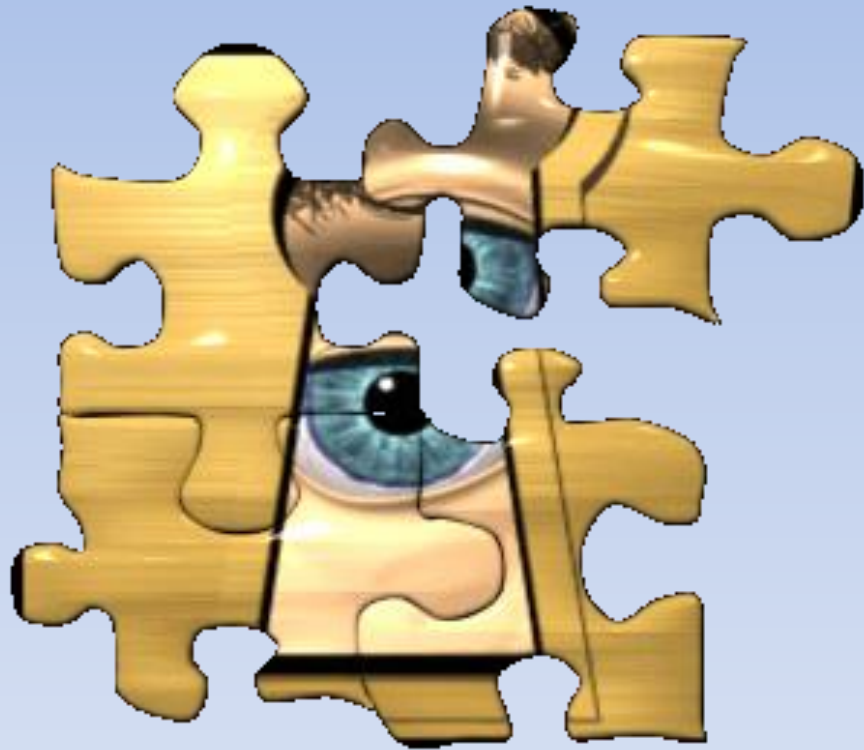


# How do we solve problems?



- Insight
- Trial and Error
- Formal Reasoning  
(2 types)
- Informal Reasoning

# Insight - the "A-ha! Moment"



- Insight involves a sudden novel realization of a solution to a problem.
- No real strategy is involved

Who is the person who studied "insight" in chimpanzees???



## KOHLER

1. Seemingly all possible problem-solving attempts have been exhausted and are unsuccessful.
2. Ongoing attempts to solve an apparently unsolvable problem eventually end.
3. A perfect solution to the problem is suddenly realized in a spontaneous way.

# Insight - the "A-ha! Moment"

What does this phrase mean?

you just me

Often fun, satisfying,  
and one of the reasons  
that people enjoy  
working on word jumbles  
and other mental  
puzzles (causes a  
pleasing excitement)



What does this  
phrase mean?

stood  
well  
view

# Can you get the "A-HA" moment? Or are you a victim of a mental set?

(1)



(2)



(3)



(4)



# Trial and Error

➤ Characterized by repeated, varied attempts which are continued until success, or until the agent stops trying.

➤ Typically good for problems where you have multiple chances to get the correct solution.

➤ However, this is not a good technique for problems that don't give you multiple chances to find a solution. For those.....



