



INSTITUTE FOR SOCIAL RESEARCH
PROGRAM IN SURVEY AND DATA SCIENCE
UNIVERSITY OF MICHIGAN

Assessing Measurement Error in Hypothetical Questions

Jennifer Sinibaldi
NCSES

Adam Kaderabek
Michigan Program in Survey & Data Science

National Center for Science and Engineering Statistics
Social, Behavioral and Economic Sciences
National Science Foundation

Introductory Comments about this Project

SDR
2019
Survey of Doctorate Recipients
Conducted by
NCSSES **NIH**

The National Center for Science and Engineering Statistics (NCSSES) within the National Science Foundation (NSF) and the National Institutes of Health (NIH)
Data collection activities are contracted to Westat

Please make any name/address changes below:

First Name

Last Name

Number and Street Address

City/Town

State ZIP/Postal Code

Territory/Country (if not U.S.)

Dr. (FIRST NAME) (MIDDLE INITIAL) (LAST NAME)
(ORGNAME)
(STREET ADDRESS 1)
(STREET ADDRESS 2)
(CITY), (STATE) (ZIP CODE)

This information is solicited under the authority of the National Science Foundation Act of 1950, as amended, and the Confidential Information Protection and Statistical Efficiency Act of 2002. Per the Federal Cybersecurity Enhancement Act of 2015, your data are protected from cybersecurity risks through screening of the federal systems that transmit your data. The information you provide will be used for statistical purposes only. Your responses will be kept confidential. Your response is voluntary and failure to provide some or all of the requested information will not in any way adversely affect you. The average time to complete this survey is about 25 minutes. Please send any comments on the time required for this survey to National Science Foundation, 2415 Eisenhower Avenue, Alexandria, VA 22314, Attn: NSF Reports Clearance Officer.



Hypothetical Questions in Practice

2008 National Health Interview Survey, supplement about the vaccine for Human Papillomavirus (HPV)

- *“The cost of the vaccine may be about \$360-\$500. Would you get the HPV vaccine if you had to pay this amount?”*

National HIV Behavioral Surveillance Round 3 interview (2011-2013)

- *“Would you be willing to take anti-HIV medicines every day to lower your chances of getting HIV?”*

Hypothetical Questions in Practice

- Millar, M., O'Neill, A., & Dillman, D. 2009. "Are Mode Preferences Real." (*Technical Report No. 09-003*). Pullman, WA: Washington State University, Social and Economic Sciences Research Center.
- Olson, K., Smyth, J., & Wood, H. 2012 "Does Giving People Their Preferred Survey Mode Actually Increase Survey Participation Rates? An experimental Examination." *Public Opinion Quarterly* 76:611-635.
- Keusch, F., Struminskaya, B., Antoun, C., Couper, M. P., & Kreuter, F. (2019). Willingness to participate in passive mobile data collection. *Public opinion quarterly*, 83(S1), 210-235.
- Hargittai, E., Redmiles, E. M., Vitak, J., & Zimmer, M. (2020). Americans' willingness to adopt a COVID-19 tracking app. *First Monday*, 25(11), online.

Design & Data

Survey of Doctorate Recipients 2020 Pilot

- SDR Topics: employer, job duties, recent education/training
- Web preferred:
 - 2017 SDR = 84%
 - 2019 =93%
- Between wave pilot, sample only respondents
- Experiment groups: TR1, TR2, CTR
 - Cases randomly assigned; 1,300 cases for each group
- Shortened questionnaire + R experience questions

Background

Design & Data

Respondent Experience Questions

- All respondents were asked to complete a series of respondent experience questions (REQs) to assess their experience with the survey which included several standard survey experience questions.

Design & Data

Respondent Experience Questions

- Treatment participants were asked about their experience with the dependent interviewing format.

(TRT) One of the goals of this survey is to understand people's reactions to seeing their prior answers pre-filled on the survey.

Please share your own reactions to seeing your {PRIOR_CYCLE_YEAR} responses to the Survey of Doctorate Recipients pre-filled in today's survey.

Design & Data

Respondent Experience Questions

- Control participants were asked a hypothetically equivalent question about how they believe they would feel if their survey had included their prior responses.

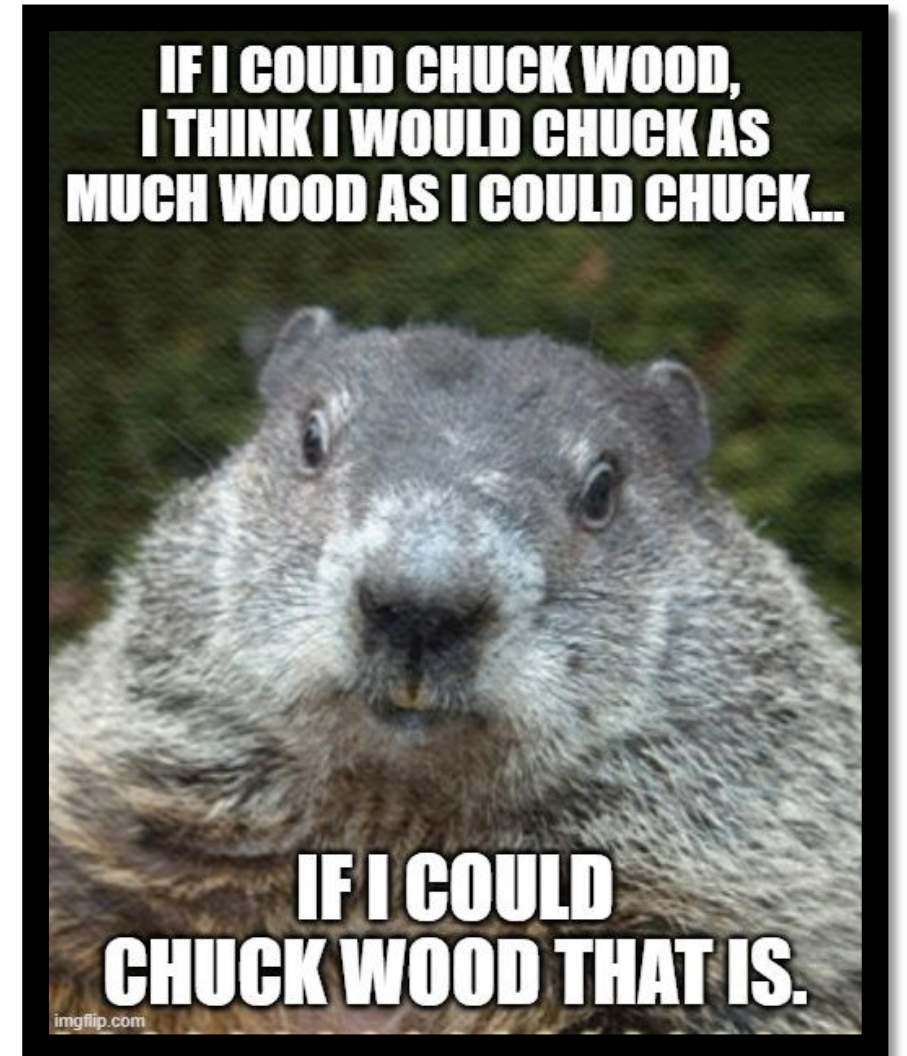
(CTR) We are interested in understanding how people might react if some of their answers from the last time they responded to the Survey of Doctorate Recipients were pre-filled in today's survey. People would then confirm or update the answers (rather than having to re-enter information that had not changed).

