

RESEARCH DESIGN AND ANALYSIS

Research Design Choices and Choosing
Appropriate Measures

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Recap: Planning Research

- Thorough reading of literature related to area/topic of interest
- Discover aspect that has yet to be addressed or question that remains unanswered.
- Convert ideas into specific research question and possible hypothesis
- Define and measure/examine variables
- Select a strategy and a study design
- Identify participants
- Prepare relevant materials and conduct the study
- Analyse data
- Evaluate and report findings
- Refine or reformulate hypothesis

Understanding Design Choices in Research

- Study design choices need to be considered carefully
- Choice of variables should be based on appropriate theory and/or empirical evidence
- Need to think carefully about the type of data you need to collect **BEFORE** you collect it

Hypotheses

- A prediction about the outcome of the (quantitative) research.
- **One-tailed:** makes a prediction regarding both the presence of an effect **and** the direction of this effect.
- **Two-tailed:** only predicts the presence of an effect, not its direction.
- **Null:** predicts a possibility that there will be **no** effect or association between variables.

Always implicitly there - so no need to include BOTH an experimental hypothesis and the null!

Recap: Different Types of Research

- Basic versus applied research
- Qualitative versus quantitative
- Experimental versus non-experimental

Recap: Different Types of Data

Quantitative



Numbers
Categories / Continuous
Nominal, Ordinal, Ratio, Interval

Qualitative



Free text/words

Quantitative versus Qualitative

Quantitative research:

- We are *not* really interested in the sample that we study – we are interested in the target population
- Ability to generalise results to target population

Qualitative research:

- Interested in the specific experiences of our sample - the "real-life-world" of our participants
- Do not attempt to generalise to larger populations

QUANTITATIVE RESEARCH

Types of Data

- We need to consider the **TYPE** of data we are using in any study design before we can decide what to **do** with that data
- But... how do you decide?

Types of data: Two broad types

- **Categorical**

E.G., Gender, personality type

Limited number of groups to which people can belong or can only belong to one group

- **Continuous**

E.G., Age, scores on a scale, seconds taken to complete a task

Can take a vast range of values often from zero to an infinite number

Groups

Numbers

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You can turn continuous data into categorical but not vice versa



Why does it matter?

- So why does it matter?

- It will influence the quality of your results and the conclusions you are able to make
- It will also have an effect on the type of statistical analysis you are able to conduct

Example

- **Categorical**
 - The results showed that a higher proportion of people in group B (60%) were anxious compared to those in group A (10%)
- **Continuous**
 - Can use mean scores:
 - The results showed that the mean anxiety score of participants in Group A was 2.3 and in Group B was 24.7 (measured on a scale of 0-30)
 - Enables a more sophisticated option for statistical analysis

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Types of data and levels of measurement

Scale type	Properties of scale
Nominal	Records differences <i>A is red, B is blue</i>
Ordinal	Records differences and magnitudes <i>A is larger than B</i>
Interval	Records differences and magnitudes, and has equal intervals <i>A is two units larger than B</i>
Ratio	Records differences and magnitudes, has equal intervals and a true zero <i>A is twice as large as B</i>

Main Types of Variable

- **Independent variables (IV)**
 - Variables controlled, manipulate, or collated by researcher
 - Research conditions / factors
- **Dependent variables (DV)**
 - Scores or measurements taken (the data...)
- **Often want to examine a possible causal effect or association between IV and DV**
- **AND! Confounding / Extraneous variables**
 - Variables that may effect the DV but not intended as part of your study

Conditions and Groups

- Use the manipulation of IV to produce conditions
 - The 'level' of the IV
 - Note: an IV is not always directly manipulated
 - E.g. Male and female
- Within-subject variation: Variation in the responses of same individual on more than one occasion.
- Between-subject variation: Variation between measures of different individuals.

Types of Design

Related/Repeated or Within-subjects:

- Same participants used in different conditions
- Issues?
 - Order effects, practice effects, fatigue
 - Counterbalancing order of conditions removes this as a confounding variable

Independent or Between-subjects:

- Different participants in different groups/conditions
- Issues?
 - Individual differences between groups
 - Aim to match individuals in groups as much as possible

Conducting Experimental Research

- Use of software packages for running experiments on a PC
 - E.g., Superlab, E-prime, Inquisit, etc.
- Experimental research on the PC can involve:
 - Display of pictures, words, films, or other forms of stimuli on screen
 - P's can view, respond, compare, or perform other tasks with the stimuli
 - Play sound files: at specific points or throughout
 - Can randomise order of presentation of stimuli and use blocks of trials
 - Can change position, colour, exposure time of stimuli
 - Can provide P's with feedback or corrections

Conducting Experimental Research

- For capturing data from an experiment, you can:
 - Collect response time and/or accuracy (in all trials or by blocks of trials)
 - Can specific method of response: keyboard, mouse, microphone
- Can also conduct experimental research without the use of the PC, but this can lead to loss of standardisation, rigour and control.

