

# PSYC2040 Tutorial 4

Experimental Design and  
Terminology

# Preliminary Definitions

- **Variable:**
  - any property or characteristic of some event, object, or person that may have different values at different times depending on the conditions
- **Independent Variable (IV):**
  - A variable that is under control and systematically manipulated by the experimenter
  - A variable that is seen to cause, or potentially cause, a variation in another variable (*e.g., cohesiveness of the group, gender*).
- **Dependent Variable (DV):**
  - A variable whose values are believed to be affected by the independent variable
  - the variable that the investigator measures to determine the effect of the independent variable (*e.g., time taken, effort, accuracy*).

- **Hypothesis (Prediction):**
- -A statement to the effect that a change or variation in one variable (IV) will produce, or be associated with, a change or variation in another variable (DV).
- **Confounding Factors:** Variable/s that change systematically with the IV and therefore offer alternative interpretations of the data
- *-e.g., If you have all men in an audience condition, and all women in an alone condition, then gender is a confound. If you got a difference between the two conditions, how would you know whether it was due to the audience manipulation or to gender?*
- **Random Variability:**
- differences in scores on the dependent variable/s that **cannot** be attributed to the independent variable.
- **2 types of random variability:**
- **individual differences:** different people just vary in their abilities / attributes (*e.g., handedness, extroversion/introversion, intelligence*)
- **experimental effects:** insensitivity of measurement devices (*e.g., lack of standardised instructions, crude measuring devices*)

# Still More Preliminary Definitions

- **Descriptive statistics:**
  - Display and summarise data like central tendency and variability (*i.e., means, range, standard deviations*).
- **Inferential statistics:**
  - Estimate how likely it is that any differences between groups or conditions are due to chance (*e.g., t-test on difference between audience and alone conditions*).

# Overview of Experimental Method

- What is a research design?
- Blue print for collecting and providing data which will allow us to support or refute the prediction being tested
- **Experimental study (what you'll be doing):**
- experimenter controls or manipulates the way in which the independent variable functions, and then observes the resultant change in the dependent variable

## Random allocation to levels of the experiment...

- It is necessary in *true* experiments to place participants into the experimental group and the control group in a random fashion.

# More Details about Research Design

- **Aims of an experimental design:**
  - test a prediction (main purpose)
  - directly manipulate and control the IV so we can measure whether this has the predicted effect on the DV
  - eliminate or control for any variable that may have a confounding effect
  - nullify or minimise random variability.
- **Types of experimental designs relevant to your study:**
  - *Repeated measures designs* (AKA "within subjects" designs):
    - each participant performs under all conditions in the experiment
  - *Independent groups design* (AKA "between groups" design):
    - participants are divided into entirely separate groups

# Advantages of Laboratory Experiments

- **ability to control IVs**
  - the IVs are arranged by the experimenter with other sources of variation being controlled
- **ability to infer causation**
  - Because of superior control, experiments are better positioned than other types of research (e.g., observational studies, correlational studies) to imply causality



# Disadvantages of Laboratory Experiments

- threats to *ecological validity*
- threats to *external validity*
- threats to *internal validity (examples below)*
  - *Confounds* (already discussed)
  - *Demand characteristics*:  
experimental setting places certain demands upon Ps to behave in particular ways (especially if point of experiment is obvious)
  - *Evaluation apprehension*:  
participants' concerns about being observed and judged in a lab setting may lead them to attempt to present themselves favourably.
  - *Experimenter expectancies*:  
an experimenter who is aware of the hypothesis may unwittingly influence the results of the study

# Ethical Considerations

Your experiment **MUST** comply with basic ethical considerations:

- Experimenters should *minimise stress/pain* for participants
- i.e., don't ask your Ps to do anything painful, stressful, or humiliating
  
- Participants should be placed in no greater danger than they face in daily life
- i.e., don't get them to do anything risky or dangerous
  
- ***Informed consent is required***
- Ps must be informed of the requirements of the experiment and give consent to participate
- exception: you can use deception (e.g., you can deceive Ps as to the true purpose of your experiment) provided you debrief them later
  
