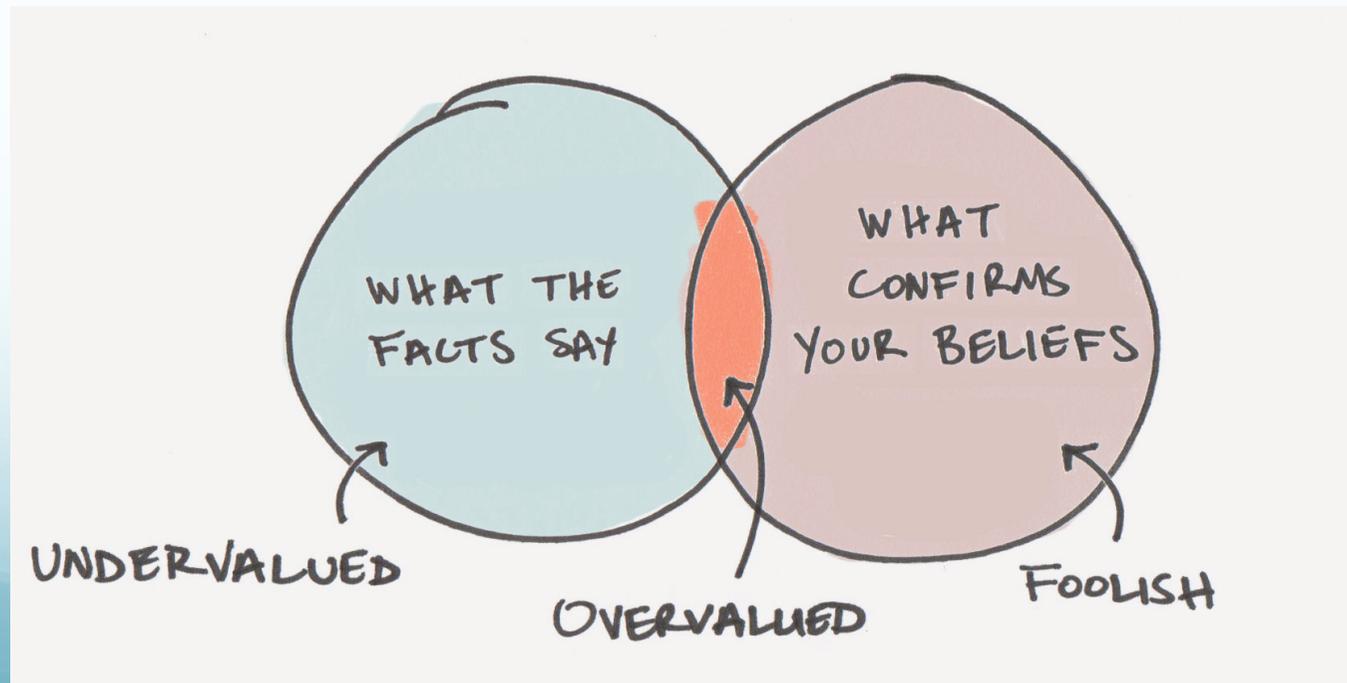


- Let's learn more about why we get these brain teasers wrong sometimes

Obstacles to Problem Solving

Confirmation bias - We seek evidence verifying our ideas more eagerly than evidence that might refute them.

Have you ever been in a debate or argument with a friend and you deliberately only point out evidence that proves your point and try to overlook or not notice any evidence that counters your argument?



Obstacles to Problem Solving

Confirmation bias

Are you into politics? You might only read news that backs up your political views instead of accepting views from the other side.



Obstacles to Problem Solving

Fixation – the inability to see a problem from a new perspective, by employing a different mental set



How would you arrange six matches to form four equilateral triangles?

Types of Fixation

Mental Set – predisposes how we think, tendency to approach a problem in one particular way, often a way that has been successful in the past.

Similar to *perceptual set / priming*

O-T-T-F-?-?-?

What are the final 3 letters?

Types of Fixation

F-S-S

(F)Ive-(S)ix-(S)even

O-T-T-F-F-S-S

So once you solve that problem, it makes this problem easier:

J-F-M-A-?-?-?

But sometimes what worked in the past hurts our ability to find new solutions

Types of Fixation

Functional fixedness – our tendency to think of things only in terms of their usual functions; impeding our problem solving



Using these materials, how would you mount the candle on a bulletin board?

