PSY200 Chapter Summaries (Research Methods in Psychology)

CHAPTER 1 (WK 1): THE SCIENTIFIC METHOD

1.1 Explain how the purpose of a methods course differs from other courses in the psychology curriculum.

The research methods course is at the core of the psychology curriculum. It should be taken by all psychology majors because it provides the foundation for doing research in psychology, serves as a basis for understanding other content courses in psychology, makes one a more critical thinker about research, is essential for admission to postgraduate courses and teaches scientific thinking.

1.2 Identify and evaluate non-scientific ways of knowing about things in the world — through authority, reasoning and experience.

Our knowledge of the world around us often derives from our experiences and how we interpret them, our reliance on the authority of others and our use of reason. These sources of knowledge can be quite valuable, but they can also lead to error. Our experiences can be subject to social cognition biases (e.g., belief perseverance, availability heuristic, confirmation bias), authorities can be wrong and while reason and logic are essential for critical thinking, reasonable arguments in the absence of empirical evidence can be unproductive in the search for truth. Research psychologists rely heavily on scientific thinking as a way of knowing and understanding behaviour.

1.3 Describe the attributes of science as a way of knowing.

Research psychologists assume that human behaviour is lawful and predictable and that using scientific methods can lead to the discovery of regularities in behaviour. Science relies on observations more systematic than those made in everyday life and produces knowledge open to public verification (e.g., it is said to be objective, or verifiable by more than a single observer); historically, the emphasis on objectivity led to a shift from using introspection as a method to using methods that measured specific behaviours. Science also requires conclusions about the causes of behaviour to be data-based, but scientists recognise their data-based conclusions are tentative and could change depending on the outcomes of future studies. The questions asked by scientific researchers are referred to as empirical questions; they are answerable through the use of recognised scientific methods. Scientists also develop theories precise enough to meet the test of falsification. Research psychologists are sceptical optimists — optimistic about discovering important things about behaviour but sceptical of claims made without solid empirical support.

1.4 Distinguish science from pseudoscience and recognise the attributes of pseudoscientific thinking.

It is important to distinguish legitimate scientific inquiry from pseudoscience. The latter is characterised by a deliberate attempt to associate itself with true science, by relying on anecdotal evidence (e.g., glowing testimonials), by developing theories too vague to be adequately tested with scientific methods and that fail the test of falsification, and by a tendency to explain complicated phenomena with simplistic concepts.

1.5 Describe the main goals of research in psychology and relate them to research strategies to be encountered later in the text.

This section introduced key concepts that underpin qualitative research. What becomes clear is that qualitative research is quite different to quantitative research. Different in terms of the types of research questions that are suitable for qualitative research and the focus on non-probability sampling methods and smaller sample sizes. There are particular ethical challenges that can arise when sampling and there are differences in how data is collected and transcribed. In qualitative research, the researcher is part of the research process and their contribution needs to be recognised and accounted for. This is because the data that is collected can be often influenced by the interaction that occurs between researcher and participant.

11.2 Understand how to undertake open and credible qualitative analysis and explore thematic analysis.

Reliability and validity are not relevant in qualitative research. Instead, data analysis must be credible and robust. Having different analysts work with our data and letting the participants comment on our interpretation are ways to enhance the robustness of our analytic observations. There are no set analytic rules that qualitative analyses must follow because different qualitative methodologies approach analysis in different ways. However, there are guiding principles that help us identify themes in our data, regardless of approach and methodology. Undertaking a thematic analysis means familiarising ourselves with the data, coding text, identifying themes and engaging in credibility checks. Issues associated with premature analytic closure and the transparency of our analytic process do not mean that the reader has to agree with our analytic interpretations, only that they have to see how we have come to the interpretations that we have.

11.3 Understand realist and relativist epistemological approaches, compare phenomenology and social constructivism and explore interpretative phenomenological analysis.

There is no single version of the truth according to relativism. This means we all perceive the world differently. In contrast, for the realist there is a single measurable reality. Qualitative researchers are more relativist than realist. Theoretical approaches are linked to epistemological stances. Phenomenological and social constructivist approaches are relativist in orientation. One focuses on experiences and perceptions (phenomenological), the other on how reality is constructed through interactions with others (social constructivist). Interpretative phenomenological analysis (IPA) is the methodology that is commonly used in psychology to research the experiences and perceptions of others. Researchers must ensure that their methodology and approach are consistent.

