Does Counter-Attitudinal Information Cause Backlash? Results from Three Large Survey Experiments

ONLINE APPENDIX

Contents

1 Online Appendix A: Exploring Effect Heterogeneity

In the main text, we present estimates by proponent or opponent status, defined by $Y_{baseline}$, measured pre-treatment. In this appendix, we present parallel tables in which we subset our samples by (when available) attitude extremity, perceived issue importance, attitude consistency, ideology, and partisan identification.

1.1 Attitude Extremity

Where available, we operationalize attitude extremity as holding an attitude measured pre-treatment in the bottom or top quartile of the distribution of attitudes. These tables show that within these subgroups as well, positive information has a positive or null effect and negative information has a negative or null effect.

Table 1: Study 2: Effects of Information on Preferred Minimum Wage Amount by Extremity

| | Dependent Variable: T2 Amount | | | |
	Extreme Initial Position		Moderate Initial Position	
Pos. Info (0 to 1)	0.96**	0.71***	1.63***	1.73***
	(0.45)	(0.26)	(0.42)	(0.24)
Neg. Info (0 to 1)	−0.99**	−1.54***	−0.80***	−1.01***
	(0.41)	(0.30)	(0.28)	(0.18)
Condition: Placebo	−0.44	−0.43**	−0.42	−0.69***
	(0.45)	(0.20)	(0.41)	(0.15)
Constant	10.26	2.94	9.00	1.79
	(0.19)	(0.74)	(0.16)	(0.61)
Covariates	No	Yes	No	Yes
N	576	576	593	593
R^2	0.02	0.65	0.06	0.72

*p < .1; **p < .05; ***p < .01
Robust standard errors are in parentheses.
The information content of the Placebo condition is coded 0.
Covariates include T1 Amount, T1 Favor, age, gender, ideology, party ID, and education.

Table 2: Study 2: Effects of Information on Favoring Minimum Wage Raise by Extremity

| | Dependent Variable: T2 Favor | | | |
	Extreme Initial Position		Moderate Initial Position	
Pos. Info (0 to 1)	0.54**	0.60***	0.61***	0.61***
	(0.21)	(0.13)	(0.18)	(0.10)
Neg. Info (0 to 1)	0.004	−0.29*	−0.48**	−0.58***
	(0.26)	(0.17)	(0.20)	(0.14)
Condition: Placebo	0.62**	0.50***	0.04	−0.12
	(0.26)	(0.17)	(0.26)	(0.17)
Constant	4.81	2.07	5.21	1.24
	(0.11)	(0.40)	(0.09)	(0.30)
Covariates	No	Yes	No	Yes
N	576	576	593	593
R^2	0.01	0.67	0.03	0.64

*p < .1; **p < .05; ***p < .01
Robust standard errors are in parentheses.
The information content of the Placebo condition is coded 0.
Covariates include T1 Amount, T1 Favor, age, gender, ideology, party ID, and education.

Table 3: Study 3: Effects of Information on Support for Capital Punishment By Extremity

| | Dependent Variable: T2 Attitude Toward Capital Punishment | | | |
	Extreme Initial Position		Moderate Initial Position	
Positive Information (0 to 2)	0.29	−0.01	0.09	0.06
	(0.31)	(0.16)	(0.15)	(0.05)
Negative Information (0 to 2)	0.17	−0.20*	−0.08	−0.13**
	(0.28)	(0.11)	(0.14)	(0.06)
Condition: Null Null	−0.55	0.07	−0.13	−0.19*
	(0.60)	(0.19)	(0.27)	(0.10)
Constant	4.65	0.48	2.99	0.29
	(0.38)	(0.44)	(0.18)	(0.19)
Covariates	No	Yes	No	Yes
N	183	183	503	499
R^2	0.02	0.86	0.004	0.84

*p < .1; **p < .05; ***p < .01
Robust standard errors are in parentheses.
The information content of the Null Null condition is coded 0.
Covariates include T1 Attitude, T1 Belief, age, gender, ideology, and education.

Table 4: Study 3: Effects of Information on Belief in Deterrent Efficacy By Extremity

| | Dependent Variable: T2 Belief in Deterrent Effect | | | |
	Extreme Initial Position		Moderate Initial Position	
Positive Information (0 to 2)	0.43*	0.15	0.25**	0.25***
	(0.25)	(0.17)	(0.11)	(0.07)
Negative Information (0 to 2)	−0.06	−0.31**	−0.22**	−0.24***
	(0.24)	(0.14)	(0.11)	(0.08)
Condition: Null Null	−0.57	−0.22	−0.33	−0.32**
	(0.49)	(0.24)	(0.20)	(0.13)
Constant	4.23	1.74	3.28	1.42
	(0.32)	(0.48)	(0.13)	(0.28)
Covariates	No	Yes	No	Yes
N	183	183	503	499
R^2	0.05	0.66	0.05	0.57

*p < .1; **p < .05; ***p < .01
Robust standard errors are in parentheses.
The information content of the Null Null condition is coded 0.
Covariates include T1 Attitude, T1 Belief, age, gender, ideology, and education.

1.2 Issue Importance

We measured issue importance in Study 1 only, where we asked subjects how important the issue of gun control is, on a 5-point scale. For the analysis that follows, "low importance" corresponds to scale points 1 and 2, "medium importance" to scale point 3, and "high importance" to scale points 4 and 5. For the "support gun control" dependent variable, we find a significant backlash effect of negative information among those for whom gun control is of low importance. This estimate is significant at the 10% level only and does not survive a multiple comparisons correction.

