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Survey Research and Design in Psychology

Lecture 1 - Introduction to survey research

Dr Ananthan Ambikairajah

University of Canberra

Acknowledgement of country

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About me and my teaching philosophy

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Dr Ananthan Ambikairajah

Neuroscientist. Educator. Science Communicator.

- University of Canberra
- Website
- Email
- Google Scholar
- ORCID
- ResearchGate
- Web of Science
- Github
- LinkedIn
- YouTube

I'm running the Canberra Marathon for Dementia Australia - donate below

Donate

Dr Ananthan Ambikairajah is a Lecturer in the Discipline of Psychology in the Faculty of Health at the University of Canberra (UC) and a core member of the Centre for Ageing Research and Translation (CARAT). He completed his PhD in Neuroscience at the Australian National University in 2022 and, in 2024, received the ACT Minister for Health's Outstanding New Researcher Highly Commended Award. His research focuses on genetic, environmental and lifestyle factors that influence ageing, brain health and disease, with a particular emphasis on sex-specific determinants and cardiometabolic factors. His recent work investigates potential pathways for dementia risk reduction as well as improving timely and accurate diagnosis. His research has been covered by ABC News, The Sydney Morning Herald, The Australian Financial Review, The Australian and ABC Radio. In 2025, Ananthan received the UC Award for Teaching Excellence and the Vice-Chancellor's Educator of the Year Award. He has also received multiple student-nominated awards and commendations for Excellence in Teaching. Following his undergraduate degree in Neuroscience at the University of New South Wales, he completed a Master's in Teaching (Secondary) and is a Senior Fellow of the Higher Education Academy (SFHEA). In 2023, he founded and continues to chair the Faculty of Health Generative Artificial Intelligence Community of Practice, leading university-wide efforts to support staff and students with their understanding, use and adoption of GenAI to enhance learning, teaching, research and professional practice. Elected to the University Council in 2026, Ananthan represents the academic voice in university governance and serves as the academic staff representative on both the Academic Board and the Faculty of Health Board. Ananthan hosts Midnight Conversations, a podcast that communicates research and the principles of scientific thinking to the public in an engaging and accessible way. The podcast is available on Apple Podcasts, Spotify and SoundCloud. Beyond academia, Ananthan is an avid runner who has raised over $1,000 for Dementia Australia through events including the Canberra Times and Sydney Marathons. He also enjoys rock climbing, playing chess and tennis.

Featured Research Presentation

Why do you need to study statistics?

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- Understanding data
- Making informed decisions
- Solving real-world problems
- Improving research
- Career opportunities
- Critical thinking skills (Calling Bullshit - The art of scepticism in a Data-Driven World by Carl Bergstrom and Jevin West)

Practical application of statistics

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Fisher's exact test

- Used to determine if there is a significant association between two categorical variables.
- Lady tasting tea test

Student's t-test

- Used to determine if there is a significant difference between the means of two independent groups (independent samples t-test) or related groups (paired samples t-test)
- William Sealy Gosset

Critical thinking exercise

46% of people think statistics isn't useful

- What questions would you ask to assess this statement further?

Critical thinking exercise

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How long is an elevator pitch?

- What factors would you consider to try and address this question

Frequentist and Bayesian statistics

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Frequentist and Bayesian statistics are two different approaches to statistical inference, which is the process of using data to make conclusions about unknown quantities (e.g., a population mean, a treatment effect) and make predictions.

Frequentist Statistics: The parameter is treated as a single fixed (but unknown) "true" value. The data are treated as random because they would vary if you repeated the study with a new sample. So uncertainty in your estimate is quantified by variability in the estimator across repeated sampling. This is where standard errors, p-values, and confidence intervals come from - for example a 95% confidence interval means that if we repeated this sampling procedure many times and calculated an interval each time, 95% of those intervals would contain the true parameter value.

Bayesian Statistics: The parameter is treated as unknown and our uncertainty about it is represented with a probability distribution. We start with a prior distribution (what we assume or know before seeing the current data), combine it with the likelihood (what the observed data imply under the model), and obtain a posterior distribution. Inference is then made directly from the posterior - for example, a 95% credible interval means there is a 95% posterior probability that the parameter lies in that range, given the model and prior.

