

Evaluating Propaganda’s Effect on Americans’ Support for the War on ISIS

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I. Project Motivation

Propaganda has been an important part of military efforts in the United States since World War I. It manipulates the emotions of ordinary citizens, garnering support for military operations. It has been used to justify US involvement in external conflicts and influence the attitudes of young people, and is often able to sidestep real issues and questions in doing so.

Propaganda can stimulate positive emotions, making viewers feel supportive of the US Military, or negative emotions, making viewers feel hatred toward the enemy. Either path may lead to increased support for US military action. In this project, we investigated the two paths and perform an experiment to determine which is more open to propaganda’s messages. We measured reactions to both types of messaging to understand how best to raise support - and whether propaganda may unintentionally reduce support if designed poorly.

In particular, we attempted to apply propaganda tactics to US involvement in the war on ISIS (the Islamic State of Iraq and al-Sham). We selected two news clips to be used as propaganda: one stirring positive emotions and one invoking negative emotions - and then analyzed the response of randomly selected US Citizens living throughout the country.

II. Experimental Design & Materials

Experimental Flow

In order to understand the effects of both positive and negative emotion propaganda, our experiment had two separate treatments: a positive emotion treatment (T_p) and a negative emotion treatment (T_n). The experiment followed a a comparison group randomized experimental design, as diagrammed below.

R	X_p	O
R	X_n	O
R	$X-$	O

Subjects were randomly assigned to each of the three groups. The X_p and X_n treatment groups were shown propaganda videos approximately 2-3 minutes in length, meant to invoke their assigned emotion. A third group served as the comparison/control group for treatment effect calculations.

There was some concern about non-compliance, given the sensitive and potentially upsetting material shown in the treatment videos. We worried that subjects would refuse to watch their assigned treatment videos to their full length. In order to be able to monitor this issue, we employed a placebo design where the control/comparison group was shown a placebo video unrelated to the treatment subject matter (denoted $X-$). This allowed us to measure compliance percentage for both treatment *and* control. The “Pilot Studies” below contains more information about our compliance findings and actions we took in response.

The outcome of our experiment was support for US involvement in the war on ISIS, as measured through survey responses. We elected to measure outcome only after treatment, rather than before and after (pre- and

post-test). Pre-test outcome would have served as a strong covariate for our analysis, making the treatment effect measure more precise. However, we believed that the pre-test survey would effect subjects' post-test responses. When subjects are asked for their opinion twice, they tend to value consistency and simply repeat their pre-test answers, rather than really considering their post-test response. This effect is particularly strong when the pre- and post-test measurements are done in a short time frame (such as this study). To avoid such effects, we did not show participants the survey questions until after they had received their treatment.

Treatment Materials

All treatment materials were taken from news clips publicly available on YouTube.

Treatment group T_p was shown a Fox News video titled *US Marines arrive in northern Syria to help fight ISIS*.¹ The clip presents the US as a powerful ally who is helping focus and strengthen other nations' efforts. The images emphasize US military strength by showing heavy armored vehicles and nimble soldiers. There is no mention of cost in this video; the entire focus is on the positive impact of US involvement.

Treatment group T_n was shown an RT TV video clip titled *Inside the mind of ISIS*.² A correspondent interviews captured ISIS extremists, asking how they justify the suffering of innocent people. The prisoners state "The Americans have destroyed us and also other countries. If I have the opportunity to fight them, I will do so. I will not hesitate." The images in the video are of suffering: exploding car bombs, panicking children, and innocent civilians being led at gunpoint.

Our experiment employed a placebo design, so the control (placebo) group was also shown a news clip. However, this clip purposefully did not include any military or political subject matter. The placebo group was shown a weather report for California.³

Outcome measurement

As stated above, we measured the outcome - support for US involvement in the war on ISIS - through five survey questions.

The first survey question was the most general and abstract, simply asking

"Do you believe that the United States should be involved in the war against ISIS?"

The next two survey questions asked about specific types of aid: monetary aid and personnel support. The questions were kept at an abstract level, to probe subjects' high-level views on the specific areas of US involvement.

"Do you believe that the United States should provide monetary aid to countries fighting the war against ISIS?"

"Do you believe that the United States should send more American troops to fight the war against ISIS?"

Finally, we asked more pointed questions about the personal sacrifices subjects would (or would not) be willing to make to offer support.

"Do you believe that the United States should raise the tax rate to fund the war against ISIS?"

"Would you join the United States armed forces to fight the war against ISIS?"