# Formal Reasoning

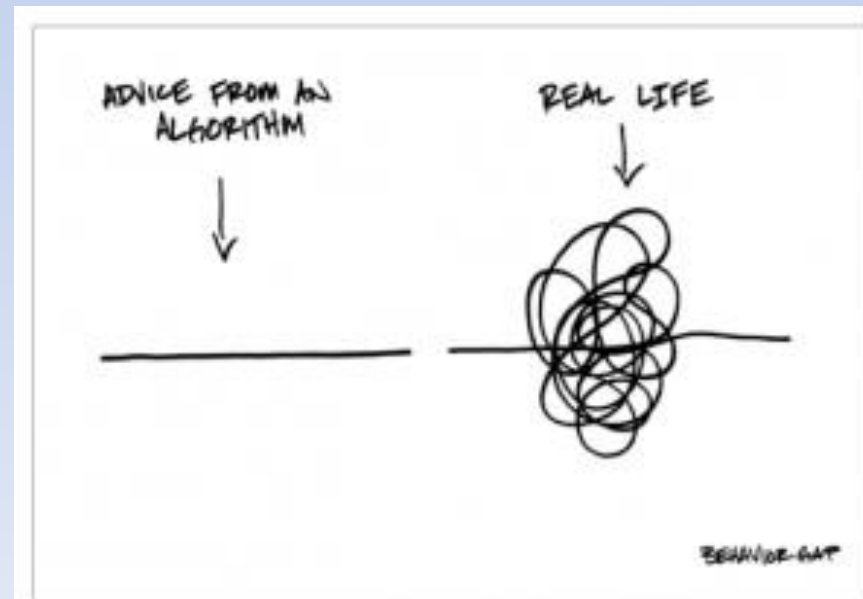
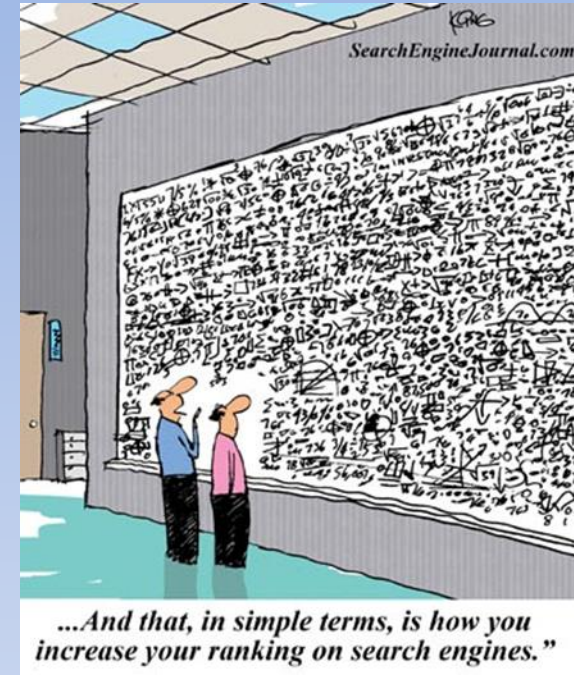
- It is the kind of thinking you find in an intelligence test.
- The information needed for reaching a solution is specified clearly.
- There is a single right or best answer.

# Formal Reasoning

## #1 - Algorithm

- A rule that guarantees the right solution to a problem.
- Usually by using a formula.
- **Example:**
- To solve a problem in long division you just apply a series of operations that you have learned.

They work but are sometimes impractical.



# Formal Reasoning

## 1 - Algorithm

Algorithms, which are very time consuming, exhaust all possibilities before arriving at a solution. Computers use algorithms.

S P L O Y O C H Y G

If we were to unscramble these letters to form a word using an algorithmic approach, we would face 907,208 possibilities.



# Formal Reasoning #2-Logic

## • Deductive Reasoning

- Drawing conclusions from a set of observations or premises.

- If the premises are true, the conclusion must also be true.

## • Example:

- All human beings are mortal. I am a human being.

## • If the premises are true

- Then, I am mortal.

## • Inductive Reasoning

- Draw conclusions but could be conceivably wrong.

- You draw **specific conclusions** from **general premises**.

## • Example:

- Most people with season tickets must love music. John has season tickets.

- Then, John probably loves music.

# Formal Reasoning - 2 - Logic

## • Deductive Reasoning

### Examples:

- 1. All oranges are fruits  
2. All fruits grow on trees  
3. Therefore, all oranges grow on trees
- The soccer game is on either Thursday or Friday. I just found out that the game is not on Thursday, so the game must be on Friday.
- If the two premises really are true, then there is no possible way that the conclusion could be false.

## • Inductive Reasoning

### Example:

- All the tigers observed in a particular region have yellow black stripes, therefore all the tigers native to this region have yellow stripes
- My dog has never bitten me, so dogs don't bite.
- Even if all the premises are true, it is still possible that the conclusion is false.

January has always been cold here in Siberia. Today is January 14, so it is going to be another cold day in Siberia.

This argument is inductive. The premises makes the conclusion likely, but they do not guarantee that the conclusion is true. To put the point another way, it is possible that the premises of this argument could be true and the conclusion could still be false. One can, for example, imagine a freak warm day in Siberia on January 14.

# Sherlock Holmes and inductive reasoning.



# Informal Reasoning

- In informal reasoning problems, there may be no clearly correct solutions.
- **Disagreement** may exist about basic premises.
- Information may be **incomplete**.
- Many **view points** may compete.

