

Research Methods – Hypotheses, Reliability and Validity

BATs

(A03) – Distinguish between directional and non-directional hypotheses. (E)

- Operationalise a hypothesis (D)

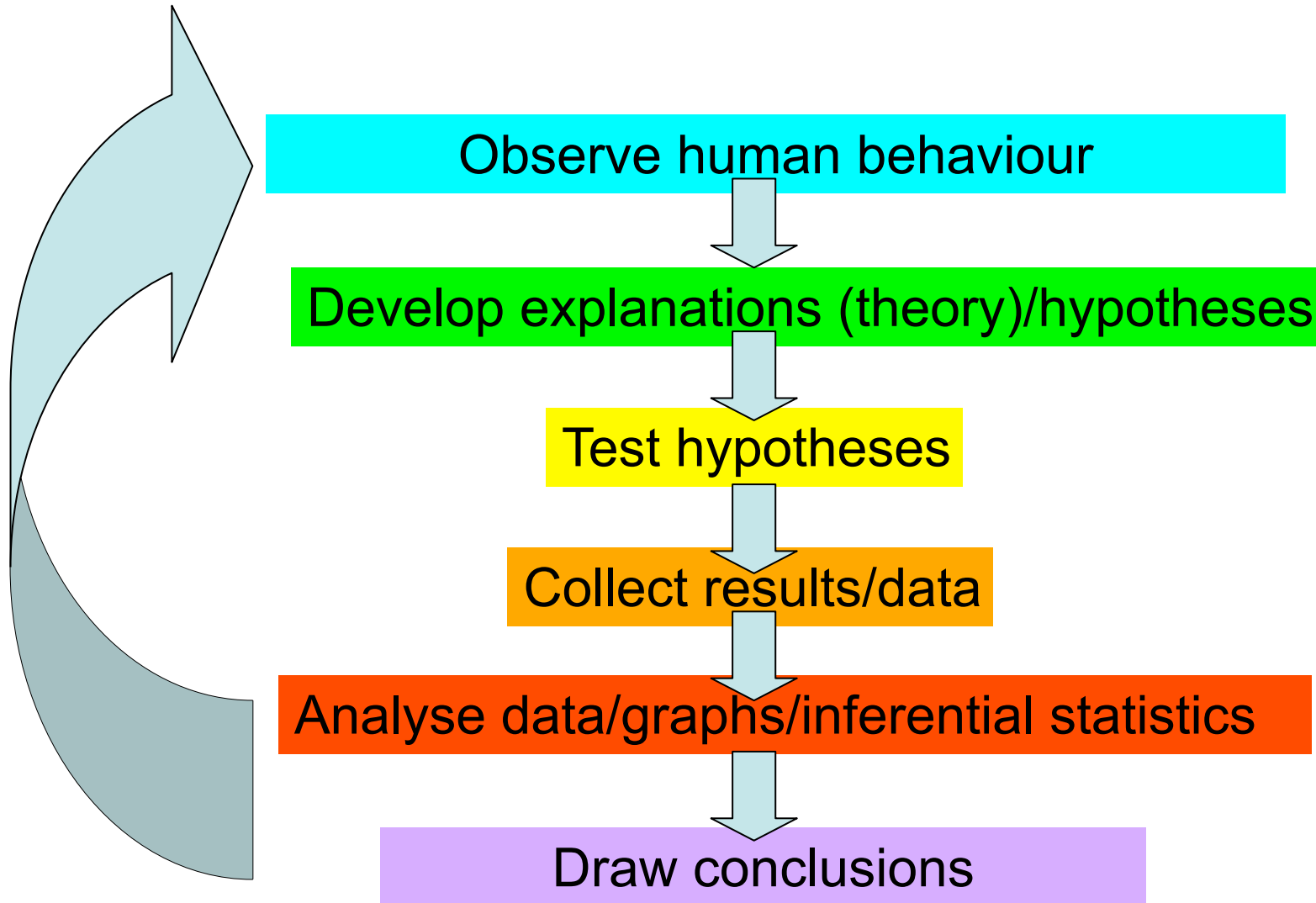
- Distinguish between reliability and validity (C)

- Explain how to control bias in research (C+)

Homework : Finish plan for memory experiment

BLOG - how to fill n answer sheet

A03 - How Science Works



Aims and Hypotheses

- **AIM** - a general statement of WHY a study is being carried out. E.g **To test the Multi Store Model of memory.**
- **HYPOTHESIS** - states precisely WHAT you expect to SHOW or BELIEVE to be TRUE. E.g. **It takes longer to read a list of conflicting words than non-conflicting words.**
- **NULL hypothesis (H_0)** - states that the IV has no effect on the DV, e.g.
'Semantic processing will have no effect on the amount of recall from LTM.'

