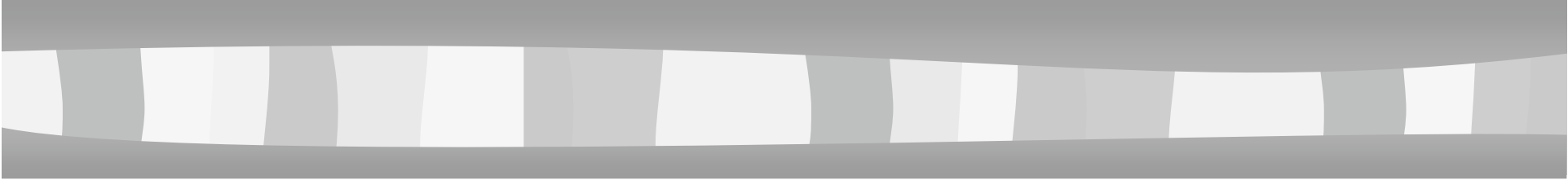


Cognition Lab

M-Th: 12:15-2:05, May 29 - July 6



Julie Phelan

Email: Phelan.CogLab@gmail.com

Office: 523 Tillett Hall

Section website: www.jephelan.com/coglab

Course website: ruccs.rutgers.edu/~jacob/Psych306/lab.html



Today's Class

- Go over syllabus
- Introductions
- Introduction to research in cognitive psychology
- Group problem-solving task



The syllabus

- ...is subject to change, but we'll cover these topics:
 - Lab 1: Categorization and Typicality
 - Lab 2: Mental Rotation
 - Lab 3: Probabilistic Learning
 - Lab 4: Category Learning
 - Lab 5: Decision-Making
 - Lab 6: Working Memory
- For the most part, we'll take 2-3 classes per topic
 - 1st class: Theory and experiment
 - 2nd class: Data analysis and homework assigned
 - 3rd class: anything that doesn't fit in the first two classes!
- Attendance is mandatory!



What I expect from you...

- Let me know what you want to learn from this lab.
- Ask questions, even “dumb” ones, and tell me when something is unclear
- Be honest, which includes doing your own work
- Come to class, on time.
- Do the homework and turn it in, on time.
- Please turn cell phones on silent.



What you can expect from me...

- To teach you something about the research process, including:
 - Theoretical and conceptual issues in cognitive psychology
 - Basic statistical procedures
 - Some technical skills
 - APA Style
- I'll answer your questions the best I can
- I'll turn my cell phone on silent too!



Course Websites

- Lecture slides and assignments will be posted here:
 - www.jephelan.com/coglab
- Other course materials, including the general cognition lab manual can be found here:
 - <http://ruccs.rutgers.edu/~jacob/Psych306/lab.htm>
 - Please look over this website sometime tonight.



Grading

- Participation (20%)
 - On time, no disruptions, focused on task, respond to questions
- Weekly writing assignments (50%)
 - Should be emailed to Phelan.CogLab@gmail.com before class, or turned in at the beginning of class. Anything emailed after class will be late.
- Final lab report (30%)
- Extra credit: participate in studies that recruit from the lab (+1% point per experiment)



Introductions

■ Please state:

- Your name (whole thing)
- What we should call you
- Year in school
- Major (and minor if any)
- When you took cognition
- When you took quant
- What you want to do after graduation
- Anything else you want to add (e.g., a hobby, etc).



What is cognitive psychology?

- The study of the mind at the individual level
 - How people perceive, learn, remember, think, and understand.
- **Cognition** (Ashcraft, 2002)
 - The collection of mental processes and activities used in learning, remembering, thinking, and understanding, and the act of using those processes.



Cognition drives everyday activities

- Some examples of cognitive activities:
 - Recognizing your friends
 - Making your way on Route 18
 - Adding numbers in your head
 - Forgetting the date of your friend's birthday
 - Deciding to attend college



Seven Themes of Cognition

■ Attention:

- Limited mental resource in quantity and it is linked to conscious awareness.
- Selective but divisible

■ Automatic vs. conscious processing:

- Fast and effortless OR slow and deliberate



Seven Themes of Cognition

■ **Data driven vs. conceptually driven processes:**

- Data-driven (bottom-up): influenced by outside stimuli (loudness, brightness)
- Conceptually driven (top-down): affected by internal influences (expectations, knowledge)

■ **Representation**

- How do we store information in the cognitive system? (visual or verbal, others?)
- Are there multiple types of representation?