Table 5: Study 1: Effects of Information on Gun Control Composite Scale by Issue Importance

| | Dependent Variable: Support Gun Control | | | | | |
	Low Importance		Medium Importance		High Importance	
Positive Information	0.30**	0.19	−0.09	−0.03	0.09	0.08
	(0.14)	(0.14)	(0.14)	(0.12)	(0.07)	(0.06)
Negative Information	0.25*	0.23*	−0.27**	−0.22*	0.06	0.07
	(0.13)	(0.13)	(0.13)	(0.12)	(0.07)	(0.06)
Constant	−0.78	−0.24	−0.01	−1.20	0.18	−0.46
	(0.09)	(0.48)	(0.09)	(0.43)	(0.05)	(0.21)
Covariates	No	Yes	No	Yes	No	Yes
N	355	355	441	441	1,274	1,274
R^2	0.02	0.18	0.01	0.18	0.002	0.25

*$p < .1$; **$p < .05$; ***$p < .01$
Robust standard errors are in parentheses.
Covariates include age, registation, education, hispanic ethnicity,
gender, income, marital status, employment status, ideology and party ID.

Table 6: Study 1: Effects of Information on Gun Control Support by Issue Importance

| | Dependent Variable: Support Gun Control | | | | | |
	Low Importance		Medium Importance		High Importance	
Positive Information	0.02	−0.04	0.04	0.06	0.03	0.02
	(0.07)	(0.06)	(0.06)	(0.06)	(0.03)	(0.03)
Negative Information	−0.11	−0.12*	−0.18***	−0.16***	−0.02	−0.01
	(0.07)	(0.06)	(0.06)	(0.06)	(0.03)	(0.03)
Constant	0.39	0.16	0.64	0.33	0.79	0.66
	(0.05)	(0.21)	(0.04)	(0.21)	(0.02)	(0.09)
Covariates	No	Yes	No	Yes	No	Yes
N	360	360	448	448	1,283	1,283
R^2	0.01	0.21	0.03	0.21	0.002	0.26

*p < .1; **p < .05; ***p < .01
Robust standard errors are in parentheses.
Covariates include age, registation, education, hispanic ethnicity,
gender, income, marital status, employment status, ideology and party ID.

1.3 Attitude Consistency

We define a subject as "consistent" in Study 1 if he or she gave exclusively pro- or anti-gun-control survey responses in the pre-treatment survey. We again find no evidence of backlash by this covariate.

Table 7: Study 1: Effects of Information on Gun Control Composite Scale by Attitude Consistency

| | Dependent Variable: Composite Scale | | | |
	Not Consistent		Consistent	
Positive Information	0.13*	0.10	−0.004	0.04
	(0.08)	(0.07)	(0.09)	(0.07)
Negative Information	0.06	0.05	−0.02	0.03
	(0.08)	(0.07)	(0.09)	(0.07)
Constant	0.19	−0.85	−0.34	−1.32
	(0.05)	(0.21)	(0.07)	(0.18)
Covariates	No	Yes	No	Yes
N	1,200	1,200	834	834
R^2	0.003	0.14	0.0000	0.45

*$p < .1$; **$p < .05$; ***$p < .01$
Robust standard errors are in parentheses.
Covariates include age, registation, education, Hispanic ethnicity, gender, income, marital status, employment status, and party ID.

Table 8: Study 1: Effects of Information on Gun Control Support by Attitude Consistency

| | Dependent Variable: Support Gun Control | | | |
	Not Consistent		Consistent	
Positive Information	0.03	0.03	0.01	0.04
	(0.03)	(0.03)	(0.05)	(0.03)
Negative Information	−0.09***	−0.10***	−0.03	0.002
	(0.03)	(0.03)	(0.05)	(0.03)
Constant	0.78	0.41	0.56	0.04
	(0.02)	(0.10)	(0.03)	(0.09)
Covariates	No	Yes	No	Yes
N	1,213	1,213	839	839
R^2	0.02	0.13	0.001	0.47

*p < .1; **p < .05; ***p < .01
Robust standard errors are in parentheses.
Covariates include age, registation, education, Hispanic ethnicity,
gender, income, marital status, employment status, party ID, and ideology.

1.4   Party ID and Ideology

In Studies 1 and 2, we conduct our analyses separately for Democrats, independents, and Republicans. In Study 3, we did not collect information about subjects' partisan attachments, so we use subjects' self-reported identification as a liberal, moderate, or conservative to subdivide the sample. In the tables that follow, we show that in no case do we estimate positive effects of negative information or negative effects of positive information. That is, we do not observe backlash in any of the groups defined by partisanship in Studies 1 and 2 or by ideology in Study 3.

Table 9: Study 1: Effects of Information on Gun Control Composite Scale by Partisanship

| | Dependent Variable: Composite Scale | | | | | |
	Among Democrats		Among Independents		Among Republicans	
Positive Information	0.23*	0.20*	−0.002	0.03	0.04	0.05
	(0.12)	(0.11)	(0.10)	(0.09)	(0.09)	(0.09)
Negative Information	0.08	0.11	−0.003	0.06	0.02	0.003
	(0.10)	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)
Constant	−0.57	−0.11	−0.05	0.03	0.42	0.09
	(0.07)	(0.34)	(0.07)	(0.25)	(0.06)	(0.23)
Covariates	No	Yes	No	Yes	No	Yes
N	569	569	848	848	660	660
R^2	0.01	0.15	0.0000	0.15	0.0004	0.09

*$p < .1$; **$p < .05$; ***$p < .01$
Robust standard errors are in parentheses.
Covariates include age, registation, education, hispanic ethnicity,
gender, income, marital status, employment status, and ideology.

