Department of
Psychological and
Behavioural Science

2021/22
Full Course Outline

PB130

Statistics and Research Methods for Psychological and Behavioural Science

General Information

Summary

This course equips students with the bedrock knowledge and skills for conducting research in psychology and behavioural science. It integrates core concepts from the planning and conducting research with those of understanding and analysing data. Lectures and classes introduce research methods and statistics to provide a foundation for Years 2 and 3. Students will be provided with datasets that they can use to put what they learn into practice, as well as having the opportunity to collect and work with data of their own.

Teachers

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Availability

This course is compulsory for students following the BSc in Psychological and Behavioural Science. It is not available to any other students.

Aims

- To situate contemporary research in psychology and behavioural science in the historical context of psychological enquiry;
- To convey an understanding of the processes required in planning, carrying out, summarising, and evaluating research in psychological and behavioural science;
- To introduce principles for designing, conducting, and writing up qualitative and quantitative research projects;
- To introduce statistical methods needed to familiarise oneself with a dataset, summarise its key features, and identify key relationships among variables;
- To provide practical experience of collecting and analysing psychological and/or behavioural data, and;
- To prepare students for later courses in statistics and research methods for psychological and behavioural science.

Learning Outcomes

- Outline core tenets in philosophy and twentieth century history of psychological enquiry;
- Understand the principles of high quality research questions and associated research designs, with a view to shedding light on phenomena and processes involved in human behaviour and psychology;
- Outline the potential for a range of research methods to address research questions in psychological and behavioural science;
- Describe the steps involved in collecting, analysing, and summarising psychological and/or behavioural data and;
- Apply principles of statistics and research design in the evaluation of research in psychological and behavioural science.

Teaching Arrangements

This course is delivered through a combination of lectures, workshops, lab sessions and classes totalling a minimum of 84 hours across Michaelmas term and Lent term. There is a reading week in Week 6 of Michaelmas term and Week 6 of Lent term.

In response to the current situation some of this teaching, particularly lectures may be delivered through online videos or online sessions.

Attendance at classes, workshops and lab sessions is compulsory and registers will be taken.

HUB

Timetables on Student Hub

You'll be able to see you lecture and class timetable on the LSE Student Hub. Timetables are normally released during Welcome.

Office hours

The course teachers and Graduate Teaching Assistant all have office hours. This is time set aside to meet with you to discuss any questions or concerns you may have. Please do not hesitate to get in touch if you feel you need study support or advice. You make office hour appointments via the Student Hub. There are many other sources of support for LSE students, and your Academic Mentor and teachers, among others, can help you find what you need.

HUB

Office hours in Student Hub

You can book office hours through the Student Hub.

Topic Summary

Week	Topic	
MT1	How we got here: History and philosophy of psychological research	
MT2	Framing the question: Approaches to research design	
MT3	Welcome to data analysis: Understanding data, getting data, and an introduction to R	Links to MT3 in PB100
MT4	Distributions and variation: Summarizing and visualizing your data	
MT5	Observe and Listen: Obtaining qualitative data	
MT6	Reading Week – No Teaching	
MT7	What is said and how it is said: Analyzing qualitative data	Links to MT5 in PB101
MT8	Modelling variation: Introduction to the linear model	
MT9	Explaining variation I: Comparing groups	
MT10	Explaining variation II: Simple relationships in your data	
MT11	Evaluating linear models: Hypothesis testing and causal inference	
	Christmas Vacation	
LT1	Research design and ethics: Designing experiments for the lab and field	
LT2	Regression I: Moving from simple to multiple regression	
LT3	Regression II: Moderation and mediation	
LT4	Grasping at causality: Controlled observational, quasi-experimental, and naturally occurring data	Links to LT3 in PB100
LT5	Regression III: Factorial ANOVA	
LT6	Reading Week – No Teaching	
LT7	Categorical data analysis: Chi-Square and logistic regression	
LT8	Ask and assess: Designing surveys and psychological tests	
LT9	Armed and Ready: Challenges of doing research in psychological and behavioural science	Links to LT9 in PB101
LT10	When things get tricky: Common complications in psychological and behavioural science research	
LT11	Open Science: Publication bias, scientific misconduct, and the research integrity movement	
	Easter Vacation	

Linked Learning for BSc in Psychological and Behavioural Science

In Year 1 of the BSc in Psychological and Behavioural Science there are a number of occasions where you will learn about a theory or phenomena in PB100 or PB101. You'll then investigate ways to research and measure this in PB130. These are identified by the linked learning symbol in the lecture and class summary. There is more detail about the links against the relevant topics.

Reading Week

There is a 'Reading week' in week 6 of the both Michaelmas and Lent term. During these weeks there will be no lectures, classes, statistics workshops or lab sessions. Instead, you should review your progress thus far and consider plans for the remaining weeks. You could consider:

- Assess your progress in achieving the Learning Outcomes.
- Consider your learning about overlapping theories and phenomena from this and other courses that you take (especially PB100 and PB101).
- Reviewing any texts that you may have missed so far.
- Revisiting texts that you read earlier in the term but were not sure about.
- Reviewing your notes in preparation for the assessments.

You may want to meet up with other students to:

- Use peer assessment to measure your progress in achieving the Learning Outcomes.
- Consider your learning about overlapping theories and phenomena from this and other courses that people in your group take.
- Talk about your overall experience of the programme.
- Discuss and develop further ideas sparked by the course.

Teaching for PB130

Because of the content, and training element, teaching in PB130 is delivered in a slightly different way to most LSE courses. There will be weekly lectures and these will be supported by a mix of classes, statistics workshops and lab sessions. The topic descriptions will outline whether there is a class, workshop or lab session that week.

Our response to COVID-19

This year, in response to COVID-19, we're taking a flexible approach to teaching and learning. We're aiming to deliver classes, workshops and lab sessions on campus. Lectures however are likely to be delivered online, you can see more about what this means in the section below. COVID-19 is a rapidly evolving situation so we may need to make changes to how we teach at short notice but we'll do our best to keep you up to date. Our priority is to make sure you get the best educational experience at the same time as keeping everybody safe.

Lectures

Lectures are an essential component of university life in the UK (and in most universities around the world). They are not designed to be exhaustive and sometimes students will finish the lecture with more questions than answers. This is not something to worry about but to work on: lectures aim to open up the field, excite your curiosity and get you to read more, discuss and exchange doubts and ideas with teachers and peers. Each academic will have their own approach to delivering lectures, but the aim of lectures remains the same; to convey key entry points of knowledge for each topic and facilitate critical assessment of the material.

Online lectures may take one of two forms. They may be '**asynchronous micro-lectures**' which means they will be pre-recorded and made available for you to watch on Moodle. Alternatively, they may be delivered as a **synchronously via a live Zoom call**. For a course like PB130, there is likely to be changes from week to week depending on the topic being taught. You'll be able to see what's happening in a particular week on Moodle.

Even during this time of online lectures, dialogue between lecturers and students is still very much welcomed and encouraged and course leaders have created avenues for conversation. Discussion forums, Q&A sessions and classes are some of the opportunities for you to interact and exchange ideas with peers and lectures.

Classes

Classes intend to provide students with a space for exploring the issues covered in the lectures further. They involve working with foundational texts and research papers and are designed to guide you through reading and presentations. Unlike lectures, academics act to facilitate the class with the expectation that students will lead the discussion, for example there may be presentations and discussions of key texts led by students. Many classes operate as a 'reading group' and as a forum for collective mutual support for critical reflection, integrating of key ideas covered during lectures and the development of oral and argumentative skills.

Classes are an integral part of courses and as such attendance is compulsory and attendance will be monitored. Any student who regularly absent will be automatically reported to their Academic Mentor, therefore if you expect to miss a class it is advisable to discuss the matter in advance with the class teacher.

Statistics Workshops

The statistics workshops are designed to provide you with an opportunity to put what you've learned into practice. You should expect to engage in practical work to help you learn how to design and conduct research and work with data. The workshops will be bigger than classes (the full cohort will be there) but as a result you'll be supported by more staff – usually the course leader plus a Graduate Teaching Assistant.

Statistics workshops are an integral part of courses and as such attendance is compulsory and attendance will be monitored. Any student who regularly absent will be automatically reported to their Academic Mentor, therefore if you expect to miss a class it is advisable to discuss the matter in advance with the class teacher.

Lab Sessions

Over the course you will also complete 10 two hour lab sessions. During these sessions we'll introduce you to some key experimental work.

The lab sessions are an integral part of courses and as such attendance is compulsory and attendance will be recorded on LSEforYou. Any student who is absent from the workshops, classes or lab sessions for two consecutive weeks will be automatically reported to their Academic Mentor via LSE for You. If you expect to miss a session it is advisable to discuss the matter in advance with the course leader.

Moodle

Moodle is LSE's virtual learning environment. During this time of blended online and on-campus teaching Moodle is a vital platform as the central hub for all teaching and learning. You can access Moodle by visiting moodle.lse.ac.uk.

PB130 has a designated Moodle page containing the asynchronous lecture videos and activities (such as quizzes and forum posts), lectures slides, reading lists and additional resources, such as links, audio and videos files and podcasts.

You will be asked to submit your formative and summative assessments electronically through Moodle, we'll provide feedback and, for summative work provisional marks, via Moodle. Moodle is managed by your course leader so how it is used will vary from course to course.

Resources

There are a number of different types of resource for PB130. The main resource will be readings – either books, chapters in books or journal articles. Other resources will include videos, magazine articles, webpages, talks and podcasts. There are some resources which are relevant to the whole course, you'll find these listed below. There are then resources relevant to each topic which you'll find listed on the relevant page.

Within all of the resource lists we'll indicate which things are essential and which provide you further content. You are also encouraged to go more deeply into topics that particularly interest you.

- ***Essential*** - in this guide items marked with two stars (**) are essential. You *should* read, watch or listen to these before the lecture, and you ***must*** engage with them before the class. Class learning is a co-operative endeavour – you all benefit if everyone does the reading; discussions and learning will suffer when some students don't.
- ***Further*** - you should try to delve into topics by exploring the resources more widely. The course leader will list suggested further resources in the relevant resource lists. You should engage with these further resources, particularly if you plan to cover a topic seriously, for example for an essay.
- ***Deep*** - if you want to explore a topic even more deeply there are two ways that you can do this. Firstly, the lecturer and class teacher will include links to all resources that they discuss in the lecture. This may be on the particular slide or in a list at the end. Secondly, you can investigate readings listed in the bibliographies of the essential readings.