Seven Themes of Cognition

■ **Implicit vs. explicit processes:**

- Explicit: thought processes that we are consciously aware of
- Implicit: processes we are unaware of... things might influence our thoughts without knowing

■ **Metacognition**

- What do we know about our own mental processes

■ **Brain**

- The relationships between specific cognitive processes and brain regions or systems (Neuroimaging etc., techniques, and patient work)



Research Methods in Cognitive Psychology

GOALS OF RESEARCH

- **Description:** The accurate portrayal of a phenomenon or situation
- **Explanation / Understanding:** The statement of the cause of some phenomenon or situation
- **Prediction:** The ability to anticipate the occurrence of some event
- **Control/Solving applied problems:** Manipulation of some condition(s) to produce a change in the behavior

Research methods in cognitive psychology

Observations



Theory

A general statement about the relationship between variables. Set of statements to explain a phenomenon.



Hypothesis

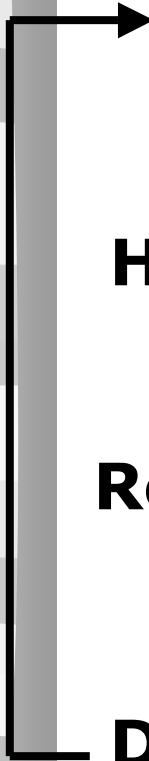
A specific statement about the relationship between two or more variables. It is tentative and can be tested.



Research design / Hypothesis Testing



Data Gathering / Analysis





Research methods in cognitive psychology

- Keywords: **control** and **experimental** conditions
- Manipulating something (Experimental) while keeping everything else constant.
- Because the effects on the mind are not visible to the naked eye you have to study the side effects of mental activity (e.g., reaction times, accuracy of responses or judgments)



Measuring Information Processing

■ Reaction Time (RT)

- The time elapsed between stimulus and person's response to the stimulus
- Typically measured in milliseconds
- 1000 msec = 1 second
- $4+3 = 12$ -----> False

RT



Measuring Information Processing

■ Accuracy Measures

- How many errors the subject makes
- An example is how many words a subject correctly recalled and which were omitted.
- Often measured as proportion or percent correct.

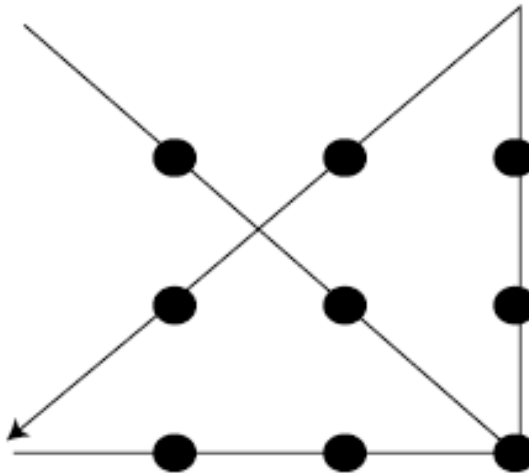


Problem Solving

- In-class assignment
- Two teams:
 - Each team will work on problems 1, 2, 8, and 9 together
 - **Team 1:** will also work on problem 3.
 - **Team 2:** will also work on problem 7.

Problem 1:

- People often think that their lines need to stay in the box formed by the dots.
- **“think outside the box”**





Problem 2

- People often think that the matches should be arranged in 2-D.
- **“form a 3-D pyramid where each of the 4 sides is an equilateral triangle”**



Problem 3:

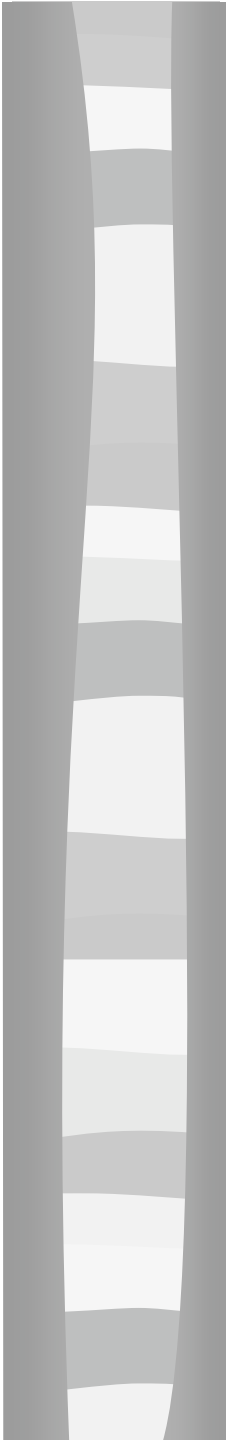
- First 6 items: “B - A - 2c”
- This also works for the last 2 items BUT there is a simpler operation to solve them.
- G: A+C
- H: A-C

- If you used the more complex formula for these items, the first 6 items cause you (problem solver) to get into a “mental set” and stick to it even when a faster and better solution is possible.