Bayesian thought experiment: Bayes' billiard table

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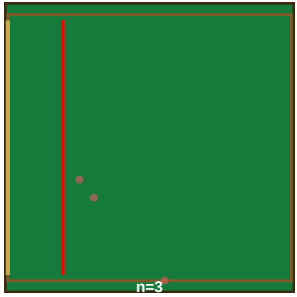

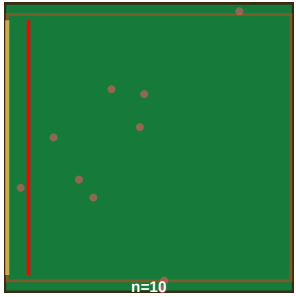

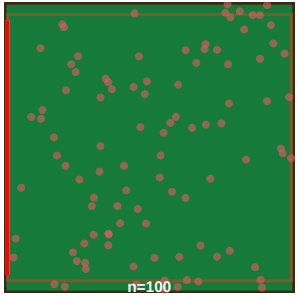

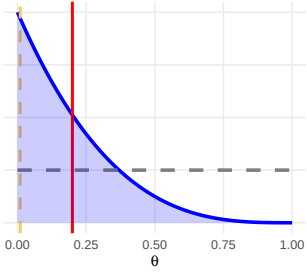

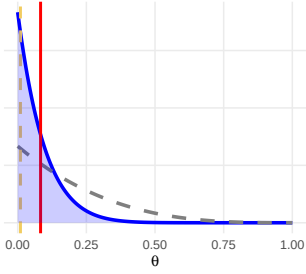

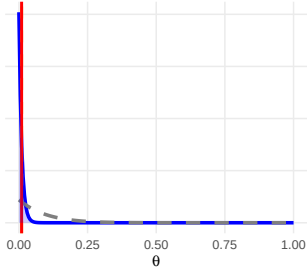

Bayesian thought experiment: Bayes' billiard table

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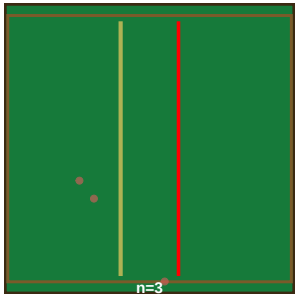

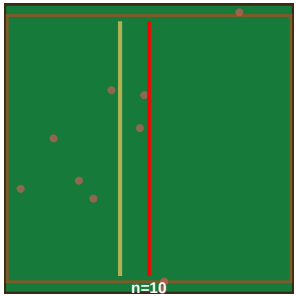

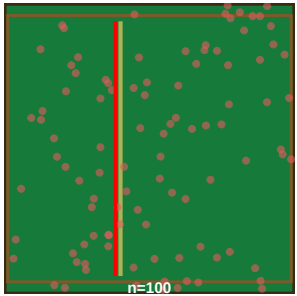

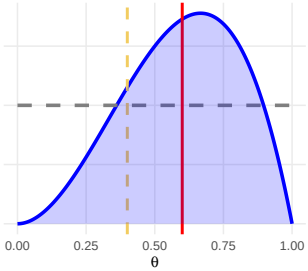

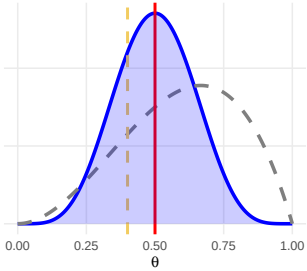

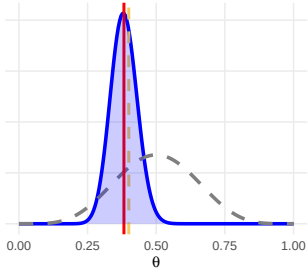

Bayesian example from my research

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Received: 21 May 2025 | Revised: 21 July 2025 | Accepted: 21 August 2025

DOI: 10.1002/dad2.70184

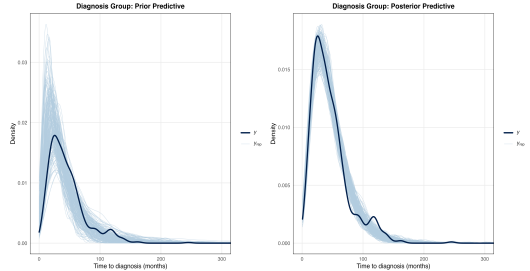
Diagnosis, Assessment & Disease Monitoring

RESEARCH ARTICLE

A Bayesian analysis of diagnostic timelines across Alzheimer's disease, frontotemporal dementia, and other neurodegenerative conditions

Ananthan Ambikairajah[1,2,3,4,5] | David Foxe[4,5] | Ann-Marie G. de Lange[6,7] | James Carrick[4,5] | Sau Chi Cheung[4,5,8] | Velandai K. Srikanth[9] | Yun Tae Hwang[5,10,11] | Rebekah M. Ahmed[5,8] | James R. Burrell[5,12] | Olivier Piguet[4,5]

https://alz-journals.onlinelibrary.wiley.com/doi/10.1002/dad2.70184



Supplementary Figure 1. Prior and Posterior Predictive Check comparing observed diagnostic timelines (y) with model-simulated data (y-rep) for Diagnostic Group Analysis.

