Solutions for Methods In Behavioural Research 3rd Edition by Cozby

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Solutions

Instructor's Manual

to Accompany

Methods in Behavioural Research

3rd Canadian Edition

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Altering the Course for Different Timelines
What Does Dr. Catherine D. Rawn Do?

Introduction to the Instructor's Manual

Teaching research methods can be a difficult undertaking, with students sometimes struggling with the complexity of the content or failing to identify its personal relevance and utility. The previous author of this textbook, Dr. Catherine Rawn, did a fantastic job of updating this instructor's manual, developing exercises and demonstrations that help students understand key concepts and illustrate the relevance of these concepts. As a result, there was little that needed to be done when it came to revising this manual for the 3rd edition. To recognize the excellent work done by Dr. Rawn in producing this manual, drawing heavily on her own experience, it only seemed appropriate to preserve her unique voice throughout. Thus, following this paragraph, all instances of "I" and "my" refer to Dr. Rawn rather than myself. That said, I have edited things throughout so that it reflects the changes made to the 3rd edition, along with other minor edits and additions throughout. And make no mistake, any errors or lacunae that remain are my own responsibility, and mine alone. I hope that you find these resources helpful for communicating just how exciting it is to conduct research!

-- Dr. Raymond Mar

This Instructor's Manual offers some tools to help you make research methods a fascinating and useful experience for your students. All of the resources offered here are meant as inspiration, feel free to adapt them to fit your learning goals and context.

The manual is organized in five parts: (1) Transition Tool; (2) Demonstrations, Activities, and Discussion Topics; (3) Handouts; (4) Assignment Inspirations; and 5) Course Sequencing Options. Each part is described below.

Part I: Transition Tool

As an instructor, I know how challenging it can be to transition textbooks, especially ones with relatively substantial changes. To help instructors transition to the current edition, I provide an overview of what has been updated in each chapter. The largest organizational change is that what was previously Chapter 11 (*Research Designs for Special Circumstances*) is now Chapter 10, and the previous Chapter 10 (*Complex Experimental Designs*) is not Chapter 11. Overall, however, the learning objectives for each chapter remain similar.

Part II: Demonstrations, Activities, and Discussion Topics

The second part of the manual contains a number of suggestions for demonstrations, activities and discussions that can be conducted in class, plus possible homework assignments and other activities that push your students to move their knowledge of research methods beyond the classroom. There are now 124 of these prompts to inspire you to engage your students in experiencing research methods.

Most demonstrations and activities require a minimum amount of equipment and other costly items, and I did not assume that your students have access to a large participant pool. Some may require one or two classes to complete, whereas others may be completed during a single class. Most of the projects can be conducted by students working in groups, and this can be a particularly valuable learning experience for students.

As you peruse the demonstrations, activities, and discussion topics, you will notice that each one is explicitly linked to one or more learning objectives (LOs) from the textbook. These notes may help you prioritize certain activities, given your own course goals. Many demonstrations, activities, and discussions can also be adapted to address other LOs from that chapter or other chapters, which may make for a richer experience for your students.

I added a rough estimate of the required class time I suspect it would take to complete the activity, as well as an estimate of appropriate class size(s). These estimates are based on my best guess based on my understanding of the discussion or activity (whether or not I have used it) and my in-class experiences. Activities and demonstrations often take longer than I anticipate, so I tried to account for that in my time estimates. Investing time in a rich demonstration or discussion can help students understand, link, and remember key ideas, and may not need a supplemental lecture if students know to come prepared with readings.

As for class sizes, I tend to be optimistic. I teach students in groups of 15-30, but more regularly 100 or 300-400 at a time. With some creativity, commitment, and acceptance of risk, many demonstrations and activities and discussions can help our students learn in any sized group. Whenever I thought of them, I added suggestions for modifications with very large (or in some cases very small) groups of students.

In addition to the activities, Reference Articles are included at the end of each chapter's section. They include any articles that were cited in the activities, along with articles from the journal *Teaching of Psychology* and an excellent resource for instructors of methods classes: the second edition of *Handbook for Teaching Statistics and Research Methods* by Mark E. Ware and Charles L. Brewer (Lawrence Erlbaum Associates, 1999). Ware and Brewer have compiled articles on teaching statistics and methods that were published in the journal *Teaching of Psychology*. Most articles describe a class exercise that is effective in demonstrating a particular concept or experimental procedure. Many concepts not included in this manual are addressed in that book.

Also included are sample answers to some of the questions posed to students during chapters and at the end of each chapter (i.e., the *Deepen Your Understanding* questions). Key points that should be included for a good answer are highlighted.

Part III: Handouts

The third part of the instructor's manual contains suggested handouts for homework assignments or small group activities. The nature of the assignments is discussed in Part II of the manual. We hope you will find the handouts useful and that you can easily adapt them for your particular class.

