**Online appendix for**

**Displacing misinformation about events:**

**An experimental test of causal corrections**

Brendan Nyhan

Dartmouth College

nyhan@dartmouth.edu

Jason Reifler

University of Exeter

J.Reifler@exeter.ac.uk

*Journal of Experimental Political Science*, forthcoming

**Experimental stimulus**

[pre-treatment question]

Do you think that almost all of the people running the government are crooked, quite a few are, not very many are, or do you think hardly any of them are crooked?

-Almost all are crooked

-Quite a few are crooked

-Not many are crooked

-Hardly any are crooked

---page break---

We are interested in your opinions about the following scenario, which consists of a series of news dispatches from a reporter about an Alaska state senator who recently resigned from office unexpectedly. Later in the survey we will ask you several questions about these dispatches.

---page break---

[experiment (see Table 1) - block-randomized based on responses to crooked question above]

---page break---

[delay content - unscramble and word search tasks]

---page break---

We would now like you to ask questions about the dispatches you read earlier. Select the response which best describes your beliefs about the following questions.

Overall, how would you describe your opinion of Dan Swensen?

-Very favorable [6]

- Somewhat favorable [5]

-Slightly favorable [4]

-Slightly unfavorable [3]

-Somewhat unfavorable [2]

-Very unfavorable [1]

---page break---

In your opinion, how likely is it that Dan Swensen is resigning from office because he is under investigation for bribery?

-Very likely [4]

- Somewhat likely [3]

-Not very likely [2]

-Not likely at all [1]

---page break---

In your opinion, how likely is it that Dan Swensen has accepted bribes or engaged in other illegal practices?

-Extremely likely [5]

-Very likely [4]

-Moderately likely [3]

-A little likely [2]

-Not at all likely [1]

**Balance tests**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Control** | **Innuendo** | **Denial** | **Causal** | **Total** |
| *Gender* |  |  |  |  |   |
| Male | 51.5% | 42.4% | 45.5% | 47.1% | 46.6% |
| Female | 48.5% | 57.6% | 54.5% | 52.9% | 53.4% |
|   |  |  |  |  |   |
| *Education* |  |  |  |  |   |
| High school or less | 32.5% | 34.3% | 32.5% | 29.5% | 32.1% |
| Some college | 35.1% | 33.5% | 34.6% | 33.5% | 34.1% |
| College grad | 22.9% | 23.7% | 20.3% | 21.6% | 22.1% |
| Post-grad | 9.5% | 8.6% | 12.6% | 15.5% | 11.7% |
|   |  |  |  |  |   |
| *Race/ethnicity* |  |  |  |   |
| White | 75.3% | 78.0% | 73.2% | 75.2% | 75.4% |
| Black | 10.8% | 9.4% | 9.3% | 11.2% | 10.2% |
| Hispanic | 6.5% | 7.3% | 8.1% | 5.4% | 6.8% |
| Other | 7.4% | 5.3% | 9.3% | 8.3% | 7.6% |
|   |  |  |  |  |   |
| *Age* |  |  |  |  |   |
| 18-29 | 11.7% | 5.7% | 8.5% | 7.6% | 8.3% |
| 30-44 | 14.7% | 15.1% | 11.0% | 15.5% | 14.1% |
| 45-59 | 43.7% | 40.4% | 46.3% | 45.3% | 44.0% |
| 60+ | 29.9% | 38.8% | 34.1% | 31.7% | 33.6% |

Unweighted results above. The distribution of respondents across demographic categories is not different from what we would expect due to chance when the data are analyzed in unweighted form or with survey weights. (It is not possible to calculate the correct test statistics using inverse probability weights.)