- ***The right to withdraw must be stressed to participants***
- Ps must be informed that they have the right to leave the experiment at any time without penalty or explanation
  
- ***Confidentiality***
- Ps' names and identities must be kept separate from any of their data
- Data should be kept under code numbers only

# Ethical Considerations (cont)

- ***Deception***

- You should not conduct a study involving deception unless you have determined that the use of deception is justified by the study's scientific, educational, or applied value and no alternative procedures are available
- You should not deceive Ps about significant aspects that would affect their willingness to participate (e.g., physical risks, discomfort)
- Any deception must be explained to Ps as early as is feasible, preferably at the conclusion of their participation

- ***Debriefing and Provision of Information***

- If deception is required as part of the experimental design or procedure, then at the end of the experiment the reason for this deception must be revealed
- The purpose and hypotheses of the research must be explained

- ***Offering inducements***

- You cannot offer excessive or inappropriate inducements (financial or otherwise), particularly when it might tend to coerce participation
- If you promise a reward for participation, you must follow through with the rewards

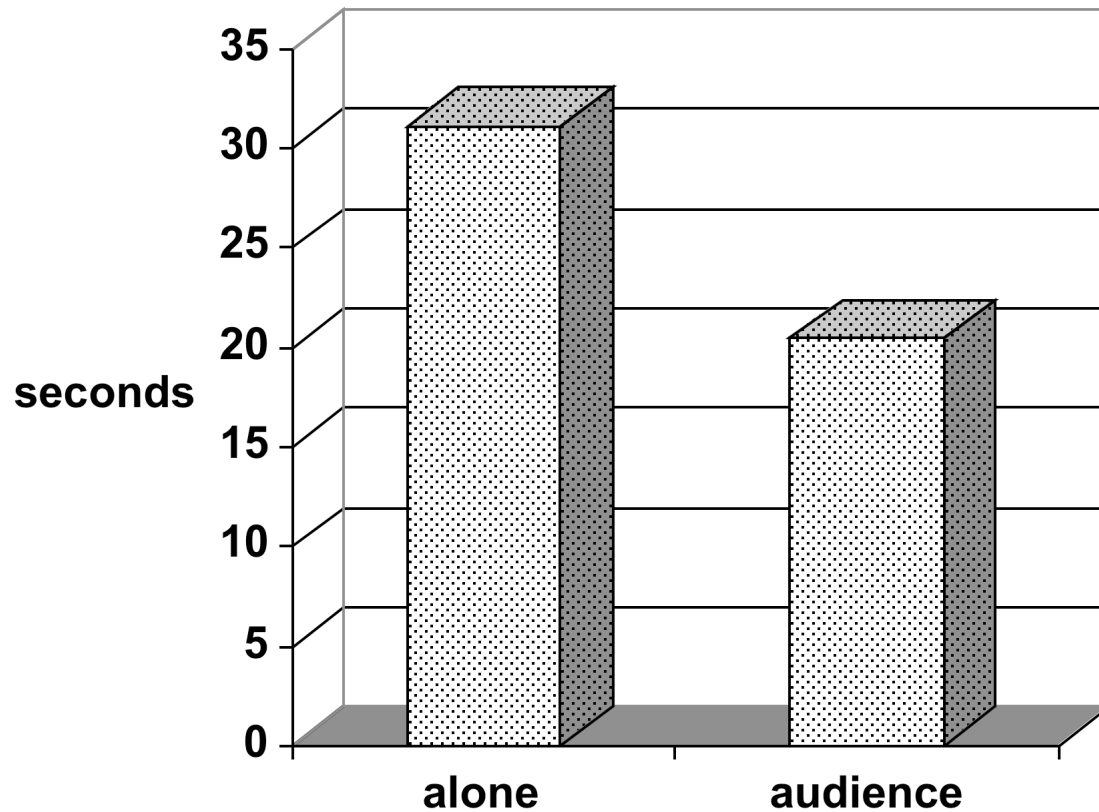
# Operationalising an Experiment

- Once the basic design has been decided, procedural matters need to be attended to...
- How is the IV going to be manipulated (or measured)?
- How many levels are to be used?
- What will the DV be, exactly?
- How is it going to be defined and measured? (*e.g., performance*).