Ambikairajah et al. (2025)

Lectures

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- Survey research
- Survey design
- Descriptive and graphing
- Correlation
- Exploratory factor analysis
- Psychometrics
- Multiple linear regression x2
- Power and effect sizes
- Summary and conclusions

Navigating canvas

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- Survey research and design in psychology canvas page

Unit schedule

Survey Research and Design in Psychology: Unit Schedule Semester 1, 2026

Week	Lecture	Tutorial	Assessments
Week 1 16th Feb	**Lecture 1** Survey research		
Week 2 23rd Feb	**Lecture 2** Survey design	**Tutorial 1** Intro to Jamovi	
Week 3 2nd Mar	**Lecture 3** Descriptives and Graphing		**Data Collection Assessment** (10%) Due: Before 11:59pm Monday 2nd March
Week 4 9th Mar	**Lecture 4** Correlation	**Tutorial 2** Correlation	
Week 5 16th March	**Lecture 5** Exploratory factor analysis		
Week 6 23rd March	**Lecture 6** Psychometrics	**Tutorial 3** Psychometrics	
Week 7 30th March	**Lecture 7** Multiple linear regression 1		
Week 8 6th April	**Lecture 8** Multiple linear regression 2	**Tutorial 4** MLR	
Week 9 13th April	*Class Free Period*		
Week 10 20th April	**Lecture 9** Power and effect sizes		**Lab report** (40%) Due: Before 11:59pm Friday 24th April
Week 11 27th April	**Lecture 10** Summary and conclusions	**Tutorial 5** Public data analysis	
Week 12 4th May			
Week 13 11th May			
Week 14 - 15	Exam Period		**Final exam** (50%) Date and time to be confirmed

Software for data analysis

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- In this course we use Jamovi for statistical analyses (not SPSS)

Why Jamovi?

- Ease of use: Jamovi has a simple and intuitive interface that makes it easy for users to perform statistical analyses without prior knowledge of complex syntax or programming.
- Accessibility: Jamovi is open-source software that can be downloaded for free, making it accessible to a wide range of users, including students and researchers who may not have access to commercial statistical software.
- Speed: Jamovi is designed to be fast and efficient, allowing users to perform complex analyses quickly and easily.
- Versatility: Jamovi supports a wide range of statistical tests, including regression, t-tests, ANOVA, and non-parametric tests, making it a versatile tool for a variety of research and data analysis needs.
- Integration with R: Jamovi is built on top of the R programming language and can be used in conjunction with R, allowing users to access the power and versatility of R while benefiting from Jamovi's user-friendly interface.

Jamovi

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- Instructions for downloading Jamovi can be found on canvas
  - There is a free textbook, as well as a user manual, which will help you get set up and started.

Datacamp

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- I have applied for a DataCamp classroom account for Survey Research and Design in Psychology students this semester and have been successful in this application. If you are interested in learning R or further statistics support, please click on the following invite link, which will give you access to hundreds of courses for free! You must sign up using your @uni.canberra.edu.au email address.

Assessments

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- Data Collection Assessment (10%)
- Lab report (40%)
- Final Exam (50%)

Data Collection Assessment (10%)

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- The data submission task is due before 11:59pm, Monday, Week 3.
- In the data collection assessment, you will get hands-on experience as a psychological researcher collecting and entering data.

More details here

Lab report (40%)

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- Include an exploratory factor analysis
- Include a multiple linear regression
- You will be able to complete the lab report progressively as we work through the course.
- Lab report reading list is available on canvas

Lab report

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- Lab reports are the main way we communicate our research in psychology
- Want some good examples? Have a look at the articles published in psychology journals (particularly Q1 journals - this can be checked via Scimago)

Final Exam

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- Final exam assess knowledge of concepts covered in the lectures and tutorials, and will include practical knowledge (i.e. requires some use of jamovi).
- 2 hours in duration.

Practice Final Exam

- A practice final exam is available on canvas, which will cover material from Lectures 7, 8 and 9 as well as the Multiple Linear Regression Tutorial
- The settings will allow you to complete the practice assessment up to 3 times. After each attempt, check which questions you are performing well on, and which ones need improvement to help your revision.
- On your final (3rd) attempt, the correct answers will be presented. Again, this is not a graded assessment, just a set practice questions.

Questions

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- If you have any questions about the unit or assessments, post them in the discussion forum on canvas

CLASS PHOTO!