Table 10: Study 1: Effects of Information on Gun Control Support by Partisanship

| | Dependent Variable: Support Gun Control | | | | | |
	Among Democrats		Among Independents		Among Republicans	
Positive Information	0.11*	0.10*	−0.001	0.01	−0.02	−0.01
	(0.06)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)
Negative Information	−0.06	−0.04	−0.07*	−0.06	−0.06*	−0.06*
	(0.05)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)
Constant	0.39	0.73	0.68	0.79	0.91	0.81
	(0.04)	(0.18)	(0.03)	(0.13)	(0.02)	(0.08)
Covariates	No	Yes	No	Yes	No	Yes
N	573	573	858	858	668	668
R^2	0.02	0.14	0.01	0.13	0.01	0.10

*$p < .1$; **$p < .05$; ***$p < .01$
Robust standard errors are in parentheses.
Covariates include age, registation, education, hispanic ethnicity,
gender, income, marital status, employment status, and ideology.

Table 11: Study 2: Effects of Information on Preferred Minimum Wage Amount by Partisanship

| | Dependent Variable: T2 Amount | | | | | |
	Among Democrats		Among Independents		Among Republicans	
Pos. Info (0 to 1)	1.66***	1.51***	1.58***	1.22***	0.07	0.80**
	(0.41)	(0.28)	(0.43)	(0.31)	(0.63)	(0.37)
Neg. Info (0 to 1)	−1.44***	−1.38***	−0.68*	−1.04***	−0.79	−1.05***
	(0.31)	(0.24)	(0.37)	(0.30)	(0.57)	(0.28)
Condition: Placebo	−1.11**	−0.67**	−0.14	−0.47**	0.17	−0.29
	(0.50)	(0.26)	(0.47)	(0.21)	(0.41)	(0.25)
Constant	10.86	3.26	9.45	2.77	8.10	1.41
	(0.17)	(0.91)	(0.20)	(0.93)	(0.23)	(1.64)
Covariates	No	Yes	No	Yes	No	Yes
N	468	468	416	416	226	226
R^2	0.09	0.52	0.06	0.60	0.01	0.69

*$p < .1$; **$p < .05$; ***$p < .01$
Robust standard errors are in parentheses.
The information content of the Placebo condition is coded 0.
Covariates include T1 Amount, T1 Favor, age, gender, ideology, initial position, and education.

Table 12: Study 2: Effects of Information on Favoring Minimum Wage Raise by Partisanship

	Among Democrats		Among Independents		Among Republicans	
			Dependent Variable: T2 Favor			
Pos. Info (0 to 1)	0.38***	0.41***	0.87***	0.75***	0.26	0.52*
	(0.14)	(0.11)	(0.21)	(0.14)	(0.36)	(0.28)
Neg. Info (0 to 1)	−0.45**	−0.55***	−0.34	−0.54***	0.21	0.11
	(0.21)	(0.17)	(0.26)	(0.19)	(0.38)	(0.27)
Condition: Placebo	−0.09	0.02	0.54*	0.15	0.63	0.46
	(0.26)	(0.17)	(0.28)	(0.18)	(0.47)	(0.38)
Constant	5.89	3.04	4.86	1.49	3.83	0.11
	(0.07)	(0.46)	(0.12)	(0.45)	(0.15)	(1.88)
Covariates	No	Yes	No	Yes	No	Yes
N	468	468	416	416	226	226
R^2	0.03	0.44	0.05	0.67	0.01	0.52

*p < .1; **p < .05; ***p < .01
Robust standard errors are in parentheses.
The information content of the Placebo condition is coded 0.
Covariates include T1 Amount, T1 Favor, age, gender, ideology, initial position, and education.

Table 13: Study 3: Effects of Information on Support for Capital Punishment By Ideology

| | Dependent Variable: T2 Attitude Toward Capital Punishment | | | | | |
	Among Liberals		Among Moderates		Among Conservatives	
Positive Information (0 to 2)	0.14	0.01	−0.15	0.13	0.16	0.01
	(0.18)	(0.06)	(0.29)	(0.12)	(0.27)	(0.11)
Negative Information (0 to 2)	−0.10	−0.07	0.07	−0.29**	−0.13	−0.26**
	(0.16)	(0.05)	(0.26)	(0.12)	(0.25)	(0.12)
Condition: Null Null	−0.48*	−0.15	−0.06	−0.08	0.66	−0.26
	(0.29)	(0.12)	(0.53)	(0.19)	(0.40)	(0.21)
Constant	2.69	0.27	3.95	0.12	5.19	1.14
	(0.21)	(0.23)	(0.37)	(0.46)	(0.29)	(0.50)
Covariates	No	Yes	No	Yes	No	Yes
N	374	374	162	162	121	121
R^2	0.02	0.85	0.004	0.86	0.03	0.80

*p < .1; **p < .05; ***p < .01
Robust standard errors are in parentheses.
The information content of the Null Null condition is coded 0.
Covariates include T1 Attitude, T1 Belief, age, gender, proponent, race, and education.

Table 14: Study 3: Effects of Information on Belief in Deterrent Efficacy By Ideology

| | Dependent Variable: T2 Belief in Deterrent Effect | | | | | |
	Among Liberals		Among Moderates		Among Conservatives	
Positive Information (0 to 2)	0.40***	0.30***	0.03	0.16	0.21	0.11
	(0.15)	(0.09)	(0.20)	(0.16)	(0.18)	(0.14)
Negative Information (0 to 2)	−0.17	−0.18**	−0.11	−0.36**	−0.44**	−0.50***
	(0.14)	(0.09)	(0.17)	(0.14)	(0.22)	(0.15)
Condition: Null Null	−0.45*	−0.25*	−0.14	−0.18	−0.15	−0.73**
	(0.23)	(0.14)	(0.39)	(0.26)	(0.36)	(0.30)
Constant	2.95	1.42	3.85	1.31	4.86	1.74
	(0.18)	(0.33)	(0.21)	(0.61)	(0.24)	(0.61)
Covariates	No	Yes	No	Yes	No	Yes
N	374	374	162	162	121	121
R^2	0.07	0.60	0.005	0.55	0.09	0.60

*p < .1; **p < .05; ***p < .01
Robust standard errors are in parentheses.
The information content of the Null Null condition is coded 0.
Covariates include T1 Attitude, T1 Belief, age, gender, proponent, race, and education.