Please share how you might have reacted if your most recent responses to the Survey of Doctorate Recipients had been pre-filled in today's survey.

Preference and Intention

How much wood would a woodchuck chuck if a woodchuck could chuck wood?

But how do we know?



Preference and Intention

Behavioral Intentions

Assumes a strong relationship exists between **attitudes** and **behaviors**, such that attitudes drive intention and intention drives behavior.

Attitudes → Intentions → Behaviors

Identifies extent to which attitudes and behaviors are consistent but cannot effectively quantify measurement error due to bias.

Stated Preferences

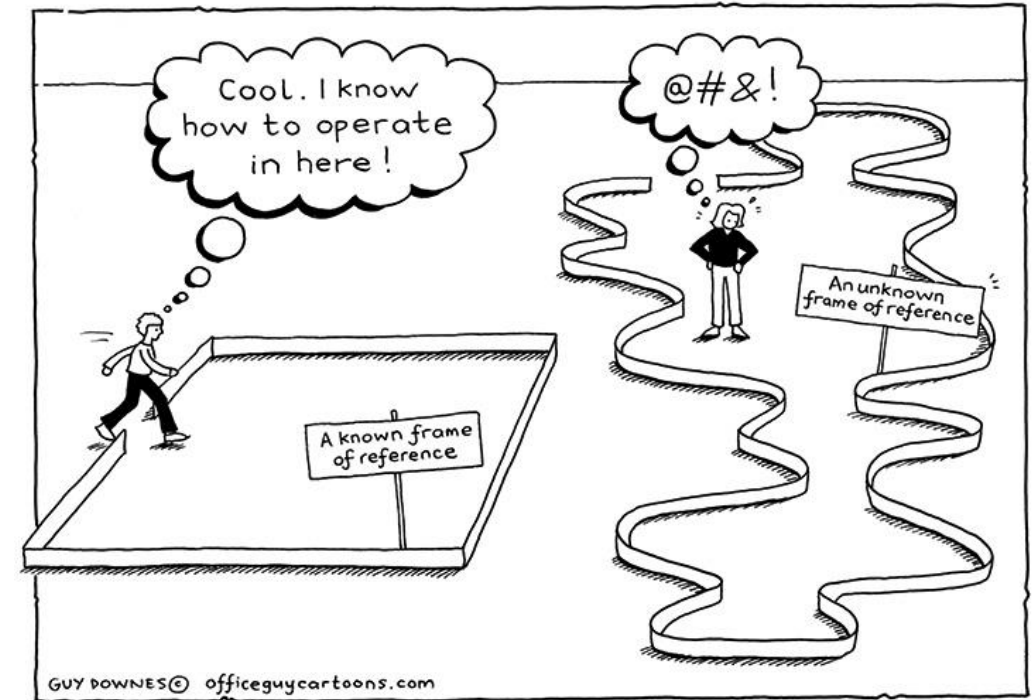
Assumes “**stated**” preferences deviate from “**observed**” preferences. Employs comparative methods (e.g., vignettes, factorial experiments, conjoint analysis) to address hypothetical bias.

Attitudes → (*SP* – *HB*) → Behavior

Allows for calibration of responses and bias correction but studies often target niche; e.g., consumer preferences, public goods, and market research.

Understanding Hypothetical Bias

- Cognitive process for judgement of preference mirrors cognitive processes of survey response.
- Abstract values make comparing alternatives more burdensome than standard metrics.
- Imagining the hypothetical requires a starting point; i.e., an existing frame of reference. Specifically, the relevant status quo.

