

**Workshop: Teaching writing in research methods and
statistics**

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How could you create a writing assignment from these scenarios?

Purpose: To get students to think critically about numbers and to get them to understand that numbers tell us something but also leave something out.

Scenario 1: A student writing a dissertation and cited this claim from the Children's Defense Fund: "Every year since 1950, the number of American children gunned down has doubled."

According to Joel Best, the author of *Damned Lies and Statistics: Untangling Numbers from the Media, Politicians, and Activists*, this may be the worst social statistic ever. If you read the statement critically, you should be able to figure out why this statistic cannot possibly be true.

Reference: *The State of America's Children Yearbook--1994* (1994). Washington, DC: Children's Defense Fund.

Scenario 2: There have been reports in the news that pregnant women are murdered at shockingly high rates.

From ABC News: A study published in the March 2005 edition of the American Journal of Public Health found that homicide was a leading cause of death among pregnant women in the United States between 1991 and 1999. Data taken from the Pregnancy Mortality Surveillance System at the Centers for Disease Control and Prevention found that the pregnancy-associated homicide ratio was 1.7 per 100,000 live births.

ABC News report: <http://abcnews.go.com/US/LegalCenter/story?id=522184&page=1>

One issue here is that the CDC reports *pregnancy-related* deaths, which includes early stages of pregnancy during which a woman does not know she is pregnant to a year after the end of pregnancy. Another factor to deal with is that women of childbearing age are generally quite healthy, so deaths are likely to involve unusual circumstances. According to Joel Best, the murder rate of pregnant women is actually less than half that of women of a similar age, which the news report didn't note.

Scenario 3: When the PowerBall Lottery reaches astronomical levels, millions of people play. Is it a reasonable thing to do?

Suppose I had set your alarm to go off at a randomly selected second during the eight years of Barack Obama's presidency. Then I told you that if you correctly predicted that second, you would win the PowerBall Lottery (which has been as high as \$1.6 billion). The odds of your winning are actually higher in this scenario than if you bought an actual lottery ticket.

The odds say that somebody is going to win the lottery. It just isn't going to be you. Still, it is possible to come up with reasonable justifications for playing. What might some of them be?

Graphic depictions of the odds: <http://graphics.wsj.com/lottery-odds/>
http://www.huffingtonpost.com/ronald-l-wasserstein/chances-of-winning-powerball-lottery_b_3288129.html

Scenario 4: Are mice a good model for people? Does it make sense to think that what is true for the experimental mice holds true for people? Are there elements of our behavior that we think we control but that might not actually be the product of conscious decisions?



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Do Gut Bacteria Rule Our Minds?

In an Ecosystem Within Us, Microbes Evolved to Sway Food Choices

By Jeffrey Norris on August 15, 2014



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Mind-Control Parasite Kills Mice's Fear of Cats Permanently

By Douglas Main, Staff Writer | September 19, 2013 07:22am ET

2911

92

42

68

25

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A fair amount of research has taken place on *Toxoplasma gondii*, the bizarre parasite that makes mice unafraid of cats, and the latest chapter is a strange one.

A new study shows that even a brief infection with a weakened form of the protozoan caused mice to permanently lose their innate fear of cats.

The protozoan is known to

The loss of mice's innate fear may persist after the parasite responsible (*T. gondii*) is no longer detectable in their brains, suggesting that initial infection may cause permanent changes in the mechanisms underlying their fear of predators. Credit: Wendy Ingram and Adrienne Greene

Flies and booze:

<https://www.youtube.com/watch?v=47FKHKrENSs>

Loss of fear of cats by mice:

<http://www.livescience.com/39772-parasite-makes-mice-unafraid.html>

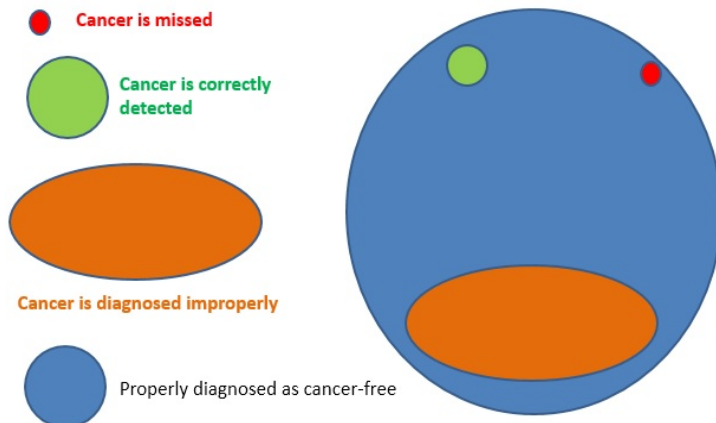
Role of gut bacteria:

<http://www.ucsf.edu/news/2014/08/116526/do-gut-bacteria-rule-our-minds>

Scenario 5: The prevalence of breast cancer in 40-year-old women is about 1%. If a woman is tested for breast cancer and the test comes back positive, what is the likelihood that she actually has breast cancer? Surprisingly, less than 5% because the Type II error rate (false positives) is about 18%. The tests are good at detecting cancer (88%) but miss some (12%). The tests correctly rule out cancer much of the time (82%) but produce false positives quite often (18%).

Thus with a 1% prevalence, of 1,000 women tested, 10 will have cancer and 9 of those women will be correctly identified. Of the 990 women who do not have cancer, 178 will incorrectly be diagnosed as having cancer (18%) and 812 women will be properly diagnosed as cancer-free.

The numbers



So many more women will be diagnosed with cancer than actually have it (187 versus 9). Only about 5% of the women diagnosed as having cancer will actually have it.

It can be important to ask about Type II errors.

Birth Defects

Many women want to have children. For any woman, there is always some risk that a child will be born with a birth defect. Based on the data, how likely would you be to advise a woman with a birth defect either to consider having children or not to consider having them?

Research from Norway studied women with birth defects and the health of their children: the women are less likely to have children, and those who do give birth run an increased risk of bearing a child with the same birth defect that they themselves have. But most children born to women with birth defects are healthy, and they face no increased risk of any type of defect except their mother's.

- **Scenario A:** What would you advise if mothers with birth defects are 60 percent more likely than other women to have children with birth defects.
- **Scenario B:** What would you advise if this were the case? Mothers with birth defects are 1.6 times as likely than other women to have children with birth defects.
- **Scenario C:** Sometimes women with birth defects give birth to children. The rate of birth defects in those cases is 160% that of mothers without birth defects.

On a scale of 1 to 7, what would you say?

1. Give advice that there is no problem
2. There is a small risk, but probably not worth worrying about very much
3. There is a noticeably higher risk than normal, but pregnancy is definitely worth considering
4. There is a moderate amount of risk, so sound advice is impossible
5. There is a higher than normal amount of risk, so there are potential problems to consider
6. There is a very high degree of risk, so the best advice is great caution because problems are likely
7. Strongly advise against having children

Assignment:

- What is the IV? The DV?
- Is the difference between groups reliable?
- What do the data tell you about the way you present numbers?

Wording	Rating
60% more	4.7 ^a
1.6 times	3.8 ^b
160%	4.8 ^a

Different superscripts reflect significant differences.

Source of Variation	Sum of Squares	df	Mean Square	<i>F</i>	<i>p</i>	η^2
Wording	18.03	2	9.01	6.303	.003	.129
Error	121.56	85	1.43			
Total	1868.00	87				

Francis Galton and the Efficacy of Prayer

Purpose: To distinguish the characteristics of science and pseudoscience.

Over a century ago, a British scientist, Francis Galton, conducted a study to see if prayer had an effect in the natural world (contrasted with the religious, or supernatural, domain). Discuss whether Galton's research should be considered as having a scientific approach. Make sure you do not confuse methodological weaknesses with problems with the characteristics of science, which are that science is objective, empirical (or data driven), verifiable, and public.

The Study: Galton defined the Royal Family as being prayed for because, every Sunday, the clergy and congregations took a moment to pray for the health and well being of the Royals. He defined the other groups (lawyers, doctors, and clergy) as not being prayed for because large numbers of people were never called on to pray for them. He used official records that were quite accurate to see how long the people in each group lived, on average.

He reasoned that because members of the Church of England prayed for the health and well-being of the royal family every Sunday and if prayer is effective, the Royals would live longer than other people. He discovered that, of 94 male members of the royal family, the mean age at death for males was 64.04. He compared it with other men: the clergy, whose mean age at death was 69.49 years; with lawyers, 68.14 years; and with doctors, 67.31 years. His research was published in a popular magazine that regularly published the results of research, *Fortnightly Review*, in 1872. He concluded that prayer is not effective in the natural world because the Royals lived shorter lives than the members of the other groups.