# 2 Online Appendix B: Experimental Materials

2.1 Study 1

Questions

1. Do you support or oppose stricter gun control laws in the United States?

    (a) I support stricter gun control laws

    (b) I oppose stricter gun control laws

2. What do you think is more important: protecting the rights of Americans to own guns, or regulating gun ownership?

3. Do you support or oppose a nationwide ban on the sale of assault weapons?

4. Do you support or oppose a nationwide ban on the possession of handguns, except by the police and other authorized persons?

5. Suppose more Americans were allowed to carry concealed weapons if they passed a criminal background check and training course. If more Americans carried concealed weapons, would the United States be safer or less safe?

Pro Treatment

Kramer and Perry (2014) studied the relationship between gun laws and gun-related crimes in all 50 U.S. states. As a proxy for state-level gun regulations, they used the scorecard developed by the Brady Campaign to Prevent Gun Violence, a pro-gun-control group, which ranks states from 0 (negligible restrictions) to 100 (strong restrictions). They found that on average, states with stricter policies on gun ownership and possession tend to have lower levels of firearm-related accidents, assaults, homicides, and suicides.

The figure below displays their main findings:

State Gun–Related Crimes vs. Brady Campaign Scorecard
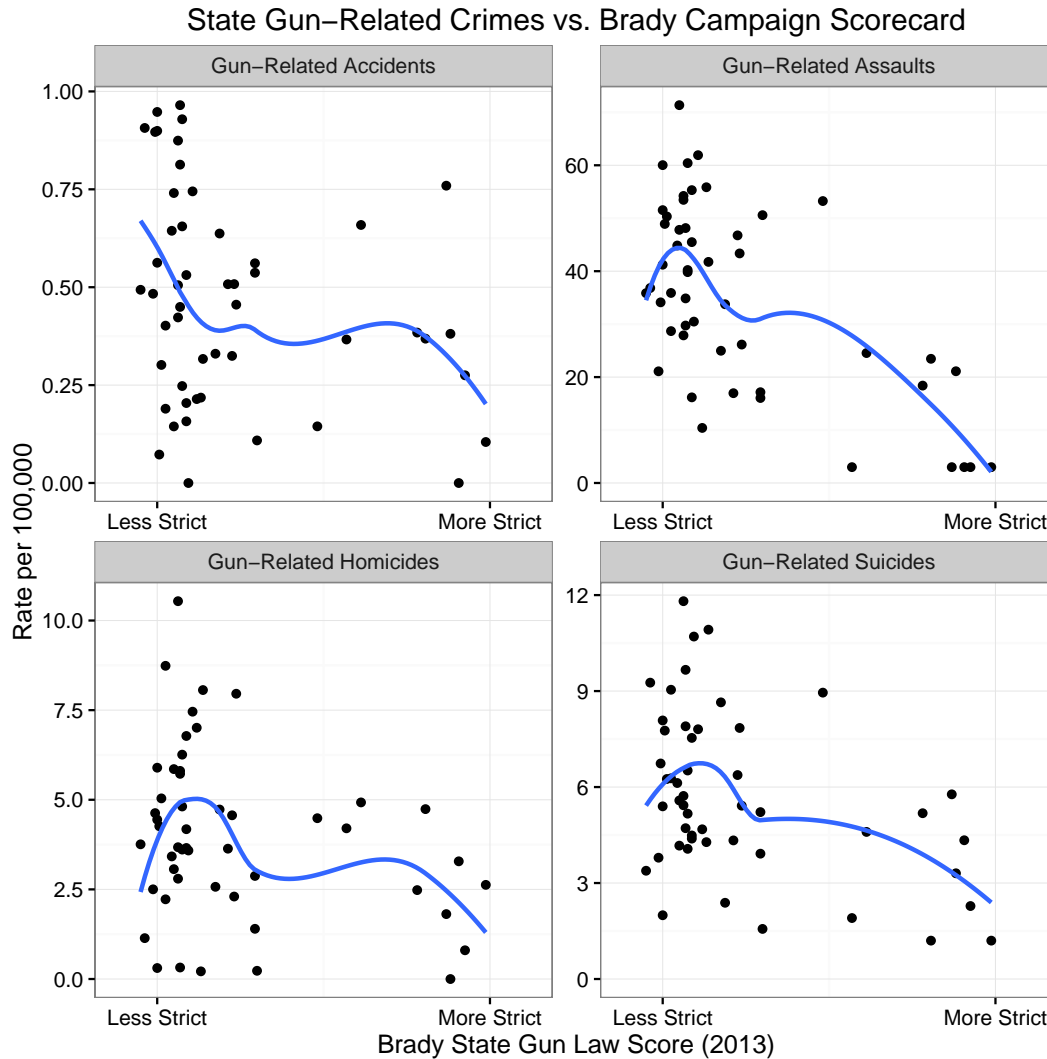
Con Treatment

Kramer and Perry (2014) studied the relationship between gun laws and gun-related crimes in all 50 U.S. states. As a proxy for state-level gun regulations, they used the scorecard developed by the Brady Campaign to Prevent Gun Violence, a pro-gun-control group, which ranks states from 0 (negligible restrictions) to 100 (strong restrictions). They found that on average, states with stricter policies on gun ownership and possession tend to have higher

levels of firearm-related accidents, assaults, homicides, and suicides.