Problem #1-3

- **Functional Fixedness (Mental Set):**
 - It occurs when the problem solver imposes constraints that don't really exist
 - An action or move is seen to have a particular function, and problem solvers don't think to use that action for a different function.
 - *The tendency to perceive an object through it's most common use.*



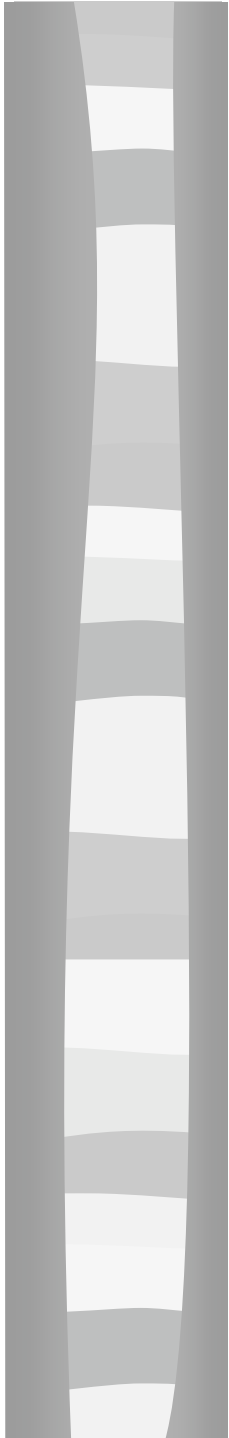
- **Problem 7:**

- Actually it's about the functional fixedness.

- Usually $A > B$ then $AB > C$ then $ABC > D$
- Open up all 3 links of chain A
- Use each for B & C then C & D then D & B

- **Problem 8:**

- $25 \text{ butts}/5 = 5 \text{ cigars} \rightarrow 5 \text{ more butts}/5 = 1 \text{ more cigar}$
- Total: 6 cigars



■ Problem 9:

- Picture the page holding the last hat.
- What about the 10th hat and 10th senator
- For the hats to be mixed up, at least two senators must get the wrong hats so
- **$p(\text{exactly 9 correct}) = 0$**

■ Problem 10:

- In order to solve this problem you have to think through what mathematician knew at each step. Then the last clue makes sense.



Problem #8-10

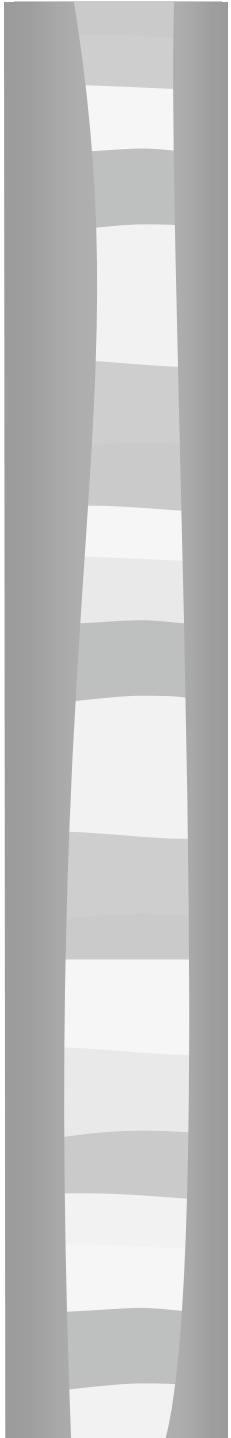
■ Process Analysis:

It is a problem solving technique in which one thinks through each step of the solution process and imagines what the problem solver would or would not know at each step.



Problem Solving

- Problem solving is a classic way to illustrate cognitive psychology, because so many real life cognitive operations involve problem solving.
- So what?
 - It is important for cognitive psychologists to find out what problems are hard (and why) and what mistakes people make (and why), because **patterns of error or reaction times offer clues as to the psychological processes that people go through in solving problems.**



- Extra credit: solve problem #10 and turn it in tomorrow at the beginning of class, or email me the solution at Phelan.CogLab@gmail.com
- Also: look through the course website. Tomorrow we'll briefly go over APA style and begin our first lab.