Subjects indicated their response to each question on a 5-point scale with the following values:

- Strongly in favor
- Somewhat in favor
- Neither in favor nor opposed

¹<https://youtu.be/Kq9JLxCp8fA>

²<https://youtu.be/4y6llpCGQIM>

³https://youtu.be/_5jjjmtmtOy0

- Somewhat opposed
- Strongly opposed

The ordering of these questions was deliberate, so that we could record subjects' idealistic views (questions 1-3) before reminding them of the personal costs of war (questions 4-5). The survey was designed so that answers to the first three questions were submitted and locked before the subjects saw the final two questions.

Covariate Measures

The survey also collected covariate data that we expected would be helpful in our analysis: gender, location (US state of residence), educational background, and military history. The full set of survey questions is included in Appendix A of this document.

IV. Pilot Studies

Pilot 1: Friends & Family

We conducted our first pilot study during the week of 19 March 2018. The purpose of this pilot was to validate treatment delivery and ensure that our survey questions made sense to respondents. We created three separate surveys on SurveyMonkey, each containing a single treatment video and 9 survey questions (4 covariate measures and 5 outcome measures). To collect test data, each team member shared one of the survey links with their personal network of family, friends, and colleagues.

With this pilot, we confirmed that subjects were able to view the treatment videos and answer the survey questions successfully. There were no issues observed.

Pilot 2.0: Survey Monkey

We attempted to conduct our second pilot study the weekend of 31 March 2018. This study was intended to test the deployment functions of SurveyMonkey, including treatment randomization and data collection. However, we discovered issues before actually opening the survey. The SurveyMonkey pricing scheme required an upfront paid plan membership (for \$400) *in addition* to the fee for data collection. This was over-budget for our project. Additionally, the study data could not be exported to a csv file for analysis. Since we planned to analyze the data in R, this was a severe hindrance.

We explored other options for deployment. As students of UC Berkeley, we have free access to Qualtrics; there is no charge for data collection itself. The built-in survey design functions of Qualtrics are very useful for implementing complex survey designs such as ours (with randomization between three study groups) and survey data can be exported to a csv file easily. This platform change solved the issues we encountered with SurveyMonkey, so we settled on that tool and moved our survey to Qualtrics.

Pilot 2.1: Qualtrics

While moving our survey to Qualtrics, we implemented treatment randomization. Qualtrics presents survey questions in blocks, and contains built-in functions to randomize questions within a single block. We designed the Qualtrics survey with all three treatment videos in the same block, and had the platform randomly present only one video when the survey was taken.

To confirm this randomization method, we conducted a simulated pilot study of 100 participants using another built-in Qualtrics tool.⁴ The simulator randomly fills in survey questions, so this study was not

⁴<https://www.qualtrics.com/support/survey-platform/survey-module/survey-tools/generating-test-responses/>

useful for actual data analysis. However, the automatic responses do follow page logic, so we were able to see whether the 100 responses would be divided evenly between the three treatment groups.

Our 100 automated subjects were assigned to the T_p , T_n , and *placebo* groups with $N=30$, 38, and 32 respectively. This aligned fairly well with the expected value of 33.3 participants per group, giving us confidence in our randomization method.

Pilot 3: Mechanical Turk

Our final pilot study was conducted on 2 April 2018. The purpose of this pilot was to validate the full deployment pipeline: Mechanical Turk recruiting, Qualtrics data collection, and csv file export for analysis. This was also our first chance to see the human element of data collection and what unanticipated issues arise when working with real subjects.

We collected 63 responses through MTurk, offering compensation of \$1 to each respondent. We were able to successfully export the data from Qualtrics to a csv file for analysis using R.

The randomization scheme worked, assigning approximately even numbers to the placebo and treatment groups. However, review of the data revealed a problem: according to timing data, the maximum time any participant spent on the video page was only 50 seconds. The shortest video was 130 seconds, so participants were definitely not watching the entire video.

We had anticipated this non-compliance problem from the beginning, and had included a multiple choice question on video content that would allow us to detect non-compliance:

- What was the news story about?
- US Marines deployed to fight ISIS
 - Weather in California
 - 2018 NFL Draft
 - Interview of captured ISIS terrorists
 - Scott Foster's debut for Chicago Blackhawks

However, we learned in this pilot study that a fair number of people were actually able to answer the multiple choice question correctly, even without watching the entire video. The video thumbnails may have been enough to reveal the content, or perhaps subjects watched 10 seconds of the video and understood the topic. Either way, participants were not taking the full treatment.

Since our experiment is interested in the effect of propaganda on citizens' opinions - and not necessarily focused on effective methods for delivering propaganda - we decided to force compliance for this study. We used Qualtrics functions to hide the video page submit button until 130 seconds had passed, in order to force participants to watch more of the video before proceeding. We also added a short answer survey question to better test subjects' understanding of the video content, so that we could better detect non-compliance.