You can access all resources via the PB100 Moodle page – there will be a link to the reading list (which in turn links to the library catalogue) and lists of other types of resources.

Course Wide Resources

PB130 Online Textbook

Son, J. Y., & Stigler, J. W. (2019). *Introduction to Statistics: A Modeling Approach*
PB130 has an online textbook in Canvas. You will be sent an invitation to join Canvas at the start of the year and will need to set up an account to access the textbook. Canvas is free to use. You can access this at https://canvas.instructure.com/courses/1694468

Readings

The following books are core course texts which you will need to purchase, borrow, or access online on a continuous basis. You will use these texts in addition to any readings specified in the individual lectures, they form the essential readings for the course.

Braun, V., & Clarke, V. (2013). *Successful qualitative research: A practical guide for beginners*. London: Sage.
Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. London: Guilford Publications.
Howitt, D., & Cramer, D. (2014). *Introduction to Research Methods in Psychology.* 4th edition. London: Pearson.
Hunt, M. (2007). *The story of psychology.* (2nd ed.) London: Random House.
Navarro, D. (2015). *Learning Statistics with R: A Tutorial for Psychology Students and Other Beginners: Version 0.5*. Adelaide, Australia: University of Adelaide. Available on the PB130 Github.
Phillips, N. D. (2017). *Yarrr! The pirate's guide to R.* Available on the PB130 Github.
Urdan, T. C. (2011). *Statistics in plain English*. London: Routledge.

The following are general readings which you may wish to consult:

American Psychological Association. (1994). *Publication manual. Sixth Edition.* Washington: APA.
Cooper, H., Camic, P. M., Long, D., Panter, A., Rindskof, D., & Sher, K. (2012). *The APA handbook of research methods in psychology* (volumes 1-3). American Psychological Association.
Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed method approaches* (3rd ed.). Thousand Oaks, CA: age.
Danziger, K. (1994). *Constructing the subject: Historical origins of psychological research.* Cambridge: Cambridge: Cambridge University Press.
Firebaugh, G. (2008). *Seven rules for social research.* Princeton, NJ: Princeton University Press.
Poldrack R. A. (2019). *Statistical Thinking for the 21st Century.* Available on the PB130 Github.
Wickham, H. (2016). *ggplot2: elegant graphics for data analysis*. London: Springer. Available on the PB130 Github.

Website

British Psychological Society (2014). *Code of Human Research Ethics.* BPS. Available on the BPS Website.

Research Ethics

Throughout the course we will frequently refer to the research ethics. You should make sure that you have read the British Psychological Society's Code of Human Research Ethics and pages 62 to 68 of the Year 1 Programme Handbook.

Topics

MT1 – How we got here: History and philosophy of psychological research

Dr Miriam Tresh

In this first week, students will be taught a brief history of psychology and psychological research, from early human philosophy to the introduction of scientific methodology in the twentieth century and beyond. Students will be introduced to the pioneers of psychological research and the rise of specialism within the field. Here, students will gain an understanding of the core questions and methodologies of the times and how these shaped the evolution of psychology as a social science. Lastly, we will consider the philosophy of science and its implications for how psychological research is conducted today.

Psychology in the twentieth century and beyond

- Social focus (present in Wundt's Volkerpsychologie) splits off to sociology (Mead, Blumer), while within psych, individualisation of the social occurs (Allport, cf. Farr)
- The pioneers
    - Early experimenters (Wundt, James)
    - Psychoanalysis (Freud & onwards)
    - Early Individual Differences (Binet, Galton)
    - Early Behaviourism (Thorndike, Pavlov, Watson, Hull, Skinner),
    - Gestalt Psych (Koffka, Wertheimer, Kohler)
- Rise of specialisms
    - Personality
    - Development
    - Social Psychology
    - Perception
    - Emotion & Motivation
    - Cognition
    - Psychopathology
    - Genetics & Evolution
    - Neuroscience
- Questions drawing on problems of the time
- Metaphors and methods drawing from technologies of the day
- Influence of parallel developments in neighbouring fields (cf. PB110 early lectures)

Introduction to philosophy of science

- Popper, Lakatos, Kuhn, Feyerband etc.
- Positivism, constructivism, postmodernism
- Reflexivity in psychological enquiry

Aims

- To introduce the history of psychological and behavioural enquiry in the twentieth century and beyond;
- To situate the development of psychology as a science within the context of political, social, economic, and technological developments of the day;
- To equip students with a critical awareness of the individualisation of psychological enquiry and the implications for the evolution of psychology as a social science.

Learning Outcomes

After attending this lecture, participating in the associated class, and completing the relevant reading and coursework, you should be able to:

- Identify key historical developments in psychology as a science of mind and behaviour.
- Outline the extent to which research approaches, metaphors and methods in psychological and behavioural science were influenced by the contemporary societal context in which they emerged.
- Discuss the implications of the individualisation of psychological and behavioural enquiry for the development of psychology as a social science.

Resources

Readings

** Walsh, R., Teo, T., & Baydala, A. (2014). *A Critical History and Philosophy of Psychology: Diversity of Context, Thought, and Practice*. Cambridge: Cambridge University Press. Chapter 1; Chapter 2 (parts 2 and 3); Chapter 3 (parts 2, 3 and 4); Chapter 6 (parts 1, 2 and 3); and Chapter 7 (part 1, 2 and 3)

** Hunt, M. (2007). *The story of psychology* (2nd ed.). New York: Random House. Parts 2 and 3

MT2 – Framing the question: Approaches to research design

Dr Miriam Tresh & Dr Thomas Curran

In this lecture, students will be introduced to research design. We will consider both theory and data-driven approaches to developing research questions and how research design is shaped by various factors, including context and ethics. Following this, students will be introduced to various research strategies used in psychological research and how each can be used to make inferences about causality and complexity, in light of the research question of interest. We will also consider the advantages and disadvantages of these various strategies and methodologies.

Developing research questions:

- Theory-driven versus data-driven, A priori v. a posteriori
- Testing theories: the trick of establishing causality

Research strategy choices:

- Criterion 1: ability to establish causality
  Maryland scale & related notions of hierarchy: expert opinion → observational → controlled observational → quasi-experimental → RCT
- Criterion 2: ability to capture complexity
  Risks and advantages of lab experiments, field experiments, quasi-experiments, action research, correlational field studies, case studies, ethnographies, interviews/focus groups, media analyses, and historical studies

Keeping the research process in context:

- How values, abilities & preferences shape research design choices
  - Intro sociology of science
  - History of qual-quant divide in psych
- How social & geographic context shapes research design choices
  - Introduce WEIRD re researchers (example of religion), as an example: Luria and Kazakhstan
- Ethical considerations and the research ethics process

Aims

- To introduce the range of methods in psychological and behavioural science, their key strengths and limitations;
- To critically assess criteria for choice of empirical approach and data collection tool;
- To convey the impact of the surrounding context of research on the nature of insights gained.

Learning outcomes

After attending this lecture, participating in the associated workshop, and completing the relevant reading and coursework, you should be able to:

- Outline the strengths, drawbacks, and empirical potential of key methods in psychological and behavioural science;
- Describe the contextual influences and limitations on psychological and behavioural enquiry;
- Articulate how the nature of a research question affects the appropriate selection of data collection and analysis methods.

Statistics Workshop

In the workshop, we will:

- Discuss the assessment
- Download and install R and R studio
- Introduce R markdown and the creation of notebooks

Resources

Readings

** Howitt, D. & Cramer, D. (2014) *Introduction to Research Methods in Psychology* 4th edition. London: Pearson. Chapters 1, 2 and 26.
** Phillips, N. D. (2017), *YaRrr! The Pirates Guide to R.* Chapters 1 and 2. Available on the PB130 Github
Cohen, B. (2003). Creating, testing, and applying social psychological theories. *Social Psychology Quarterly, 66*, 1, 5-16

MT3 - Welcome to data analysis: Understanding data, getting data, and an introduction to R

Dr Thomas Curran

This week, students will be introduced to issues of sampling and the common forms of data in psychology. We will also take a brief foray into the operationalization of variables and their measurement, before tackling research design and issues of validity. The workshop will introduce R as a data analysis tool. Here, we will download a secondary data source and conduct some basic data manipulation. It will include an initial foray into variables and how they are formed from concepts. We will then move to discussing the sources of data and how to get it, before moving to an overview of different data types and their implications for analyses. Finally, we will introduce students to the programming language R and give an overview and justification for its use.

Sampling

- Population and sample
- Types of sample
- Sampling issues
- Generalization

Sources of data in psychology

- Qualitative vs quantitative data
- Primary vs secondary data
- Behaviours
- Attitudes, preferences and tendencies
- Unconscious or undesirable associations and feelings
- Abilities
- Meanings or understandings

From concepts to variables

- Operationalization and measurement
- Types of variables
- Predictors vs outcomes

Introduction to R

- Why R
- Introduction to R functions
- R objects
- Basic data manipulation

Aims

- To introduce the variety of kinds of psychological/behavioural data, their key characteristics and affordances;
- To convey the challenges and principles of translating psychological and behavioural phenomena into measurable units;
- To introduce data retrieval and the concepts of sampling and sampling bias;
- To introduce students to the programming language R and basic data manipulation.

Learning outcomes

After attending this lecture, participating in the associated workshop, and completing the relevant reading and coursework, you should be able to:

- List the variety of forms of psychological and behavioural data;
- Outline the principles of operationalisation and measurement of psychological and behavioural phenomena;
- Appreciate the impact of characteristics of data format for how it can later be analysed;
- Conduct basic data manipulation functions in R.

Statistics Workshop

During the workshop we will:

- Download the World Values Survey
- Conduct basic data manipulation

Resources

Readings

** PB130 Online Textbook. Chapters 1 and 2. Available on Canvas.
** Urdan, T. C. (2017) *Statistics in plain English* New York: Routledge. Chapter 1.
Navarro, D. (2015), Learning Statistics with R: A Tutorial for Psychology Students and Other Beginners (Version 0.5) Chapters 1-4. Available on the PB130 Github
Phillips, N.D. (2017), *YaRrr! The Pirates Guide to R.* Chapters 4 – 10. Available on the PB130 Github
Howitt, D. & Cramer, D. (2014) *Introduction to research methods in psychology* 4th edition. London: Pearson. Chapters 3, 4, 16 and 17.