**Ordered probit results**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Favorable** | **Bribes** | **Investigation** |
|  | **(1)** | **(2)** | **(3)** |  | **(4)** | **(5)** | **(6)** |
| Innuendo | -0.57\*\* | -0.57\*\* | 0.78\*\* |  | 0.77\*\* |  |   |
|   | (0.10) | (0.09) | (0.10) |  | (0.09) |  |   |
| Denial of innuendo | -0.38\*\* | -0.38\*\* | 0.54\*\* |  | 0.53\*\* | -0.41\*\* | -0.40\*\* |
|   | (0.10) | (0.09) | (0.10) |  | (0.09) | (0.10) | (0.10) |
| Causal correction | 0.05 | 0.03 | 0.08 |  | 0.10 | -0.85\*\* | -0.84\*\* |
|   | (0.09) | (0.09) | (0.09) |  | (0.10) | (0.10) | (0.10) |
| Weights | IPW | Survey | IPW |  | Survey | IPW | Survey |
| N  | 987 | 987 | 986 |   | 986 | 764 | 764 |

Ordered probit models estimated with survey weights provided by YouGov or inverse probability weights accounting for block randomization; standard errors in parentheses (\*\* *p*<.01, \* *p*<.05; estimated cutpoints omitted). “Favorable” measures favorability toward the fictional politician in the experiment on a six-point scale from “very unfavorable (1) to “very favorable” (6). “Bribes” measures belief that the politician “accepted bribes or engaged in other illegal practices” on a five-point scale from “not at all likely” (1) to “extremely likely” (5). “Investigation” measures belief that the politician “is resigning from office because he is under investigation for bribery” on a four-point scale from “not likely at all” (1) to “very likely” (4). Experimental design and question wording are provided in the online appendix.

**Unweighted results**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Favorable** | **Bribes** | **Investigation** |
| Innuendo | -0.58\*\* | 0.79\*\* |  |
|   | (0.10) | (0.10) |  |
| Denial of innuendo | -0.39\*\* | 0.55\*\* | -0.25\*\* |
|   | (0.10) | (0.10) | (0.07) |
| Causal correction | 0.06 | 0.09 | -0.58\*\* |
|   | (0.10) | (0.10) | (0.07) |
| Constant | 2.75\*\* | 2.86\*\* | 3.45\*\* |
|   | (0.08) | (0.07) | (0.05) |
|  |  |  |  |
| N  | 987 | 986 | 764 |

OLS models estimated without survey or inverse probability weights; standard errors in parentheses (\*\* *p*<.01, \* *p*<.05). “Favorable” measures favorability toward the fictional politician in the experiment on a six-point scale from “very unfavorable (1) to “very favorable” (6). “Bribes” measures belief that the politician “accepted bribes or engaged in other illegal practices” on a five-point scale from “not at all likely” (1) to “extremely likely” (5). “Investigation” measures belief that the politician “is resigning from office because he is under investigation for bribery” on a four-point scale from “not likely at all” (1) to “very likely” (4). Experimental design and question wording are provided in the online appendix.

**Significance tests: Pairwise comparisons between conditions**

All results below are calculated from the inverse probability weight models in Table 2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DV** | **Condition 1: mean** | **Condition 2: mean** | **Difference** | ***p*-value** |
| Favorable | Innuendo: 2.17 | Control: 2.75 | -0.58 | *p*<.01 |
| Favorable | Denial: 2.36 | Control: 2.75 | -0.39 | *p*<.01 |
| Favorable | Causal: 2.83 | Control: 2.75 |  0.08 | *ns* |
| Favorable | Denial: 2.36 | Innuendo: 2.17 |  0.19 | *ns* |
| Favorable | Causal: 2.83 | Innuendo: 2.17 |  0.66 | *p*<.01 |
| Favorable | Causal: 2.83 | Denial: 2.36 |  0.46 | *p*<.01 |
| Bribes | Innuendo: 3.65 | Control: 2.86 |  0.78 | *p*<.01 |
| Bribes | Denial: 3.41 | Control: 2.86 |  0.55 | *p*<.01 |
| Bribes | Causal: 2.93 | Control: 2.86 |  0.07 | *ns* |
| Bribes | Denial: 3.41 | Innuendo: 3.65 | -0.23 | *p*<.05 |
| Bribes | Causal: 2.93 | Innuendo: 3.65 | -0.72 | *p*<.01 |
| Bribes | Causal: 2.93 | Denial: 3.41 | -0.48 | *p*<.01 |
| Investigation | Denial: 3.21 | Innuendo: 3.46 | -0.25 | *p*<.01 |
| Investigation | Causal: 2.87 | Innuendo: 3.46 | -0.58 | *p*<.01 |
| Investigation | Causal: 2.87 | Denial: 3.21 | -0.34 | *p*<.01 |

**No differences in stimulus recall between conditions**

*Recall questions*

What part of Alaska did Dan Swensen represent in the State Senate?