WHAT ABOUT MEASURES?

Choosing Appropriate Measures

- Choosing appropriate measures for your study is a vital aspect of study design
- Need to think carefully about what it is you actually want to measure (think about your operational definition!) and the best way of measuring it
- Measures capturing psychological constructs are expected to be **reliable** and **valid**.

Examples of Psychological Measures

- Psychometric tests
 - IQ test
- Personality tests
- A questionnaire measuring psychological distress
- A questionnaire measuring attachment style

Psychometric Standards

- Key measurement concepts:
 - 1) **RELIABILITY:**
 - Is the measure consistent and stable over time?
 - 2) **VALIDITY:**
 - Is it an accurate and precise measure?
 - i.e., does it measure what it claims to measure?
- **STANDARDISATION**

Choosing Appropriate Measures

- Choosing an **existing** reliable and valid scale is always the best option:
 - You know that you are measuring something in a robust way (you haven't just made it up!)
 - You have existing data from other studies to compare your findings with
 - Sensitive to change within studies (if appropriate)
 - Allows for stronger statistical analyses

RELIABILITY

Consistency or stability of a measure

Reliability

Test-retest reliability:

consistency of measurement over time

- Administer measure to same P's on 2+ occasions and correlate sets of scores
- If construct is stable, scores should be consistent over time

Split half reliability:

internal consistency between two halves of scores

- Split items in half (random)
- Correlate between two sets

Inter-rater reliability:

- Extent to which two different raters agree in their evaluations
- Consistency of measurement when different people observe same event or score the same test

Reliability

Internal Consistency:

consistency of measurement within test itself

- All items should measure same thing
- Items should correlate highly with each other
- Homogenous content

Cronbach's Alpha

- Response to each item should be correlated with the response to every other item

Note: Interpreting reliability of .70 or above
(but .60 adequate...)

E.g., a scale of Extraversion

- Very much so Moderately so Somewhat so Not at all so
1. I feel at ease with people.
 2. I start conversations.
 3. I take charge.
 4. I am the life of the party.
 5. I am skilled in handling social situations.
 6. I make friends easily.
 7. I talk to a lot of different people at parties.
 8. I know how to captivate people.
 9. I do not mind being the centre of attention.
 10. I feel comfortable around other people.

■ response to each item should be correlated with the response to every other item
– otherwise not tapping into the same thing!

VALIDITY

How well a test actually measures what it
is designed to measure

Face Validity

Test looks plausible at face value

- Does it look like it measures what it claims to measure?

E.g., Life Orientation Test (Scheier & Carver, 1985): a measure of dispositional optimism

- In uncertain times I usually expect the best
- If something can go wrong for me, it will
- I'm always optimistic about my future
- I hardly ever expect things to go my way

Construct Validity

Does the test successfully measure the psychological construct it is designed to measure?

E.g., Intelligence

- Assessed by looking at the relationship between test scores and other behaviours that it should be related to
 - Do scores on a new IQ test relate to academic performance?
 - Does a measure of psychological distress report similar scores to a psychiatric interview.

Construct Validity

- Should be related to measures of the same construct – **convergent validity**
- Should be unrelated to measures of unrelated constructs – **discriminant validity**

Content Validity

Whether the items on a test measure all the knowledge or skills that are assumed to underlie the construct of interest

E.g., Intelligence

- Does a measure of intelligence capture all types of intelligence or just certain types e.g. problem-solving ability, numerical reasoning;

Criterion-related Validity

The ability of test scores to correlate with meaningful criterion measures

- Are they able to predict future outcomes?
- Test should predict present or future outcomes that are influenced by the construct being measured
 - e.g. Does a measure of IQ successfully predict future performance/success in that job?
 - e.g., Do scores on a measure of conscientiousness predict future academic performance?

Beware of scales and sub-scales!