Linked Learning
In MT3 you will be looking at discussion of preferences, beliefs and attitudes in PB100. This links to our work with the World Values Survey.

MT4 – Distributions and variation: Summarizing and visualizing your data

Dr Thomas Curran & Dr Miriam Tresh

This week, students will be taught about descriptive statistics as a lenses to view the "shape" of data and moments of distributions. Peeking at it from different sides, poking at it with different tools. The focal learning outcome here is that distributions matter because they reveal to us how much variation exists in a sample or population. And with this variation comes something for us to attempt to explain using variables that we introduced last week.

Distributions
- The concept of distribution
- Types of distribution
- Distributions in the population and sample

Measuring central tendency
- Means, median, mode

Variation
- The beauty of variation to statistical analyses
- Sources of variation – explained and unexplained
- Randomness

Badly behaved data
- Skew, kurtosis, non-normal data
- Exponents and polynomials

Visualisations
- Visualizing distributions with histograms
- Visualizing distributions with box-plots
- Scatter plots
- Line graphs and trend lines

Combining distributions
- Explaining variation of one variable with another

Aim
- To introduce students to common methods for summary statistics and visualisation for data.

Learning outcomes
After attending this lecture, participating in the associated workshop, and completing the relevant reading and coursework, you should be able to:
- Calculate and interpret the central tendency and spread of a given dataset and know the difference between these;
- Describe the ways in which datasets commonly vary from clean distributions, particularly from Gaussian distributions;
- Select between a variety of common visualization techniques and apply the most appropriate to interpret a given dataset.

Statistics Workshop
During the workshop we will:
- Calculate summary statistics in R
- Perform basic visualisations on data in R

Lab Session
In the lab session we will practice experimental data collection using some popular social-cognitive paradigms.

Resources

Readings

** PB130 Online Textbook. Chapters 3 and 4. Available on Canvas.
** Urdan, T. C. (2017) *Statistics in plain English* New York: Routledge. Chapters 2 and 3.
** Navarro, D. (2015), *Learning Statistics with R: A Tutorial for Psychology Students and Other Beginners* (Version 0.5) Chapter 6. Available on the PB130 Github.
Phillips, N. D. (2017), *YaRrr! The Pirates Guide to R.* Chapters 11 and 12. Available on the PB130 Github.
Poldrack, R. A. (2019), *Statistical Thinking for the 21st Century.* Chapter 4. Available on the PB130 Github.
Wickham, H. (2016). *Ggplot2: Elegant graphics for data analysis.* London: Springer. Available on the PB130 Github.

Lab Readings

Bellezza, F., Greenwald, A.G., & Benaji, M.R. (1986) Words high and low in pleasantness as rated by male and female college students *Behavior Research Methods, Instruments, & Computers* 18(2) 299-303
Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology,* 74(6), 1464–1480
Battig, W.F., & Montague, W.E., Category norms for verbal items in 56 categories: A Replication And Extension Of The Connecticut Category Norms *Jorunal of Experimental Pscyhology* 80(3)2

MT5 – Observe and listen: Obtaining qualitative data

Prof Bradley Franks

This week students will begin their introduction into qualitative methods by focusing on the three 'Ws': 'what', 'when' and 'why'. We will focus on key epistemological differences between qualitative and quantitative research to examine what qualitative data actually means, the different forms of qualitative data 'out there' and when to use them, as well as why qualitative research is important for examining psychological processes.

Opportunities & challenges in qualitative research

- How combining qualitative and quantitative helps resocialise the individual:
  - Understanding lived experience in context
  - Capturing subtle social and societal dynamics
- How combining qual and quant are needed to solve the WEIRD people problem:
  - Economists and parachutes
  - Anthropologists and diaries
  - The "New Fieldwork"--an integration--and the WEIRD people
- Strengths of qualitative research:
  - People in their own words
  - Individuals in social context
  - Phenomena in all their complexity
- Assumptions of introspection: Can we see what drives us?
- Assumptions of communication: Can we articulate what drives us, and can we trust what we tell each other?

Naturally-occurring qualitative data

- Naturalistic observations ("don't mind me…")
  - Participant observation
  - Ethnographic approaches
- Media analysis (including qual to quant)
  - Mass media articles & footage
  - Social media content
- Conversation & social interaction (e.g. text corpus analysis)

Solicited qualitative data

- Interviews: unstructured, semi-structured, structured
  - From topic guide to 2-way conversation
- Focus groups: measuring guided interactions
  - From topic guide to collective interaction
- Tips and hurdles:
  - Reducing bias and distortion
  - Allowing for the unpredictable
  - Reflexivity

Aims

- To apprise students of the potential for qualitative data to form part of the psychological/behavioural scientist's empirical package;
- To introduce the range of methods for collecting qualitative data;
- To equip students with basic skills for identifying and soliciting high quality qualitative data.

Learning objectives

After attending this lecture, participating in the associated class, and completing the relevant reading and coursework, you should be able to:

- Describe the potential and limitations of qualitative data collection methods in psychological and behavioural science;
- Identify sources of existing qualitative data with potential for insight into psychological/behavioural phenomena;
- Follow procedures to collect qualitative data in basic forms, such as through observation, interviews and focus groups.

Class

In the class you will get an opportunity to discuss and share ideas for the group project assessment.

Lab session

During the lab session we will collect qualitative data. Students will transcribe in groups.

Readings

Readings

** Braun, V. & Clarke, V. (2013), *Successful qualitative research: a practical guide for beginners* London: SAGE. Chapter 2.
** Howitt, D & Cramer, C. (2014), *Introduction to research methods in psychology* 4th edition. London: Pearson. Chapter 18.
Braun, V. & Clarke, V. (2013), *Successful qualitative research: a practical guide for beginners* London: SAGE. Chapters 3 & 4.

MT7 – What is said and how it's said: Analysing qualitative data

Dr Bradley Franks

Following from MT5, this week we move from the 'what', 'when' and 'why' of qualitative data, to considering the 'how'. Students will be introduced to different types of qualitative analysis, how to apply them, and their strengths and weaknesses. We will also look at some common software analysis packages used to aid in qualitative analysis.]

This week you'll be introduced to

- Thematic analysis
- Conversation analysis
- Grounded theory
- Discourse analysis
- Interpretative phenomenological analysis

Aim

- To introduce core qualitative data analysis techniques.

Learning outcomes

After attending this lecture, participating in the associated class, and completing the relevant reading and coursework, you should be able to:

- Describe the appropriateness of different qualitative analysis methods for different kinds of psychological and behavioural data;
- Understand the steps involved in conducting thematic, conversation, interpretative phenomenological, and discourse analysis, and the use of grounded theory.

Class

During the class you'll get practical exposure to qualitative data analysis. We'll guide you through the application of two of the above methods to the same piece of qualitative data.

Lab Session

During the lab session we will analyse data extracted from MT5.

Resources

Readings

** Braun, V. & Clarke, V. (2013), *Successful qualitative research: a practical guide for beginners* London: SAGE. Chapter 8.
Howitt, D. & Cramer, D. (2014), *Introduction to research methods in psychology* 4th edition. London: Pearson. Chapters 20 - 24

Linked Learning

In MT5 and MT7 you'll be looking at perceptions and cognitive processes in PB101. This links to our work on qualitative research methods.

MT8 – Modelling variation: Introduction to the linear model

Dr Thomas Curran

This week we will introduce the linear model as an overarching framework for understanding common statistical tools in the psychological sciences. You will learn about the most basic form of as statistical model, that is: DATA = MODEL + ERROR. The model part of this formula being our "best guess" given available information, and the error part being the imprecision or variance of that best guess from the observed data. The concepts introduced here are the fundamental building blocks for the more complex statistical models that we will construct in subsequent weeks, which allow us to add variables that might reduce (or explain) the variance around our "best guess".

Simple (or empty) model

- Why models?how
- mean as the "best guess" or simple (empty) model
- DATA = MODEL + ERROR

Statistics and parameters

- b_0 vs β_0
- e_i vs ε_i

Error (or residual)

- Think about error as variance around the model (or mean)
- The beauty of sum of squares as a measure of variance
- The standard deviation
- Z-scores

The normal distribution

- Balancing error variation: The power of aggregation
- Modelling error with the normal distribution
- Using the normal distribution to estimate probability

Aim

- To introduce the general concept of the linear model of as overarching statistical framework and the key parameters and assumptions associated with it.

Learning outcomes

After attending these lectures, participating in the associated workshop, and completing the relevant reading and coursework, you should be able to:

- Explain what it a simple (or empty) model is;
- Define the parameters of a simple (or empty) model;
- Describe how error is quantified in a simple (or empty) model and appreciate the importance of variance;
- Describe the various ways in which models can be specified and the assumptions behind such specifications.