The figure below displays their main findings:

State Gun−Related Crimes vs. Brady Campaign Scorecard
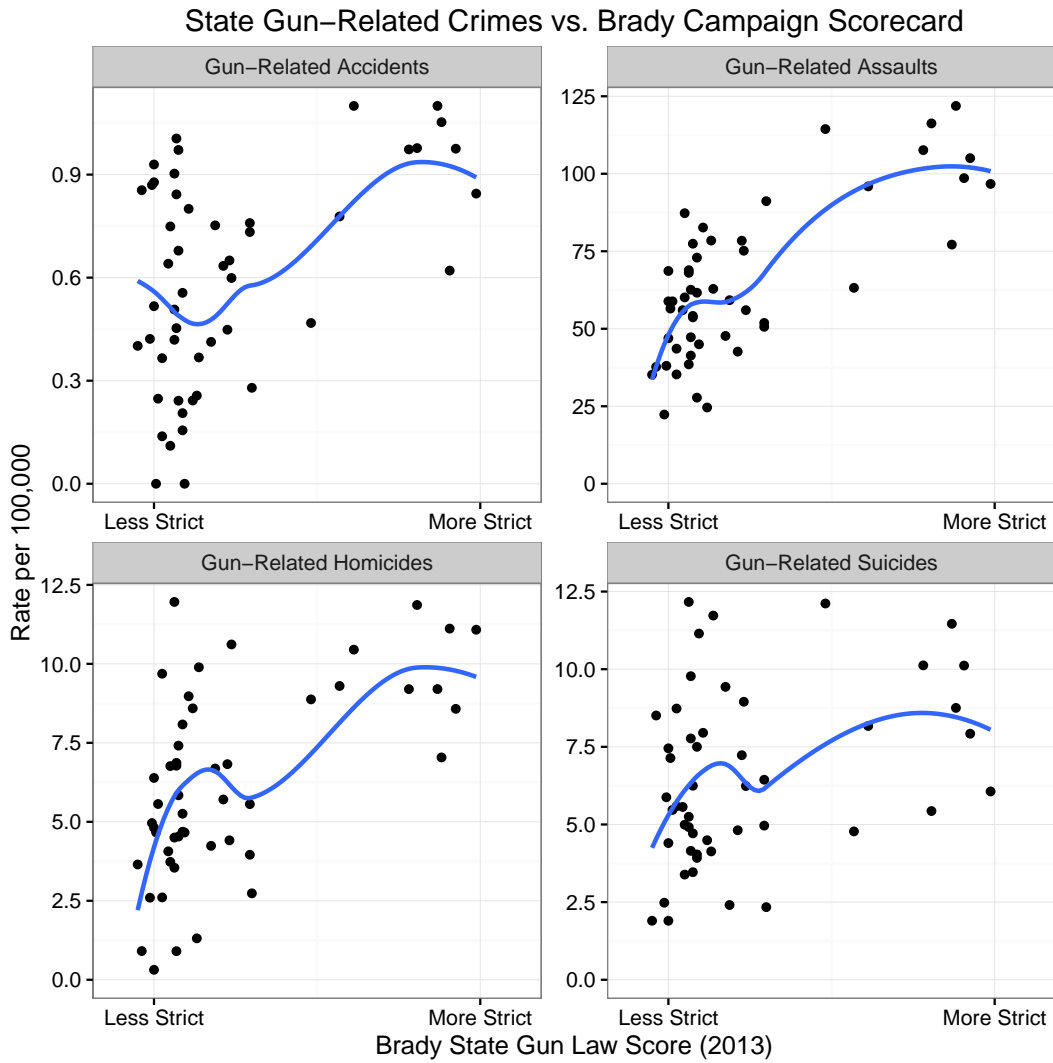
2.2 Study 2

Questions

The *Favor* question asked, "The federal minimum wage is currently $7.25 per hour. Do you favor or oppose raising the federal minimum wage?" The response options ranged from 1. "Very much opposed to raising the federal minimum wage" to 7. "Very much in favor of raising the federal minimum wage." The *Amount* question asked, "What do you think the federal minimum wage should be? Please enter an amount between $0.00 and $25.00 in the text box below."
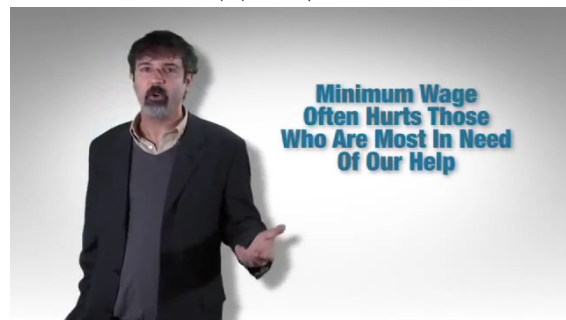
Treatments

(a) Pro/Young
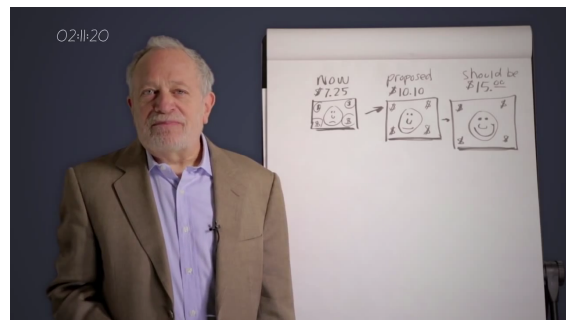
(b) Pro/Old
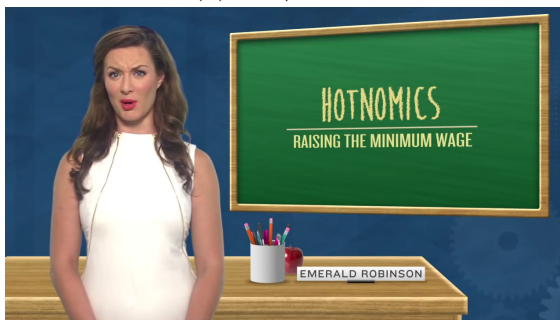
(c) Con/Young

(d) Con/Old

Figure 1: Study 2 Treatment Videos

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Table 15: Study 2 Treatment Video URLs

Treatment Video	URL
Pro/Young	`http://youtu.be/ZI9aDHLptMk`
Pro/Old	`http://youtu.be/GOqtl53V3JI`
Con/Young	`http://youtu.be/hFG1Ka8AW6Q`
Con/Old	`http://youtu.be/Ct1Moeaa-W8`

2.3 Study 3

Detailed Study Procedure

Following the original Lord, Ross and Lepper (1979) procedure, in treatment conditions 1, 3, and 6, the order of the reports' methodology (time series or cross-sectional) was randomized, resulting in two orderings per condition. In treatment conditions 2, 4, and 5, both the order of the methodology and the order of the content were randomized, resulting in four orderings per condition. In total, subjects could be randomized into 18 possible presentations. This design was maintained in order to preserve comparability with the original study, but we average over the order and methodology margins to focus on the effects of information.