Part IV: Assignment Inspirations

Creating assignments from scratch can be a daunting task (I know, I've been there!), but they can also provide rich learning opportunities for our students. I have included drafts of five assignments that you may wish to adapt for your purposes. Each one comes with a description of the purpose and objectives addressed by the assignment, the specific instructions, and a grading key. These assignments include: an empirical article summary, a literature critique (which is a more advanced version of the summary), a "communicating psychology to non-psychologists" assignment that involves writing a secondary source for an outlet such as Psychology Today, and a detailed guide to a collaborative research project (complete with group poster presentation and individual APA style reports).

These assignments are the result of my own intellectual efforts over a period of five years. They are not perfect by any means, but I offer them to you in case they are helpful starting places for your own assignments. All I ask is that at the bottom of the assignment, you cite that your assignment was adapted from mine (see the opening to Part IV for an example citation).

Part V: Course Sequencing Options

Four sequencing options are provided as starting points to fuel your course design. I suspect they may be most helpful for instructors who are new to this course and/or text, or to those wishing to shake up their existing course. Consider whatever combinations would work best to achieve your learning objectives, given your students, your learning context, and your pragmatic parameters (e.g., TAs).

General Resources for Research Methods Instructors

If you're not too familiar with what's been happening with respect to disciplinary reform in light of replication issues, I suggest scanning the following articles as you prepare for the course. Also see the list prepared for Chapter 14's *Discussion Topic: Is Psychology Having a Replicability Crisis?.*

Pashler, H. & Harris, C. R. (2012). Is the Replicability Crisis Overblown? Three arguments examined. *Perspectives on Psychological Science*, *7*, 531–536.

Maxwell, S. E., Lau, M. Y., & Howard, G. S. (2015). Is psychology suffering from a replication crisis? What does "failure to replicate" really mean? *American Psychologist, 70*, 487-498.

Miguel, E., Camerer, C., Casey, K., Cohen, J., Esterling, K. M., Gerber, A., et al. (2014). Promoting transparency in social science research. *Science, 343*, 30-31.

Nosek, B. A., Alter, G., Banks, G. C., Borsboom, D., Bowman, S. D., Breckler, S. J., et al. (2015). Promoting an open research culture: Author guidelines for journals could help to promote transparency, openness, and reproducibility. *Science, 348*, 1422-1425.

Simons, D. J., Holcombe, A. O., & Spellman, B. A. (2014). An introduction to Registered Replication Reports at *Perspectives on Psychological Science*. *Perspectives on Psychological Science, 9,* 552-555.

Vazire, S. (2016). Editorial. *Social Psychological and Personality Science*, *7*, 3-7.

An introductory research methods course plays a vital role in many psychology major degree programs. One of the great things about teaching a course that is so popular is that many people have prepared many resources! The following sources may be helpful as you develop your course:

Dunn, D. S., Halonen, J. S., & Smith, R. A (Eds.) (2008). *Teaching critical thinking in psychology: A handbook of best practices*. West Sussex, UK: Wiley-Blackwell.

Dunn, D. S., Smith, R. A., & Beins, B. C. (Eds.) (2007). *Best practices in teaching statistics and research methods in the behavioural sciences*. Mahwah, NJ: Erlbaum.

Finkel, D. L. (2000). *Teaching with your mouth shut.* Portsmouth, NH: Boynton/Cook.

Hulsizer, M. R., & Woolf, L. M. (2009). *A guide to teaching statistics: Innovations and best practices*. West Sussex, UK: Blackwell.

Saville, B. (2008). *A guide to teaching research methods in psychology*. West Sussex, UK: Blackwell.

Office of Teaching Resources in Psychology (OTRP), sponsored by the Society for the Teaching of Psychology, has a fantastic website http://teachpsych.org. It includes lots of peer-reviewed teaching resources available for download, including whole sections on “Research and Teaching” and “Scientific Misconduct” and “Ethical Issues” where you will find lots of ideas for methods courses. They also have a peer-reviewed Project Syllabus: http://teachpsych.org/otrp/syllabi/index.php.

Part I
Transition Tool

CHAPTER	ADDED IN 3CE	REMOVED FROM 2CE
1	Student Spotlight: Examining opinions empirically; different motivation for drinking alcohol. Student Spotlight: Descriptive research; prevalence of major depressive disorder in Canada. Student Spotlight: Making Predictions; Are doctors who are more empathetic more likely to experience burnout? Student Spotlight: Basic Research; Do reminders destabilize old memories and make them more vulnerable to false memories? Student Spotlight: Applied Research; Treating a fear of thunderstorms with VR. Research Spotlight: Program Evaluation; Needle-exchange program. Think About It! exercise on other explanations for why higher empathy in doctors predicts lower risk of burnout.	Dated or unnecessary examples (Freud & Falsifiability; TV/Videogames & aggression; Speaker credibility and attitude change; Spatial maps of complex environments; Treating spider phobias)

