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# **Obstacles to Problem Solving**

# Obstacles to Problem Solving

- **Hindsight Bias**: the tendency to believe, after learning an outcome, that one would have foreseen it
  - “I knew it all along” phenomenon



Monday Morning  
Quarterbacking!!!

9/11 example -  
“people in the second  
tower *should* have  
immediately  
evacuated”



# Obstacles to Problem Solving

- **Confirmation Bias**: A tendency to search for information that confirms one's perceptions
  - Example: Business managers want to confirm they hired the right person so look for good things they do



# Confirmation Bias

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- You choose your boyfriend or girlfriend; you want to be proven right (that you made a good choice); you look for signs that indicate this



# Confirmation Bias

- Which station do you watch your news on?
- If you guess your secret Santa, you will see "signs" that it was true



**Stone Soup**  
by Jan Eliot



# Obstacles to Problem Solving

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- **Fixation**: The inability to see a problem from a new perspective
  - 2 types: Mental Set and Functional Fixedness
  - **Mental Set**: a tendency to approach a problem in a particular way, often a way that has been successful in the past
    - Given the sequence O-T-T-F-?-?-?, what are the final three letters?
    - Given the sequence J-F-M-A-?-?-?, what are the final three letters?

# Mental Set Example

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- Jared gets girl after girl to date him throughout high school because they all dig his big muscles

But when he gets to college,  
he fails to realize  
the best way to get  
his new crush is  
to read her poetry!

# Obstacles to Problem Solving – Functional Fixedness

- Functional Fixedness: the tendency to think of things only in terms of their usual functions

The Matchstick  
Problem: How would  
you arrange six  
matches to form four  
equilateral triangles?





# Functional Fixedness

## The Matchstick Problem: Solution



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# Functional Fixedness

## Candle-Mounting Problem

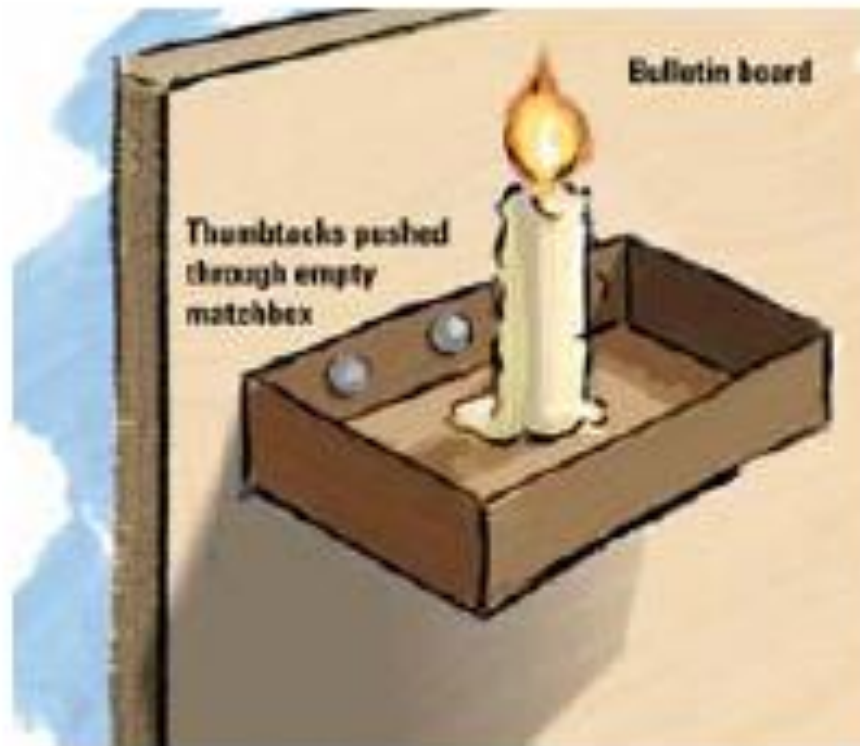
Using these materials, how would you mount the candle on a bulletin board?



From "The Candle-Mounting Problem" by L. B. Resnik, Copyright 1981 by  
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# Functional Fixedness

## Candle-Mounting Problem: Solution



# Functional Fixedness

- The tendency to think of things only in terms of their usual functions.



Apollo 13 CO2 Problem

What are some things I can do with this quarter (other than spend it)?

# Representativeness Heuristic

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- Heuristics: Cognitive Rules of Thumb
- **Representativeness Heuristic**: A rule of thumb for judging the likelihood of things in terms of how well they seem to represent, or match, particular prototypes

# Representativeness Heuristic

Who went to Harvard?



My friend Dan is a smart dude, but did not go to Harvard (but he looks like he did).



- If I tell you that Sonia Dara is a Sports Illustrated swimsuit model, you would make certain quick judgments (heuristics) about her...like about her interests or intelligence.
- She is an economics major at Harvard University.

- Judging a situation based on how similar the aspects are to the prototypes the person holds in their mind.
- Like thinking everyone from Orange County is preppy, or someone with glasses is nerdy, or a blonde is not smart.

# Representativeness Heuristic

- Which is a more likely result of a penny being flipped 6 times: HHHHHH or HTTHTH?



# Representativeness Heuristic

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Below is Linda. She loves books and hates loud noises. Is Linda a librarian or a beautician?



Chances are, she is a beautician!!!