Efficacy of Prayer Homework:

- List and describe the four characteristics of science (NOT the four goals of science; make sure you know the difference)
- Apply your knowledge of each of the characteristics of science to Galton's research to draw a conclusion about whether Galton's research can be considered scientific based on the extent to which his study met the criteria of scientific research.
- Identify weaknesses in Galton's research methodology and possible remedies for them
- Tell how you would remedy the weaknesses in his methodology. Your remedies need to be realistic; that is, they have to be practical. You should not develop a methodology that would be exceedingly difficult or impossible.
- What is your conclusion regarding how scientific Galton's study was? Your response should be based on the extent to which Galton's study met the four criteria for determining scientific research.

The Tearoom Trade

Purpose: To identify potential pitfalls in a research design.

How ethical is this study?

A researcher was interested in the men who participated in sexual activity in a public place, that is, their personal characteristics and the nature of the sexual activity. His first step was to engage in observation of such activity in a public restroom in a park within a large city; these places were known as "tearooms." The general pattern was for the men to drive to the park, enter the public restroom, and engage in the desired behavior.

The researcher often served as what was called the "watch queen," that is, a lookout to prevent individuals who might cause trouble from interrupting the sexual activity. In general, interruptions of the activity occurred due to the presence of local teenagers or police. This activity was technically illegal when the study was done (in the 1960s), so it would have been troublesome if the police arrived on the scene.

He gathered his information on 50 sex acts (mostly oral sex) involving over 100 men. Then he obtained personal information about these individuals. He copied down their license plate numbers, went to the police and, giving a false cover story, obtained names and addresses based on the license plates, and subsequently interviewed the men. He informed them that it was part of a marketing research project.

Analysis of responses to the interview revealed that "when the characteristics of the participants were compared with those of typical males from the same urban area, no striking differences in terms of occupations, marital status, socioeconomic characteristics, and the like were found. Aside from their participation in clandestine homosexual activity, there was little to distinguish these men from typical adult males" (Reynolds, 1982, p. 68).

- Identify and describe three potential ethical problems with this research and say why they are problematic. (3 pts)
- Are there realistic alternatives were there to the methodology used by the researcher? The research was conducted in the 1960s, a time when homosexual behavior was illegal, society was very restrictive, and very few people would be willing to admit to such behaviors. Explain your thoughts and describe a potential alternate methodology that would actually work in that era. (1 pt)
- What were the potential benefits to this study? (1 pt)
- Should this study have been done? Explain your response in terms of ethical issues you mentioned above. Do not just argue that you do or don't like it. Instead, make your arguments and pose a counterargument for each criticism (if there is a counterargument; if there isn't, say that). (3 pts)

References

Humphreys, L. (1970). *Tearoom Trade: Impersonal Sex in Public Places*. Chicago: Aldine.
Reynolds, P. D. (1982). *Ethics and Social Science Research*. Englewood Cliffs, NJ: Prentice-Hall.

Mice, Sugar, Credibility, and Critical Thought

Purpose: To encourage students to engage in critical thinking about what they read (without turning them into cynics).

Reaction Paper (3 pts): Nutritionists believe that sugar consumption is a problem in this country. Too much sugar is associated with obesity, diabetes, and other potential problems. A recent study on mice revealed that increased sugar was associated with problems. In addition, a different study showed reducing sugar intake can help people diagnosed with schizophrenia or with depression.

- Do you think that the research with mice provides information that is actually relevant to the health of people? (1 pt)
- Think critically about the article describing the research with schizophrenic and depressed patients. What alternate explanations can you think of to explain why the mental health of people in the study improved when they reduced sugar consumption? (1 pt)
- One of the readings for this reaction paper came from Natural News. According to the publication's website, "The key mission of Natural News is to empower consumers with factual information about the synthetic chemicals, heavy metals, hormone disruptors and other chemicals found in foods, medicines, personal care products, children's toys and other items." Given the orientation of the website, do you think that the articles they publish are likely to be biased toward some perspective? Would this mean that you would evaluate their articles differently than if the information came from a traditional news source (e.g., Washington Post or New York Times)? (1 pt)

Effect of sugar intake on mice:

https://www.washingtonpost.com/national/health-science/study-sugar-even-at-moderate-levels-toxic-to-mice-health-reproduction/2013/08/13/95887bee-0443-11e3-a07f-49ddc7417125_story.html?utm_term=.a152df9a0768

Natural News article:

<http://www.naturalnews.com/2017-03-26-daily-aspirin-found-to-increase-risk-of-heart-attack-by-190.html>

Sample Results and Discussion without Statistics

Manipulation check

The ego threat and boost manipulations appear to have succeeded. When participants solved fewer anagrams than expected and then announced their total publicly in a group that included more successful participants, their mood as measured on the PANAS (Watson, Clark, & Tellegen, 1988) was depressed relative to the more successful participants.

