

CGSC 5002 Experimental Research in Cognition

Fall 2020, v.1.0

Instructor

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Office hours: Tuesday 11:30 - 12:30 PM (= +5 GMT)

Class time & location

Class: Monday 2:35 - 5:25 PM, via Zoom

Prerequisites

Graduate standing and/or permission of the Department of Cognitive Science.

Course Objectives

The goal of this edition of CGSC 5002 is to foster an understanding of some big picture issues associated with collecting data in psychology experiments. This includes a philosophy of science component, problems that arise in data collection, and problems that can occur in analyzing and interpreting data, and how to potentially solve these problems. I want you to become much more thoughtful, if not skeptical, about the psychology results you read, appreciating how challenging it can be to gain an accurate picture of human cognition.

Textbooks

1. Ritchie, S. (2020). *Science fictions: How fraud, bias, negligence, and hype undermine the search for truth*. Metropolitan Books. Hardcover version: ISBN-13: 978-1250222695 (\$30.56 from amazon.ca as of Aug 12, 2020). A Kindle edition is also available: Page Numbers Source ISBN: 1250222699 (\$15.99, from amazon.ca as of Aug 12, 2020). Because this book is new, no paperback version exists yet.
2. Dienes, Z. (2008). *Understanding psychology as a science: An introduction to scientific and statistical inference*. Palgrave Macmillan. Paperback version: ISBN-13: 978-0230542310 (\$54.50 from amazon.ca as of Aug 12, 2020). This book is also available online through the CU library.
3. 2-4 readings from journal articles and other sources in classes 4-12.

Class Internet Site

The website for CGSC 5002 is: cuLearn.carleton.ca. The web site contains some of the readings and is where you will upload assignments.

How You Will Be Evaluated

1. 3 short class presentations (30%)
2. 6 weekly position papers (summarize and critique readings) (60%)
3. class participation (10%)

Presentations

You will do three short presentations in class where you will talk about a reading. "Short" means 5-10 PowerPoint (or equivalent) slides and talk for ~10 minutes. We will determine a presentation schedule in the first week of class (September 14). Presentations should combine both a review of the readings content and also a critique of the reading. The critique can be original (i.e., by you) and/or it can be based on criticism of the reading by others. The rubric for grading presentations will be similar to the rubric for position papers (see below). This requirement is worth 30% of your final grade.

Position papers

You will do 6 position papers over the course of the term. They can be scheduled as you see fit over the term. For example, you could submit them over 6 consecutive weeks or submit them on various weeks distributed over the entire term. Each position paper will be ~800 words. Potential questions to address in the position papers are provided on p. 4-5. A position paper must cover a given week's readings. It is due at 11:59 PM on the Sunday *before* the Monday class. Each paper is worth 6%, for a total of 60% of your final grade. Grading rubric: Position papers will be graded based on the paper's form (spelling and syntax) (20%) and content (the quality of your arguments, the clarity of your presentation, and your understanding of the readings.) (80%) This requirement is worth 60% of your final grade.

Class participation

You will be assigned 1) 0.5% for each class that you attend and 2) 0.5% for each class you demonstrate a moderate level of engagement (0.5%). This requirement is worth 10% of your final grade; the participation grade therefore requires attendance for 10/12 classes.

Late assignment policy

Extensions to assignment deadlines will be permitted for illness, bereavement, or religion reasons.

Legitimate documentation is required in order to schedule an extension for a deadline.

For Fall 2020, due to the COVID-19 pandemic, the Provost has directed that students seeking an academic accommodation will not be required to produce a doctor's note or medical certificate. Instead, students should use the *Medical Self-Declaration form*.