# Example from last Week

- A social psychologist measures the time taken for students to trace a spiral when alone and when in front of the class.
  - Identify the IV and DV
  - Identify the number of levels of the IV
  - What is the experimental design?
  - What is the likely research hypothesis?

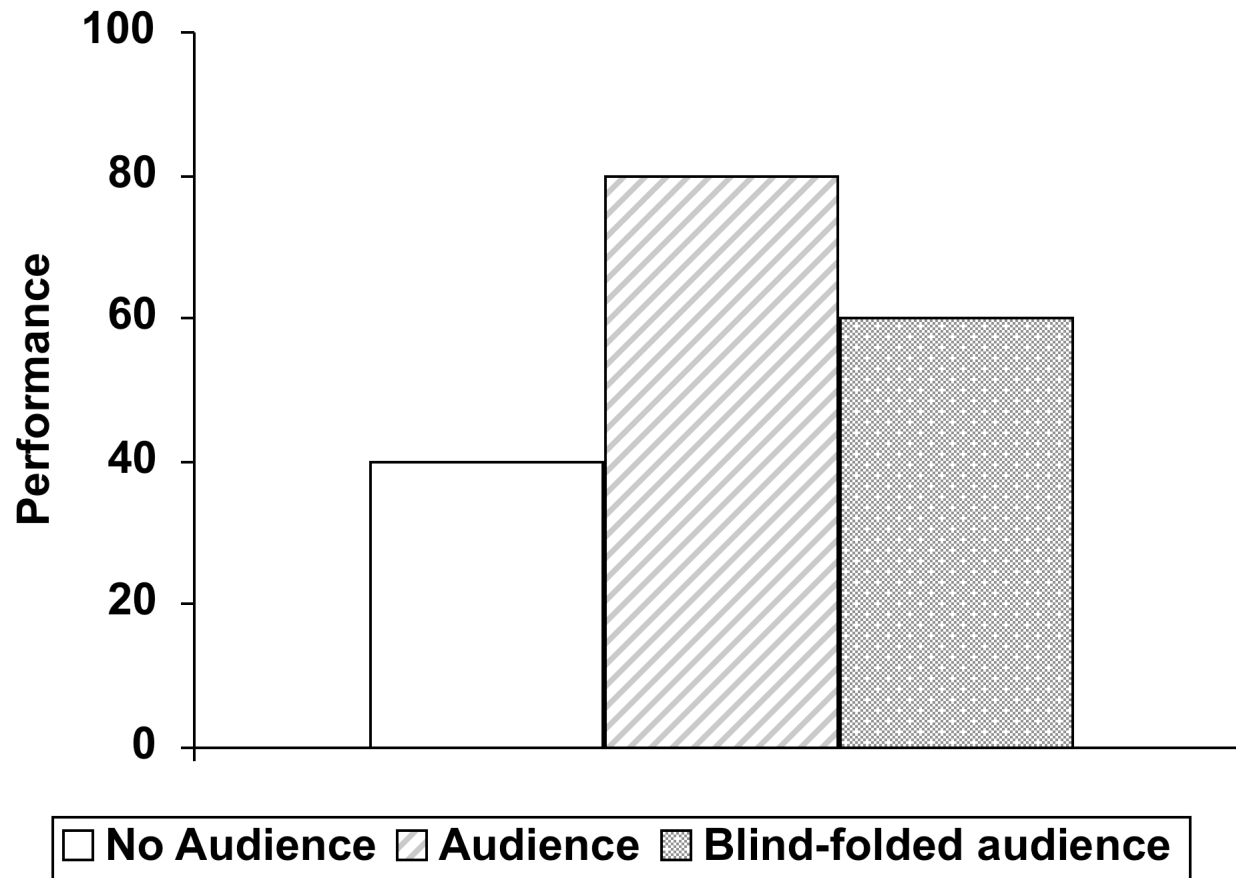
# Time taken to draw the spiral



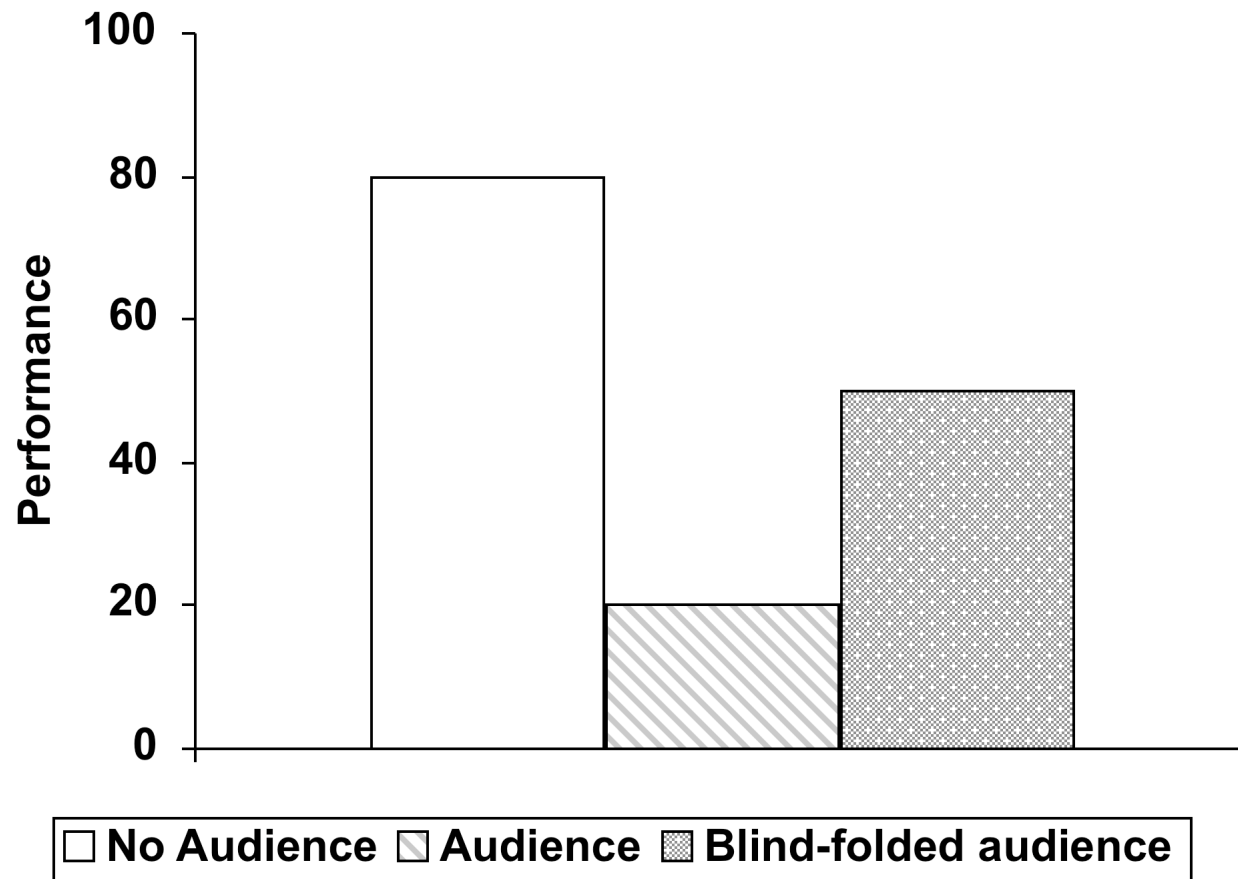
But wait...

Any possible confounds??