The difference between the ego boost condition with the higher joke ratings and the ego threat condition with lower joke ratings reflected negative affect in the latter condition. This difference is reassuring because the manipulation was necessary for investigating the relation between varied mood states and humor appreciation.

Joke Ratings

It is reasonable to hypothesize that the effects of the ego boost/threat tasks would differ among katagelasticists, gelotophobes, and gelotophiles. As such, there is a separate analysis for scores on each approach to humor.

In addition, the ratings of the different types of humor, neutral and mean spirited, could vary. Previous research (e.g., Proyer, Wellenzohn, & Ruch, 2014) has revealed that katagelasticists do not seem to be forgiving, modest, or self-regulating. They also combine low self-esteem with public self-consciousness (Beins, Grady, Geller, Mendes, Leibel, & Lara, 2013). As such, when faced with ego threat, they might see retaliation as a legitimate response.

Given that katagelasticists use humor instrumentally (Lara, Cipriano, Reid, Geller, Grady, & Beins, 2014), it is possible that in a situation of ego threat, they will enjoy jokes reactively; that is, they could use jokes as a release. In fact, with respect to joke ratings, katagelasticists showed an interaction between joke type and ego condition. The means appear in Table 1.

These results are not entirely straightforward, but in the threat condition, participants scoring high in katagelasticism showed a distinctly higher enjoyment of jokes compared to those lower in katagelasticism. In contrast, there was less difference in ratings in the ego boost condition across katagelasticism levels.

The relatively high joke ratings by katagelasticists in the ego-threat condition may be attributable to a protection afforded by the katagelastic approach. That is, when one's approach to humor involves intentionally directing laughter away from oneself and toward another person, one might gain some satisfaction from humor that helps fight the effects of ego threat. Katagelasticism has been associated with bullying (Proyer et al., 2012), so in an ego threat condition, katagelasts might choose to direct attention elsewhere.

Sample Results and Discussion

Manipulation check

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The difference between the ego boost condition ($M = 6.31$) and the ego threat condition ($M = 4.94$) reflected negative affect in the latter condition. This difference is reassuring because the manipulation was necessary for investigating the relation between varied mood states and humor appreciation.

Joke Ratings

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Numberless Results Section

According to previous research done by Dr. Beins and his Psychology of Humor research team¹, individuals who interpret laughter negatively are privately self-conscious and tend to withdraw during social situations (Cipriano, Rebholz, Krauss, & Beins, 2015). They also do not self-deceive (Beins, Grady, Geller, Mendes, Lara, & Leibel, 2013)². To be self-conscious means to be participating in the process of self-reflection. Not participating in self-deception means these individuals view themselves in a realistic way. Being self-reflective is a positive trait, as it allows for someone to look back on their past and essentially learn from their mistakes, creating a better future by making improved decisions when faced with certain situations. Perhaps the engagement in self-reflection and being realistic with themselves can explain why this group of people are active when faced with a stressful situation. They accept what is occurring to them, becoming active due to accepting the reality of the situation and how they will handle it based on past actions taken during stressful events in their lives.³ Although these people accept the negative event occurring and become active, the disengagement can be explained by previous research done by Dr. Beins and his team, which found that they do not view their own personal future in such a positive light, holding a less optimistic view towards themselves. The more prone one is to gelotophobia, the less optimistic one is about one's future. Being less optimistic means that one tends to think that good events will not likely occur in their future endeavors (Smith, Suarez, Marshall, Krauss, Cardwell, McGuane, Lauser, & Beins, 2016)⁴. Withdrawing during social situations, having low self-esteem (Beins, Grady, Geller, Mendes, Leibel, & Lara, 2013), and not self-deceiving are all tendencies that can explain the process of leading towards maladaptive coping mechanisms.

Comments

1. APA citation issues
2. Good integration of prior research with current research
3. Nice interpretation followed by the rationale
4. More APA citation issues