Class Schedule / Readings / Assignments

Class	Date	Topic
1	September 14	Introduction to the course: Review of course requirements and content; assignment of students to present readings
2	September 21	Overview of research issues: Ritchie: Preface, Chapter 1 (How science works), Chapter 2 (The replication crisis), Chapter 3 (Fraud), Chapter 4 (Bias), Chapter 5 (Negligence)
3	September 28	Overview of research issues: Ritchie: Chapter 6 (Hype), Chapter 7 (Perverse incentives), Chapter 8 (Fixing science), Chapter 9 (Epilogue), Appendix (How to read a scientific paper)
4	October 5	Philosophy and statistical issues (1): Dienes: Chapters 1 (Karl Popper and demarcation) & 2 (Kuhn and Lakatos: paradigms and programmes)
-	October 12	No class - Thanksgiving
5	October 19	Philosophy and statistical issues (2): Dienes: Chapters 3 (Neyman, Pearson, and hypothesis testing), 4 (Bayes and the probability of hypotheses), & 5 (Fisher and the likelihood: the Royall road to evidence)
-	October 26	No class - Fall break
6	November 2	The structure of science: 1) Merton, Robert K. (1942). The normative structure of science. https://www.panarchy.org/merton/science.html . (or see this YouTube video for explanation: https://www.youtube.com/watch?v=00btFojQPiu&list=PLAKyhL4GNnqMVIDZDvSt3bqIHfJVRNOsF&index=2), 2) Feynman, Richard P. Cargo Cult Science. Presented at the Caltech 1974 Commencement Address, Caltech, 1974. http://calteches.library.caltech.edu/51/2/CargoCult.htm . (or listen to it: https://www.youtube.com/watch?v=yvfAtIJbatg) 3) Cummins, R. (2000). 'How does it work' vs. 'What are the Laws?' Two conceptions of psychological explanation. Originally published in F. Keil and R. Wilson (eds.), <i>Explanation and Cognition</i> , Cambridge, MA: MIT Press, 117–45. (Also published in Cummins, R. (2010). "How does it Work?" vs. "What are the Laws?" In <i>The World in the Head</i> . Oxford University Press. https://doi.org/10.1093/acprof:osobl/9780199548033.003.0016)
7	November 9	Scientific method applied to psychological research: 1) Platt, J. (1964). Strong inference. <i>Science</i> , 16 , 347-353. 2) Fudge, D. (2014). Fifty years of J. R. Platt's strong inference. <i>Journal of Experimental Biology</i> , 217 , 1202-1204 doi:10.1242/jeb.104976. 3) O'Donohue, W., & Buchanan, J.A. (2001). The weaknesses of strong inference. <i>Behavior and Philosophy</i> , 29 , 1-20.; 4) Garner W. R., Hake, H.W., & Eriksen, C.W. (1956). Operationism and the concept of perception. <i>Psychological Review</i> , 63 , 317–329.
8	November 16	The beginnings of the replication crisis in psychology: 1) Bem, Daryl J. (2011). Feeling the future: experimental evidence for enomalous retroactive influences on cognition and affect. <i>Journal of Personality and Social Psychology</i> , 100 , 407–25. https://doi.org/10.1037/a0021524 . 2) Engber, Daniel. (2017). Daryl Bem proved ESP is real. Which means science is broken. <i>Slate Magazine</i> (7 June 2017). https://slate.com/health-and-science/2017/06/daryl-bem-proved-esp-is-real-showed-science-is-broken.html 3) Carney, D. R., Cuddy, A. J. C., & Yap, A. J. (2010). Power posing: Brief nonverbal displays affect neuroendocrine levels and risk tolerance. <i>Psychological Science</i> , 21 , 1363–1368. https://doi.org/10.1177/0956797610383437 4) Cesario, J., & Johnson, D. J. (2018). Power poseur: Bodily expansiveness does not matter in dyadic interactions. <i>Social Psychological and Personality Science</i> , 9 (7), 781–789. https://doi.org/10.1177/1948550617725153