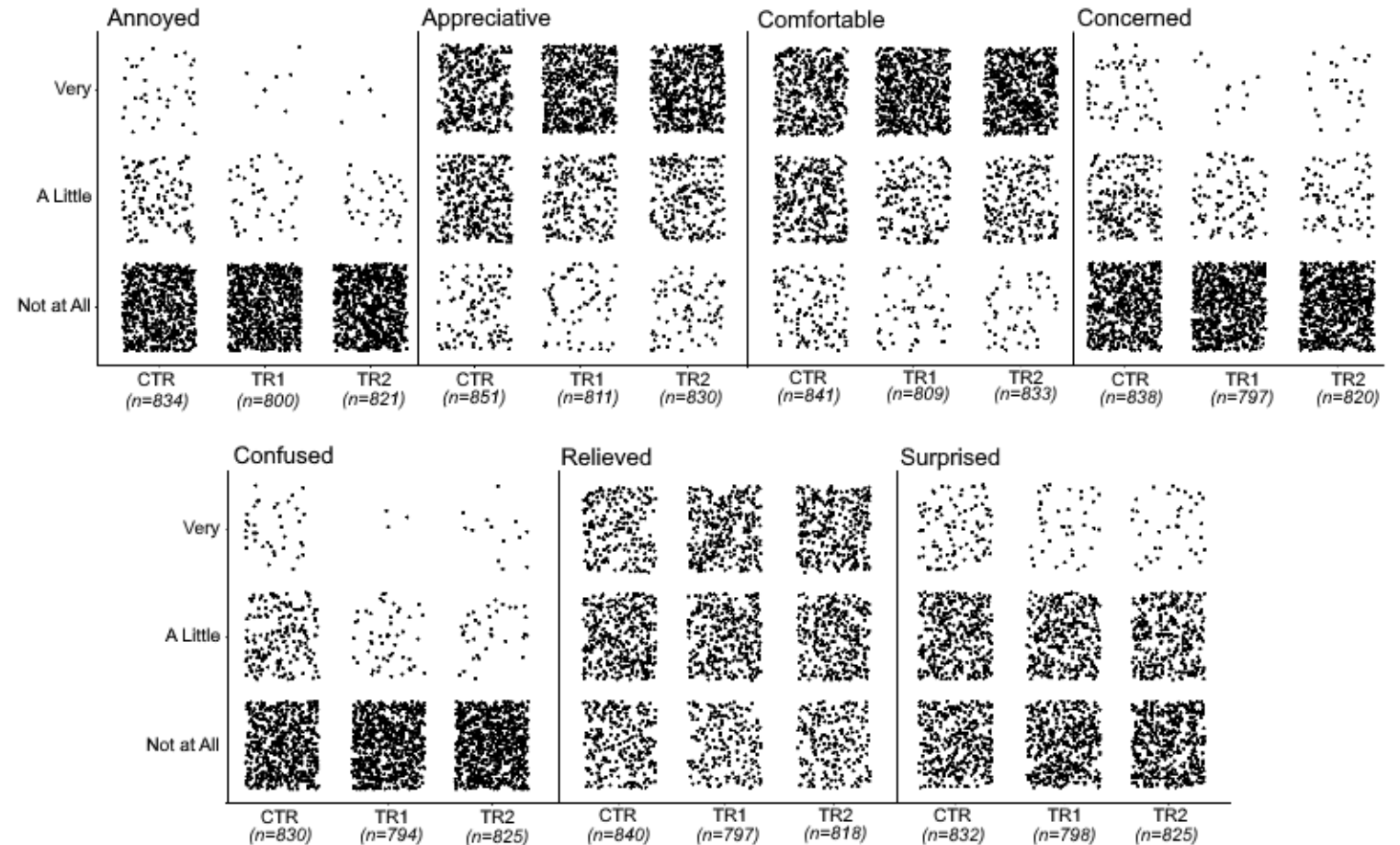


Results

Distribution of Responses to Reaction Questions

Reactions/Hypothetical Reactions to Pre-filling Survey Answers

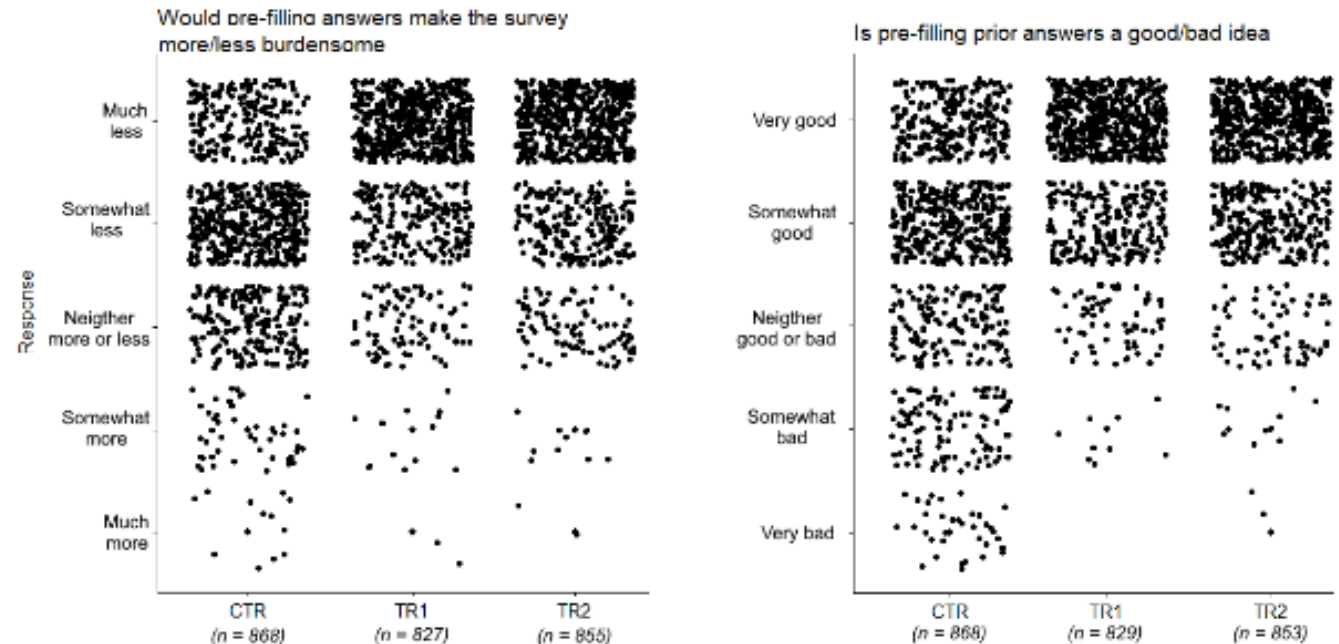
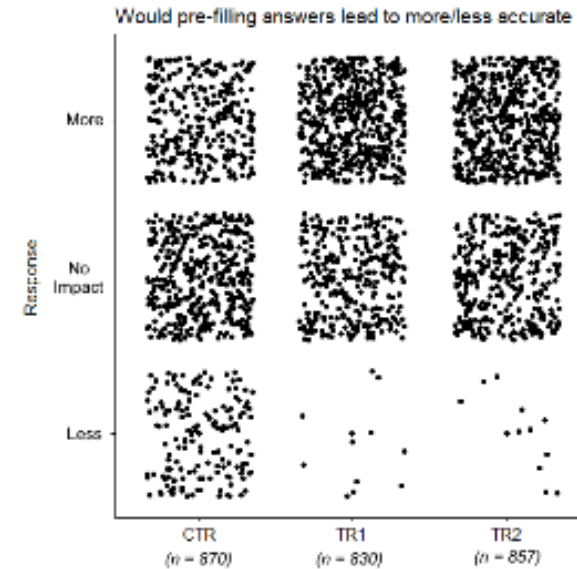
- Responses trend in same direction for all groups
- Control group attitudes consistently skew negative compared to treatment groups
- No significant differences between the treatment groups