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Survey research - overview

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- Types of research
- Purposes of research
- Writing a research question and hypothesis

Positivism

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- Positivism is a philosophical approach that emphasizes the scientific method and the use of empirical evidence as the basis for knowledge and understanding of the world. It asserts that all knowledge, including human behaviour and society, can be studied objectively and reduced to mathematical and natural laws.
- Has several assumptions
  - The world is made up of pheomena which have measurable properties
  - Psychological phenomena can be measured, recorded and analysed
  - Interpretation of analysis can lead to valid insights about how people think, feel and behave
- Other perspectives including post-modernism (i.e. social constructivist perspective), which assumes that there is no objective truth. We can come up with theories as ways of interpreting the world but because they are not measurable we can't compare them.
- Most survey based research is based on positivism, which is the perspective/lens used in this course.

Scientific method

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- Positivism is closely tied to the scientific method:
  - Observe phenomenon
  - Ask questions
  - Make hypotheses
  - Conduct experiments
  - Collect data
  - Analyse data
  - Interpret and conclude
  - Apply findings

Example - The case of the disappearing teaspoons

Types of research

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- Three main types of research methods:
  - Experimental
  - Quasi-experimental
  - Non-experimental

Different ways to answer the same question

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Question: Does eating chocolate improve happiness?

Experimental

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- Random assignment to groups (i.e. treatment and control)
- Control over extraneous variables
- Can be difficult to conduct, costly and time consuming
- May not be ecologically valid
- May not be ethical

Quasi-experimental

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- Uses ‘naturally occurring’ groups, so assignment to groups is non-random
- Some control over extraneous variables (e.g. participant matching)
- Has ecological validity
- Less control over extraneous variables

Non-experimental

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- No manipulations: measuring things as they are
- More descriptive research questions
- Faster, cheaper
- Can look at relationships between variables but cannot determine causality

Types of research

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- All research types can include surveys
- If a variable is manipulated, then it's experimental

Practice questions

I want to know if drinking caffeine before a lecture affects recall. I compare study habits of university students who regularly use caffeine with uni students who do not regularly use caffeine. This research is:

a) Experimental
b) Quasi-experimental
c) Non-experimental

Practice questions

I want to know if drinking caffeine before a lecture affects recall. I compare study habits of university students who regularly use caffeine with uni students who do not regularly use caffeine. This research is:

a) Experimental
b) **Quasi-experimental**
c) Non-experimental

Practice questions

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A researcher surveys Australian community attitudes to eating non-traditional meats. This research is:

a) Experimental
b) Quasi-experimental
c) Non-experimental

Practice questions

A researcher surveys Australian community attitudes to eating non-traditional meats. This research is:

a) Experimental
b) Quasi-experimental
c) **Non-experimental**

Practice questions

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A researcher randomly allocates participants to a morning or evening exercise routine and then compares the sleep patterns of the two groups. This research is:

a) Experimental
b) Quasi-experimental
c) Non-experimental

Practice questions

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A researcher randomly allocates participants to a morning or evening exercise routine and then compares the sleep patterns of the two groups. This research is:

a) **Experimental**
b) Quasi-experimental
c) Non-experimental

For you to think about

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- "What is the effect of pet ownership on happiness?" - Think about a way to design and test this research question using each type of research

What is a survey?

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- A survey is a standardised stimulus.
- A survey is a measuring instrument

History of surveys

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- Very early surveys collected not much more than demographic information
- Early survey research began in 1920s
- Modern scientific survey research methods became widely available in the 1980s

Examples of survey-based research

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- Demographics – census
- Epidemiology – health surveys
- Marketing – customer satisfaction
- Politics – polls
- Psychology – attitudes, emotions
- Sociology – social trends

What can we measure?

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- Attitudes
- Behaviours
- Emotions
- Satisfaction

Survey research characteristics

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- Used widely in social sciences
- Standardised and systematic: follows specific procedures based on science and the scientific method
- Replicable: other researchers are likely to get similar results if following the same method
- Types: administered via interview or questionnaires
- Data: often quantitative, can be qualitative
- Impartial sampling: selected from target population without preference (so it's representative)
- Ecologically valid: can get real world samples

Purposes of survey research

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- Two broad purposes of survey-based research:
  - Information gathering (including exploratory and descriptive)
  - Theory testing and building (including explanatory and predictive)

Exploratory

- The goal is to discover and explore psychological phenomena
- Example: Are there patterns in midlife health factors that contribute to poorer brain health?

Descriptive

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- The goal is to describe phenomena
- Example: What is the average age of symptom onset for Alzheimer's disease?