	Think About It! exercise Research Bulletin Figure 1.1? Reinforces that we cannot trust peer-review to catch all flaws in research, but must become skilled enough to evaluate research on our own and not trust authorities. Emphasizes that science is built on accurate description, which must precede prediction and explanation.	
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**
2	Student Spotlight: Literature Review; Whether autism spectrum disorder diagnoses should be considered when judging criminal responsibility. Student Spotlight: Meta-analysis; Whether parent-child interaction therapy benefits children with disruptive behaviour disorder. Student Spotlight: Questions & Hypotheses; Whether culture influences career decisions for biculturals. Try it Out! exercise on finding an article and its abstract based on partial information. Illustrative Article: Laptops in Class	Dated or unnecessary examples (Book on strict parenting; Meaning Maintenance Model; Eating in same-sex or mixed-sex groups)

	Added reference to patient HM and memory research. Elaborated on how revising theories in light of new data is the foundation of science. Extended discussion of how to approach abstracts. Added the importance of admitting the limitations of your own study. Emphasized importance of reading articles critically, even peer-reviewed scholarly articles, especially the results section. Updated table of major journals. Expanded discussion of cited reference searches, especially for locating studies that have used a particular measure. Elaborated on science as a continuous process of gathering evidence and re-evaluating beliefs, rather than proving things to be unequivocally true or false.	
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**
3	Student Spotlight: Disclosure and Selection Bias; Do people self-select differently for studies based on how they are described? Student Spotlight: Animal Research; Is a non-destructive	Dated or unnecessary examples and discussion (Thinking about traumatic events; Researcher mistrust of IRBs)

	alternative to brain lesions as effective when studying rats? Think About It! exercise on how the TCPS2 ethics guidelines handle new technology. Think About It! exercise on whether the study about male urination was ethical or not. Think About It! exercise on finding the article from the Student Spotlight. Think About It! exercise on what sort of ordinary daily stressors would be considered minimal risk. Think About It! exercise on the parties harmed by scientific fraud. Elaborate on why naturalistic observation, in which behaviour is not manipulated or influenced, does not require informed consent. Elaborate on how scientific misconduct emerges from flexibility in how data is collected, analyzed, and reported. Fleshed out discussion of scientific fraud (e.g., Stapel, Smeesters, Ruggiero), and included mention of the retractionwatch.com website. Added discussion of new statistical techniques for detecting fraud based on the statistics reported in papers.	

	Included more detail on pre-registrations. Illustrative Article: Replication of Milgram	
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**
4	Student Spotlight: Correlational Research; Do learning styles exist for different modalities? Student Spotlight: Experimental Research; Does differential framing for transitions impact our perceptions of them? Student Spotlight: Field Experiments; Does exposure to nature have a positive impact during the Winter months? Try it Out! box, on finding the source article for the Student Spotlight. Try it Out! box, on critiquing media articles. Think About It! box, on what phenomena or traits might be difficult or impossible to manipulate in an experiment. Think About It! box, on what phenomena or traits might be unethical to manipulate in an experiment. Think About It! box, on the pitfalls of pursuing explanation before description. 2 Test Yourself! boxes, for different types of relationships	Dated or unnecessary examples and discussion (Loftus experiment on false memory; Bushman study on hunger and aggression; Media report on fathers' attitudes and daughters' career ambitions) The term "operational definitions" now changed "operationalizations" throughout.

	between variables. Elaborated on the definition of a confound and added the difficulty of controlling for these statistically. Expanded on the strengths and weakness of both experimental and non-experimental designs. Explain that individual cases that don't fit a group trend, don't invalidate the finding across the group. Clarified that the multiple possible explanations for an observed correlation are not mutually exclusive. Added discussion of how some constructs cannot be studied with experiments and are better suited to non-experimental designs. Provided more detail on the paper by Mitchell (2012), on when lab and field studies found opposite results. Re-emphasized the importance and primacy of accurate description, in the scientific process. Illustrative Article: Studying Behaviour	
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**
5	Student Spotlight: Scale Validity & Reliability; Developing and validating a scale of student empathy.	Dated or unnecessary examples and discussion (Measurement of intelligence, infant looking time, attractiveness of females

	Think About It! box, on sources of measurement error. Think About It! box, on the Student Spotlight, identifying the form of reliability. Expanded and clarified the concept of measurement error and its relationship to true scores and reliability. Introduce critiques of Cronbach's alpha as a measure of internal reliability and a superior alternative, coefficient omega. Elaborated on participant reactivity. Illustrative Article: Measurement Concepts	based on waist-to-hip ratio)
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**
6	Student Spotlight: Naturalistic Observation; How patients in psychological distress view their reception at hospitals. Student Spotlight: Case Studies; The detail of case files for autism patients. Student Spotlight: Archival Research; Prevalence of major depressive disorder. Think About It! box on using either qualitative data, quantitative data, or both.	