Subjects were exposed to both of their randomly assigned research reports—one time series and one cross-sectional within each treatment condition—according to the following procedure:

1. Subjects were first presented with a "Study Summary" page in which the report's findings and methodology were briefly presented. Subjects then answered two questions about how their attitudes toward the death penalty and beliefs about its deterrent efficacy had changed as a result of reading the summary.

2. Subjects were then shown a series of three pages that provided further details on the methodology, results, and criticisms of the report. The research findings were presented in both tabular and graphical form.

3. After reading the report details and criticism, subjects answered a series of five ques-

tions (including a short essay) that probed their evaluations of the study's quality and persuasiveness.

4. Subjects then answered the attitude and belief change questions a second time.

Subjects completed steps one through four for both the first and second research reports. After reading and responding to the first and second reports, subjects were asked two endline *Attitude* and *Belief* questions, identical to the pre-treatment questions.

Questions

The *Attitude* question asked, "Which view of capital punishment best summarizes your own?" The response options ranged from 1. "I am very much against capital punishment." to 7. "I am very much in favor of capital punishment." The *Belief* question asked, "Does capital punishment reduce crime? Please select the view that best summarizes your own." Responses ranged from 1. "I am very certain that capital punishment does not reduce crime." to 7. "I am very certain that capital punishment reduces crime."

Sample Treatment: Con (Cross Section)

Does Capital Punishment Prevent Crime?

One of the most controversial public issues in recent years has been the effectiveness of capital punishment (the death penalty) in preventing murders. Proponents of capital punishment have argued that the possibility of execution deters people who might otherwise commit murders, whereas opponents of capital punishment denied this and maintain that the death penalty may even produce murders by setting a violent model of behavior. A recent research effort attempted to shed light on this controversy.

The researchers (Palmer and Crandall, 2012) decided to look at the difference in murder rates in states that share a common border but differ in whether their laws permit capital punishment or not. Carefully limiting the states included to those which had capital

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punishment laws in effect or not in effect for at least five years, they compiled a list of all possible pairs and then selected ten pairs of neighboring states that were alike in the degree of urbanization (percentage of the population living in metropolitan areas), thus controlling for any relationship between the size of urban population and crime per capita. They also limited the capital punishment states to those which had actually used their death penalty statutes, thus controlling for the possibility that the mere existence of the death penalty may not carry the same weight unless capital punishment is known to be a possibility. Using the murder rate (number of willful homicides per 100,000 population) in 2010 as their index, they assembled the table and graph shown on the next page. They reasoned that if capital punishment has a deterrent effect, the murder rates should be lower in the state with capital punishment laws.

The results, as shown in the table and graph below, were that in eight of the ten pairs of states selected for their study the murder rates were **higher** in the state with capital punishment laws than in the state without capital punishment laws. The researchers concluded that the existence of the death penalty does not work to deter murderers.

Critics of the study have complained that selection of a different set of ten neighboring states might have yielded a far different, perhaps even the opposite, result.

In replying to this criticism, Palmer and Crandall (2013) have recently reported a replication of their study, using a different set of ten states that share a common border but differ in whether their laws permit capital punishment or not. The results of this second study were essentially the same, murder rates being higher in the capital punishment state for seven of the ten comparisons.

Murder Rate in 2012 for Neighboring States With and Without Capital Punishment

Pair	State	Murder Rate	Capital Punishment	Pair	State	Murder Rate	Capital Punishment
1	A	0.5	Yes	6	K	1.6	Yes
	B	0.3	No		L	1.3	No
2	C	0.9	Yes	7	M	2.3	Yes
	D	0.6	No		N	1.8	No
3	E	1.0	Yes	8	O	2.9	Yes
	F	0.7	No		P	3.4	No
4	G	1.6	Yes	9	Q	2.7	Yes
	H	2.2	No		R	2.5	No
5	I	2.8	Yes	10	S	1.4	Yes
	J	2.7	No		T	1.1	No