Statistics Workshop

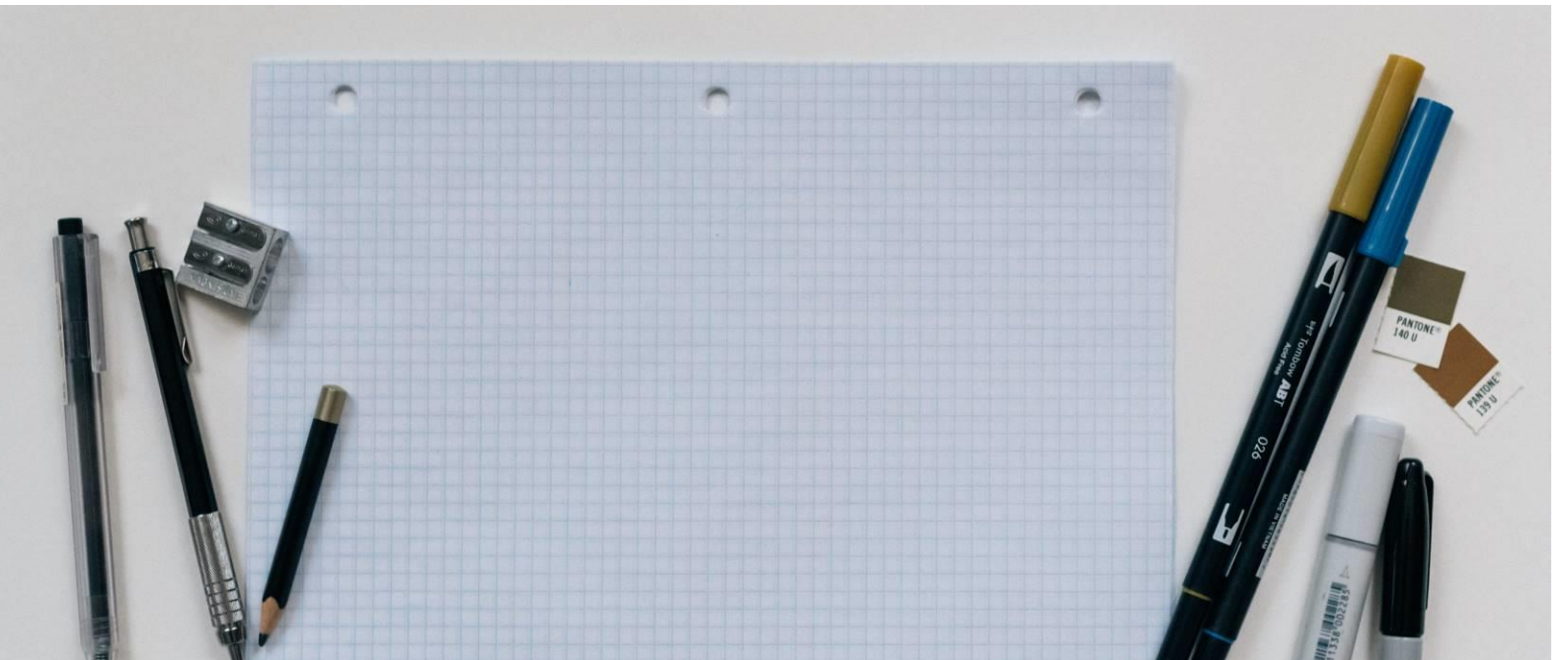
During the workshop we will:

- Use the lm() function in R to fit an empty model
- Calculate predicted scores and residuals
- Use the anova() function in R to inspect error

Resources

Readings

** PB130 Online Textbook. Chapters 5 and 6. Available on Canvas.
** Urdan, T.C. (2017) *Statistics in plain English* New York: Routledge. Chapters 4 and 5.
Poldrack, R.A. (2019), *Statistical Thinking for the 21st Century.* Chapter 5. Available on the PB130 Github.



MT9 – Explaining variation I: Comparing groups

Dr Thomas Curran & Dr Miriam Tresh

This week we will move on from the empty model to add categorical explanatory variables that might help to reduce the error or imprecision of statistical estimation. Let's say we have an empty model that contained 100 student scores of narcissism. Without any other information, our best guess of what any given student might score on narcissism is the mean (i.e., the empty model). However, let's say we speculate that we might be able to improve our best guess, or reduce our estimated variance, if we knew the gender of the student because males typically score higher on narcissism than females. This is, in essence, what we are doing by adding a categorical explanatory variable to our empty model – attempting to improve the accuracy of our best guess by adding variables that explain the error variation in the empty model.

Explaining variation
- Improving our best guess by using categorical explanatory variables to reduce error.
- Going from a one parameter empty model (mean) to a two (mean plus two-level categorical explanatory variable) and three (mean plus three-level categorical explanatory variable) parameter model.

Categorical variables
- Dummy coding
- Fitting a categorical variable to an empty model
- Paired t-test, independent t-test, ANOVA

Error
- Quantifying error in a two and three parameter model
- Partitioning variance in the outcome variable attributable to the categorical variable and variance attributed to error (residuals)
- The Proportional Reduction in Error (eta-squared) from the empty model
- Introduction to degrees of freedom and effect size
- The F ratio

Non-parametric equivalents
- Wilcoxon signed ranked test
- Wilcoxon matched pairs
- Welch's t-test
- Mann-Whitney U-test

Aims
- To introduce students to two and three parameter models that seek to reduce error in empty models using categorical variables.
- To introduce students to the statistical approach to group comparison using the linear model.

Learning outcomes
After attending this lecture, participating in the associated workshop, and reading the appropriate references from the reading list, students should be able to:
- Understand the relationship between an empty (mean) linear model and a linear model with a categorical explanatory variable.
- Describe simple statistical measures of the magnitude of reduction in error from an empty model;
- To appreciate the variety of techniques that can be used to compare groups, and their underlying relationship with the linear model.

Statistics Workshop
During the workshop we will:
- Use the lm() function in R to fit a two and three parameter models using categorical variables
- Calculate predicted scores and residuals
- Use the supernova() function in R to inspect the model variance, the proportional reduction in error, and the F ratio

Lab Session
During the lab session we will practice collecting data on a simple two-condition social-cognitive experiment.

Resources

Readings

** PB130 Online Textbook. Chapter 7. Available on Canvas.

Navarro, D. (2015), *Learning Statistics with R: A Tutorial for Psychology Students and Other Beginners* (Version 0.5) Chapters 13 and 14. Available on the PB130 Github.

Urdan, T. C. (2017) *Statistics in plain English* New York: Routledge. Chapters 8 and 9.

MT10 – Explaining variation II: Simple relationships in data

Dr Thomas Curran & Dr Jens Madsen

Having taken a look at explaining error variance in the empty model with a categorical explanatory variable to compare groups, this week it's the turn of continuous or quantitative explanatory variables to examine relationships. Although comparing groups and examining relationships might sound like different analyses, they are in fact just special cases of the linear model, with both seeking to reduce the error in our empty model's "best guess". The only difference being that we can't use the mean as a model for continuous variables because we don't have discrete groups (e.g., males or females). Instead, we use a line as a model so that we can make estimations using any data point along a whole spectrum of possible scores (e.g., height or weight). You may remember this line from school, it's called the line of best fit or the regression line.

The regression line as a model
- Groups vs continuous explanatory variance
- The regression line (y = ax + b)
- Intercept (b_0) and slope (b_1)

Fitting the regression model
- Using the regression line to make predictions
- Examining residuals
- Model fit and the F ratio
- Correlation and the correlation coefficient

Non-parametric equivalent
- Spearman correlation coefficient

Why correlation does not necessarily equal causation and other limitations
- Third variable problem
- Reverse causality

Aims
- To introduce students to regression line models that seek to reduce error in empty models using continuous variables.
- To introduce students to the statistical approach to simple relationships using the linear model.

Learning outcomes
After attending this lecture, participating in the associated workshop, and completing the relevant reading and coursework, you should be able to:
- Understand the relationship between an empty (mean) linear model and a linear model with a continuous explanatory variable.
- Describe and define the regression line, model fit, and correlation coefficient.
- Describe the relationship between regression and ANOVA.
- Understand the difference between correlation and causation and the ways in which variables can be related.

Statistics Workshop
During the workshop, we will:
- Use the lm( ) function in R to fit a regression line model
- Visualise relationships and the regression line in R
- Use the cor( ) function in R to calculate the correlation coefficient

Lab Session
During the lab session we will practice collecting physiological data.

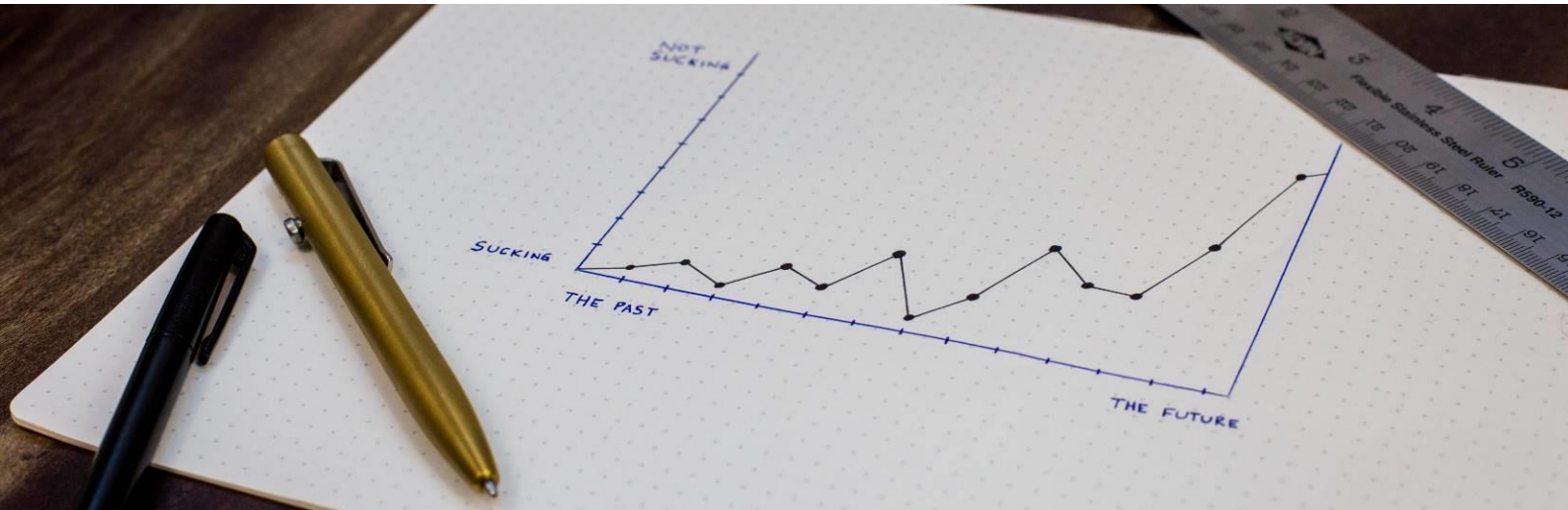
Resources

Readings

** PB130 Online Textbook. Chapter 8. Available on Canvas.

Urdan, T. C. (2017) *Statistics in plain English* New York: Routledge. Chapter 12

Hayes, A. F. (2015), *Introduction to mediation, moderation and conditional process analysis: a regression based approach* New York: The Guilford Press. Chapter 2.