	Added Table of Publicly available datasets. Try it Out! box, on downloading and analyzing publicly available data. Clarified how qualitative and quantitative approaches map onto the goals of science and different research questions. Added mention of how qualitative data can be coded to transform it into quantitative data. Updated discussion of technology, including tools for analyzing different forms of archival data. Illustrative Article: Observational Methods	
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**
7	Student Spotlight: Survey Research; Parental socialization of emotions for children and links to depression. Student Spotlight: Constructing Surveys; Measuring catastrophic thinking when it comes to sleep problems. Think About It! box on how "think aloud" protocols relate to quantitative versus qualitative approaches. Updated and expanded discussion of inaccurate responding and socially-desirable responding, including mention of tools for catching inattentive responders.	Dated or unnecessary examples and discussion (Multi-stage cluster sampling) Removed prior, incorrect definition of a confidence interval.

	Introduced the term acquiescence bias Provide an expanded discussion of how samples may or may not generalize to populations. Expanded on participant fatigue and how this can be spread out equally over surveys using randomization. Included the practical definition of a confidence interval, distinguishing this from the theoretical or statistical definition. Define science as a process of accumulating knowledge, with no single study being authoritative.	
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**
8	Student Spotlight: Anticipating Confounds; Describes a paper with a follow-up study to rule out a potential confound. Think About It! box, on the why random assignment is not needed for a within-subjects design. The matched-pairs design now discussed as part of between-subjects designs. Updated examples and discussion of sample size recommendations for random assignment to conditions. Illustrative Article: Experimental Design	Learning Objective (LO) 4 swapped with LO 5 Changed key terminology to between-subjects and within-subjects (from independent-groups and repeated-measures designs). Changed the term mortality to selective attrition. Dated or unnecessary examples and discussion (Solomon four-group design; self-control glucose depletion study; visual

		contrast effects).
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**
9	Student Spotlight: Strength of Manipulation; Measurements taken 1 hour after smoking versus 24 hours after smoking. Student Spotlights: Using MRI for Measurement; Measuring anxiety within the MRI scanner. Think About It! box on the relationship between demand characteristics and participant reactivity. Clarified the difference between experimental realism and mundane realism. Added mention of the risks of manipulation checks. Clarified discussion of fMRI. Emphasized value of using many different forms of measurement. Elaborated on diagnosing ceiling and floor effects. Added discussion of selective reporting as an unethical practice. Clarified that placebo effects can occur without drug administration.	Removed Figure 9.1, overview of research process with chapter topics highlighted. Dated or unnecessary examples and discussion (Helping behaviour toward robots).

	Elaborated on the importance of debriefings. Illustrative Article: Conducting Experiments	
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**
10	Think About It! box on effectiveness of the "At My Best" program Think About It! box on additional threats to validity for a single-group design with a pretest. Think About It! box on how to improve on interrupted time series designs Think About It! box on when quasi-experimental designs might be necessary. Think About It! box on alternative explanations for a single-case experiment. Moved discussion of quasi-experiments closer to the beginning of this chapter, directly after Program evaluation which now comes first. Clarified that quasi-experiments are *not* true experiments that lack internal validity, but rather unique designs that are sometimes necessary. Used quasi-experiments to illustrate flaws in designs that	Formerly Chapter 11, now Chapter 10. Title changed to "Research Designs for Special Circumstances." LO1 now LO6; LO2 now LO1; LO3 now LO2; LO4 now LO3; LO5 now LO4; LO6 now LO5

	claim to be true experiments. Clarified why regression to the mean is related to reliability and measurement error. Illustrative Article: Longitudinal Study	
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**
11	Try it Out! box on marginal means Think About It! box on the limitations of a two condition experiment in the context of curvilinear relationships Think About It! box on how most psychological phenomena have many different causes Clarified the example for the utility of additional control conditions and the meaning of statistical significance. Illustrative Article: Complex Experimental Designs	Formerly Chapter 10, now Chapter 11. Dated or unnecessary examples and discussion (Hypothetical experiment with ads featuring scantily-clad models).
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**
12	Student Spotlight: Multiple Regression; Study on how psychopathy and Machiavellianism predict the perceptions of others Student Spotlight Think About It! box on what variables might have a	Changed title, to "Descriptive Statistics: Describing variables and relationships among them."

	curvilinear relationship Try it Out! box on calculating and interpreting r-squared Try it Out! box on making predictions using a regression equation Try it Out! box Test Yourself! box on calculating measures of central tendency. Test Yourself! Box Added mention that descriptive statistics can help catch errors in the data (e.g., impossible values). Added explanation of the normal distribution and its importance for parametric statistics. Added formula for calculating Cohen's *d* and practice exercises. Expanded on when you use each measure of central tendency and why. Updated guidelines for interpreting effect-size magnitude. Clarified the relationship between effect-size, practical significance, and statistical significance.	