Class	Date	Topic
9	November 23	<p>How to fix things (1): 1) Warren, Matthew. (2018). First analysis of “Pre-Registered” studies shows sharp rise in null findings’. <i>Nature</i>, 24 October 2018 2) Goldin-Meadow, Susan. (2016). Why Preregistration Makes Me Nervous. <i>APS Observer</i>, 29(7) (31 August 2016). https://www.psychologicalscience.org/observer/why-preregistration-makes-me-nervous. [Make sure you read the comments in response to this column] https://doi.org/10.1038/d41586-018-07118-1 3) Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2018). False-positive citations. <i>Perspectives on Psychological Science</i>, 13(2), 255–259. https://doi.org/10.1177/1745691617698146</p>
10	November 30	<p>How to fix things (2): 1) Stark, Philip B. (2018). Before reproducibility must come preproducibility. <i>Nature</i>, 557(7707) (24 May 2018), 613. https://doi.org/10.1038/d41586-018-05256-0 2) Munafò, M., Nosek, B., Bishop, D. et al. (2017). A manifesto for reproducible science. <i>Nature Human Behaviour</i>, 1, 1-9 (article 0021). https://doi.org/10.1038/s41562-016-0021-3 3) Flake, J.K., & Fried, E.I. (in press). Measurement schmeasurement: Questionable measurement practices and how to avoid them. <i>Advances in Methods and Practices in Psychological Science</i>, accepted June 2020 (preprint)</p>
11	December 7	<p>Constraints on data in psychology: 1) Gelman, A., Loken, A. (2013). The garden of forking paths: Why multiple comparisons can be a problem, even when there is no “fishing expedition” or “p-hacking” and the research hypothesis was posited ahead of time. manuscript http://www.stat.columbia.edu/~gelman/research/unpublished/p_hacking.pdf (a shorter version of this manuscript was published as Gelman, A., & Loken, E. (2014). The statistical crisis in science. <i>American Scientist</i>, 102(6), 460- doi: 10.1511/2014.111.460) 2) Devezer, B., Navarro, D.J., Vandekerckhove, J., & Buzbas, E. (2020). The case for formal methodology in scientific reform. bioRxiv preprint doi: https://doi.org/10.1101/2020.04.26.048306</p>
12	December 11 (Friday!)	<p>Theory-building: 1) van Rooij, I., & Baggio, G. (2020, February 28). Theory before the test: How to build high-verisimilitude explanatory theories in psychological science. https://doi.org/10.31234/osf.io/7qbpr 2) Smaldino, P. (2019). Better methods can’t make up for mediocre theory. <i>Nature</i>, 575, 9 doi: 10.1038/d41586-019-03350-5 3) Gigerenzer, G. (2019). How to explain behavior?. <i>Topics in Cognitive Science</i>. doi:10.1111/tops.12480 4) Guest, O. & Martin, A. E. (2020). How computational modeling can force theory building in psychological science. <i>PsyArXiv</i>. 10.31234/osf.io/rybh9</p>

N.B. - This schedule is meant to be a guide and may be subject to change. Any changes will be announced.

Academic Regulations

REQUESTS FOR ACADEMIC ACCOMMODATION

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

- **Pregnancy:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see the Student Guide.
- **Religious obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see the Student Guide

- **Academic Accommodations for Students with Disabilities:** The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact the PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from the PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).
- **Survivors of Sexual Violence:** As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: carleton.ca/sexual-violence-support
- **Accommodation for Student Activities:** Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist.

WITHDRAWAL WITHOUT ACADEMIC PENALTY

The last day to withdraw from a Fall course, without academic penalty, is September 30, 2020. The last day to withdraw from a Winter and Fall/Winter course, without academic penalty, is January 31, 2021. Students may withdraw on or before the last day of classes.

*WDN: For students who withdraw after the full fee adjustment date in each term (noted in the Academic Year section of the Calendar each term) the term WDN will be a permanent notation that appears on their official transcript.

For more information on the important dates and deadlines of the academic year, consult the Carleton 2020-2021 Calendar.

GRADING SYSTEM

The grading system is described in the Graduate Calendar section 10.