- Provide a summary of the topic that was discussed in the video (1-2 sentences).
[short answer, free text]

V. Official Data Collection

The official study was run on 8 April 2018. We surveyed 275 subjects, following the flow diagram below.

Data Cleanup

We manually filtered the data to eliminate non-compliers based on the response to the short-answer video content question. (As stated in the Pilot 4 discussion above, we were interested in complier average causal effects in this study, so we attempted to force compliance and removed non-compliers from our data analysis.)

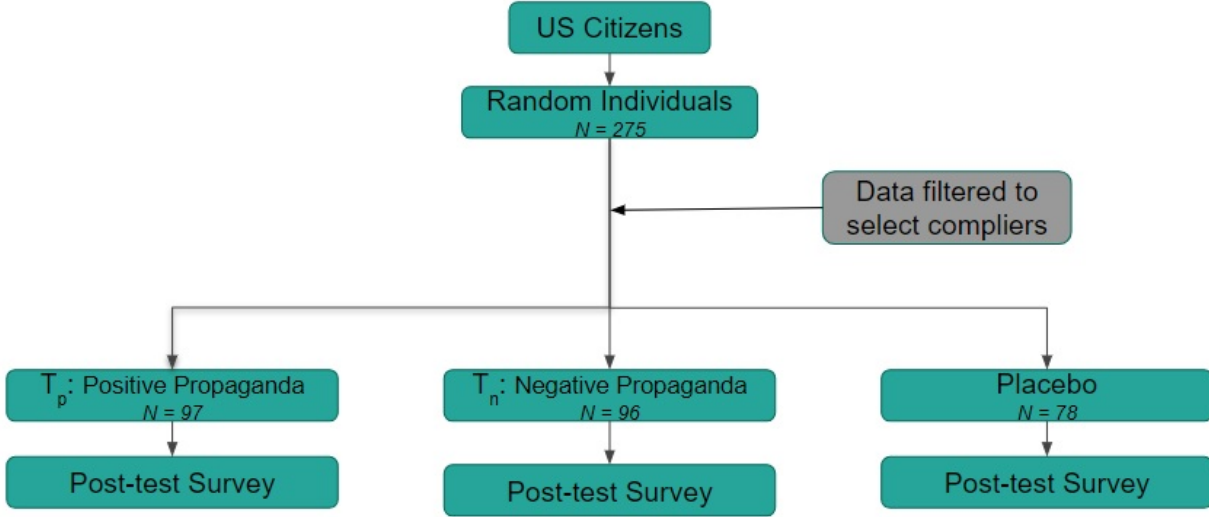


Figure 1: Flow Diagram

After importing the csv data file into R, we performed minor data transformation operations such as renaming variables, eliminating unused columns, and translating categorical variables into factors. We also re-scaled the outcome variables so that the lowest value (1) corresponded to “strongly opposed” and the highest value (5) corresponded to “strongly in favor”. This made treatment effect values more intuitive; a positive value indicates an increase in support for US involvement.

The transformation code can be viewed in the Rmd file for this report; for readability, it is not printed here.

VI. Analysis of Results

Covariate Balance Check

Our random sampling procedure did seem to achieve balanced samples, with roughly equal gender and military veteran proportions in all three groups. These percentages are given in the table below. Education and state of residence demographics were more widely spread, but still balanced across the placebo and treatment groups. Our subjects were 30% high school graduates and 40% college graduates. Most respondents were from California (34), Florida (31), Pennsylvania (16), Texas (15), Indiana (14), Idaho (13), and North Dakota (10). The remaining states had 9 or fewer respondents.

Demographic	Overall %	Placebo group %	Tp group %	Tn group %
gender - male	150 (55%)	46 (59%)	53 (55%)	51 (53%)
gender - female	119 (44%)	32 (41%)	43 (44%)	44 (46%)
gender - non-binary	2 (1%)	0 (0%)	1 (1%)	1 (1%)
military - veteran	43 (16%)	15 (19%)	15 (15%)	13 (14%)
military - non-vet	228 (84%)	63 (81%)	82 (85%)	83 (86%)