Efficacy Questions

Opinions on the Efficacy of Pre-filling Survey Answers

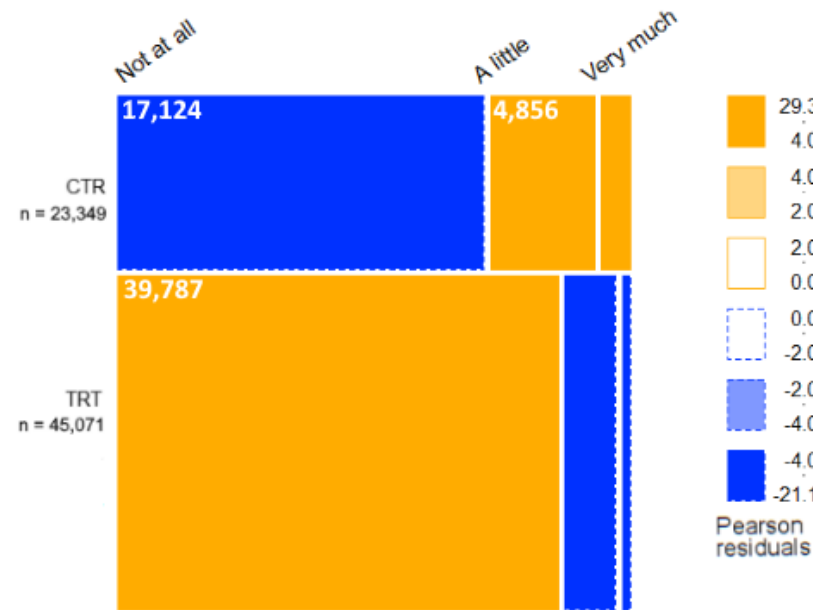
- Responses trend in same direction for all groups
- Control group attitudes consistently skew negative compared to treatment groups
- No significant differences between the treatment groups
- Almost no “very negative” opinions from the treatment groups



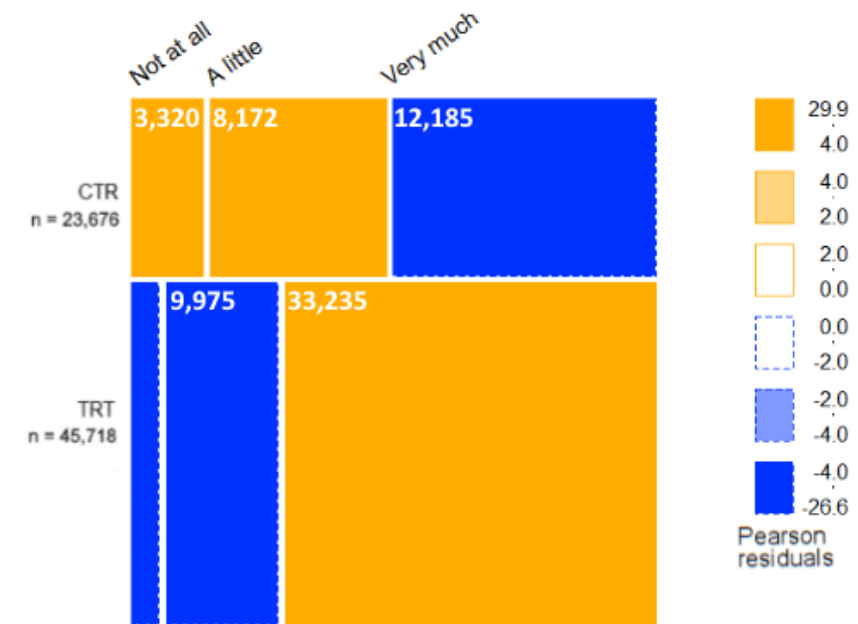
Mosaic Plots - χ^2

- Weighted comparisons show statistically significant differences across response options.
- Fewer responses of “Not at all” concerned from CTR than would be expected under independence.
- Significantly more responses of “Not at all” comfortable from CTR than would be expected under independence.

Concerned by Pre-filled Answers (WGT)



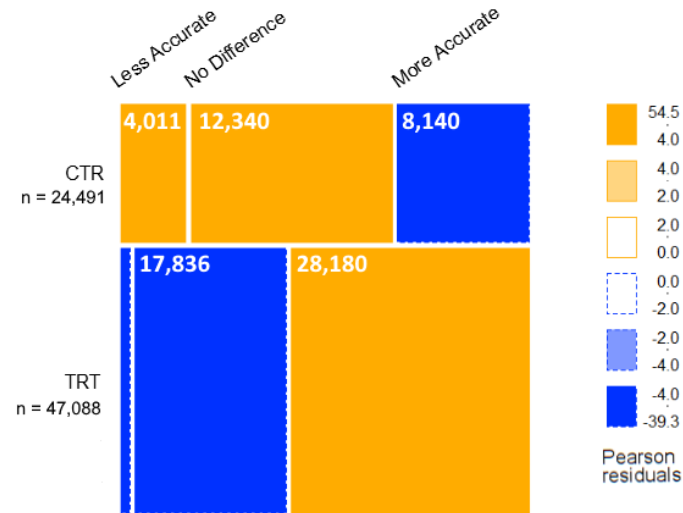
Comfortable by Pre-filled Answers (WGT)