Aims and Hypotheses

The hypothesis is sometimes called the **EXPERIMENTAL** hypothesis (H_1)

- When **not** using the experimental method, it is called the **ALTERNATIVE** hypothesis (alternative to the **NULL** hypothesis H_0)



Aims and Hypotheses

- **DIRECTIONAL** Hypothesis-
- A specific direction is predicted
- E.g. 'People who do homework without the TV on will do better than those who do homework with the TV on'
- Choose this type of hypothesis if you have an idea about what might happen, as you have read previous research

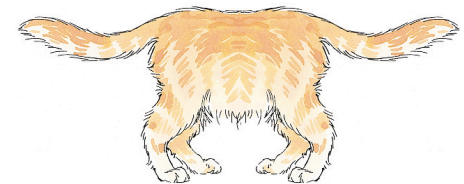
One tailed – you know which direction the expt will go in



Aims and Hypotheses

- **NON-DIRECTIONAL** hypothesis - no specific direction is predicted.
- E.g. ‘**There is a difference between work produced in noisy or silent conditions.**’
- This doesn't say what the difference will be
- Choose this type of hypothesis if you are not sure what will happen

2 tailed – the results could go either way!!



Operationalising a Hypothesis

So that variables can be accurately measured and replicated they need to be

OPERATIONALISED

e.g. Miller (56) digit span test

- IV = **number** of digits in a list
- DV = **Number** of digits **recalled** in correct order

The **longer** the list of digits the **smaller** the number of digits recalled correctly

Over to you ..

- Try the worksheet 'Directional or Non-directional?'
- Now try 'Writing hypotheses'



Extension work

Read p 73 and 74 of your text book. Answer q 1-3 p73, and 'Think Creatively' on p74

• Have a break



Research Biases

- Before we can start an experiment, we need to be aware of some aspects of research that can contaminate our results.
- We then need to know how to control these.
- Get into groups of 4
- each person finds out about one of the following..
- **Placebo effect**
- **Participant variables**
Demand characteristics
Investigator effects



How can each type of bias be controlled?

Controlling Research Bias

- Teach each other about the type of Bias you have researched - fill in the summary sheet
- Add in how each type is controlled

Research Biases

1. Placebo effect– involves the influencing of performance due to the subject's belief about the results., e.g

- if I believe the new medication will help me feel better, I may feel better even if the new medication is only a sugar pill. This demonstrates the power of the mind to change a person's perceptions of reality.

Research Biases

2. Participant variables

3. Demand characteristics

4. Investigator effects

- **Use the text book p75 and 77/78 to note down how 2, 3 and 4 can bias research**

Now add how these biases can be controlled to the sheet

Controlling Bias

- **Random Assignment** - assigning the subjects to each group based on **chance** rather than human decision.
- To control for the placebo effect, subjects are often **not informed** of the purpose of the experiment.

Controlling Bias



- This is called a **Blind** study, because the subjects are blind to the expected results.
- To control for **experimenter biases**, we can utilize a **Double-blind** study, which means that **both the experimenter and the subjects are blind** to the purpose and anticipated results of the study.



Controlling for Biases

Standardization

Standardization refers to a specific set of instructions. Why are they needed?

- Make sure all subjects are given the **same** instructions,
- Instructions presented with the experiment in the **same manner**
- All of the data is collected **exactly the same** for all subjects.
- Single experiments cannot typically stand on their own. To really show that the results are **valid**, experiments need to be **replicated** by other experimenters with different subjects.
- To do this, the experimenters need to know **exactly what we did** so they can replicate it.

Plenary

- Try the worksheet 'Sort it out'

Reliability and Validity

- **Reliability** of results is very important.

Can we trust the results?

- If a study is **replicated** the findings should be similar.

- **Validity**, does a test measure what it was designed to measure. For example, do IQ tests really measure 'intelligence'?

Reliability and Validity

Internal validity,

The extent to which a study is free of design faults, which may affect results.

Ecological validity

This is a type of '**external validity**'.

This means the extent to which **generalisation** can be made from the test environment **to other situations**



Threats to
Internal validity
sheet

Pilot Studies

- A small scale trial run before doing the real thing. Make adjustments to design, helps save money.
- How will this improve ..
- Validity?
- Make sure you are testing the right thing, people may not understand questions or misunderstand instructions, may get bored too many questions
- Reliability?
- Ensure it is replicable

Research Methods in Practice - 1

We are going to take part in a simple experiment

After it you will be asked some questions about the experiment.

You will each be given a number – 1 or 2

Group 1 and 2 will do a slightly different thing.