MT11 – Evaluating linear models: Hypothesis testing and causal inference

Dr Thomas Curran & Dr Jens Madsen

At this stage, students should now have sufficient knowledge to begin to understand the basic form of linear models and the purpose of explanatory variables in reducing the error variance around our "best guess". Rather than the amount of error within our models, this week we'll be asking a different question; how much error is there in our estimates? In other words, what is the spread or variance of our linear model estimates across many possible samples? We will introduce confidence intervals as a way of describing this error variance in the estimate and discuss the various ways in which they can be constructed.

Moving from variation in models to variation in estimates
- The non-definitive nature of estimates
- Sampling distributions
- Thinking about the mean of the sampling distribution as the point estimate
- Thinking about the standard deviation of the sampling distribution as the standard error

Reasoning with sampling distributions
- Reasoning forward
- Reasoning backward
- Central limit theorem

Estimating the error in an estimate
- Confidence intervals
- Defining likely and unlikely: Putting the 95 into the 95% confidence interval
- Bootstrapping the confidence interval
- Normal theory confidence interval
- The t-distribution
- Type I and II errors

Application of confidence intervals
- Using confidence intervals to evaluate groups
- Using confidence intervals to evaluate relationships

Aim
- To consolidate previous lecture material in a broader and deeper understanding of hypothesis testing and causal inference using confidence intervals

Learning outcomes
After attending this lecture, participating in the associated workshop, and completing the relevant reading and coursework, you should be able to:
- Define the sampling distribution and central limit theorem
- Describe standard errors and their relationship to confidence intervals
- Explain and apply bootstrapping and normal theory to the construction of confidence intervals
- Explain the difference between Type I and Type II errors and power and the relationship between these

Statistics Workshop
During the workshop we will:
- Simulate and visualise sampling distributions in R
- Use resample( ) and boot( ) functions in R to find the bootstrapped confidence interval of a mean and estimates in R
- Use confint.default( ) function in R to find the normal theory confidence interval in R

Lab Session
During the lab session have students take the 'big 5' personality test alongside serval outcome variables.

Resources

Readings

** PB130 Online Textbook. Chapters 9 and 10. Available on Canvas.
** Poldrack, R. A. (2019), *Statistical Thinking for the 21st Century.* Chapters 7 - 10. Available on the PB130 Github.
Urdan, T. C. (2017) *Statistics in plain English* New York: Routledge. Chapters 6 and 7.
Navarro, D. (2015), *Learning Statistics with R: A Tutorial for Psychology Students and Other Beginners* (Version 0.5) Chapter 9 - 11. Available on the PB130 Github.
Phillips, N. D. (2017), *YaRrr! The Pirates Guide to R.* Chapter 13. Available on the PB130 Github.

LT1 – Research design and ethics: Designing experiments for the lab and field

Prof. Bradley Franks

This week we are going to take a close look at research ethics and the key ethical considerations for conducting research in the psychological and behavioural sciences. This topic will consist of first returning to research design, with a focus on experimental methods. We will then take a look at experimental manipulations and how they are conducted before moving on to ethical considerations of data collection in the lab and field.

Principles of experimental design

- Strengths of randomisation
- Issue of confounds
- Importance of controls

Developing experimental manipulations and interventions

- Impact vs precision
- Standardisation across studies
- Manipulation checks

Ethical considerations of collecting experimental data in the lab and filed

- Managing participant awareness: from consent to study progression to funnel debriefing; importance of participant blinding
- Checking researcher awareness: importance of researcher blinding
- Scripts: standardisation of the experience
- Data recording & storage: security, confidentiality, anonymity

BPS and institutional standards

- The BPS code of human research ethics
- Introduction to ethics applications at the LSE

Aims

- Introduce principles of experimental design;
- Convey key considerations and procedures for the successful conduct of experiments in the lab and field;
- Introduce the ethics procedure and correct ethical practice in psychological research.

Learning outcomes

After attending this lecture, participating in the associated class, and completing the relevant reading and coursework, you should be able to:

- Describe the essential principles and advantages of experiments over other data collection methods;
- Outline important procedures and practical considerations for the conduct of lab and field experiments;
- Outline the core ethical practices of psychological research.

Class

During the class, we will:

- Complete an ethics application for your mixed-methods project

Readings

Readings

** Howitt, D. & Cramer, D. (2014), *Introduction to research methods in psychology* 4th edition. London: Pearson. Chapter 9 and 10.
** Paluck, E. L., & Cialdini, R. B. (2014). Field research methods in Reis, H.T. and Judd, C.M. (eds) *Handbook of research methods in social and personality psychology*, Cambriddge CUP. Pp 81-97.
Banerjee, A. V., & Duflo, E. (2017). An Introduction to the "Handbook of Field Experiments".
Glennerester, R. (2017). The Practicalities of Running Randomized Evaluations: Partnerships, Measurement, Ethics, and Transparency in. A. V. Banerjee & E. Duflo (eds) *Handbook of Field Experiments. Elsevier*.

Webpage

** British Psychological Society (2014). *Code of Human Research Ethics.* BPS. Available at https://www.bps.org.uk/our-members/standards-and-guidelines

LT2 – Regression I: Moving from simple to multiple regression

Dr Thomas Curran & Dr Jens Madsen

Now that we know the fundamentals of linear models, we are going to delve a little deeper into regression. We will hone in on the role of prediction in helping us to better understand human behaviour. To do so, we will revisit the straight line equation, but this time focussing on the interpretation of *b* and *β* as an expansion from correlation. We look at beta within simple regression – that is regression with only one explanatory variable – and then what happens to the interpretation of beta when we add additional explanatory variables to our linear models. We will finish by looking at model comparisons and how we adjudicate whether the addition of explanatory variables is "worth it" in terms of additional model variance explained.

Prediction as a cornerstone of statistical enquiry
- The importance of prediction to the psychological and behavioural sciences
- Famous examples

The linear model and regression
- A recap of the linear model and y = ax + b
- Simple linear regression
- Multiple linear regression
- Why multi$R \neq R^{x1} + R^{x2}$?
- A focus on the differences and interpretation of *b* and *β* in multiple regression

Model comparison
- Comparing models with the F-ratio
- Model comparison with a categorical explanatory variable
- Model comparison with a continuous explanatory variable
- Type I and II errors

Aim
- To introduce students to the basic idea behind regression as an expansion from correlation
- To show how integrating adding explanatory variables to a simple regression model changes the meaning of b_0
- To document how we statistically determine whether the addition of explanatory variables to linear models is necessary

Learning Outcomes
After attending this lecture, participating in the associated class, and completing the relevant reading and coursework, you should be able to:
- Describe what a simple and multiple regression model is attempting to achieve.
- Explain the difference between *b* and *β* and how these are changed in the presence of additional predictors to the linear model.
- Explain the difference between an outcome variable (dependent variable) and predictors (independent variables).

Statistics Workshop
During the workshop we will use the lm( ) R function to conduct simple and multiple regression.

Lab Session
During the lab session we use the data collected in MT11 to demonstrate simple and multiple regression.

Resources

Readings

** PB130 Online Textbook. Chapter 11. Available on Canvas.

** Hayes, A.F. (2015), *Introduction to mediation, moderation and conditional process analysis: a regression based approach* New York: The Guilford Press. Chapter 3.

Navarro, D. (2015), *Learning Statistics with R: A Tutorial for Psychology Students and Other Beginners* (Version 0.5) Chapter 15. Available on the PB130 Github.

Urdan, T. C. (2017) *Statistics in plain English* New York: Routledge. Chapter 13.

LT3 – Regression II: Moderation and mediation

Dr Thomas Curran

To date, we have examined relationships as if the predictors were independent of each other. But what if they interact? Perhaps the relations of perfectionism with burnout are larger in highly controlling contexts like work? This is classic moderation – the effect of the predictor (perfectionism) on the outcome variable (burnout) is conditional on the level of a third variable; the moderator (control). The second part of this session will be dedicated to tests of casual processes. Rather than the interaction of third variables, here we will look at relationships as they operate *through* third variables. Perfectionism is a vulnerability to anxiety disorders, for example. But this relationship is not direct – perfectionists suffer anxiety because they have a ruminative response style. This is classic mediation – the relationship between perfectionism and anxiety goes through rumination. In this session, we will extend what we know about multiple regression using the linear model to conduct tests of moderation and mediation.

Mediation and moderation

- Conceptual overview
- Examples of use

Moderation

- Moderation as an extension of multiple regression
- The interaction term and conditional effects
- Visualising the interaction
- Probing the interaction

Mediation

- Model testing is just regression
- Partitioning of total, direct, and indirect effects
- Statistical inference and bootstrapping

Aim

- To dissect the components of a regression model in more detail and extend them to the principals of mediation and moderation analyses.

Learning outcomes

After attending these lectures, participating in the associated workshop, and completing the relevant reading and coursework, you should be able to:

- Differentiate the concepts of mediation and moderation
- Understand statistical moderation analysis and conditional direct effects as an extension of the linear model
- Plot and visualise interactions
- Probe interactions
- Understand statistical mediation analysis and indirect effects as an extension of the linear model

Statistics Workshop

During the workshop, we will:

- Use the lm( ) function in R to conduct moderation and mediation analysis
- Use the jn( ) and pickapoint( ) functions in R to probe interactions
- Use the mediation( ) function in R to calculate bootstrap confidence interval of the indirect effect

Lab Session

During the lab session we will return to the data from MT11 and test simple moderation and mediation.

Resources

Readings

** Hayes, A. F. (2015), *Introduction to mediation, moderation and conditional process analysis: a regression based approach* New York: The Guilford Press. Chapters 4, 7, and 8. Available on the PB130 Github.

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication monographs*, *76*(4), 408-420.

LT4 – Grasping at causality: Controlled observational, quasi-experimental and naturally occurring data

Prof. Bradley Franks

This week we move on to look at "naturally occurring" data, or natural experiments (i.e. observations and quasi-experiments), with the aim of understanding how we can infer causality from already existing data. Much like in traditional psychological and behavioural science experiments we have seen, it is important to control for confounding variable – at least as much as we can. In the lecture students will be taught how we control for such factors and the analytical methods we can use to approach causality in controlled observations and natural experiments.