Murder Rate in 2012 for Neighboring States with and without Capital Punishment
Reproduced with permission from Palmer and Crandall (2012)
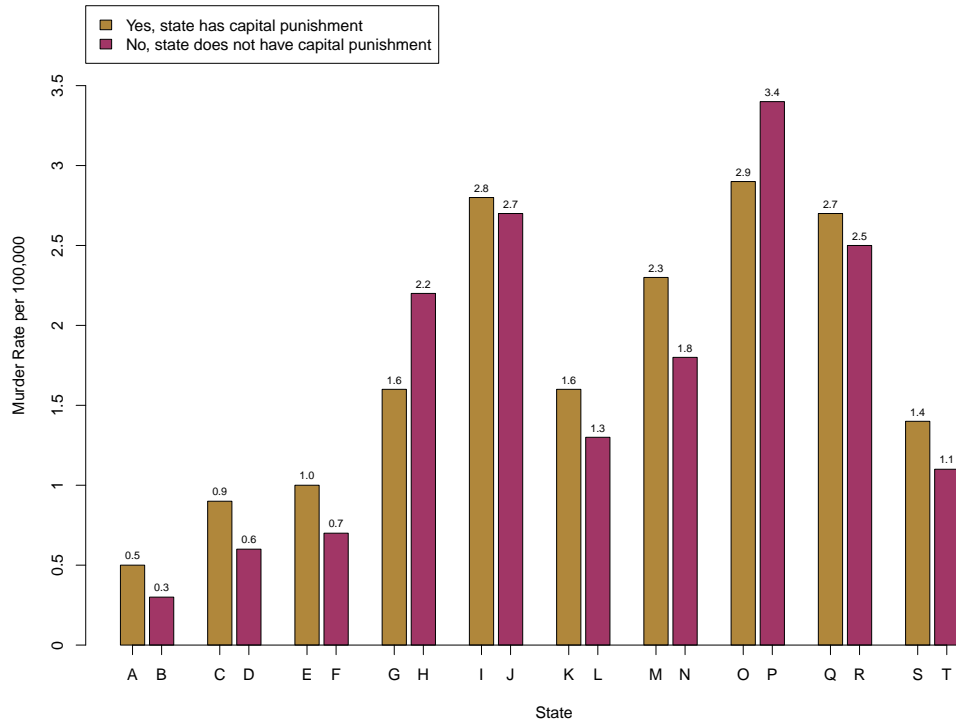
3 Online Appendix C: Exact Replication of Lord, Ross, and Lepper (1979)

Study 3 in the main text reported the results of an experiment in which subjects were assigned to different doses of information in support of or in opposition to capital punishment. The treatments in that experiment were modeled directly from those of Lord, Ross and Lepper (1979). However, in Lord, Ross, and Lepper's original study, subjects were not randomly assigned to different doses of pro or con information; instead, all subjects were treated to a "mixed information" condition.[1]

In this appendix, we present the original study results alongside an analysis of the 118 subjects in our Study 3 assigned to the "mixed information" condition (referred to as "Pro Con" in the main text), which corresponds exactly to the 1979 design. When we analyze our data using the precise procedures used by Lord, Ross and Lepper (1979), we obtain results that are astonishingly close to the original. We aim to show in this appendix that the main reason we come to a different conclusion from Lord, Ross and Lepper (1979) is *not* due to differences in subjects, treatment materials, or historical context, but instead due to an oversight in the original research design: lack of a control condition.

Other scholars have conducted replications of Lord, Ross, and Lepper as well (Pyszczynski, Greenberg and Holt 1985; Miller et al. 1993; Kuhn and Lao 1996; Munro and Ditto 1997; Corner, Whitmarsh and Xenias 2012). Those replications focused on a separate issue in the original study, the measurement strategy. Rather than asking subjects to report their own opinion change, subsequent efforts have taken the difference in measured levels of support before and after the experiment (e.g., Miller et al. 1993). No replication using this so-called "direct" measure of change has found evidence of attitude polarization.

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[1]The order in which the information was presented to subjects was randomized, but all subjects were ultimately exposed to the same content.

These two critiques of Lord, Ross and Lepper (1979) — lack of random assignment and subjective attitude change measurement — are distinct. It is true that in our analysis of subjects in the "mixed information" condition, we obtain different results depending on whether we use the self-reported change measure or the "direct" measure. But both answers are misleading in the sense that they do not compare subjects who are randomly assigned to different conditions. Furthermore, when we analyze Study 3 according to the randomly assigned doses of information, we obtain the same substantive results (updating in the direction of evidence regardless of proponent / opponent status) *regardless* of which measurement strategy we use.

3.1 The original study

Lord, Ross and Lepper (1979) was designed to evaluate two hypotheses using a within-subjects comparison of attitudes before and after encountering mixed evidence. The authors' biased assimilation hypothesis predicts that "individuals will dismiss and discount empirical evidence that contradicts their initial views but will derive support from evidence, of no greater probativeness, that seems consistent with their views" (p. 2099). The measure of biased assimilation is the observed correlation between initial attitudes and evaluations of evidence. Strictly speaking, however, this operationalization of biased assimilation does not measure the extent to which subjects incorporate new, possibly discordant facts into their base of knowledge (as would be implied by the term "assimilation"). This distinction is important because, in principle, individuals can update their beliefs even if they rate the evidence (or the source of the evidence) as being of low quality (Gerber and Green 1999).

The attitude polarization hypothesis predicts that mixed evidence makes attitudes and beliefs more extreme: "Our thesis is that belief polarization will increase, rather than decrease or remain unchanged, when mixed or inconclusive findings are assimilated by proponents of opposite viewpoints" (Lord, Ross and Lepper 1979, p. 2099). This prediction

concerns treatment effect heterogeneity: Mixed evidence should have a positive effect for proponents and a negative effect for opponents.

The study protocol was as follows:

1. An in-class survey was administered to 151 Stanford University undergraduates that included three items on capital punishment: attitudes toward the death penalty, beliefs about its deterrent effect, and whether the relevant research supported their views.

2. A subset of 48 of the 151 was selected to participate in further research. Half of the 48 were in favor of capital punishment and the other half opposed; these subjects were selected because their answers to the three capital punishment survey items were internally consistent and showed a pattern of strong belief in the initial attitude.

3. Subjects were pseudo-randomly[2] assigned to one of four conditions using a 2x2 factorial design. The first factor was the order in which the fabricated evidence was presented: either pro- or anti-capital punishment came first. The second factor was the research method of the fabricated evidence: either time series or cross-sectional analysis was presented first.

4. Subjects were given a "results card" with a research finding and then asked to rate the changes in their beliefs about capital punishment and its deterrent effect on scales from -8 to 8.

5. Subjects were then given a "criticism card" in which the research method was described and methodological critiques were made. Subjects then were asked to evaluate how well the study had been done and how convincing they found the evidence on scales from -8 to 8.