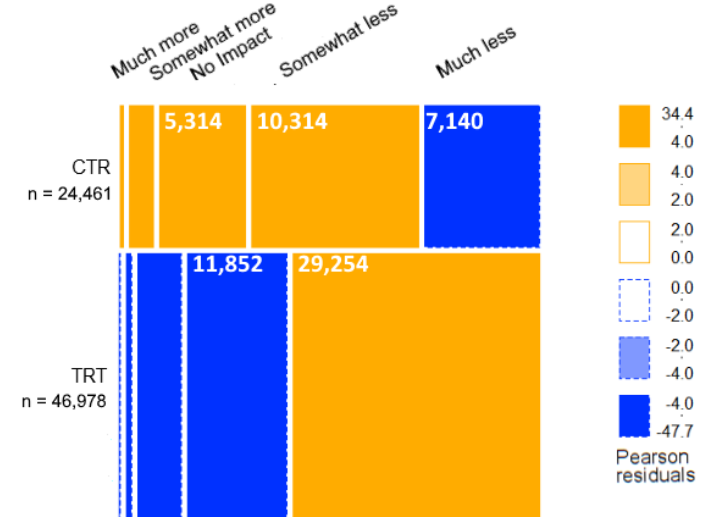
Mosaic Plots

- ~60% of TRT reported “More accurate”, “Much less burden” and “Very good idea”
- Only ~30% of CTR shared these attitudes
- 16% of CTR believing DI protocol would lead to reduced accuracy
- 29% of CTR reporting “No impact” or some increase on survey burden
- 30% CTR reporting the protocol would be “Neither good or bad” or some level of a bad idea.

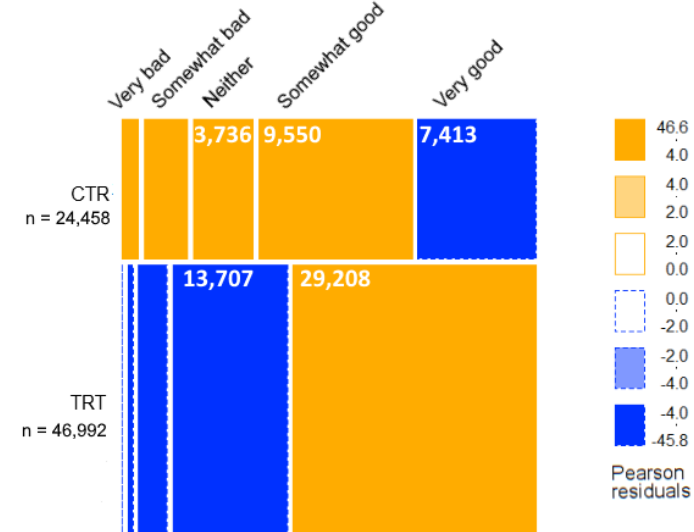
Impact on Accuracy (WGT)



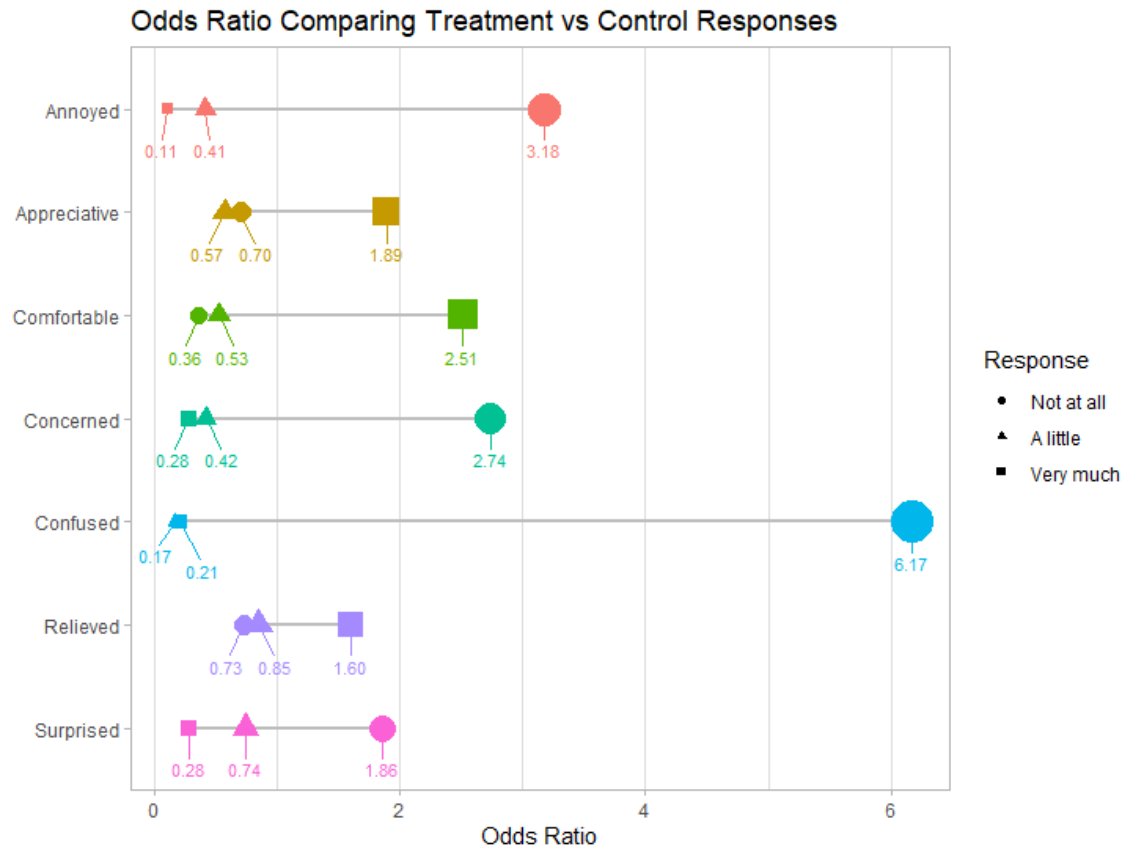
Impact on Burden (WGT)