Explanatory

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- The goal is to explain phenomena by looking at the relations between, and patterns amongst, variables
- Example: Is higher central fat linked to poorer brain health?

Predictive

- The goal is to be able to make accurate and useful predictions about what's going to happen next
- Example: Can we predict age of dementia onset using midlife health factors?

Writing a research question

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- Sometimes we have a research question, and design a study to answer that question. Other times, the data already exist, and we write a research question that can be tested with the existing data

What constructs are measured in our survey?

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- Personality – e.g. might measure traits like openness to experience, conscientiousness, extroversion, agreeableness and neuroticism
- Perfectionism – e.g. might measure organization, high standards
- Procrastination

Survey can be found on canvas

Writing a research question

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- Keep in mind that the data will be cross-sectional (not longitudinal)
- Once you have written your research question, think about whether you could sensibly answer it with the data that you will get from the survey

Writing a hypothesis

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- Once you have your research question, it is time to write a hypothesis
- What do you expect the answer to your research question will be?
- Good hypotheses are based on research – you may need to go back through the readings here and see what other researchers have found. You might expect to replicate their findings
- Show that you have based your hypothesis on previous research by including the citation in your answer

Practice questions

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What is the goal of this study?
A researcher lives in a religious commune in order to learn about the social psychological characteristics of cults.

a) Exploratory
b) Descriptive
c) Explanatory
d) Predictive

Practice questions

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What is the goal of this study?
A researcher lives in a religious commune in order to learn about the social psychological characteristics of cults.

a) **Exploratory**
b) Descriptive
c) Explanatory
d) Predictive

Practice questions

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What is the goal of this study?
A researcher measures Australian people's attitudes towards asylum seekers to Australia.

a) Exploratory
b) Descriptive
c) Explanatory
d) Predictive

Practice questions

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What is the goal of this study?
A researcher measures Australian people's attitudes towards asylum seekers to Australia.

a) Exploratory
b) **Descriptive**
c) Explanatory
d) Predictive

Practice questions

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What is the goal of this study?
A researcher administers a happiness survey and a personality survey in order to examine the hypothesis that extraverts are happier than introverts.

a) Exploratory
b) Descriptive
c) Explanatory
d) Predictive

Practice questions

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What is the goal of this study?
A researcher administers a happiness survey and a personality survey in order to examine the hypothesis that extraverts are happier than introverts.

a) Exploratory
b) Descriptive
c) **Explanatory**
d) Predictive

Practice questions

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What is the goal of this study?

Post-deployment interviews with defence personnel are used to identify risk factors for PTSD. These risk factors are then monitored in currently deployed personnel.

a) Exploratory
b) Descriptive
c) Explanatory
d) Predictive

Practice questions

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What is the goal of this study?
Post-deployment interviews with defence personnel are used to identify risk factors for PTSD. These risk factors are then monitored in currently deployed personnel.

a) Exploratory
b) Descriptive
c) Explanatory
d) **Predictive**

Pros and cons of survey research

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Advantages

- Ecological validity
- Access to wide range of participants
- Potentially large amounts of data at a relatively low cost
- May be more ethical than experiments for certain topics

Disadvantages

- Lack of control
  - Less internal validity i.e. can't make causal conclusions
- Data may be superficial
- Can be costly to obtain representative data
- Self-report data only
- Potentially low compliance rates

Summary

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- You need to:
  - Know your types of research
  - Know what a survey is, and its history
  - Know the goals of research
  - Know the pros and cons of survey research

Summary

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- Survey research relies on the scientific paradigm that assumes a positivistic view of knowledge
- Types of research: experimental, quasi-experimental, non-experimental
- A survey is a standardized stimulus designed to measure psychological phenomenon, and modern research on surveys has been around since the 1980s
- Goals of research: information gathering (exploratory/descriptive) and theory testing (explanatory/predictive)
- Pros: ecological validity, cost efficiency, can get lots of data; and cons: low compliance, reliance on self-report

Next lecture

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- Survey design:
  - Survey administration methods
  - Survey construction
  - Levels of measurement
  - Biases
  - Sampling

Contributions to this course

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Dr James Neill

Dr Samantha Stanley

Dr Jeroen van Boxtel

References I

Ambikairajah, A., Foxe, D., de Lange, A.-M. G., Carrick, J., Cheung, S. C., Srikanth, V. K., Hwang, Y. T., Ahmed, R. M., Burrell, J. R., & Piguet, O. (2025). A Bayesian analysis of diagnostic timelines across Alzheimer's disease, frontotemporal dementia, and other neurodegenerative conditions. *Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring*, *17*(3), e70184. https://doi.org/10.1002/dad2.70184