- Some psychological measures may include sub-scales
- Sometimes can either add up all items for total score, or create separate sub-scales for each
- Sometimes have to keep each sub-scale separate from others.

e.g., Impact of Event Scale (Horowitz et al., 1979)

- **INTRUSION SUB-SCALE:** Seven items measure intrusive thoughts – “Intrusion” about a stressful event (0-35)
“I thought about it when I didn’t meant to...”
- **AVOIDANCE SUB-SCALE:** Eight items measure attempts to avoid those thought – “Avoidance” (0-40)
“I stayed away from reminders of it”
- Can be combined to create a “Global Distress Scale” (0-75)

(Tick one box from each row)	Not at all	Rarely	Sometimes	Often
I thought about it when I didn't mean to	☐	☐	☐	☐
I avoided letting myself get upset when I thought about it or was reminded of it	☐	☐	☐	☐
I tried to remove it from my memory	☐	☐	☐	☐
I had trouble falling asleep or staying asleep, because of pictures or thoughts about it that came into my mind	☐	☐	☐	☐
I had waves of strong feelings about it	☐	☐	☐	☐
I had dreams about it	☐	☐	☐	☐
I stayed away from reminders of it	☐	☐	☐	☐
I felt as if it hadn't happened or wasn't real	☐	☐	☐	☐
I tried not to talk about it	☐	☐	☐	☐
Pictures about it popped into my mind	☐	☐	☐	☐
Other things kept making me think about it	☐	☐	☐	☐
I was aware that I still had a lot of feelings about it, but I didn't deal with them	☐	☐	☐	☐
I tried not to think about it	☐	☐	☐	☐
Any reminder brought back feelings about it	☐	☐	☐	☐
My feelings about it were kind of numb	☐	☐	☐	☐

Also beware of negatively worded items...

- Some scales contain items which are negatively worded and need to be **reverse-coded** prior to analysis (to prevent demand characteristics/lazy responses)
 - E.g., Life Orientation Test (Scheier & Carver, 1985): a measure of dispositional optimism*
- In uncertain times I usually expect the best
- If something can go wrong for me it will
- I'm always optimistic about my future
- I hardly ever expect things to go my way

Negatively worded items

Also beware of negatively worded items...

'Negatively worded' does **NOT** mean that there is a typical *negative* word in the sentence/statement

e.g., no, not, don't, never, etc

Negatively worded refers to whether the statement is related to the specifics of what is being measured and what low/high scores mean...

e.g., AISS (Arnett, 1994) 'I think it's best to order something familiar when eating in a restaurant'

is a **NEGATIVELY WORDED ITEM** because it forms part of the NOVELTY sub-scale with higher scores equating to more need to seek out novel (new) situations – familiar is opposite, and therefore negatively worded, to NOVEL

QUALITATIVE RESEARCH

Key Elements:

- Semi-structured interviews:
 - *Neutral, open-ended questions, aimed at eliciting in-depth responses from participants*
 - *Questions form a prompt to the interviewer*
 - *Should enable participants to express their beliefs, opinions and feelings freely.*

Key elements

- Homogeneous sample
- Select appropriate method of data collection – semi-structured interviews, focus groups, participant diaries and self reporting tasks.
- an awareness of researcher's own role in the process and any biases/preconceptions
- E.g. would a CBT therapist and a Humanistic therapist identify the same themes from an interview?
 - *Why?*

Key elements of qualitative design

- What is the aim of your research?
- Who are your participants?
 - Are they able to answer your question i.e. A relevant participant group?
 - Are they representative?
 - Any inclusion/exclusion criteria
 - Do you need different sub-groups?
 - Written informed consent?
- How many interviews are you going to conduct? (time, cost, meeting aim of research)

The Interview Schedule

- What information do you want to get from your participants?
- An interview schedule helps to guide your questions to ensure you cover all important areas
- Include:
 - Introduction
 - Permission to record interview/anonymity
 - Prompts and hints for follow-up questions
 - Wrap-up at end (thank and summary of research aim)

Categories of Questions

- **Opening:** get acquainted and feel connected
- **Introductory:** Begins discussion of topic
- **Transition:** Moves smoothly and seamlessly into key questions
- **Key:** Obtains insight on areas of central concern in the study
- **Ending:** Helps researchers determine where to place emphasis and brings closure to the discussion
- (Krueger, 1998)

Recruiting for Qualitative Studies

Recruitment for qualitative interview studies notoriously difficult

- Convey a sense that the research will be interesting and worthwhile
- Make the contacts personal
- Build on existing relationships whenever possible
- Use appropriate screening criteria
- Offer incentives
- Make participation as convenient as possible
- Follow up

Finally....

- Read your stats books!!
- Read your Research Methods books!!
- Read journal articles/studies in the area of research you are interested in!!

ANY QUESTIONS?