Would Pre-filling be Good or Bad (WGT)

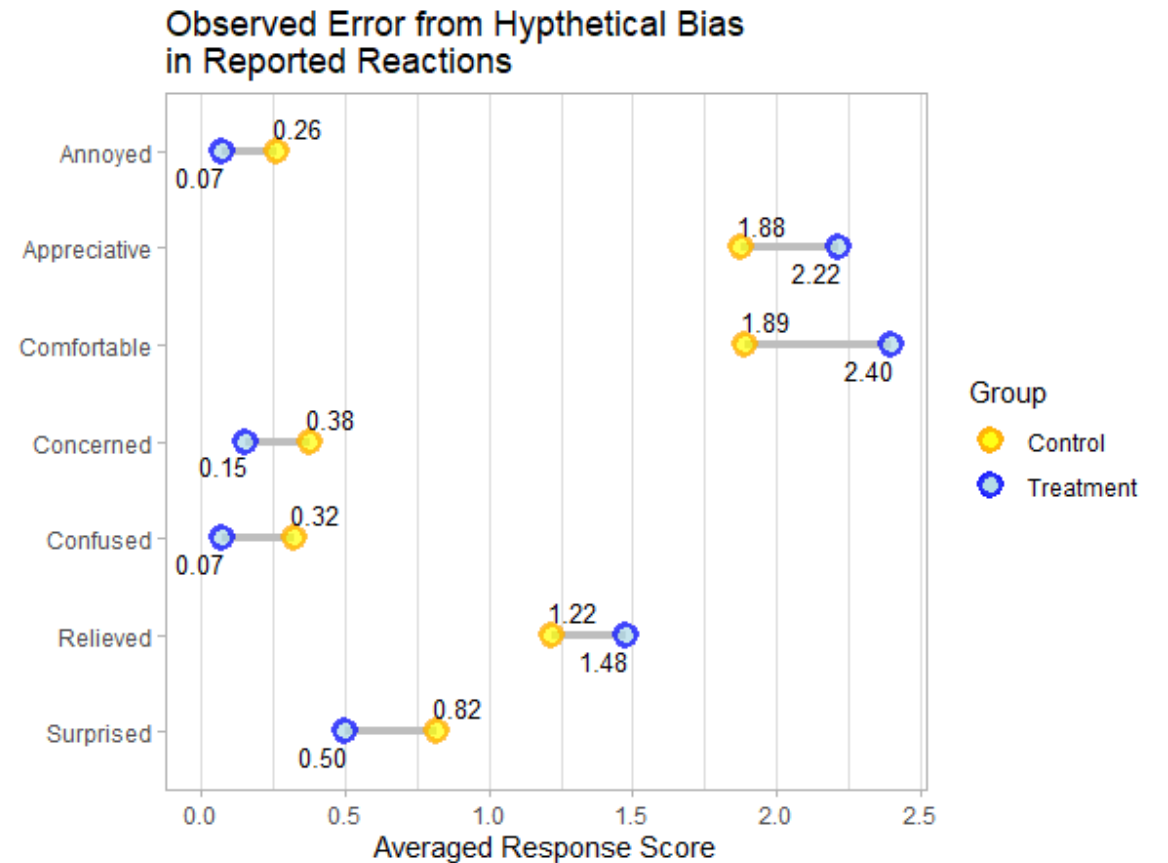
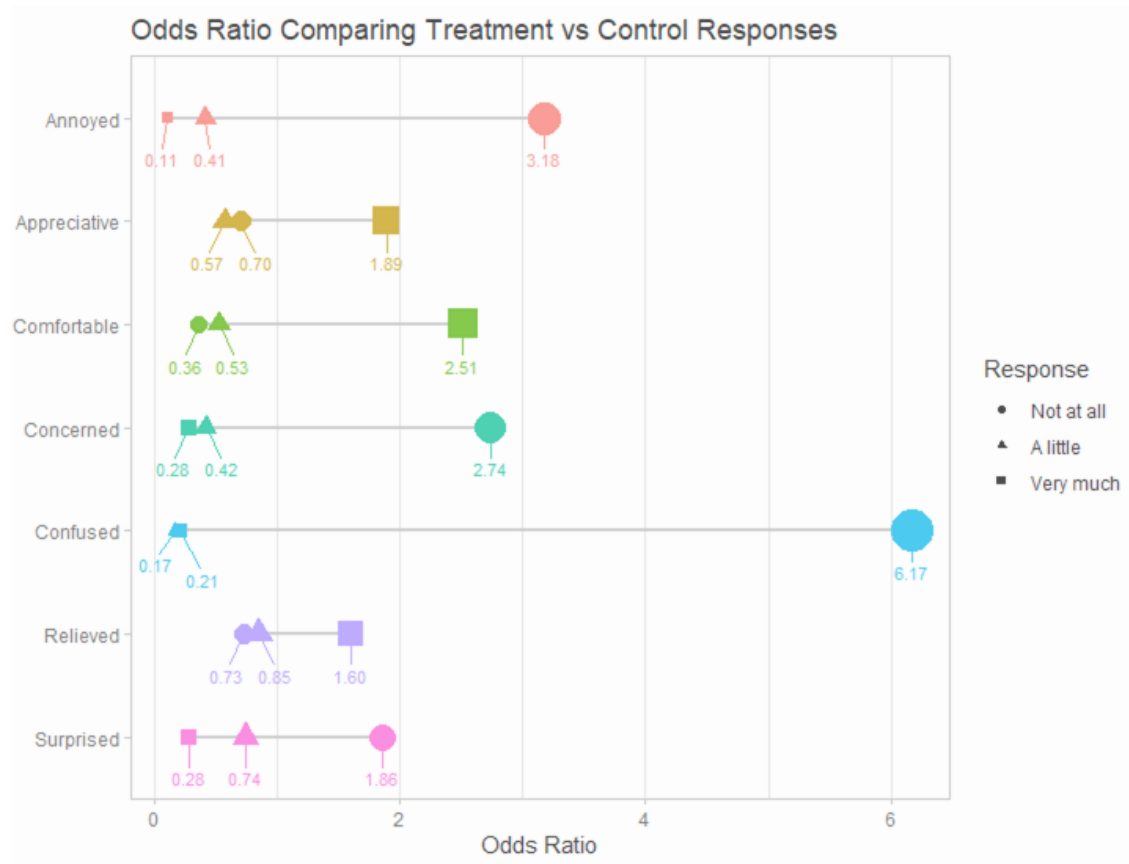