PLAGIARISM

The University Senate defines plagiarism as *“presenting, whether intentional or not, the ideas, expression of ideas or work of others as one’s own.”* This can include:

- reproducing or paraphrasing portions of someone else’s published or unpublished material, regardless of the source, and presenting these as one’s own without proper citation or reference to the original source;
- submitting a take-home examination, essay, laboratory report or other assignment written, in whole or in part, by someone else;
- using ideas or direct, verbatim quotations, or paraphrased material, concepts, or ideas without appropriate acknowledgment in any academic assignment;
- using another’s data or research findings;
- failing to acknowledge sources through the use of proper citations when using another’s works and/or failing to use quotation marks;
- handing in *“substantially the same piece of work for academic credit more than once without prior written permission of the course instructor in which the submission occurs.”*

Plagiarism is a serious offence, which cannot be resolved directly with the course's instructor. The Associate Deans of the Faculty conduct a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They range from a mark of zero for the plagiarized work to a final grade of "F" for the course, and even suspension from all studies or expulsion from the University.

You should be aware of Carleton's policy on academic integrity.

Important Information

- Students must always retain a copy of all work that is submitted.
- All final grades are subject to the Dean's approval.
- For us to respond to your emails, we need to see your full name, CU ID, and the email must be written from your valid CARLETON address. Therefore, in order to respond to your inquiries, please send all email from your Carleton CMail account. If you do not have or have yet to activate this account, you may wish to do so by visiting <https://carleton.ca/its/help-centre/email/#sect2>

Critical Reading Checklist (from <http://unilearning.uow.edu.au/reading/2b.html>)

These questions on this checklist are designed as a guide to the process of reading academic texts critically and analytically. You can apply these questions to most academic texts.

- What is the author's approach/perspective?
- Is there another theoretical or philosophical approach which might have been taken?
- Who/what is left out of the text?
- Does the author write from an insider's/outsider's perspective? How does this affect what is included/excluded from the text?
- Do you agree with the points the author is making?
- Are the points made by the author supported by evidence?
- Is the evidence anecdotal or is the evidence the result of scientific study/research?
- Is the evidence referenced? Is it recent?
- Does the writer present opinion as fact?
- Does the writer use valid reasoning?
- Are any assumptions the writer has made clear to the reader?
- Does the writer over simplify complex ideas?
- Does the writer make unsupported generalizations?
- Does the writer make reasonable inferences?
- Does the writer represent the ideas of others accurately? Fairly?
- Does the writer distort the ideas of others or present them out of context?
- Does the writer use unfair persuasion tactics such as appeals to prejudice or fear?
- Does the writer present a balanced picture of the issue?
- How would you characterize the writer's tone? How does the tone affect your response to the text?
- Does the writer's language, tone, or choice of examples reveal any biases? If so, do the writer's biases reduce his or her credibility?
- Do your reactions reveal biases in your own thinking?
- Does the text challenge your own values, beliefs, and assumptions?
- If the paper contains statistics, graphs, illustrations etc, are these adequately introduced and discussed and do they contribute to the author's argument?

Footnote: The questions on this checklist are adapted from: Kirsznner, L.G. & Mandell, S.R. (1992). *The Holt Handbook*. Sydney: Harcourt Brace College Publishers, pp. 100-117.

The questions below are especially relevant to research articles.

- Are the limitations of the procedures clear?

- Is the methodology valid? (e.g., size of the sample, method of sampling used)
- Are the results consistent with the objectives?
- Are the results variable?
- Are the claims the author makes about his or her own research internally consistent, that is, are the aims, method, results and conclusion of the research logically consistent with each other (i.e. what is argued on the basis of the research is supported by the results; the methodology allows the aims of the research to be achieved)?
- Are the diagrams clear to the reader?

Footnote: These critical questions are adapted from: *Journal of Construction Engineering and Management*, (1992), **18**, 1-2.

Course outline Version 1.0