# Are you more likely to die...

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- From an accident or a stroke?  
■ (55,000) vs. (102,000) [deaths per hundred million]
- From an asthma attack or electrocution?  
■ (920) vs. (500)
- From murder or diabetes?  
■ (9,200) vs. (19,000)
- From appendicitis or a lightning strike?  
■ (440) vs. (52)
- From a car accident or cancer of the digestive system?  
■ (27,000) vs. (46,400)
- From drowning or leukemia?  
■ (3,600) vs. (7,100)

# Representativeness Heuristic

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- The FBI classifies crime in the U.S. into 2 categories – violent crimes, such as murder, rape, robbery, and assault, and property crimes, such as burglary, larceny, or car theft.
  1. What percentage of crime would you estimate are violent rather than property crimes?
  2. What percentage of accused felons plead insanity?
  3. What percentage of these are acquitted?
  4. What percentage of convictions for felony crimes are obtained through trial instead of plea bargaining?

# Representativeness Heuristic

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1. What percentage of crime would you estimate are violent rather than property crimes?
  1. 12%
2. What percentage of accused felons plead insanity?
  1. Less than 1%
3. What percentage of these are acquitted?
  1. 25%
4. What percentage of convictions for felony crimes are obtained through trial instead of plea bargaining?
  1. Less than 10%

# Availability Heuristic

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- **Availability Heuristic**: Estimating the likelihood of events based on their availability in memory
  - If instances come to mind, we presume such events are common
    - “My grandpa smoked three packs a day and was fine...”
    - “I see people winning the lottery on TV all the time!!”

# Availability Heuristic

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- Since Columbine, are you more afraid to go to school?
- Since 9/11, are you more afraid to fly?



# Availability Heuristic

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- Does the Swine Flu or the regular Flu kill more people?



April 29, 2009: Swine Flu kills 1. Regular Flu kills 295.

# Availability Heuristic

- Judging a situation based on examples of similar situations that initially come to mind.
- Vivid examples in the news often cause an availability heuristic.

Which place would you be more scared of getting mugged or even murdered?



The Bronx, NY



Gary, Indiana

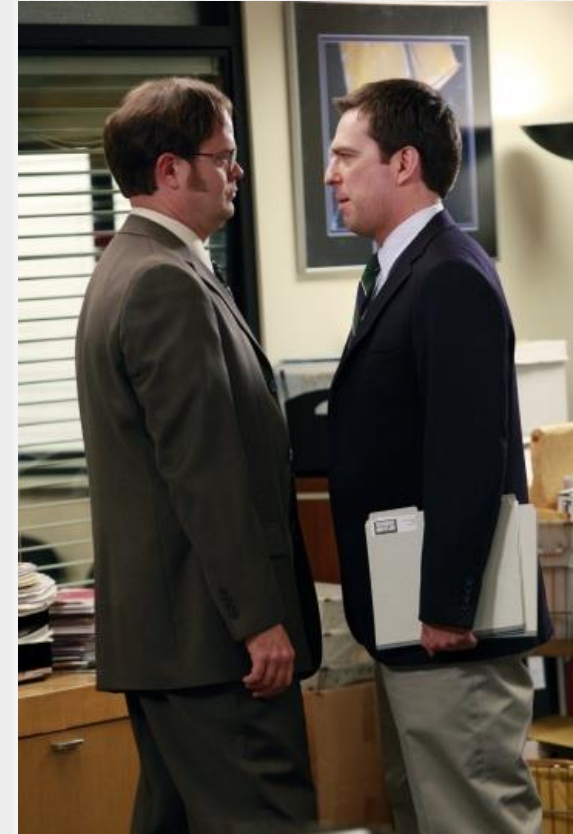
The crime rate of Gary, Indiana is MUCH higher than the Bronx. But when you think of crime, which town comes to mind?

I realize the Bronx picture is misleading.

# Other Problems



- **Overconfidence:**  
the tendency to be more confident than correct
- 82% of U.S. drivers consider themselves to be in the top 30% of their group in terms of safety.
- 81% of new business owners felt they had an excellent chance of their businesses succeeding. When asked about the success of their peers, the answer was only 39%.





# Overconfidence

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- Try unscrambling the following words...
- WREAT
  - Water
- ETRYN
  - Entry
- GRABE
  - Barge
- Based on how long it took you to solve the above problems, ESTIMATE how long you think it will take you to unscramble another five-letter word...
- OCHSA
  - Chaos

# Other Problems

- **Framing**: the way an issue is posed; how an issue is framed can significantly affect decisions and judgments
  - Ex: Ground beef – “80 percent lean” vs. “20 percent fat”
  - 90% of the population will be saved by this medication vs. 10% will die despite it



# Framing

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- Many of you will soon be off to college and trying a long-distance relationship for the first time...
- When it comes to love, is it...
- **“Absence makes the heart grow fonder”**
- ...or...
- **“Out of sight, out of mind”**

# Belief Perseverance

- **Clinging to your initial conceptions after the basis on which they were formed has been discredited.**



All Brett Favre fans who still believe that he will come up big when it counts are suffering from belief perseverance.

# The Barnum Effect

- the tendency for people to accept very general or vague characterizations of themselves and take them to be accurate.



This effect is named after P.T. Barnum, a master showman who once declared "There's a sucker born every minute."