What to do when you can't directly manipulate?

- Causality at large scale e.g. nations, ethnic groups
- Damaging causal forces e.g. abuse, deprivation
- Already existing data e.g. Census data, Big Data

Control as much as you can

- Controlled observations
- Natural 'experiments' and quasi-experiments

Observe over time

- Longitudinal designs

Use analytical methods to approach causality

- Instrumental variables
- Regression discontinuity
- Matching & propensity matching
- Difference in difference
- Principal stratification

Where it gets complicated

- Forces at multiple levels
- Being sure about mediating mechanisms

Aims

- To apprise students of the range of non-experimental data collection methods designed to offer maximum insight into causal relationships;
- To introduce analytical methods designed to estimate causal relationships in non-experimental data.

Learning outcomes

After attending these lectures, participating in the associated class, and completing the relevant reading and coursework, you should be able to:

- List cases where pure randomisation is feasible, and 'next best' data collection methods for understanding causal relationships;
- Outline the principles behind key analytical methods used for estimating causal relationships in non-experimental data.

Class

In class, we will discuss the mixed methods project (bring your questions!)

Resources

Readings

** Howitt, D. & Cramer, D. (2014), *Introduction to research methods in psychology* 4th edition. London: Pearson. Chapters 11 and 12.

Linked Learning

You will be looking at subjective wellbeing in PB100, this links to our discussion of causality.

LT5 – Regression III: Factorial ANOVA

Dr Thomas Curran

To this point in the course, we have looked at the linear model as an underlying framework for statistical analysis and we applied this to comparing groups and examining relationships. Since then, we've focussed on regression and the building block of linear models that have multiple predictor variables used to explain a single outcome variable. The goal this week is to extend these ideas into the analysis of experimental data containing multiple grouping (categorical) variables on a single outcome variable. The tool for doing so is generically referred to as factorial ANOVA but, as we will see, it follows the same principals of the linear model.

A brief recap of experimental design

- Single vs multiple grouping variables
- Examples of multiple grouping variable

Factorial ANOVA

- When to use factorial ANOVA and not one-way ANOVA
- Balanced designs, no interactions
- Balanced designs, interactions permitted
- Equivalence of ANOVA and the linear model
- Covariates
- Unbalanced designs
- Repeated measures

Assumptions and extensions

- Homogeneity of variance
- Normality of residuals
- Effect size
- Post-hoc testing

Aims

- To introduce students to factorial ANOVA and analysis of data with multiple grouping variables.
- To begin to think about analysis of repeated measures data.

Learning outcomes

After attending this lecture, participating in the associated class, and completing the relevant reading and coursework, you should be able to:

- Describe the experimental designs that yield multiple comparison groups.
- Describe when factorial ANOVA is appropriate.
- Describe the different forms of factorial ANOVA.
- Describe how to analyse repeated measures with factorial ANOVA.
- Explain the effect size and post-hoc testing in factorial ANOVA.

Statistics Workshop

During the workshop we will:

- Use the aov( ) and lm( )functions in R to conduct factorial ANOVA.
- Use the TukeyHSD ( ) and etaSquared( ) functionsin R to conduct post-hoc testing and effect size calculation.

Resources

Readings

** Urdan, T.C. (2017), *Statistics in plain English* New York: Routledge. Chapters 10 and 11.
** Navarro, D. (2015), *Learning Statistics with R: A Tutorial for Psychology Students and Other Beginners* (Version 0.5) Chapter 16 Available on the PB130 Github.

Phillips, N.D. (2017), *YaRrr! The Pirates Guide to R.* Chapter 14. Available on the PB130 Github.

LT7 – Categorical data analysis: Chi-Square and logistic regression

Dr Thomas Curran

To this point in the course, we have been examining groups and relationships using the linear model to explain continuous outcome variables. But think back to types of data introduced in MT3. What if the distribution of our outcome variable is not continuous? Perhaps we want to predict an outcome that contains count data that conform to a different distribution (e.g., number of aggressive acts by children during a playground period). Maybe we are interested in predicting a categorical outcome (e.g., anxiety disorder vs no anxiety disorder)? This week we will take a closer look at applying regression techniques to such outcomes, with a focus on logistic regression to quantify the probability of belonging to certain categories or groups. This is a very important research question in the psychological and behavioural sciences.

Not all outcome variable distributions are created equally

- Binomial, Bernoulli, Poisson distributions
- When the predictor and outcome are binomial: Chi-square test
- When the predictor is continuous and the outcome binomial: Logistic regression

Chi-square

- Chi-square goodness of fit
- Chi-square test of independence
- Testing

Logistic regression

- Transformation
- Probabilities
- Odds and log(odds)

Estimation

- Maximum likelihood estimation
- Interpretation of *b* in logistic regression
- Other coefficients
- R^2, Wald's chi-square, and *p*-values

Aims

- To introduce students to linear model analyses of binomial outcome variables
- To introduce chi-square difference testing and logistic regression as a special case of chi-square

Learning outcomes

After attending this lecture, participating in the associated class, and completing the relevant reading and coursework, you should be able to:

- Describe the difference between different distributions.
- Describe the relationship between chi-square and logistic regression.
- Understand the different forms of chi-square test.
- Explain the coefficients of the logistic regression.

Statistics Workshop

During the workshop we will:

- Use the chisq.test( ) function in R to conduct a chi-square test
- Use the glm( ) function in R to conduct logistic regression.

Resources

Readings

** Urdan, T.C. (2017), *Statistics in plain English* New York: Routledge. Chapter 14.
** Huang, F. L., & Moon, T. R. (2013). What are the odds of that? A primer on understanding logistic regression. *Gifted Child Quarterly*, *57*(3), 197-204.
Navarro, D. (2015), *Learning Statistics with R: A Tutorial for Psychology Students and Other Beginners* (Version 0.5) Chapter 12 Available on the PB130 Github.
Pampel, F. C. (2000). *Logistic regression: A primer*. London: Sage.

LT8 – Ask and assess: Designing surveys and psychological tests

Dr Thomas Curran & Dr Jens Madsen

So far in this course we have used many explanatory and outcome variables in our workshops and labs. Overwhelmingly, the most common form of variable in psychology is self-report. As an example, the World Attitudes Survey is full of self-reported information. Many experiments and field work use self-report to measure things like emotions, personality, and psychopathology. It is therefore important we have an appreciation of how these self-report measures are constructed and some key considerations required to ensure that they are valid (i.e., measuring what they intend to measure) and reliable (i.e., consistent). This week we will cover these topics.

Psychological assessment
- Intro to psychological assessment
- Measuring ability: tests and tasks
- Measuring symptoms: clinical inventories
- Measuring personality, preferences, and styles: surveys

Introduction to survey design
- Designing good questions
- Reliability considerations
- Validity considerations

Reliability and Validity
- Inter-item correlations and reliability coefficients
- Assessing test-retest consistency
- The relationship between reliability and validity

Aims
- To introduce psychological assessment, as used in the domains of ability, personality, cognitive styles, and psychopathology;
- To introduce the principles of survey design;
- To build basic survey design skills and apply basic reliability analyses.

Learning outcomes
After attending this lecture, participating in the associated class, and completing the relevant reading and coursework, you should be able to:
- Outline the principles behind the assessment of psychological abilities, preferences, and clinical symptoms;
- Follow procedures to design a basic survey measuring preferences, behaviours, experiences and/or attitudes;
- Select and access sources of secondary survey data.

Lab Session
During the lab we will:
- Practice designing and creating psychological tests
- Conduct reliability analyses in R using the psych package

Readings

Readings

** Howitt, D. & Cramer, D. (2014), *Introduction to research methods in psychology* 4th edition. London: Pearson. Chapter 14
** Maltby, J., Day, L., & Macaskill, A. (2010). *Personality, individual differences and intelligence.* London: Pearson Education. Chapter 25. Available on the PB130 Github.
Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education, 2*, 53.

LT9 – Armed and ready: Challenges of doing research in Psychological and Behavioural Science

Prof. Bradley Franks

We have now familiarised ourselves with the various research designs and methodologies used to investigate different types of questions. In this lecture, we will turn to consider some of the challenges that come alongside designing and conducting psychological and behavioural research. First, we will look at those enduring challenges, like ensuring our sample size is large and diverse enough to reflect the population we're interested in and that our measures are adaptable across groups. Following this, we will consider procedural concerns in conducting research and reiterate the importance of ethical and safety concerns. Lastly, we'll bring what we've learnt together for the final stage of a research study – how to write it up.

Better sampling
- Big enough samples
- Diverse enough samples (beyond WEIRD)

Ecological validity
- Internal vs. external validity
- Adaptation of methods for cultures

Ethical issues: lying, leading, triggering, misrepresenting
- Safety issues
- Researcher bias & research integrity

Epistemological assumptions

Power & reflexivity

Writing it all up!

Aims
- To introduce enduring and emerging challenges in the conduct of research in psychological and behavioural science;
- To encourage a critical, reflexive stance toward research in psychological and behavioural science;
- To introduce key principles and procedures in writing up research in psychological and behavioural science.

Learning outcomes
After attending this lecture, participating in the associated class, and reading the appropriate references from the reading list, students should be able to:
- List the key behavioural research challenges relating to sampling, validity, ethics, research integrity, and safety;
- Understand the role of the researcher's power, assumptions, and other forms of potential bias in all instances of collecting and analysing psychological & behavioural data;
- Outline key steps involved in the write-up of research in psychological and behavioural science.

Class
In the class we will talk about APA style.

Reading List

Readings

** Howitt, D. & Cramer, D. (2014), *Introduction to research methods in psychology* 4th edition. London: Pearson. Chapters 5, 6, 9 and 25.
** Dunn, D. (2013). *A short guide to writing about psychology*. Pearson New International Edition.
Cesario, J. (2014). Priming, replication, and the hardest science. *Perspectives on Psychological Science*, *9*(1), 40-48.
Howitt, D. & Cramer, D. (2014), *Introduction to research methods in psychology* 4th edition. London: Pearson. Chapter 7
Nuzzo, R. (2015). Fooling ourselves. *Nature, 526*(7572), 182.
Rosnow, R., & Rosenthal, R. (1997). *People studying people: Artifacts and ethics in behavioral research*. WH Freeman.
Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological science*, 22(11), 1359-1366.