We checked for covariate balance across assignment groups by running a randomization check of the following form:

$$Assignment = gender + state + militaryService + education + \beta_0 + e_i$$

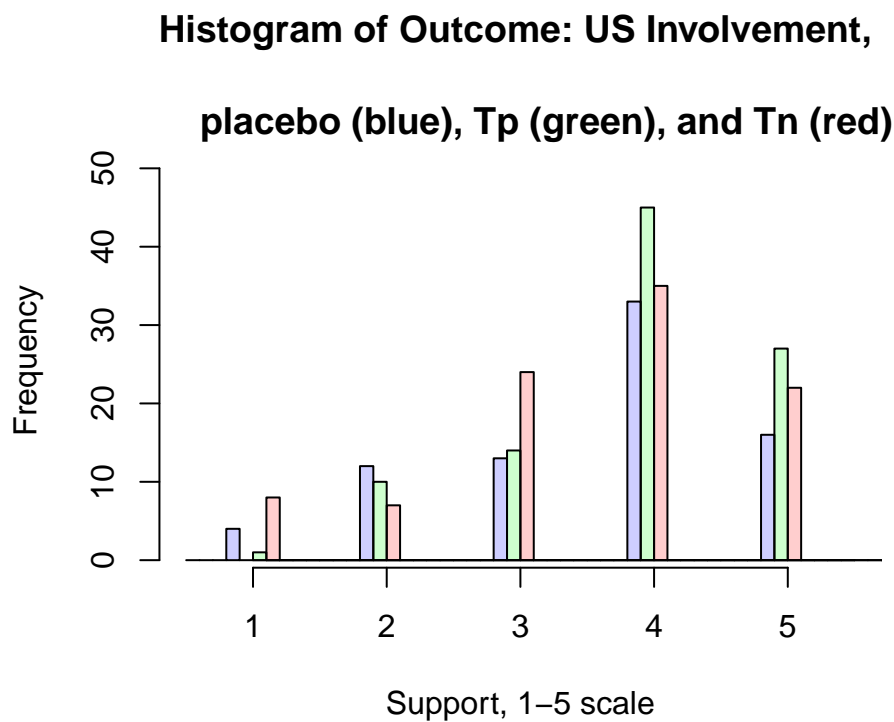
The F-statistic from that regression model describes the hypothesis test that all covariates' coefficients are jointly zero. (That is, there is no correlation between any covariates and treatment assignment, so covariates are balanced across all groups.)

In this case, the F-statistic was 1.123, with a p-value of 0.283, indicating that the covariates were successfully balanced. The regression model's full output is available in Appendix B.

Outcome Measures Distributions

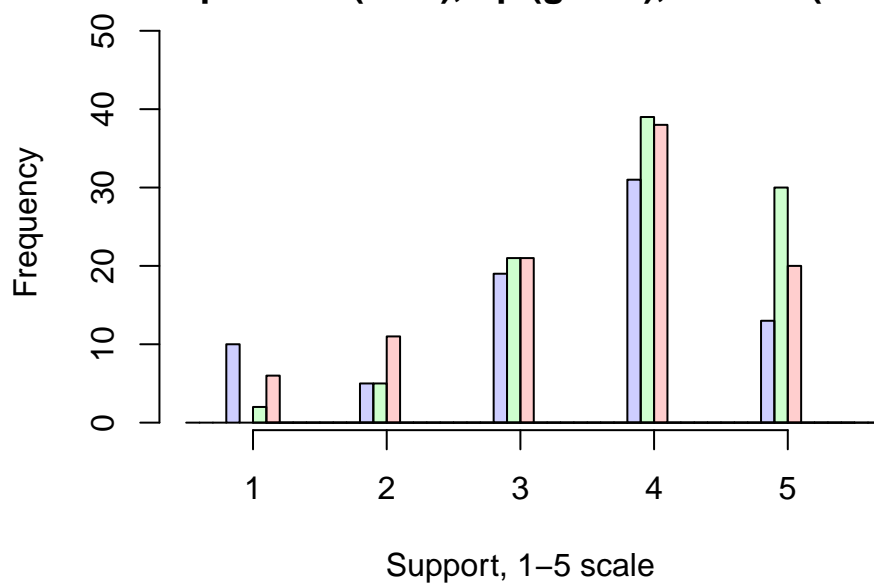
As explained above, we collected five different measurements of subjects' support for US involvement in the war on ISIS. All outcome values were between 1 and 5, expressing viewpoints of "strongly against" to "strongly in favor", but the specific question varied between the five measures.

The distribution of each outcome measure is shown in the histograms below. The placebo group response is shown in blue, the positive treatment group response is shown in green, and the negative treatment group response is shown in red.