You have 2 mins to learn
these words whilst jogging

Daffodil

Plum

Nose

Weather

Copper

Labrador

Water

Flowers

Brass

foot

Tulips

Pansy

Dogs

Sleet

Milk

Orange

Toe

Snow

Flute

spaniel

- Group 2 stop jogging
- Now everyone write down as many words as you can remember

How many words did you recall?

Daffodil

Plum

Nose

Weather

Copper

Labrador

Water

Flowers

Brass

foot

Tulips

Pansy

Dogs

Sleet

Milk

Orange

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Snow

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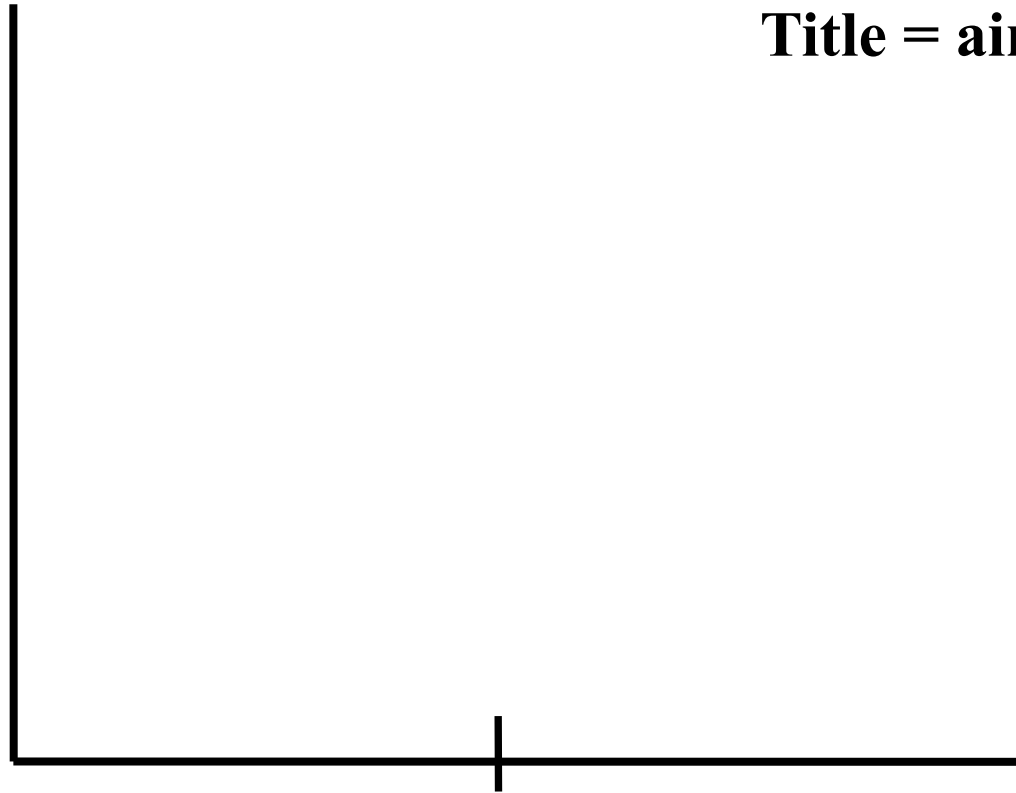
Research Methods in Practice - 1

1. What do you think the aim of the experiment was?
2. What were the **IV** and **DV**?
3. Write a **hypothesis** for it – is it directional or non-directional, have you **operationalised** it?
4. Were there any possible sources of **bias**?
5. How did it rate for **validity** and **reliability**? How could you **improve** this?

Collecting and analysing data

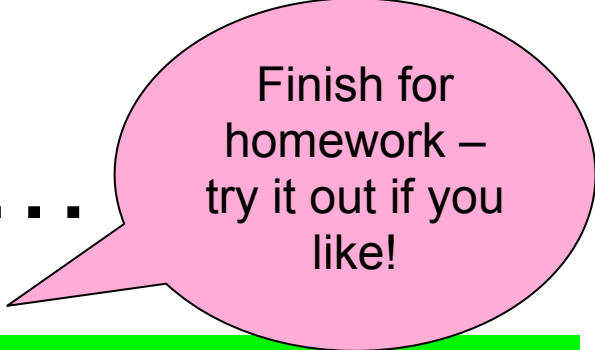
DV =

Title = aim or hypothesis



IV =

Over to you ...



Finish for
homework –
try it out if you
like!

- Use everything you have learned today to design your own experiment to test memory.
- Include ..
- Aim
- A hypothesis (is directional and operationalised or non- directional)
- IV and DV
- How have you ensured it is valid and reliable?
- How have you controlled bias?