# Informal Reasoning

## 1-Heuristics

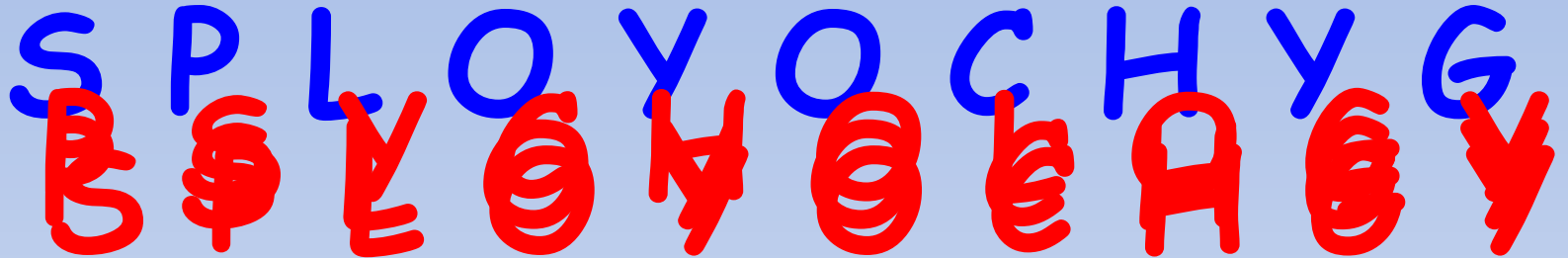


- A rule-of-thumb strategy that often allows us to make judgments and solve problems efficiently.
- A short cut (that can be prone to errors).
- **Examples:**
- A doctor who wants to determine the best kind of treatment.
- A factory owner who wants to boost production.

Who would you trust to baby-sit your child?



# Heuristics



Put a Y at the end, and see if the word begins to make sense.

We use heuristics everyday ,and they help us process our environment and make decisions quickly.

However, they set us up to make mistakes....

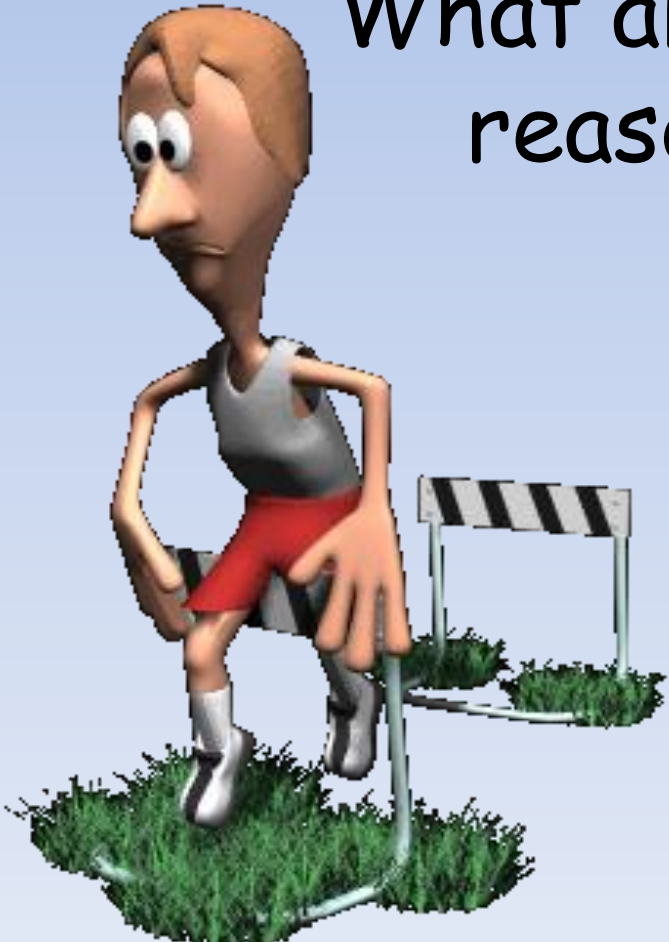
That concludes our discussion about

## PROBLEM SOLVING STRATEGIES



### Barriers to Reasoning

What are some obstacles to using reason and problem solving?