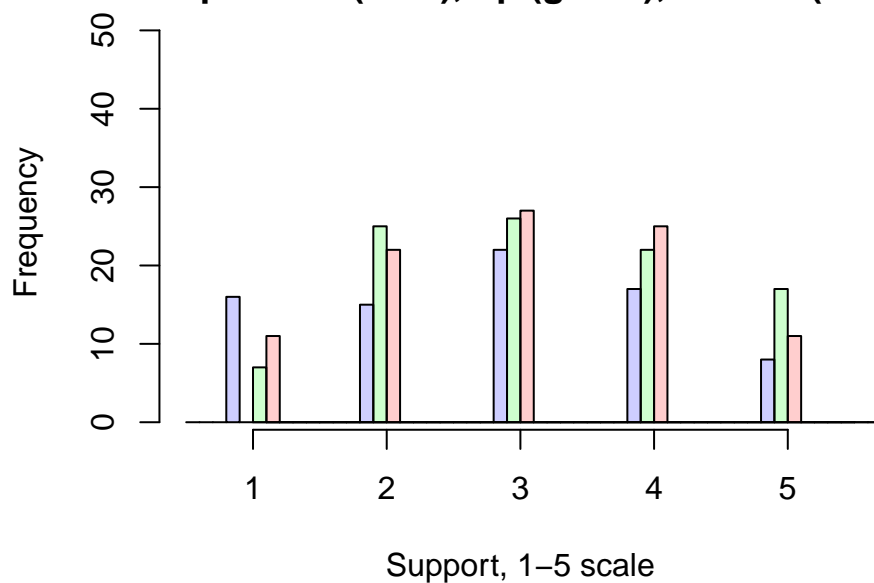
Histogram of Outcome: US Send Financial Aid,

placebo (blue), Tp (green), and Tn (red)

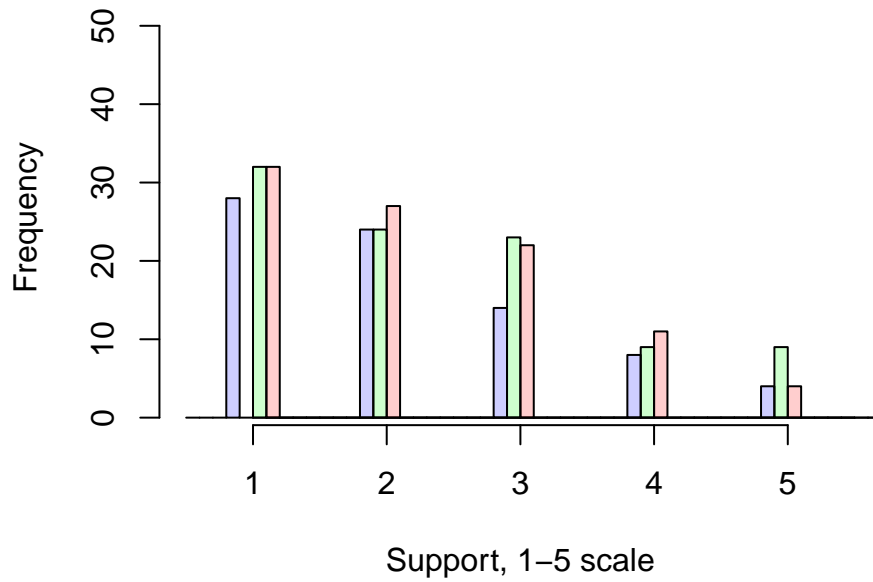


Histogram of Outcome: US Send Troops,

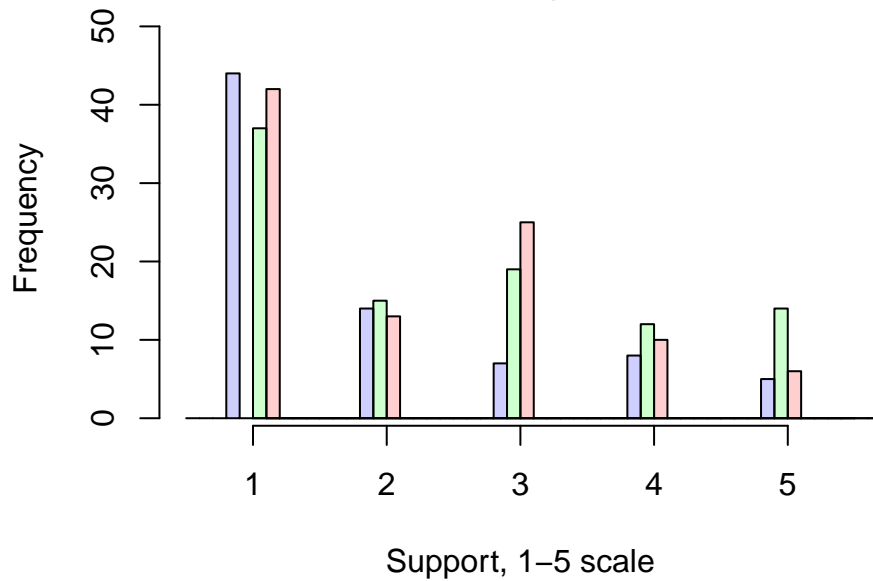
placebo (blue), Tp (green), and Tn (red)