	Removed discussion of how regressions are framed as predictions whereas correlations are not, since both can be used for prediction. Clarified difference between multiple correlation and multiple regression Provide a simple way to think about regression coefficients, as unique predictors Clarified that complex covariance analyses like SEM do not permit causal inferences. Expanded on common misinterpretations of Pearson r.	
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**
13	Think About It! box on remembering that statistical significance does not entail meaningful or practical significance Think About It! box on mnemonics to remember the definitions for Type I and Type II error Try it Out! box with list of resources for learning the statistical software package, R. Clarified that NHST is just one option for inferential statistics and discuss common misconceptions of NHST. Expanded discussion of the controversy and critiques	Changed title, to "Inferential Statistics: Making inferences about populations based on our samples." Removed manual calculation of the *t*-value in favour of emphasizing conceptual understanding. Removed discussion of one-tailed tests, as this procedure is now known to be inappropriate. Greatly truncated the discussion of looking up

	surrounding NHST, including how *p*-values are influenced by sample size and inability to evaluate evidence for the null hypothesis Point readers toward resources for pre-registration, finding papers that report null results, and loss of confidence in published papers. Provide a concrete way to remember the difference between Type I and Type II errors Include mention of the average effect-size in psychology Discuss alternatives to NHST, including confidence intervals Introduced Bayesian statistics as an appropriate way to evaluate evidence in favour of the null. Added references to introductory articles on Bayesian statistics, and introduced free software for performing Bayesian analyses. Included the fact that the parametric statistics discussed rely on an assumption of sampling from normally-distributed populations. Emphasized scientific reasoning, over ritualistic approaches to data analysis (e.g., dichotomous thinking using NHST).	critical values, as this is an outdated practice, replacing this with discussion of *p*-values and comparison to alpha instead. Dated or unnecessary examples and discussion (Election polls and confidence intervals).
CHAPTER	**ADDED IN 3CE**	**REMOVED FROM 2CE**

14	Student Spotlight: Generalizing across Cultures; How is code-switching in bilinguals perceived by people from Alberta versus Quebec? Student Spotlight: Direct Replications; Can a study on attachment avoidance and intimacy be replicated? Expanded and clarified how samples relate to the populations from which they were drawn, and generalizing to other populations. Expanded discussion of the whether laboratory studies and field experiments converge on similar results. Clarified when replication failures can be informative and how conceptual replications can be problematic. Added discussion of large-scale multi-lab attempts to replicate previous findings Illustrative Article: Generalizing Results	Dated or unnecessary examples and discussion (attractiveness of females based on waist-to-hip ratio)

Part II
Demonstrations, Activities, and Discussion Topics

Chapter 1: Scientific Understanding of Behaviour

Demonstration and/or Discussion Topic: Distracted Driving

Relevant Learning Objectives: 1, 2, 3, 4
Estimated In-Class Time: 20 minutes or more for a large class and if students complete demo during class; 10 minutes if they complete the demo outside of class (results calculated by yourself and presented at the next class)
Class Size: any

Distracted driving is a critical issue that leads to crashes and deaths every year (check out statistics at http://distracteddriving.caa.ca/education/index.php). It's also an issue that psychologists have been tackling, drawing from basic research on attention to inform this applied problem. Raising awareness of the research evidence in class may also help educate our students about the risks involved in distracted driving, and may prevent fatalities. Here are a few ideas about how to incorporate distracted driving research in your class:

1. Demonstration: Invite students to complete an online distracted driving simulator that reports their results (e.g., at the New York Times http://www.nytimes.com/interactive/2009/07/19/technology/20090719-driving-game.html, or see http://dropitanddrive.com/driving-simulators/). Collect descriptive data from your class and calculate averages and estimate the total impact that distractions had on driving. Discuss the fact that peoples' results differ, and invite students to generate predictions about who might be more or less susceptible to these effects, for example.

2. Discussion starter: Share (and/or invite students to find) research that varies in how immediately applied it is. For example, you could compare the following articles, which examine the following topics, respectively: research that tests distracted driving in the field, research that tests driving in the lab using a simulator, research that uses applied findings to ask a basic question (i.e., can some people multitask better than others?), and an example of basic theory-building that can be applied in many ways including distracted driving.

   Recarte Goldarecena, M. A. & Nunes González, L. M. (2003). Mental workload while driving: Effects on visual search, discrimination and decision making. Journal of Experimental Psychology: Applied, 9(2).