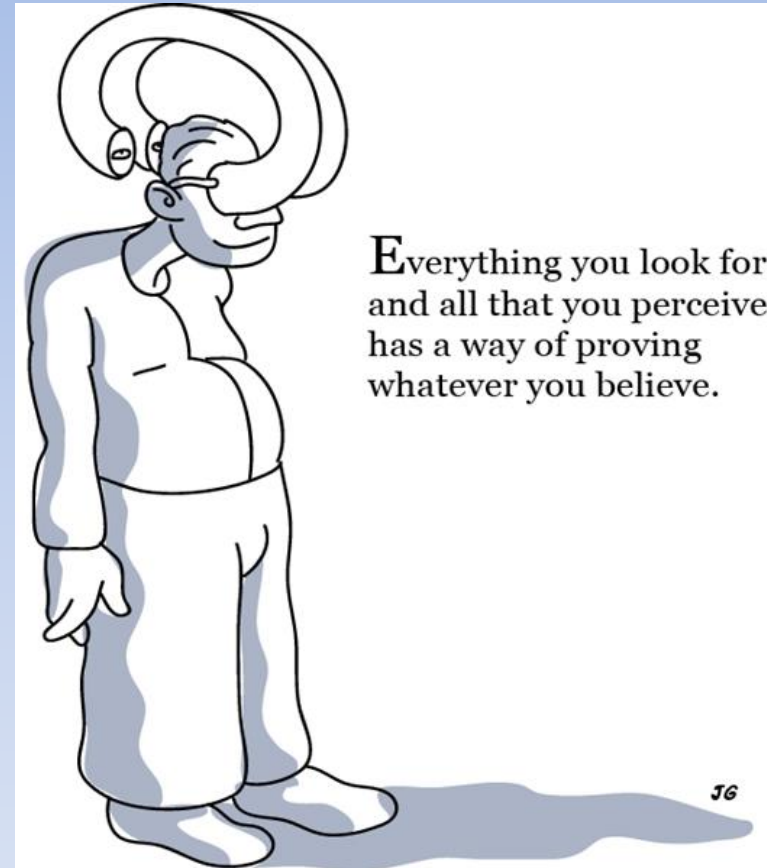


**Cognitive Biases**



# Cognitive biases impact decision-making.

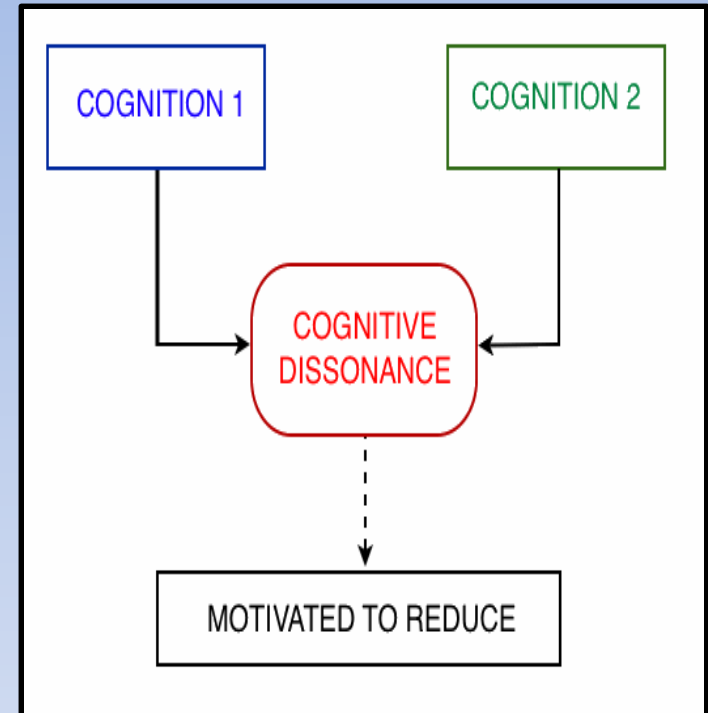
- Cognitive biases are mental mechanisms that: systematically influence judgment and decision-making.
- Cognitive biases occur without our conscious awareness.
- (They help us make decisions quickly, but can impair our ability to make rational judgments.)
  - *Note: we're not going to focus on why we have cognitive biases, but instead on their effects.*



# Cognitive biases sound vaguely familiar.

A bias you have probably heard of is cognitive dissonance:

- an unpleasant state of arousal that results when two cognitions are in conflict, that you are motivated to reduce.
- *For example, if you voluntarily do a favor for someone you don't like very much, you begin viewing the person more positively.*



You have cognitive biases. Everyone has them.



Oh! Don't forget **FAE**, that is a bias too, right? Wait... What is **FAE** again? Can someone help me out?