**Histogram of Outcome: US Raise Taxes,
placebo (blue), Tp (green), and Tn (red)**



**Histogram of Outcome: Join Armed Forces,
placebo (blue), Tp (green), and Tn (red)**



Selecting Covariates

Because most states had only a small number of respondents, we chose not to include state level fixed effects in our regression model. We also removed the gender covariate from our final models, since we saw no evidence of gender fixed effects in our initial exploratory analysis.

We did see an indication that trade/technical/vocational school had an effect on a subject's inclination to join the armed forces and support for raising the tax rate. Both of these effects were negative; that is, subjects who had trade/technical/vocational level education were less inclined than others to join the US armed forces and were more opposed to raising taxes. However, for the sake of understandability and brevity, we chose not to include education level covariates in our final analysis.

We also saw an indication that military veterans were more in favor of sending American troops to fight ISIS, raising tax rates, and joining the US Armed Forces themselves. Because the military veteran demographic information was so topically relevant, we decided to include it in our final regression models.

Linear Models

We ran a separate regression for each of the five outcome variables, and applied Bonferroni correction to the resulting p-values (i.e. label result as significant if $p\text{-value} * 15 < 0.05$). We used a correction factor of 15 because we performed comparisons between each propaganda and control (2 comparisons), and between positive and negative propaganda (1 comparison) for each of the five outcome variables (i.e. 15 comparisons in total).

Our final regression models took the following form:

$$Outcome = T_p + T_n + militaryService + T_p * militaryService + T_n * militaryService + \beta_0 + e_i$$

Regression tables are given here. The first table describes the model for the most general outcome variable: general US involvement. The second table describes the models for the two outcomes related to specific types of aid: monetary aid and additional troops. The third table describes the models for the two outcomes related to personal sacrifices: tax rate increase and subjects joining the armed forces themselves.

Note that the significance indicators in these tables have been adjusted to align with the Bonferroni correction described above. A single star indicates significance at the traditional $p=0.05$ level. Two stars indicates significance at the corrected level, $p=0.003$. Three stars indicates strong significance at the $p=0.001$ level.

Table 3: Linear Models for General Outcome: US Involvement

	<i>Dependent variable:</i>	
	us_involved	
	(1)	(2)
marines	0.320 (0.165)	0.287 (0.183)
terrorists	0.006 (0.166)	-0.001 (0.183)
served_military-veteran		-0.137 (0.314)
marines:served_military-veteran		0.180 (0.439)
terrorists:served_military-veteran		-0.004 (0.453)
Constant	3.577*** (0.123)	3.603*** (0.138)
Observations	271	271
R ²	0.019	0.021
Adjusted R ²	0.012	0.002
Residual Std. Error	1.088 (df = 268)	1.093 (df = 265)
<i>Note:</i>	*p<0.05; **p<0.003; ***p<0.001	

Table 4: Linear Models for Specific Aid Outcomes

	<i>Dependent variable:</i>			
	us_send_aid		us_send_troops	
	(1)	(2)	(3)	(4)
marines	0.518** (0.167)	0.298 (0.182)	0.355 (0.186)	0.294 (0.202)
terrorists	0.163 (0.168)	0.071 (0.182)	0.211 (0.186)	0.282 (0.202)
served_military-veteran		-0.756* (0.312)		0.470 (0.346)
marines:served_military-veteran		1.235* (0.437)		0.506 (0.485)
terrorists:served_military-veteran		0.360 (0.450)		-0.328 (0.499)
Constant	3.410*** (0.125)	3.556*** (0.137)	2.821*** (0.138)	2.730*** (0.152)
Observations	271	271	271	271
R ²	0.037	0.072	0.013	0.050
Adjusted R ²	0.030	0.054	0.006	0.032
Residual Std. Error	1.101 (df = 268)	1.087 (df = 265)	1.222 (df = 268)	1.206 (df = 265)

Note:

*p<0.05; **p<0.003; ***p<0.001

Table 5: Linear Models for Personal Sacrifice Outcomes

	<i>Dependent variable:</i>			
	raise_tax_rate		join_armed_forces	
	(1)	(2)	(3)	(4)
marines	0.192 (0.184)	0.074 (0.194)	0.572* (0.206)	0.553* (0.210)
terrorists	0.071 (0.185)	0.181 (0.193)	0.296 (0.206)	0.418* (0.210)
served_military-veteran		0.686* (0.333)		1.333*** (0.361)
marines:served_military-veteran		0.926* (0.465)		0.447 (0.504)
terrorists:served_military-veteran		-0.530 (0.479)		-0.341 (0.520)
Constant	2.179*** (0.137)	2.048*** (0.146)	1.923*** (0.153)	1.667*** (0.158)
Observations	271	271	271	271
R ²	0.004	0.102	0.028	0.172
Adjusted R ²	-0.003	0.086	0.021	0.157
Residual Std. Error	1.213 (df = 268)	1.158 (df = 265)	1.352 (df = 268)	1.255 (df = 265)

Note:

*p<0.05; **p<0.003; ***p<0.001

US to send monetary aid to other countries fighting ISIS:

The effect of `marines-served_military` is marginally significant ($p < 0.1$) after Bonferroni correction. However, the uncorrected p-values of `marines-served_military` and `served_military` show an effect that should be studied further in a separate randomized experiment.

The intercept for `us_send_aid` was 3.56 which falls somewhere between neutral and somewhat in favor. Those who served the military but did not watch the marines video had a mean value of $(3.56 - 0.76 = 2.80)$ which is close to neutral. However, the marines video changed the mean value to somewhat in favor $(3.56 - 0.76 + 1.24 = 4)$. Perhaps, subjects who served the armed forces were moved by seeing their fellow servicemen deployed to war. This poses the question whether positive propaganda can be effective in gaining support for war from current or previous members of the armed forces.

Raise Tax rate to fund the war against ISIS:

There were no significant results here after Bonferroni correction. However, the uncorrected p-values for `served_military` and `marines-served_military` show an effect that should be studied further in a separate randomized experiment.

Join armed forces to fight ISIS:

The intercept for `join_armed_forces` is 1.67 which falls somewhere between strongly opposed to somewhat opposed. The results table shows that subjects who claim to be serving or have served military had a mean response of $(1.67 + 1.33 = 3)$ which corresponds to neither in favor nor opposed. While this is not an effect of the treatment, it shows that subjects who have not served the military are opposed to joining the armed forces.

The treatment effect of watching the marines video is not significant after Bonferroni correction, however, the uncorrected p-value merits further investigation in a separate randomized experiment. The result table shows that the marines video (positive propaganda) moved the mean response from somewhere between strong opposed and somewhat opposed (1.67) to somewhere between somewhat opposed and neutral (2.20).

VII. Conclusion

This study took a broad look at the topic of propaganda and the war on ISIS, measuring support for the war effort across five outcome measures. While this provided an interesting initial glimpse into the landscape, it did hinder our ability to draw meaningful conclusions. Our wide net forced us to implement a multiple-hypothesis correction to avoid false positives.

Still, we were able to make some worthwhile observations. Through this experiment, we learned that positive and negative propaganda had an approximately equal effect on US citizens' willingness to join the US armed forces in the war against ISIS, and we saw that the positive propaganda message was particularly effective in getting military veterans' support for sending monetary aid to foreign countries. Outside of the propaganda topic, we saw that on average, citizens are less opposed to raising taxes to fight wars than they are to joining the armed forces themselves.

We have also identified some areas that warrant further, more focused study as discussed in Section VI above. The impact of educational background on support for US military efforts is of particular interest. In future studies, we would collect data on fewer outcome variables (1 or 2) across a larger sample size. We would also adjust our covariate survey questions, focusing on education and political preference as unexplored but relevant areas.

Appendix A: Survey Questions

1. What is your gender?
 - Male
 - Female
 - Non binary
2. In what US State do you live?
 - (Dropdown selection of a US state)
3. What is the highest degree or level of school you have completed?
 - Some high school
 - High school graduate
 - Some college
 - Trade/technical/vocational training
 - College graduate
 - Some postgraduate work
 - Post graduate degree
4. Have you ever served in any branch of the United States military?
 - Yes, I have
 - No, I have not
5. Please watch this news story (approx 3 minutes). You will be asked questions about it.
 - [Treatment or Placebo video]
6. Did you watch the news story?
 - Yes
 - No
7. Provide a summary of the topic that was discussed in the video (1-2 sentences).
 - [short answer, free text]
8. What was the news story about?
 - US Marines deployed to fight ISIS
 - Weather in California
 - 2018 NFL Draft
 - Interview of captured ISIS terrorists
 - Scott Foster's debut for Chicago Blackhawks