Stothart, C., Mitchum, A., & Yehnert, C. (2015). The attentional cost of receiving a cell phone notification. *Journal of Experimental Psychology: Human Perception and Performance, 41*, 893. doi: 10.1037/xhp0000100

Watson, J. M., & Strayer, D. L. (2010). Supertaskers: Profiles in extraordinary multitasking ability. *Psychonomic Bulletin & Review, 17*, 479-485. doi: 10.3758/PBR.17.4.479

Salvucci, D. D., & Taatgen, N. A. (2008). Threaded cognition: An integrated theory of concurrent multitasking. *Psychological Review, 115*, 101-130. doi: 10.1037/0033-295X.115.1.101

Additional Online Resources on Distracted Driving

- **APA summary of Strayer's research and references:** http://www.apa.org/research/action/drive.aspx
- **Strayer's Applied Cognition Lab, with videos of driving simulators:** https://www.psych.utah.edu/lab/appliedcognition/
- **List of resources on this topic at APS including video of Strayer giving a talk at APS in 2013:** http://www.psychologicalscience.org/index.php/members/teaching-psychological-science/teaching-playlist-distracted-driving
- **Canadian Automobile Association educational resources and simulator:** http://distracteddriving.caa.ca/
- **New York Times Driven to Distraction collection of resources:** http://topics.nytimes.com/top/news/technology/series/driven_to_distraction/index.html
- **New York Times Driving while texting simulator with personalized results:** http://www.nytimes.com/interactive/2009/07/19/technology/20090719-driving-game.html
- **News clip of driving simulator with high school students:** http://www.wbaltv.com/education/demonstration-teaches-dangers-of-distracted-driving/27327462

Demonstration and/or Discussion Topic: The Gambler's Fallacy

Relevant Learning Objectives: 1
Estimated In-Class Time: 4-10 minutes, depending on length of discussion
Class Size: any

Another way to illustrate the limitations of intuition is to discuss the gamblers fallacy. Ask students to imagine if they were in Vegas and played a slot machine 25 times with no payout. Compared to that first play, is there a greater probability that the next play will pay out? Or if one flips a coin 20 times and gets heads each time, is one more likely to get tails on the next trial? Even though students may understand probability intellectually, intuition can drive people to state "Yes, it is more likely!" That ignores that each trial is independent and not dependent on the results of prior trials.

Turn these questions into a demonstration. If you use a personal response system (e.g., i>clicker, TopHat, or polleverywhere), you can record students' responses to these questions to show the prevalence of people's reliance on intuition. If you collect anonymous responses, you can also add a discussion of the effects of anonymity on participant responses. You can also talk about potential differences between how participants respond while imagining a scenario versus what people would actually do in the moment.

Demonstration: Using the False Consensus Effect to Demonstrate Importance of Systematic Observation

Relevant Learning Objectives: 1, 3
Estimated In-Class Time: 30 minutes or more with a large class and when students calculate data; 10 minutes data is collected in class, but you calculate results at home and present the results next class
Class Size: any

The following demonstration, based on the false consensus effect, emphasizes the need for systematic rather than casual observation. To begin, consider the false consensus effect, a classic phenomenon from social psychology. We often believe that others are more like ourselves than they really are. Thus, our predictions about others' beliefs or behaviours, based on casual observation, are likely to err in the direction of our own beliefs or behaviour. For example, college students who preferred brown bread estimated that over 50% of all other college students preferred brown bread, whereas white-bread eaters estimated more accurately that 37% showed brown bread preference (Ross, Greene, & House, 1977). This is known as the false consensus effect (Ross et al., 1977; Mullen, Atkins, Champion, Edwards, Hardy, Story, & Vanderlok, 1985).

Before describing the false consensus effect, have students answer the questions listed below. Next, have students predict the class mean for each question. Collect the data sheets. According to the false consensus effect, students' predictions about the class mean should be influenced by their own positions. Consequently, a student whose position is below the class mean is likely to make a prediction that will be below the class mean as well.

To demonstrate the effect statistically, compute the actual class mean for each question using the students' personal data. To involve the students in this process, divide the class into six groups and assign one question to each. Have them tabulate the answers for that question and calculate the mean. (Be sure each group has access to all the data sheets—this can be done by rotating six batches of data sheets from one group to another until all groups have recorded data from all batches.) Put the means on the board. Next, have students compute a score for each participant in the following way: For each question, score a +1 if the participant's personal answer and predicted class mean are either both below or both above the actual class mean; score a -1 if the participant's personal score and predicted class mean are on opposite sides of the actual class mean. Sum all six questions so that each participant now has a single score that ranges between -6 and +6. If people err randomly, the average score for all students should be

zero. In contrast, if people err in the direction of their own beliefs, the average should be greater than zero. A simple, one-group *t*-test can be calculated using $M = 0$ for the null hypothesis.

Personal Answer	Behaviour Questions	Prediction for Class
	1. How many loads of laundry do you wash per week?	
	2. How many times per year do you attend worship services at a church or temple?	
	3. How many times per week do you eat a meal from a fast-food restaurant?	
	4. How many items per week do you recycle?	
	5. How many times per year do you see a movie at a theatre?	
	6. How many times per week do you consume alcohol?	

Mullen, B., Atkins, J. L., Champion, D. S., Edwards, C., Hardy, D., Story, J. E., & Vanderlok, M. (1985). The false consensus effect: A meta-analysis of 115 hypothesis tests. *Journal of Experimental Social Psychology*, *21*, 262-283.