Measuring Hypothetical Bias in Reaction Responses

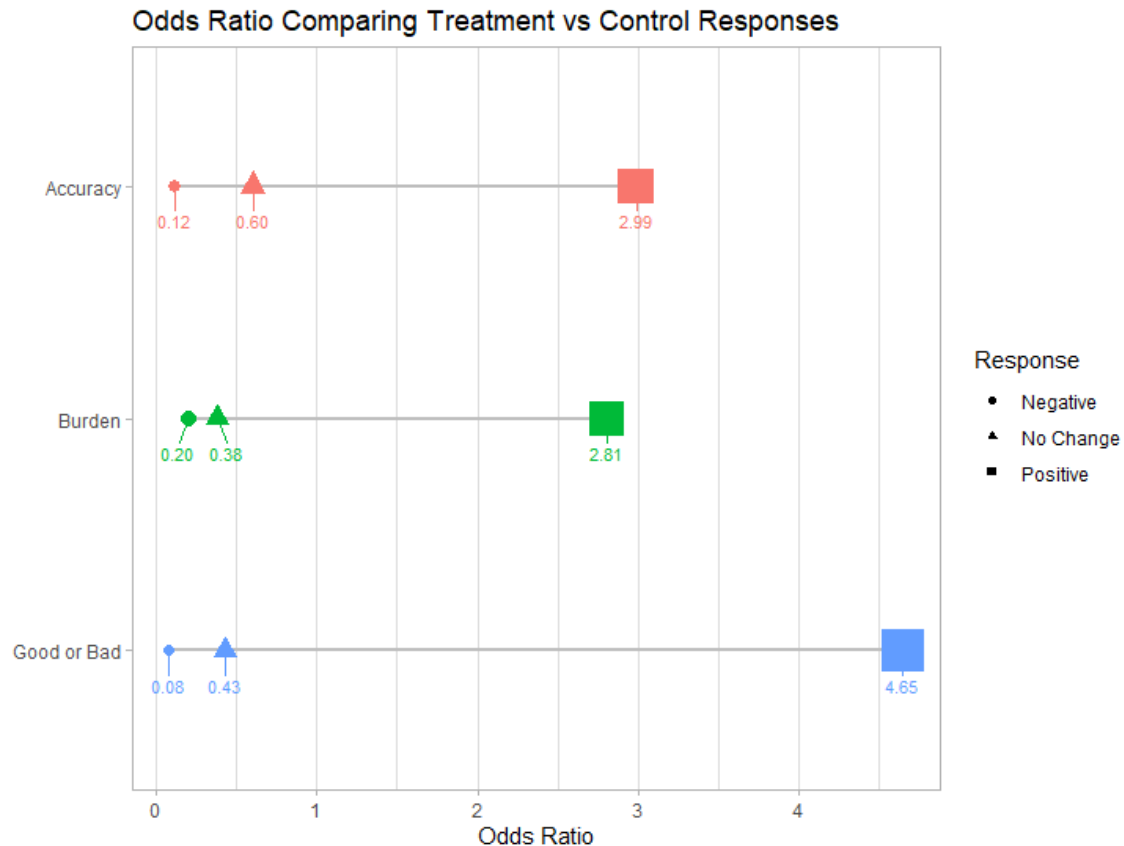


- Treatment group:
 - more than three times more likely to express no annoyance at all
 - two and a half times more likely to express no concern at all
 - over six times as likely to report no confusion at all
 - almost twice as likely to report being very appreciative and
 - two and a half times as likely to report being very comfortable