9. Do you believe that the United States should be involved in the war against ISIS?
- Strongly in favor
 - Somewhat in favor
 - Neither in favor nor opposed
 - Somewhat opposed
 - Strongly opposed
10. Do you believe that the United States should provide monetary aid to countries fighting the war against ISIS?
- Strongly in favor
 - Somewhat in favor
 - Neither in favor nor opposed
 - Somewhat opposed
 - Strongly opposed
11. Do you believe that the United States should send more American troops to fight the war against ISIS?
- Strongly in favor
 - Somewhat in favor
 - Neither in favor nor opposed
 - Somewhat opposed
 - Strongly opposed
12. Do you believe that the United States should raise the tax rate to fund the war against ISIS?
- Strongly in favor
 - Somewhat in favor
 - Neither in favor nor opposed
 - Somewhat opposed
 - Strongly opposed
13. Would you join the United States armed forces to fight the war against ISIS?
- Strongly in favor
 - Somewhat in favor
 - Neither in favor nor opposed
 - Somewhat opposed

- Strongly opposed
14. Mechanical Turk Code
- [MTurk code used by participants to receive payment]

Appendix B: Covariate Balance Check

```
##
## Call:
## lm(formula = video_topic_check ~ gender + state + served_military +
##     education, data = d)
##
## Residuals:
```

	Min	1Q	Median	3Q	Max
	-2.2088	-0.9485	-0.2731	0.9732	2.7339

```
##
## Coefficients:
```

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	2.96337	0.79747	3.716	0.000257 ***
gender-female	-0.07665	0.17209	-0.445	0.656461
gender-non-binary	0.34633	0.92256	0.375	0.707720
state2	-0.77460	0.90838	-0.853	0.394734
state3	-0.32088	1.03507	-0.310	0.756843
state4	-0.16699	0.90200	-0.185	0.853293
state5	-0.52379	0.77066	-0.680	0.497429
state6	0.59403	1.19194	0.498	0.618716
state7	-0.19493	1.04749	-0.186	0.852540
state8	-0.55382	1.46811	-0.377	0.706364
state10	-0.43827	0.78013	-0.562	0.574831
state11	-0.32146	0.81585	-0.394	0.693950
state13	-0.49562	0.99149	-0.500	0.617663
state14	-0.68148	0.88364	-0.771	0.441396
state15	-0.42192	0.81633	-0.517	0.605774
state16	1.42808	1.14738	1.245	0.214580
state17	-0.63352	1.19106	-0.532	0.595331
state18	-0.58830	0.90317	-0.651	0.515485
state19	-0.17725	1.06613	-0.166	0.868109
state22	0.55679	1.16298	0.479	0.632586
state23	-1.01603	1.17396	-0.865	0.387718
state24	1.39359	1.03157	1.351	0.178098
state25	-1.20507	0.93911	-1.283	0.200766
state26	1.52283	1.46059	1.043	0.298267
state27	-1.02810	0.84249	-1.220	0.223648
state28	-0.28075	0.83925	-0.335	0.738297
state30	-1.04696	0.89810	-1.166	0.244975
state31	-1.16721	1.15123	-1.014	0.311750
state32	0.38976	1.14978	0.339	0.734942
state33	-0.25221	1.04097	-0.242	0.808782
state34	-0.82491	0.91164	-0.905	0.366523
state35	-0.01980	0.87413	-0.023	0.981947
state36	-0.29572	1.02549	-0.288	0.773337
state37	1.39033	1.16733	1.191	0.234917
state38	-1.05943	0.91722	-1.155	0.249319
state39	-0.02273	0.80656	-0.028	0.977540
state41	-0.47962	0.98226	-0.488	0.625830
state43	-0.99111	0.96353	-1.029	0.304781
state44	0.37483	0.81270	0.461	0.645102
state45	-0.11078	1.16200	-0.095	0.924134
state46	-1.55382	1.46811	-1.058	0.291039

```

## state47          -1.26080    0.91262   -1.382  0.168517
## state48           0.27628    0.85086    0.325  0.745710
## state50           0.45630    0.96922    0.471  0.638257
## served_military-veteran -0.07557    0.24849   -0.304  0.761322
## education-some college -0.22006    0.29795   -0.739  0.460949
## education-trade school -0.12936    0.49491   -0.261  0.794041
## education-college grad -0.40956    0.29164   -1.404  0.161632
## education-some post-grad -1.09685    0.62022   -1.768  0.078359 .
## education-post grad degree -0.55411    0.33312   -1.663  0.097650 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.252 on 221 degrees of freedom
## Multiple R-squared:  0.1994, Adjusted R-squared:  0.02187
## F-statistic: 1.123 on 49 and 221 DF,  p-value: 0.2834

```