Ross, L., Greene, D., & House, P. (1977). The false consensus phenomenon: An attributional bias in self-perception and social perception processes. *Journal of Experimental Social Psychology*, *13*, 279-301.

Demonstration: Comparing Single Observations to Multiple Observations, to Demonstrate the Unrepresentativeness of Small Samples

Relevant Learning Objectives: 1, 2
Estimated In-Class Time: 20 minutes
Class Size: 30 students. If class is larger than 30, this demonstration may need substantial modifications (e.g., use 5 small groups of students to demonstrate at the front of the class)

The systematic observation employed by scientists generally relies on many independent instances whereas casual observation is often based on only a few instances. The following demonstration is designed to show how misleading a small sample of observations may be. Divide the class into groups of three or four students each. Fill a bowl or basket with a "population" of poker chips or simple slips of paper. On each chip or piece of paper there should be written a single score. (An approximate normal distribution of 200 numbers is provided below.) Let each score represent a value of a psychological variable (e.g., extraversion, reaction time, attention span, memory capacity, intelligence test score).

Have each group draw 5 samples from the population and compute the mean for each sample. Each group, however, should draw samples of a different size from the other groups. For instance, group one draws 5 samples of size 1, group two draws 5 samples of size 3, group three draws 5 samples of size 5, and so on. The rate of progression from small to large samples depends on the number of groups. It is a good idea to have the last group draw fairly large size samples (e.g., N=20 or 25). Once the means for each sample are computed, have each group plot the means on a graph on the board. It should be obvious that with small samples we can easily get a distorted picture of the population mean. Note how

the variability from sample mean to sample mean decreases dramatically as we increase the sample size. Discuss how many of our casual observations are based on relatively few observations.

The following population of 200 scores yields a population mean of 17 and a standard deviation of 4.66.

X	frequency	X	frequency	X	frequency	X	frequency	X	frequency
5	1	11	7	17	20	23	7	29	1
6	2	12	9	18	18	24	5		
7	2	13	10	19	16	25	4		
8	3	14	13	20	13	26	3		
9	4	15	16	21	10	27	2		
10	5	16	18	22	9	28	2		

Note: This population of scores can be used for demonstrations suggested in Chapters 8 and 12.

Discussion Topic: Failing to Use Scientific Skepticism

Relevant Learning Objectives: 1, 2
Estimated In-Class Time: 5-20 minutes, depending on length of discussion
Class Size: any

Offer students the opportunity to reflect on times that they might have allowed themselves to accept beliefs or engage in practices that they would not have if they had engaged in scientific skepticism. For example, it can be easy to fall for claims circulated by email or Facebook that could be hoaxes or rumours, or to believe the claims of salespeople. Conclude the discussion by brainstorming ways to investigate whether claims are valid (e.g., www.snopes.com), and how to detect pseudoscience (e.g., www.randi.org).

Admitting we've erred is difficult for many people. To make this discussion less threatening, consider sharing a time when you failed to use your scientific skepticism, or invite people to discuss the judgments of people they know.

Beyond the Classroom Activity: Detecting Pseudoscience in Online Dating Websites

Relevant Learning Objectives: 1, 2, 3
Estimated In-Class Time: 10-20 minutes, depending on length of discussion
Class Size: any

Studying psychology can heighten our awareness of claims about human behaviour in the media. Online dating services make many claims about their abilities to measure personality and find perfect matches. They cite hit rates (often without failure rates), and make great use of vivid testimonials. As homework, ask students to critically investigate a dating website (e.g., eharmony.com). Make it clear that they do not need to sign up. Provide the following questions* or others to help guide their investigation.

1. What are you being asked to believe?
2. What evidence is being given as support for this belief?
3. Are you being given all the evidence for and against this belief?
4. Is there more than one way to interpret the evidence for this belief? What are alternatives?
5. What additional evidence would help to evaluate these alternatives?
6. What conclusions are most reasonable?

At the next class, divide everyone into small groups of four or five students, ensuring at least one or two people in each group completed the homework. It may be helpful to take up the first question as a large group with the full class, to ensure everyone (even those who didn't complete the homework) has an idea of what's going on. Next, have the small groups discuss their responses to questions 2-6. When you bring the full class together again, you may wish to take up all questions, or just highlights. To help close the discussion, consider asking students to write down one sentence summarizing the most important lesson they learned from this activity/discussion. (My students often report that they never before thought to question claims that seem scientific on the surface.)