CHAPTER 5 (WK 4): COLLECTING AND ORGANISING DATA (DESCRIPTIVE STATISTICS)

5.1 Explain how to collect descriptive statistics and measure variability.

Descriptive statistics describe measures of central tendency such as the mean, median and mode. The mean can be calculated with interval and ratio data and is the sum of all scores, divided by the number of scores. The median can be calculated with ordinal, interval and ratio data and is the midpoint score of the data. The mode can be calculated on nominal, ordinal, interval and ratio data and is the most frequently occurring score in the dataset. Descriptive statistics, as the name suggests, also describe the amount of variability which describes how great the data is spread (which can include range, standard deviation, variance

independent variable are normally evaluated statistically with *t* tests (assuming interval or ratio data, normal distributions, and homogeneity of variance).

6.2 Describe why researchers may use more than two levels of an independent variable, when to use bar or line graphs to present data and demonstrate an understanding of ANOVA.

When only two levels of an experimental variable are compared, the results will always appear linear because a graph of the results will have only two points. Some relationships are nonlinear, however (e.g., the Yerkes–Dodson curve), and they can be discovered by adding more than two levels to an independent variable. Adding levels can also function as a way to test and perhaps rule out (falsify) alternative explanations of the main result. Like the two-level case, multilevel designs can be either between- or within-subjects designs. Results can be presented visually in a bar graph when the independent variable is a discrete variable or in a line graph when the variable is continuous. Studies using more than two levels of an independent variable are normally evaluated statistically with a one-way analysis of variance, or ANOVA (assuming interval or ratio data, normal distributions and homogeneity of variance). A significant *F* ratio results in subsequent post hoc testing (e.g., Tukey's HSD test) to identify precisely which means differ. Independent groups and ex post facto designs are evaluated with a one-way ANOVA for independent groups; matched groups and repeated measures designs are evaluated with a one-way ANOVA for repeated measures.

6.3 Understand the logic behind the use of three types of control groups and the ethical issues involved when using certain types of control groups.

In control group designs, the experimental treatment is absent for at least one condition. Varieties of control groups include placebo controls, often found in drug research; waitlist controls, found in research on the effectiveness of a program or therapy; and yoked controls, in which the procedural experiences of the control group participants correspond exactly to those of the treatment group participants.

CHAPTER 7 (WK 11): EXPERIMENTAL DESIGN 2 (FACTORIAL DESIGNS)

7.1 Describe factorial designs using a standard notational system, place data cell means accurately into a factorial matrix, and calculate row and column means.

Factorial designs examine the effects of more than one independent variable. Factorial designs are identified with a notational system that identifies the number of independent variables, the number of levels of each independent variable and the total number of conditions in the study. For example, a 2 × 3 ('2 by 3') factorial design has two independent variables, the first with two levels and the second with three levels and six different conditions or cells (2 times 3). Practice was given in understanding what cell means signify in the data and also in calculating and comparing marginal means (rows and columns).

7.2 Understand what main and interaction effects are, what they look like in a figure, and how to interpret main effects in the presence of an interaction.

The overall influence of an independent variable in a factorial study is called a main effect. There are two possible main effects in a 2 × 3 design, one for the factor with two levels and one for the factor with three levels. The main advantage of a factorial design over studies with a single independent variable is that factorials allow the discovery of interactions between the factors. In an interaction, the influence of one independent variable differs for

PSY200 Key Terms (Research Methods in Psychology A)

Aim: the researcher's area of interest – what they are looking at (e.g., aiming to investigate helping behaviour).

Alpha (α) level: the probability of making a type 1 error; the significance level.

Alternative hypothesis: the researcher's hypothesis about the outcome of a study (H1)

Anecdotal evidence: evidence from a single case that illustrates a phenomenon; when relied on exclusively, as in pseudoscience, faulty conclusions can easily be drawn.

ANOVA: short for ANalysis of VAriance, the most common inferential statistical tool for analysing the results of experiments when developed variables are measured on interval or ratio scales.

ANOVA source table: a standardised method for displaying the results of an analysis of variance; includes sources of variance, sums of squares, degrees of freedom, mean squares (variance), *F* ratios, and probability values.

Anthrozoology: a branch of science primarily concerned with examining human-animal interactions.

Application: a goal of science in which basic principles discovered through scientific methods are applied to solve problems.

Archival data: data initially collected for a purpose not related to a current research study and used later for a specific purpose in the current research.

Archival research: a method in which existing records are examined to test a hypothesis.

Authority: a way of knowing proposed by Charles Pierce, in which a person develops a belief by agreeing with someone perceived to be an expert.

ATI design: Aptitude-Treatment Interaction design; form of P x E factorial design found in educational research, the goal of which is to examine possible interactions between an aptitude variable (person factor) and a treatment variable (environmental factor).

Availability heuristic: social cognition bias in which vivid or memorable events lead people to overestimate the frequency of occurrence of these events.

A priori method: A way of knowing, proposed by Charles Peirce, in which a person develops a belief by reasoning and reaching agreement with others who are convinced of the merits of the reasoned argument.

experimental session in which the researcher explains the study's purpose to participants, reduces any discomfort they felt and answers any questions they pose (Burton et al., 2018).