-Anchorage

-Fairbanks

-Juneau

-Yukon

How will a replacement senator be chosen for Swensen’s district?

-Appointed by governor

-Special election

-Next general election

-Chosen by state senate special committee

Which committee in the state senate was Swensen a member of?

-Economic Development

-Energy

-Finance

-Fisheries

*Model results*

|  |  |
| --- | --- |
|  | **Recall** |
|  | **(1)** | **(2)** |
| Denial of innuendo | 0.09 | 0.19 |
|   | (0.08) | (0.14) |
| Causal correction | 0.00 | 0.05 |
|   | (0.08) | (0.15) |
| Constant | 2.21\*\* | 2.05\*\* |
|   | (0.05) | (0.11) |
| Weights | IPW | Survey |
| N  | 769 | 769 |

OLS models estimated with survey weights provided by YouGov or inverse probability weights accounting for block randomization; standard errors in parentheses (\*\* *p*<.01, \* *p*<.05). The dependent variable is the total number of correct answers provided by the respondent to the recall questions listed above. The omitted condition (control) is the innuendo condition because control group participants were not asked the second or third recall questions.

*Pairwise comparisons between conditions*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Weights** | **Condition 1: mean** | **Condition 2: mean** | **Difference** | ***p*-value** |
| IPW | Denial: 2.31 | Innuendo: 2.21 | 0.09 | *ns* |
| IPW | Causal: 2.22 | Innuendo: 2.21 | 0.00 | *ns* |
| IPW | Causal: 2.22 | Denial: 2.31 | -0.09 | *ns* |
| Survey | Denial: 2.24 | Innuendo: 2.05 | 0.19 | *ns* |
| Survey | Causal: 2.09 | Innuendo: 2.05 | 0.05 | *ns* |
| Survey | Causal: 2.09 | Denial: 2.24 | -0.15 | *ns* |