Measuring Hypothetical Bias in Reaction Responses

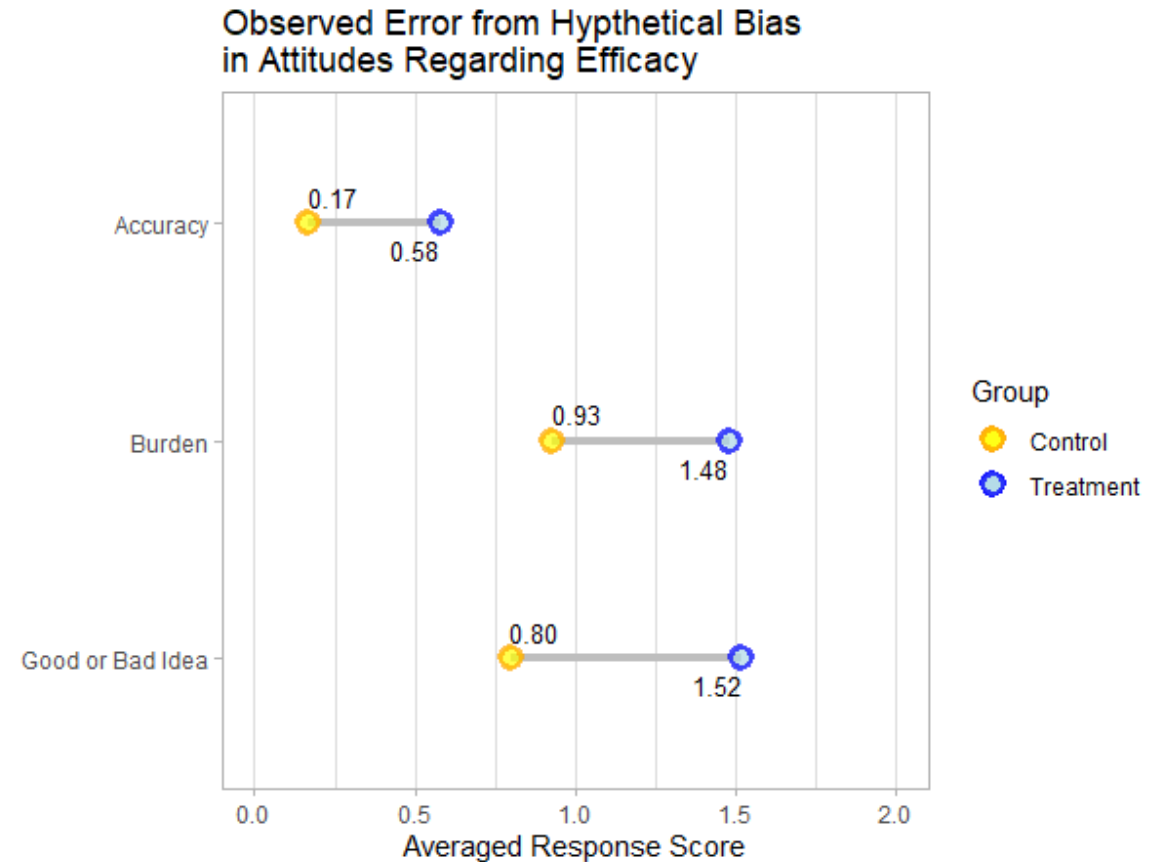


Measuring Hypothetical Bias in Efficacy Responses



- Treatment group:
 - Less likely to report a negative or neutral response to all questions and
 - far more likely to report the treatment is positive.

Measuring Hypothetical Bias in Efficacy Responses



Conclusions

Hypothetical Bias as Measurement Error

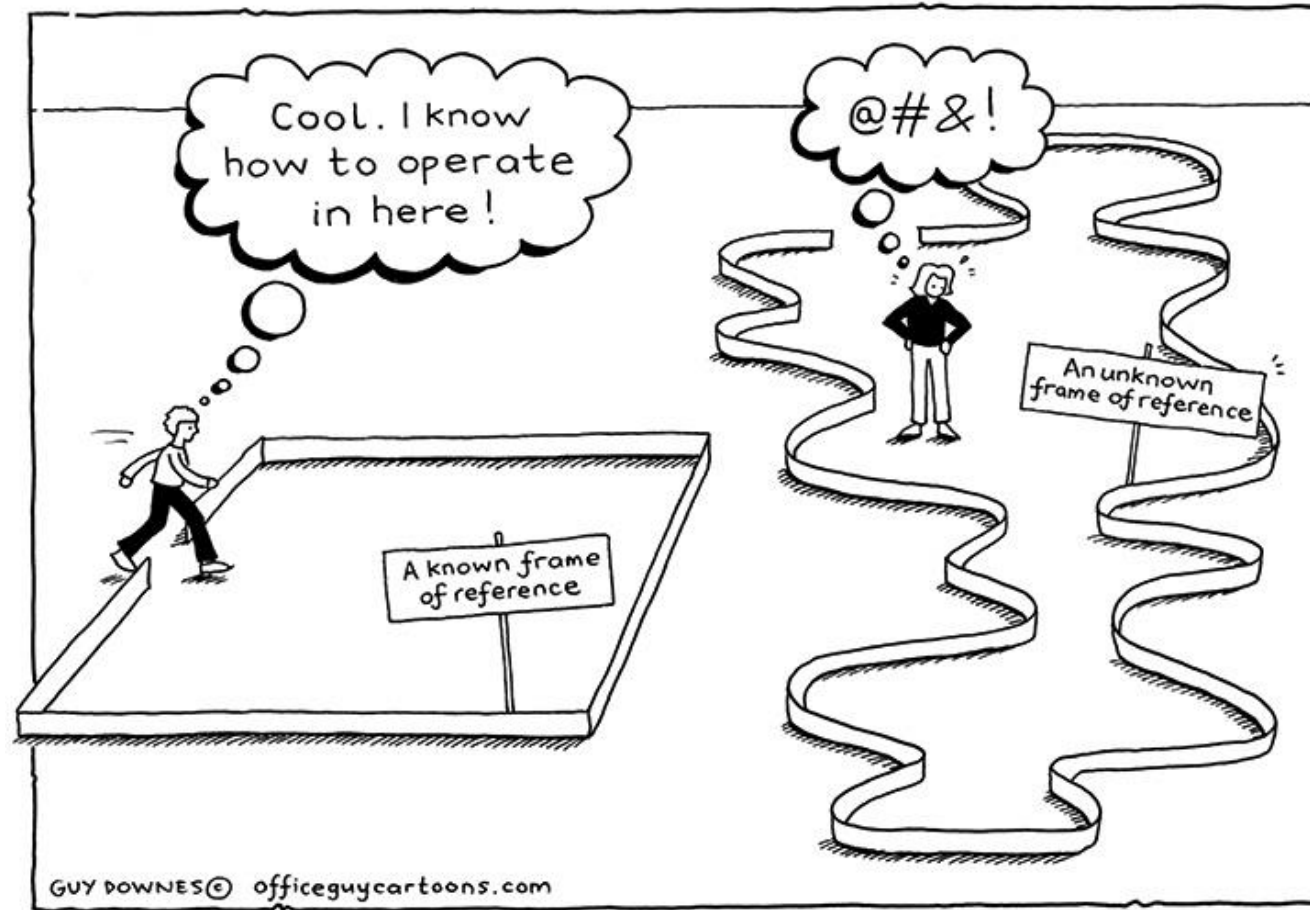
Attitudes → Intentions → Behaviors

Attitudes → ($SP - HB$) → Behaviors

~~Attitudes → ($SP - HB$) → Behaviors~~

TRT = CTL

Interpreting Hypothetical Bias



Future Work

- Correlates of Hypothetical Bias
- Develop adjustments for the bias
 - Maybe

Jennifer Sinibaldi
Jsinibal@nsf.gov



Thank you!

Adam Kaderabek
amkad@umich.edu



INSTITUTE FOR SOCIAL RESEARCH
PROGRAM IN SURVEY AND DATA SCIENCE
UNIVERSITY OF MICHIGAN