# Sample 3-level design with easy task (i.e., social facilitation)

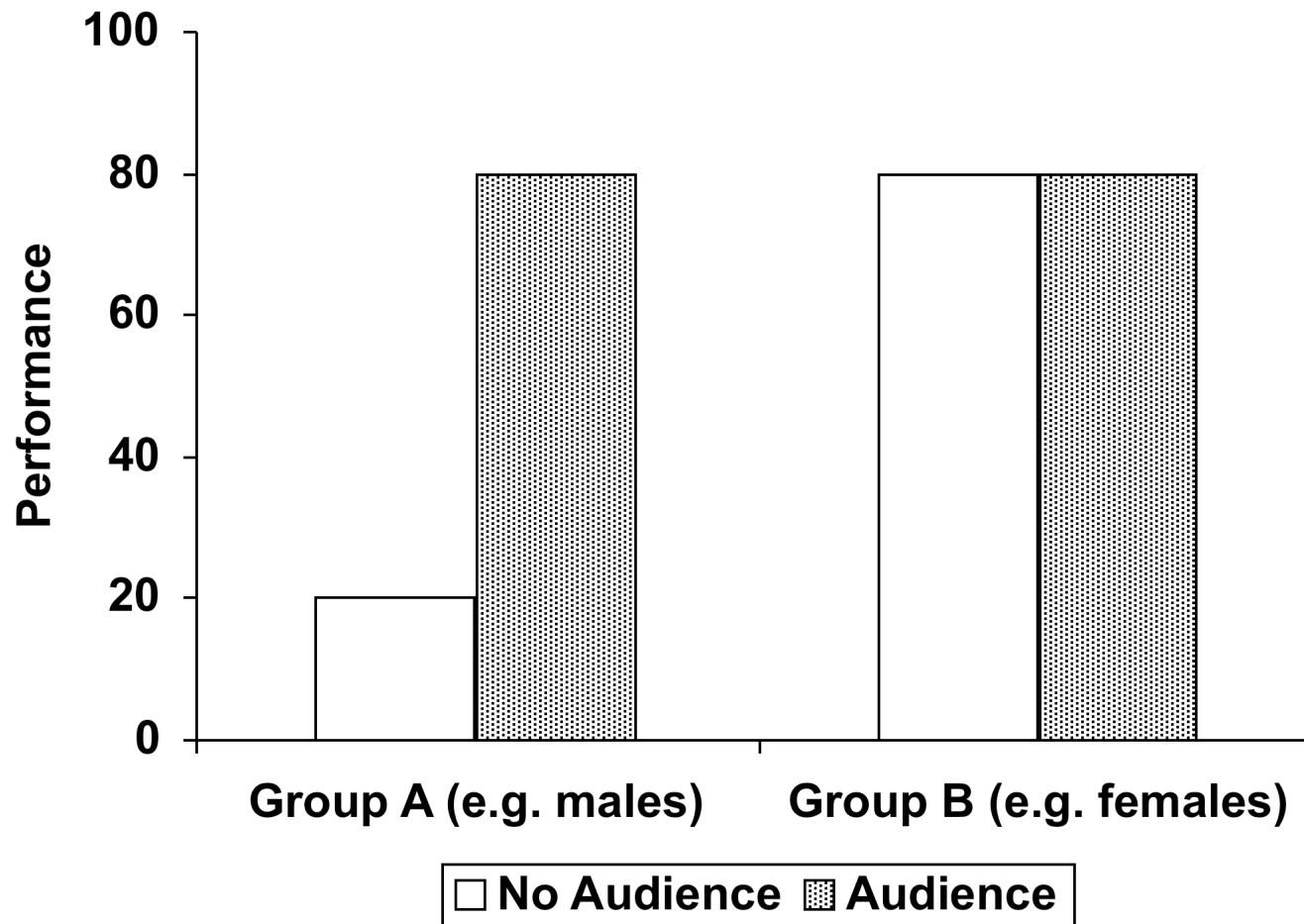


# Sample 3-level design with difficult task (i.e., social inhibition)

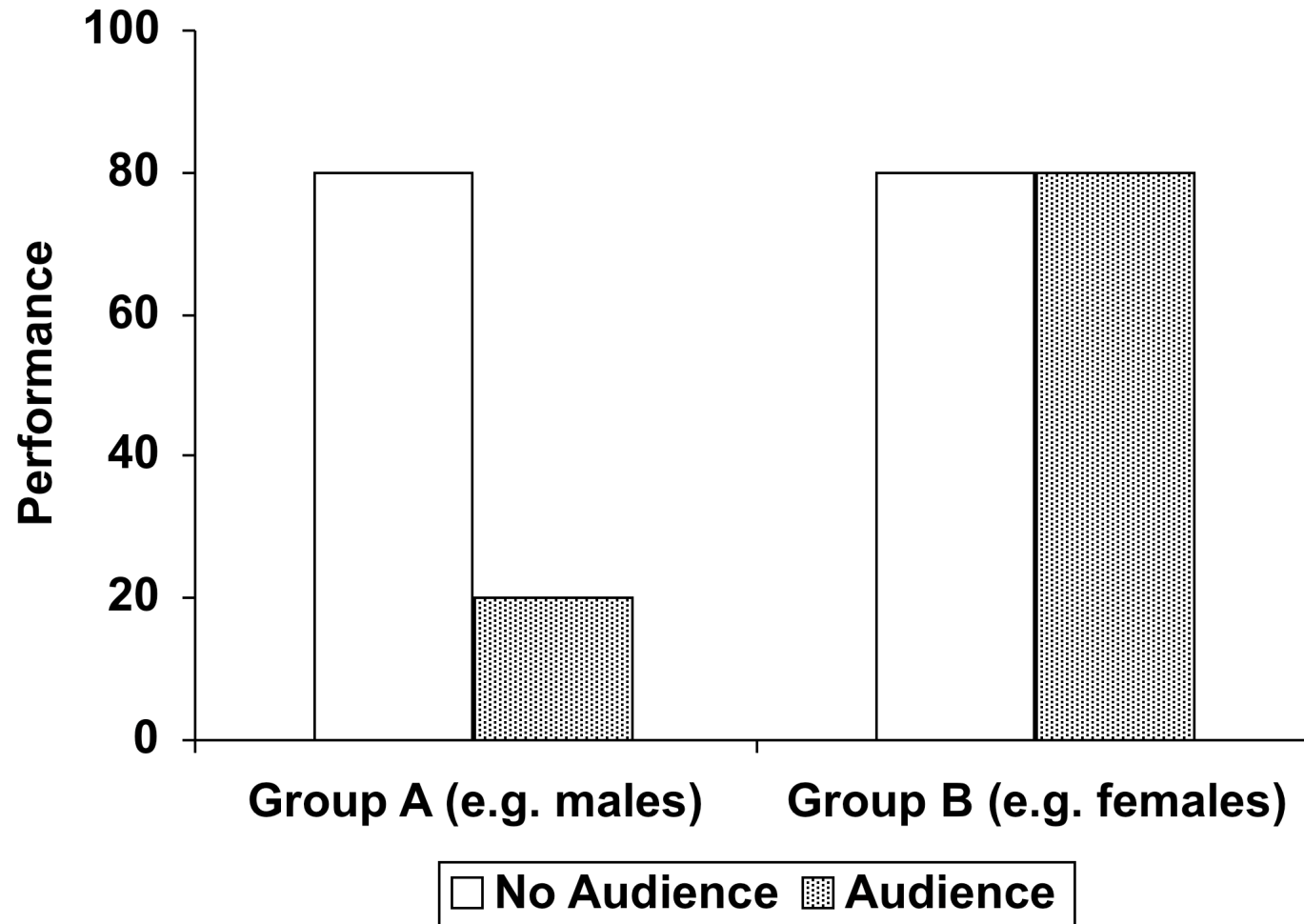




# Sample 2 x 2 design with easy task (i.e., social facilitation)



# Sample 2 x 2 design difficult task (i.e., social inhibition)





# Discuss with your groups...

- Manipulation of independent variable
  - What factor are you going to manipulate
  - How are you going to manipulate it
- Measurement of dependent variable
  - What is your dependent variable
  - How are you going to measure it
- Manipulation check
  - How are you going to make sure your manipulation worked
- Participants

# Discuss with your groups...

- Participants
  - What kind of participants do you want?
  - How many groups of participants do you want to test?
  - How many participants do you want per group?
  - How many participants do you want in total?
  - How will you find them? (**NO RECRUITING IN THE LIBRARY**)
  - Where and when will you test them?