Linked Learning
In LT9 you will be cultural psychology in PB101, this links to our discussion of the challenges of research including ecological validity and sample diversity (beyond WEIRD) causality.

LT10 – When things get tricky: Common complications in psychological and behavioural science research

Dr Thomas Curran & Dr Jens Madsen

To this point in the course, we have analysed data under the assumption that it is behaving nicely. That is, it comes from cross-sectional and/or experimental sources and that relationships are linear. However, what if we have data collected over several months or years, which is common in developmental psychology? Or what if relationships follow a shape that is not linear, such as curved or u-shaped, which is common in the behavioural sciences? This week we will take an initial look into some of these common complications (among others) and begin to explore how we deal with them.

Non-linear relationships
- Non-linear relationships: Quadratic and U-shaped examples
- Polynomial terms in a linear model

Longitudinal data
- Population designs
- Repeated cross-sectional designs
- Panel designs
- Diary and momentary assessment

The third variable problem
- Can we really control for all possible explanations?
- Conditioning on colliders

Range restriction and unreliability
- Variance reduction due to sampling on the predictor
- Correcting for range restriction
- Reliability and unreliability
- Correcting for unreliability

Aim
- To help students understand some common complications in modelling data

Learning outcomes
After attending this lecture, participating in the associated workshop, and reading the appropriate references from the reading list, students should be able to:
- Describe how to treat longitudinal data that follow linear and non-linear forms
- Understand that relationships are often non-linear and describe ways to model this non-linearity.
- Explain common challenges, including conditioning on colliders, range restriction, and unreliability..

Statistics Workshop
In this workshop, we will:
- Examine and plot non-linear relationships
- Demonstrate the correct.corr ( ) function in R to correct correlations for unreliability
- Demonstrate the rangeCorrection ( ) function in R to correct correlations for range restriction

Class
Class will be the mock exam.

Lab Session
During the lab session we will look at examples of longitudinal data and discuss different approaches to longitudinal data collection

Resources

Readings

**Menard, S. (2002). *Longitudinal research*. London: Sage.
** McDonald, J.H. (2014). *Handbook of Biological Statistics* (3rd ed.). Chapter on curvilinear regression. Available on the PB130 Github
Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual review of psychology*, *54*(1), 579-616.
Wiberg, M., & Sundström, A. (2009). A comparison of two approaches to correction of restriction of range in correlation analysis. *Practical Assessment, Research & Evaluation, 14*(5), 2.
Muchinsky, P. M. (1996). The correction for attenuation. *Educational and psychological measurement, 56*(1), 63-75.

Webpage

Rohrer J. (2017). *That one weird third variable problem nobody ever mentions: Conditioning on a collider*. Available http://www.the100.ci/2017/03/14/that-one-weird-third-variable-problem-nobody-ever-mentions-conditioning-on-a-collider

LT11 – Open Science: Publication bias, scientific misconduct, and the research integrity movement

Dr Thomas Curran

To finish our learning about research methods and statistics, this week we will look at how the psychological and behavioural sciences are working to improve scientific integrity. This topic will include an overview of recently uncovered controversies surrounding the academic practice that have led to a preponderance of "positive" or "significant" studies being published at the expense of those that do not show results. This has led to a replication crisis, whereby historical effects have failed to duplicate in across labs. We look at how psychology got here and potential solutions that include the open science movement of research transparency.

Scientific values
- Norms and counter norms
- Scientific integrity

Evidence of problems
- Statistical power and statistical bias
- Relationship between sample size and effect size
- Excess significance
- Replication crisis

How did things go wrong?
- Inferential errors
- Data peeking
- HARKing
- P-hacking
- File-drawer problem

How do we make things right?
- Open science
- Pre-registration
- Power
- Data sharing
- Structural changes

Aims
- To make students aware of some of the challenges facing scientific enquiry in the psychological and behavioural sciences
- To have student appreciate the importance of open science and transparency in data collection and analysis

Learning outcomes
After attending this lecture, participating in the associated class, and reading the appropriate references from the reading list, students should be able to:
- Explain the problem and extent of publication bias and academic misconduct
- Describe the challenges of scientific dissemination and why there is a file-drawer problem
- Explain open science and potential solutions to the challenges of scientific dissemination

Class
We will:
- Discuss preparation for the summer exam

Resources

Readings

** Spellman, B. A., Gilbert, E. A., & Corker, K. S. (2018). Open science. *Stevens' Handbook of Experimental Psychology and Cognitive Neuroscience*, *5*, 1-47.
** Nosek, B. A., Alter, G., Banks, G. C., Borsboom, D., Bowman, S. D., Breckler, S. J., ... & Contestabile, M. (2015). Promoting an open research culture. *Science*, *348*(6242), 1422-1425.
Frankenhuis, W. E., & Nettle, D. (2018). Open science is liberating and can foster creativity. *Perspectives on Psychological Science, 13*(4), 439-447.
Rubin, M. (2017). When Does HARKing Hurt? Identifying when different types of undisclosed post hoc hypothesizing harm scientific progress. *Review of General Psychology, 21*, 308–320.

Assessment for PB130

When assessing you, our aim is to encourage and support you to develop a sophisticated knowledge of the subject, the capacity for independent and critical judgment, and the ability to express your ideas with clarity. During this course you will undertake formative assessments and summative assessments.

Formative Assessments

This takes place during the teaching, and comprises assignments that aim to help you with your studies and provide opportunities for feedback. Formative assessments take different forms in different courses, and are designed to help you to progress in your understanding and to support your ability to display that understanding in the type of summative assessment for that course. The outcome of formative assessment is feedback that may be written or oral, individual or collective, but which *does not* provide a grade that contributes to your over-all degree classification.

In PB130 you will undertake eight pieces of formative assessment:

1. Worksheets covering the material in MT3 and MT4
2. Practice in designing research and formulating research questions (as practice for your summative assessment)
3. Practice in the key components of writing up for quantitative research (as practice for your summative assessment)
4. Worksheets covering the material in MT9, MT10 and MT11
5. Practice in the key components of writing up for qualitative research (as practice for your summative assessment)
6. Worksheets covering the material from LT2 and LT3
7. Worksheets covering the material from LT5 and LT7
8. A mock exam with short answer to questions on research principles, designs and methods.

Summative Assessments

Summative Assessments are designed to evaluate your level of academic achievement. These assessments take different forms in different courses and there may be more than one component to your summative assessment. The outcome of summative assessment is a grade that *does* contribute to your over-all degree classification.

In PB130 you will need to complete four pieces of summative assessment:

1. As a group, create an present a poster where you will formulate and justify the question, present it as a research proposal draft. This poster should be A1 in size and within the specified word count. This will account for 10% of your overall mark for PB130.
2. Carry out a mixed methods group project. You will collect and analyse both quantitative and qualitative data. You will write up your findings as an academic paper in APA format. This will account for 30% of your overall mark for PB130 which will be split 10% for quantitative component; 10% for qualitative component and 10% for integration, lessons learned for future research and implications for practice.
3. Undertake secondary data analysis, applying the advanced statistics covered in the course. This will comprise a 2500 word individual project and write up. This will account for 30% of your overall mark for PB130 which will be split 10% for formulation of research question and design; 10% for appropriate selection and application of statistics techniques; 10% for integration, lessons learned for future research and implications for practice.
4. A 2 hour unseen exam in the Summer Exam Period. This will account for 30% of your overall mark for PB130. The exam will consist of either multiple choice or short answers questions.

Deadlines and Feedback

The table below summarises the deadlines for each piece of assessed work and when you should expect to receive feedback

Assessment	Formative / Summative	Deadline	Feedback expected by*
MT3 and MT4 worksheets	Formative	To be confirmed	3 term weeks later
Practice in designing research	Formative	To be confirmed	3 term weeks later
Practice in writing up for qual	Formative	To be confirmed	3 term weeks later
Mixed Methods Project Poster	Summative (10%)	To be confirmed	5 term weeks later
MT9, MT10 and MT11 worksheets	Formative	To be confirmed	3 term weeks later
Practice in writing up for quant	Formative	To be confirmed	3 term weeks later
LT2 and LT3 worksheets	Formative	To be confirmed	3 term weeks later
Mixed Methods Project	Summative (30%)	To be confirmed	5 term weeks later
LT5 and LT7 worksheets	Formative	To be confirmed	3 term weeks later
Mock Exam	Formative	To be confirmed	3 term weeks later
Secondary Data Analysis	Summative (30%)	To be confirmed	5 term weeks later
2 Hour Exam	Summative (30%)	Date TBC in summer exam period	5 term weeks later

** we will always do our best to get feedback to you as soon as possible*

How to submit assessed work

Worksheets should be submitted using the relevant submission portal in Moodle.

The practice pieces should be submitted using the relevant submission portal in Moodle.

The poster should be submitted via the submission portal in Moodle. All members of the group must submit a copy of the project. You will then be expected to present it during a poster session.

The mixed methods project write-up should be submitted via the submission portal in Moodle.

The secondary data analysis should be submitted via the submission portal in Moodle.

The mock exam will take place within Moodle.

You will receive details on how the exam will be administered closer to the time.

For every assessment, including the exam, there will be a detailed 'assessment brief' which will explain exactly how to submit your work and how you should expect to get feedback. You must read this document before submitting your assignment.

If things go wrong

If you are not able to meet an assessment deadline then you should seek an extension or potentially a deferral. The rules around this vary so please check the assessment brief of contact the Professional Services Team (see page 2).

If you do defer a piece of summative assessment, or fail the course overall, then you will be able to take the deferred (or retake failed) assessments during the summer with a new deadline during the In Year Resit and Deferral Assessment Period (IRDAP). We will contact you closer to the time if this impacts you.

Please remember that you are also always able to submit Exceptional Circumstances, for more information visit lse.ac.uk/exceptionalcircumstances

Assessment Criteria for PB130

The Department of Psychological and Behavioural Science is committed to transparency and clarity in our assessment criteria and we have provided you will some guidance of what we will be looking for in assessed work below.

