Operations Manual: Preface

These are chapters that include content specific to Research Methods as taught by Prof. Paul Reber at Northwestern University.

This includes:

- Experiment 1: a "levels of processing" design that can be completed quickly and used as examples of experimental design, analysis and reporting
- Specific scripts for running a t-test in R on these data as formatted
- Specific methods information for this experiment to guide the reporting process
- Hands-on practice scripts for running and interpreting 2x2 designs using ANOVA to statistically evaluate the outcomes
- Experiment 2: an extended 2x2 design on levels of processing for which the students can ask as co-experimenters
- Specific scripts for running an ANOVA in R on these data as formatted
- Specific methods information for reporting this experiment in APA format

Note that this document is intended to accompany specific set of files made available through educational software (currently Canvas).

Operations Manual, Chapter 1

Experiment 1: Hands-on Approach

- Participate in a short psychology experiment using the QR code or the link below. When you have finished you will get a Completion Code to enter as the answer to the first assignment for the class.

- *Note: the experiment and questions/discussion below will be covered on the first day of class. Review the Q&A below if you want a refresher for that discussion.*

- Answer the following questions about that study. The following series of questions is based on the experiment but assumes some prior experience with psychological science. Since Research Methods typically follows and builds on classes *Introduction to Psychology* and basic *Statistics*, we therefore assume some familiarity with basic terms and ideas. Here we aim to reinforce understanding of these core ideas within the framework of what a simple experimental design looks like from the above hands-on example.

Or use the following link:
https://tinyurl.com/Reber205

For the following questions it is a useful exercise to cover the answers and try to answer the questions yourself before reading on. This will help you assess how much of the basic terminology and experimental approach you are already comfortable with. The terms will be defined in this chapter for general reference. The goal here will be to use the

main terminology frequently enough that it simply becomes part of your understood vocabulary without need to look definitions up later on. The bolded terms below are ones to start becoming comfortable with.

What was this experiment about?

Refer to Chapter 1, starting on page 5 for a discussion of the design and implementation of this simple experiment and introduction of a set of key terms for describing experimental design. The chapter is written using a brief piece of the experiment as a design example, but after completing the online version, you have a fuller sense of the experience of being a participant.

In particular, after participating in the experiment online, you will have experienced a common feature of psychological studies that even after completing the study, it is not entirely clear what the experimenter was trying to do. You were not told at the beginning of the study that memory would be tested at the end and you only experienced one of the two different conditions used in the study (rating liking or counting vowels). Over the next several chapters, the reasons for these aspects of experimental design will be made clear as important parts of obtaining reliable data to draw conclusions from.

Experiment 1 as an example

Not only will the design of this experiment be used as an example of how psychological studies are constructed, but we will also be examining the data collected and analyzing these data in class. The statistical approach here is based on providing recipes for organizing experiment data and carrying out analysis using the program R/RStudio. You should have some prior experience with the mathematical foundations of statistics. However, in this class we will practically focus on selecting the correct analysis based on the design, running the analysis and then correctly interpreting the analysis output and reporting the results in standard APA format.

Experiment 1 Methods

We will be preparing a written report of the results of our in-class experiment later in the class. For this, you will need some additional information about the methodology in order to report that correctly.

Materials

A set of 60 words was used for the study and test stimuli. Words were seleted to have a written frequency of 30-80 per million and to be 5-8 letters in length.

There were the two different conditions in which participants rated the words in the first part, but as much as possible, everything else about the experience of being in the study was kept constant across conditions. For both rating tasks, the words were shown on screen for exactly 4 seconds, regardless of when the response was made. The total time in the trivia section was 3 minutes for all participants. All participants completed the same recognition test with the 30 words that had been rated and the same 30 new words (the order of the words was randomized across all participants).

In Chapters 3 and 4, we will review why these elements of design are important so that the results can support valid conclusions about how the IV affected the DV. Chapter 5 will provide guidance on carrying out the statistical analysis of the results. Chapter 6 will describe how to format a written scientific report to standard, APA (American Psychological Association) style. When carrying out that project, you will need to refer back to this section for these methodological details to report.

Both Groups See the Same 30 Words

POCKET, PAINT, PRISON, QUARTER, CITIZEN, VEHICLE, ROUGH, BRAIN, TEMPLE, PRINCE, MEDICINE, FILLING, GUARD, JOURNAL, ENGINE, PALACE, GRAVE, BRANCH, CONCRETE, DANCER, SALARY, BASEMENT, MATCH, NATIVE, STABLE, FENCE, SWIMMING, QUEEN, OCEAN, FACTORY

Exercises

Read Craik & Lockhart (1972) to orient you to the background theory behind our hypothesis for Experiment 1.

It is worth noting that this is a fairly old paper that reflects the theoretical understanding at that time. The "levels of processing" theory is presented as an alternative to "multistore models." In modern memory research, elements of both theoretical ideas turn out to be true and the two approaches are not seen as inconsistent with each other.

The description and data of the multistore models reflects studies done prior to 1972. It is a useful overview, but if you are interested in the general topic of studies of memory, be aware that is a historical overview from a very long time ago. Characterization of the new ideas related to 'levels of processing' comes after this review in the paper.

Answer the following questions from the reading:

1. What is *depth of processing* and why might it lead to better memory?

2. In our study, how would our definition of *deep encoding* connect to this theoretical idea?

3. In our study, how does our definition of *shallow encoding* provide a control comparison?

4. From the prior work cited (e.g., p 677), give an example of how researchers have implemented a different procedure to create shallow encoding.

5. Give another example of a procedure to create deep encoding from the briefly reviewed prior work.