**These questions are based roughly on those shared by Bill Buskist of Auburn University, during a talk at the Vancouver International Conference on the Teaching of Psychology (2009).*

Beyond the Classroom Activity: Observing Behaviour

Relevant Learning Objectives: 1, 2
Estimated In-Class Time: 5-20 minutes, depending on length of discussion
Class Size: any

It is often useful to have students immediately begin making observations of behaviours. In class, students might generate a list of possible behaviours to observe on campus. For example, observe the age, ethnic category, and dress of students in various campus locations, such as different eating/gathering places, the library, and the computer lab. How many students are alone, in groups of two, or groups of three or more? Are they dressed similarly, or differently? Check door cards on faculty offices to see whether the occupant is an assistant professor, associate professor, or full professor, and note whether the office has a window. Categorize restroom graffiti: how much is aggressive, sexual, humorous, political? Discussion of the observations in class can introduce students to many topics and procedures of research methods (e.g., data collection, hypothesis, operationalizations, archival methods, person variables, ethics of consent). A restroom graffiti exercise is described in detail for Chapter 6.

Illustrative Article: Inspired by Social Science

Relevant Learning Objectives: 3, 4
Estimated In-Class Time: none, depending on how you use it
Class Size: any; especially appropriate for online/hybrid courses
Ideas for use: Discussion Starter or Beyond the Classroom Activity; respond to questions in blog or discussion forum; complete in advance and bring answers to discuss in class

Read three columns in which New York Times columnist David Brooks describes the value and excitement he has discovered by reading social science research literature. His enthusiasm for research is summed up by his comment that "a day without social science is like a day without sunshine." The articles can be found on the New York Times website (nytimes.com) or using a newspaper database in your library that includes the New York Times:

Brooks, D. (2010, December 7). Social science palooza. New York Times, p. A33. Retrieved from www.nytimes.com/2010/12/07/opinion/07brooks.html

Brooks, D. (2011, March 18). Social science palooza II. New York Times, p. A29. Retrieved from www.nytimes.com/2011/03/18/opinion/18brooks.html

Brooks, D. (2012, December 10). Social science palooza III. Retrieved from www.nytimes.com/2012/12/11/opinion/brooks-social-science-palooza-iii.html

After reading the articles, consider the following:

1. Brooks describes several studies in his articles. Which one did you find most interesting? (i.e., you would like to conduct research on the topic, you would be motivated to read the original journal articles) Why do you find this interesting?
2. Of all the articles described, which one would you describe as being the most applied and which one most reflects basic research? Why?
3. For each of the studies that Brooks describes, which goal of science do you think is primarily targeted (description, prediction, causation, explanation)?

Source: Cozby, P. C., & Bates, S. C. (2015) *Methods in behavioural research* (12th ed.). New York, NY: McGraw Hill.

Chapter 1 Reference Articles

Brems, C. (1999). Taking the fear out of research: A gentle approach to teaching an appreciation for research. In M. E. Ware & C. L. Brewer (Eds.), *Handbook for teaching statistics and research methods* (2nd ed.; pp. 105-107). New Jersey: Erlbaum.

Johnson, D. E. (1999). A "handy" way to introduce research methods. In M. E. Ware & C. L. Brewer (Eds.), *Handbook for teaching statistics and research methods* (2nd ed.; pp. 108-109). New Jersey: Erlbaum.

Lakin, J.L., Giesler, R.B., Morris, K.A., &Vosmik, J.R. (2007). HOMER as an acronym for the scientific method. *Teaching of Psychology, 34, 94-96*.

Lilienfeld, S. O. (2005, September). The 10 Commandments of helping students distinguish science from pseudoscience in psychology. *Observer, 18*(9). Retrieved http://www.psychologicalscience.org/index.php/publications/observer/2005/september-05/the-10-commandments-of-helping-students-distinguish-science-from-pseudoscience-in-psychology.html

Marek, P., Christopher, A.N, & Walker, B.J. (2004). Learning by doing: Research methods with a theme. *Teaching of Psychology, 31,* 128-131.

Chapter 1: Sample Answers for Selected Questions in the Text

Deepen Your Understanding Questions

4. A newspaper headline says that "Obesity is More Common Outside Major Cities." You read the article to discover that a researcher found that the rates of obesity are lower in cities like Vancouver, Toronto, and Montreal than in less urban centres across the country. Based on this information, is it appropriate to infer cause and effect and explanations of behaviour? Why or why not? Come back to this question after you have read the next few chapters. For more information, see Vanasse, A., Demers, M., Hemiari, A., & Courteau, J. (2006). Obesity in Canada: Where and how many? *International Journal of Obesity, 30*, 677-683.

   There are three elements to consider when looking at cause and effect. First, is a need to ask about temporal precedence: did living in a major city precede obesity? Second, is a need to look at covariation of cause and effect: do people in major cities experience obesity more than do people in small cities and towns. Third, one would want to eliminate alternative explanations: could something besides city life be responsible for the higher incidence of obesity in major cities?

Chapter 2: Where to Start

Demonstration: Applying Systematic Observation to Figure Out *What's in the Bag*

Relevant Learning Objectives: 1, 2, 5 plus vocabulary (e.g., parsimony, falsifiability)
Estimated In-Class Time: 20-40 minutes, depending on discussion
Class Size: easier with smaller classes (<50), but manageable with larger courses with groups of 4-5.