Quite deliberately, we will apply the same general criteria for both summative and formative assessments because the formative work is meant to help you prepare for summative work. All work in the Department of Psychological and Behavioural Science is assessed using three criteria of Content, Presentation and Critical Judgement, however what we're looking for in each type of work will vary slightly.

Worksheets (Formative)

These are aimed to assess students' competence in understanding how to conduct key foundational forms of data organisation and analysis using R software. In each case, you will work with a data set and will be given the task of using statistical techniques to analyse the data in order to answer the questions posed:

Content
- Evidence of understanding the conceptual foundations of foundational statistical methods
- Evidence of understanding of which conditions govern the use of particular statistical methods
- Evidence of understanding how to carry out relevant statistical analyses

Presentation
- Explicit characterisation of the appropriate steps in each statistical analysis
- Appropriate style of presentation of statistical analyses and results (APA format)

Critical Judgement
- Evidence of understanding how to interpret the results of statistical techniques in conceptual terms
- Evidence of understanding the conditions on and limitations of the use of particular statistical techniques in conceptual terms
- Evidence of understanding possible alternative statistical techniques in conceptual and statistical terms

Practice in writing (Formative)

These are aimed to assess students' understanding of key aspects of conducting research, which will also form a key part of their written summative assessments. They will take the form of short essays identifying key challenges and key steps to go through:

Content
- Evidence of knowledge of key issues in designing research and formulating clear, concise, and testable research questions
- Evidence of knowledge of key issues in writing up quantitative research
- Evidence of knowledge of key issues in writing up qualitative research

Presentation
- Clarity and precision of expression, including grammar, punctuation, spelling
- Appropriate referencing of literature
- Consistency and relevance to the question

Critical Judgment
- Evidence of awareness of pros and cons of qualitative and quantitative approaches to research
- Evidence of awareness of how research questions influence research design choices
- Evidence of awareness of trade-offs in research design

Mixed Methods Group Project: Group Poster (Summative)

Students will be expected to work in a group to formulate and justify research question(s), and to present a research proposal draft in poster form:

Content
- Presentation of breadth and depth of substantive knowledge to motivate research project using both qualitative and quantitative methods
- Evidence of skilled development of clear, concise, and testable Hypotheses/Research Questions, Research Method and Materials
- Engaging presentation and insightful answers to questions

Presentation
- Poster design has transparent organisation and structure of key points, relevant to the audience
- Poster design shows narrative flow between appropriate sections for a scholarly presentation of a research proposal: including Introduction, Research Questions, Hypotheses, Method, Materials, anticipated analyses of Results
- Poster design indicates the ways key aspects of the research proposal are motivated: e.g., Hypotheses/Research Questions motivated by Introduction, and Method motivated by Hypotheses/Research Questions

Critical Judgement
- Creativity and sophistication in addressing the poster brief
- Imaginativeness and independence of thought in assessing the potential contribution and limitations of the research project to existing literature

You will also be asked to rate your own contribution to the preparation and implementation of the Group Poster.

Mixed Methods Group Project: Individual Written Report (Summative)

Content
- Evidence of knowledge of theories, studies and policies relevant to motivating the research project
- Evidence of skilled development of clear, concise, and testable Hypotheses/Research Questions, based on wide reading
- Evidence of skilled development of Research Method, Design and Materials
- Evidence of skilled use and interpretation of appropriate Results analysis and presentation methods
- Evidence of knowledge of theories, studies and policies relevant to critically evaluating the success of research project
- Evidence of consideration of ethical issues associated with research design

Presentation
- Clarity and precision of expression, including grammar, punctuation, spelling.
- Explicitness, clarity and coherence of presentation of the appropriate sections for a scholarly publication, including Abstract, Introduction, Method and Ethical Considerations, Hypotheses/Research Questions, Materials, Results, Discussion and Conclusion
- Skill in using appropriate format for presenting Method, Results and References (APA format)
- Appropriate analysis and presentation of qualitative results
- Appropriate analysis and presentation of quantitative results

Critical Judgment
- Creativity and sophistication in writing up the research report
- Imaginativeness and independence and sophistication of thought in assessing the contribution of the research project to existing literature, and in discussing the results
- Ability to appropriately integrate qualitative and quantitative data types and to explain any contradictory patterns of results
- General coherence of the research project
- Critical reflection on the integration of qualitative and quantitative results, and on the limitations of the research project

Secondary Data Analysis (Summative)

Content
- Evidence of knowledge of theories, studies and policies relevant to motivating the research project
- Evidence of skilled development of Hypotheses/Research Questions, based on wide reading
- Evidence of appropriate data analysis justified on the basis of a wide range of materials
- Evidence of understanding the key components of each analysis used
- Evidence of skilled use and interpretation of appropriate Results analysis and presentation methods

Presentation
- Clarity and precision of expression, including grammar, punctuation, spelling.
- Explicitness, clarity and coherence of presentation of the appropriate sections for a scholarly publication, including Abstract, Introduction, Method, Hypotheses/Research Questions, Materials, Results, Discussion and Conclusion
- Clarity in motivating each aspect of the research
- Skill in using appropriate format for presenting Method, Results and References (APA format)
- Appropriate analysis and presentation of quantitative results
- Figures and tables presented clearly and used to supplement the Results

Critical Judgment
- Creativity and sophistication in writing up the research report
- Imaginativeness and independence and sophistication of thought in assessing the contribution of the research project to existing literature, and in discussing the results
- Where relevant, ability to explain any contradictory patterns of results
- The data analyses are integrated and coherently combined to provide a compelling evidence-based answer to the research question posed
- General coherence of the research project

Exam (Summative)

Content
- Evidence of knowledge of key historical developments in research in PBS
- Evidence of knowledge of different approaches to research in PBS and their conceptual foundations
- Evidence of knowledge of key concepts in PBS research (such as reliability, replication, validity)
- Evidence of knowledge of ethical principles governing research in PBS

Presentation
- Clarity and precision of expression, including grammar, punctuation, spelling.
- Appropriate referencing of literature
- Consistency and relevance to the question

Critical Judgment
- Evidence of awareness of how current research methods relate to historical developments in the discipline
- Evidence of awareness of how research methods relate to philosophical traditions concerning research
- Evidence of awareness of how research methods relate to conceptual underpinnings of PBS

You should also consult pages 70 to 82 of your Year 1 Programme Handbook for more information on assessment.

Applying Assessment Criteria to your work

These assessment criteria are intended as broad guides for what we will be hoping to find in your work but please remember that at university level assessment is more of an art than an exact science so these notes are for general guidance only. It is worth remembering that assessment is **not** carried out according to a checklist of separate contents, but in a more integrated way that assesses the piece as a whole and allows for deficits in one aspect of the piece to be compensated for by particular merits in another aspect. The type of questions posed will require some novel thinking and/or synthesis across areas of the discipline. With such questions there may be some core of important material but there are usually a number of acceptable ways of framing that material and of introducing other relevant arguments.

Moreover, since there will always be constraints on what you can produce exams are time-limited, essays have a word-count, presentations have a time limit, **you** must decide which theories and findings are critical to **your** argument. An important skill to develop is determining which content to omit, and appropriate omissions will depend on the argument that you wish to present. As a result, there are no "model answers" against which your written work is assessed – there are many different ways of successfully approaching any one question, and answers employing widely differing arguments may be equally successful. All references to appropriateness, relevance, etc., of use of material in these assessment criteria should be understood as appropriateness, relevance, etc., of use of material relative to the argument that you present, and not relative to a model answer.

Feedback for PB130

You will receive feedback in a number of different ways and it is important to remember that feedback is not limited to marks! You should actively seek feedback from teachers and from other students. This could involve a range of approaches such as:

- Asking for an answer to a simple question (e.g., 'I think concept X means p, q, r … am I on the right lines?')
- Asking for a view of the way you have handled a presentation of a topic or argument during a class
- Engaging in a more general dialogue with one or more teachers

To gain a picture of your progress on the course, it will be useful for you to try to integrate the information you gain from all forms of feedback. Meeting with your Academic Mentor can help you in this. If you are following the BSc in Psychological and Behavioural Science programme you should also consult pages 83 to 89 of your Year 1 Programme Handbook for more information on making use of feedback.

It is your responsibility to be sure that you understand the feedback you receive and to use it to understand your own strengths and weaknesses. Think about the comments you are given rather than focussing only on the mark. Try to understand your feedback comments in the light of the assessment criteria, perhaps even to understand the criteria better. You may want to use feedback to improve the piece of work, or to plan a future piece of work. You can take on this work independently or, better yet, with a study group or friends.

Feedback on assessed work

How you receive feedback on assessed work will vary

- Feedback on **worksheets** will be given to you as written comments on the worksheets and orally in the workshops. The feedback will be provided the Graduate Teaching Assistants.
- Feedback on **practice pieces** will be in the form of annotations and comments on your original submission which you will be able to access via Moodle.
- Feedback on **your group project poster presentation** will be in the form of a separate document which you will be able to access via Moodle. You will also spend some time discussing this during your Academic Mentoring sessions (see pages 49 and 50 of your Year 1 handbook). Your mark will also be shown in Moodle but you must remember that this is a provisional mark, it does not become final until it is released via LSE for You at the end of the year.
- Feedback on **your group project write-up** will be in the form of a separate document which you will be able to access via Moodle. You will also spend some time discussing this during your Academic Mentoring sessions (see pages 49 and 50of your Year 1 handbook). Your mark will also be shown in Moodle but you must remember that this is a provisional mark, it does not become final until it is released via LSE for You at the end of the year.
- Feedback on **secondary data analysis** will be in the form of a separate document which you will be able to access via Moodle. You will also spend some time discussing this during your Academic Mentoring sessions (see pages 49 and 50of your Year 1 handbook). Your mark will also be shown in Moodle but you must remember that this is a provisional mark, it does not become final until it is released via LSE for You at the end of the year.
- The **mock exam** will be run in Moodle and you will get instant feedback on which questions you got right and which need more work.
- Feedback on **exam** will be in the form of collective feedback uploaded to Moodle.

The table of deadlines on page 26 shows when you should expect to receive your feedback. These turn around times are in line with LSE's Academic Code.

Final Mark

Your final mark will be made available on LSE for You in line with the School-Wide results release process. You can find out more details about this online at lse.ac.uk/results.

Please remember that all results are provisional until they are released via LSE for You.