**Reporting standards**

|  |  |
| --- | --- |
| **JEPS Reporting Standards** | **Page, Table, or Figure number (or note if not in text)** |
| **A. Hypotheses** |  |
| • State specific objectives or hypotheses. | Page 2 |
|  |  |
| **B. Subjects and Context** |  |
| • Report eligibility and exclusion criteria for participants. | Pages 2-3 |
| • How were participants contacted for recruitment? Were incentives offered? | Pages 2-3 |
| • Report recruitment dates defining the periods of recruitment and when the experiments were conducted. | Pages 2-3 |
| • Describe settings and locations where the data were collected. | Pages 2-3 |
| • If there is a survey: Provide response rate and how it was calculated. | (TBD; request pending with YouGov as of 10/27/14) |
|  |  |
| **C. Allocation Method** |  |
| • Report details of the procedure used to generate the assignment sequence (e.g., randomization procedures). | Random assignment was generated by the YouGov survey software platform |
| • If random assignment used, report details of procedure (e.g., any restrictions, blocking). | Page 3 (block-randomized by answers to ANES question about crooked politicians) |
| • If random assignment used, to help detect errors such as problems in the procedure used for random assignment or failure to properly account for blocking, provide a table (in text or appendix) showing baseline means and standard deviations for demographic characteristics and other pretreatment measures (if collected) by experimental group. | See appendix above |
| • Describe blinding. | Subjects were blind to which condition they were in |
|  |  |
| **D. Treatments** |  |
| • Provide a detailed description of the interventions in each treatment condition, as well as a description of the control group. | Table 1 |
| • State how and when manipulations or interventions were administered. | Page 3 |
| • Report the number of repetitions of the experimental task and the group rotation protocol. Report the ordering of treatments for within-subject designs. Any piggybacking of other protocols should be reported. Report any use of experienced subjects or subjects used in more than one session or treatment. | N/A |
| • Report time span: How long did each experiment last? How many sessions were subjects expected to attend? If there were multiple sessions, how much time passed between them? | Single online session |
| • Report total number of sessions conducted and number of subjects used in each session. | One session for each of 1000 respondents (online) |
| • Report whether deception was used. | No |
| • Report treatment fidelity: Evidence on whether the treatment was delivered as intended. | Yes (online platform - no known technical errors) |
| • Were incentives given? If so, what were they and how were they administered? | YouGov offered their normal survey participation incentives; no additional incentives were offered |
|  |  |
| **E. Results** |  |
| **1. Outcome Measures and Covariates** |  |
| • Provide precise definitions of all primary and secondary measures and covariates. | Page 4 |
| • Clearly state which of the outcomes and subgroup analyses were specified prior to the experiment and which were the result of exploratory analysis. | All specified prior to study (only DVs and experimental conditions tested) |
| **2. CONSORT Participant Flow Diagram** |  |
| • Complete CONSORT Participant Flow Diagram | (TBD; request pending with YouGov as of 10/27/14) |
| ∘ An example of a CONSORT flow diagram can be found at http://www.consort-statement.org. The flow diagram records the initial number of subjects deemed eligible for the experiment and all losses of subjects during the course of the experiment. The flow chart follows the subjects from initial recruitment to the sample used in the main analyses, providing readers clear information on the amount of attrition and exclusions. The chart also reports the portion of each treatment group that received the allocated intervention and if not, why this was not accomplished. Naturally, in the event that there is zero or very trivial non-compliance with group assignment or zero or very trivial attrition, researchers may decide it is more convenient to report the information that would otherwise be shown in the CONSORT diagram in the text and omit the diagram. |  |
| **Note that the CONSORT flow chart entries include:** |  |
| • Number of subjects initially assessed for eligibility for the study. |  |
| • Exclusions prior to random assignment and reasons for the exclusions. |  |
| • Number of subjects initially assigned to each experimental group. |  |
| • The proportion of each group that received its allocated intervention and the reasons why subjects did not receive the intended intervention. |  |
| • The number of subjects in each group that dropped out or for other reasons do not have outcome data. |  |
| • The number of subjects in each group that are included in the statistical analysis, and the reasons for any exclusions. |  |
| **3. Statistical Analysis** |  |
| • Researchers will conduct statistical analysis and report their results in the manner they deem appropriate. We recommend that this reporting include the following: | Table 2 |
| ∘ Note whether the level of analysis differs from level of randomization and estimate appropriate standard errors. | N/A (individual-level randomization and analysis) |
| ∘ If there is attrition, discuss reasons for attrition and examine whether attrition is related to pretreatment variables. | No known attrition (single, short study - data provided to researchers by YouGov for 1000 respondents who completed study) |
| ∘ Report other missing data (not outcome variables): |  |
| -Frequency or percentages of missing data by group. | N/A (see below for outcome data; treatment assignment observed for all respondents; no other control variables used in analysis) |
| -Methods for addressing missing data (e.g., listwise deletion, imputation methods). | Listwise deletion |
| -For each primary and secondary outcome and for each subgroup, provide summary of the number of cases deleted from each analysis and rationale for dropping the cases. | DV 1 (Swensen favorability): 13 cases excluded by listwise deletion due to missing data; DV2 (Swensen took bribes): 14 cases excluded by listwise deletion due to missing data; DV 3 (Swensen being investigated for bribery): This question not asked for 231 subjects in the control condition, 5 cases were excluded by listwise deletion due to missing data |
| ∘ For survey experiments: Describe in detail any weighting procedures that are used. | Survey weights provided by YouGov and inverse probability weights due to use of block randomization |
| **F. Other Information** |  |
| ∘ Was the experiment reviewed and approved by an IRB? | Yes |
| ∘ If the experimental protocol was registered, where and how can the filing be accessed? | N/A |
| ∘ What was the source of funding? What was the role of the funders in the analysis of the experiment? | Democracy Fund and the New America Foundation provided funding; these organizations played no role in the analysis of the experiment |
| ∘ Were there any restrictions or arrangements regarding what findings could be published? Are there any funding sources where conflict of interest might be an issue? | No |
| ∘ If a replication data set is available, provide the URL. | Replication data will be made available at http://www.dartmouth.edu/~nyhan/ after the study is published |

Note: All page numbers above correspond to the non-typeset text at http://www.dartmouth.edu/~nyhan/nyhan-reifler-causal-corrections.pdf.