Deception: (1) involves misleading participants about the purpose of a study. (2) a research strategy in which participants are not told all the details of an experiment at its outset; used for the purpose of avoiding demand characteristics (Burton et al., 2018).

Dehoaxing: that portion of debriefing in which the true purpose of the study is explained to participants.

Demand characteristics: occur when participants try to make sense of the research situation they are in and try to guess the purpose of the research or try to present themselves in a good way.

Demographic information: data that classifies or identifies individuals (e.g., gender, age, income).

Dependent samples *t* test: an inferential statistical analysis used when comparing two samples of data in either a matched groups design or a repeated-measures design.

Dependent variable: the variable that is measured to tell you the outcome.

Desensitising: portion of debriefing in which the experimenter tries to reduce any distress felt by participants as a result of their research experience.

Description: A goal of psychological science in which behaviours are accurately classified or sequences of environmental stimuli and behavioural events are accurately listed.

Descriptive statistics: (a) analysis of data that helps describe, show or summarize data in a meaningful way. (b) provide a key summary of the main features of a set of data collected from a sample of participants (Burton et al., 2018).

Directional hypothesis: a one-tailed hypothesis that states the direction of the difference or relationship (e.g., boys are more helpful than girls).

Directionality problem: in correlational research, the fact that for a correlation between variables *X* and *Y*, it is possible that *X* is causing *Y,* but it is not possible that *Y* is causing *X*; the correlation alone provides no basis for deciding between the two alternatives.

Discoverability: the assumption made by scientists that the cause of events can be discovered by applying scientific methods.

Discrete variable: variable in which each level represents a distinct category that is qualitatively different from another category (e.g., males and females).

Main effect: the presence or otherwise of statistically significant differences between the levels of an independent variable in a factorial design.

Matched groups design: a between subjects design that uses a manipulated independent variable and has at least two groups of participants; subjects are matched on some variable assumed to affect the outcome before being randomly assigned to the groups.

Matched pairs design: an experimental design where pairs of participants are matched on important characteristics and one member allocated to each condition of the IV.

Mean: (a) measure of central tendency calculated by adding all the scores in a set of data together and dividing by the total number of scores. (b) the arithmetic average of a dataset, found by adding the scores and dividing the total number of scores in the set (Burton et al., 2018).

Measures of central tendency: a measurement of data that indicates where the middle of the information lies e.g., mean, median or mode.

Measurement error: produced by a factor that introduces inaccuracies into the measurement of a variable.

Measurement scale: ways of assigning numbers to events; see nominal, ordinal, interval and ratio scales.

Median: (a) measure of central tendency calculated by arranging scores in a set of data from lowest to highest and finding the middle score. (b) the middle score of a dataset; an equal number of scores in both above and below the median (Burton et al., 2018).

Median location: the place in the sequence of scores where the median lies.

Memory failure and distortion: human memory is fallible and susceptible to bias, and these types of errors can distort self-report data.

Meta-analysis: (a) a technique where rather than conducting new research with participants, the researchers examine the results of several studies that have already been conducted. (b) a statistical tool for combining the effect size of a number of studies to determine if general patterns occur in data (Burton et al., 2018).

Mixed factorial design: a factorial design with at least one between-subjects factor and one within-subjects factor.

Mixed P x E factorial design: a mixed design with at least one subject factor and one manipulated factor.

Mode: (a) measure of central tendency which is the most frequently occurring score in a set of data. (b) the most frequently appearing score in a dataset (Burton et al., 2018).

Unstructured interviews: (a) also known as a clinical interview, there are no fixed questions just general aims, and it is more like a conversation. (b) unspecified list of questions for participants and instead of opening questions the conversation is allowed to run in whatever direction within the frame of the pre-specified topic (Burton et al., 2018).

Unstructured observation: observation where there is no checklist, so every behaviour seen is written down in an much detail as possible.

Validity: whether something is true – measures what it sets out to measure.

Valid: in general, the extent to which a measure of X truly measures X and not Y (e.g., a valid measure of intelligence measures intelligence and not something else).

Variance: a measure of the average squared deviation of a set of scores from the mean score; the standard deviation is squared.

Volunteer sample: a sampling technique where participants put themselves forward to take part in research, often by answering an advertisement.

Waitlist control group: control group in which participants are not yet receiving treatment but will eventually; used to ensure that those in the experimental and control groups are similar (e.g., all seeking treatment for the same problem).

Written survey: a survey method in which the researcher creates a written questionnaire that is filled out by participants.

Yoked control group: control group in which the treatment given a member of the control group is matched exactly with the treatment given a member of the experimental group.