6. Subjects wrote essays explaining their answers.

7. Subjects rated the changes in their beliefs about capital punishment and its deterrent effects once again.

8. Subjects then repeated steps 4-7, this time with evidence from the other point of view and using the other research design.

Table 16 shows subjects' mean evaluations of the studies' quality and persuasiveness. Proponents found the pro-deterrence study to be better conducted (difference = 3.1) and more convincing (difference = 3.2) than the anti-deterrence study. Opponents held the

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[2]It appears that groups of four or more subjects were (cluster-) assigned to conditions by session, and that session conditions followed an alternating pattern. This procedure is pseudo-random insofar as subjects are not randomly assigned to sessions, nor are sessions randomly assigned to conditions.

opposite opinion, finding the anti-deterrence study to be of higher quality (difference $=$ -1.8) and more persuasive (difference $= -2.2$). Using t-tests, the authors found all four of these differences to be statistically significant at $p < 0.01$ or better. These results show an unambiguous association between initial attitudes and evaluations of evidence, which the authors interpreted as evidence in favor of the biased assimilation hypothesis.

Table 16: Biased Assimilation Results of Lord, Ross and Lepper (1979)

Study	Proponents (N = 24)	Opponents (N = 24)
Mean ratings of how well the two studies had been conducted		
Prodeterrence	1.5	-2.1
Antideterrence	-1.6	-0.3
Difference	3.1	-1.8
Mean ratings of how convincing the two studies were as evidence on the deterrent efficacy of capital punishment		
Prodeterrence	1.4	-2.1
Antideterrence	-1.8	0.1
Difference	3.2	-2.2
N=48		

Table 17 presents the evidence the authors offer in support of attitude polarization: After seeing both sets of evidence, proponents reported moving an average of 1.5 scale points in the pro-capital-punishment direction and opponents reported having moved an average of 1.7 scale points in the anti-capital-punishment direction. A similar pattern holds for beliefs about the deterrent efficacy of capital punishment, which move in opposite directions for proponents (1.4) and opponents (-1.8). t-tests reveal that these differences are all significant at $p < 0.001$. These results show a clear correlation between initial positions and self-reported changes in beliefs and attitudes, which the original authors interpret as evidence of the attitude polarization hypothesis. Note, however, that the "Results only" panel of Table 17 also includes evidence that does not support this hypothesis — proponents and

opponents appeared to move in parallel after just reading the "results card" of each study.

Table 17: Attitude Polarization Results of Lord, Ross and Lepper (1979)

Issue and Study	Initial Attitudes	
	Proponents (N = 24)	Opponents (N = 24)
	Results only	
Capital punishment		
Prodeterrence	1.3	0.4
Antideterrence	-0.7	-0.9
Combined	0.6	-0.5
Deterrent efficacy		
Prodeterrence	1.9	0.7
Antideterrence	-0.9	-1.6
Combined	1.0	-0.9
Details, data, critiques, rebuttals		
Capital punishment		
Prodeterrence	0.8	-0.9
Antideterrence	0.7	-0.8
Combined	1.5	-1.7
Deterrent efficacy		
Prodeterrence	0.7	-1.0
Antideterrence	0.7	-0.8
Combined	1.4	-1.8
N=48		

3.2   The replication study

As mentioned above, Study 3 in the main paper embedded a direct replication of Lord, Ross and Lepper (1979). Subjects in our "Pro Con" condition received information in the identical format and using the identical question wordings as subjects in the original study. (See Appendix B for our adapted question wordings and treatment materials.)

Table 18 presents replication of the biased assimilation results. As in the original study, proponents ranked the Pro study as better conducted (difference = 3.24) and more convincing (difference = 4.10) than the Con study. Among opponents, the opposite pattern holds:

The difference in mean quality rankings was −2.81 and the difference in mean persuasiveness ratings was −2.22. The pattern of biased assimilation observed among these online participants in 2014 is substantively identical to the pattern observed among Stanford undergraduates in the late 1970s. The point estimates only differ by an average of about 0.5 scale points, which is well within sampling variability.[3]

Table 18: Replication: Biased Assimilation

Study	Proponents (N = 50)	Opponents (N = 68)
Mean ratings of how well the two studies had been conducted		
Prodeterrence	4.02	-0.56
Antideterrence	0.78	2.25
Difference	3.24	-2.81
Mean ratings of how convincing the two studies were as evidence on the deterrent efficacy of capital punishment		
Prodeterrence	4.00	-1.54
Antideterrence	-0.10	0.68
Difference	4.10	-2.22

Table 19 presents the average self-reported changes in attitudes and beliefs for both proponents and opponents of capital punishment. After reading only the results page, proponents reported average attitude change of 3.08 scale points in the pro direction, while opponents reported moving 3.09 scale points in the con direction. The same pattern holds for beliefs about deterrent efficacy (proponents 2.76; opponents −3.17). The second panel of Table 19 shows the mean attitudes and beliefs after reading the study details and criticism. Again we see that proponents reported higher support for capital punishment after encountering evidence, and vice versa for opponents. The signs on the "combined" rows all match those in the original study (see Table 17), though the magnitudes of the changes are

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[3]We do not present standard errors in these tables for continuity of presentation, but they range between 0.40 and 0.55.

two to three times as large. This difference may have as much to do with the measurement technology (our subjects reported their answers using online "sliders" whereas the Stanford subjects presumably used pen and paper) as with differences across subjects and contexts.

Table 19: Replication: Attitude Polarization (self-reported measure)

	Initial Attitudes	
Issue and Study	Proponents (N = 50)	Opponents (N = 68)
	Results only	
	Capital punishment	
Prodeterrence	2.86	-0.44
Antideterrence	0.22	-2.65
Combined	3.08	-3.09
	Deterrent efficacy	
Prodeterrence	3.04	0.19
Antideterrence	-0.28	-3.37
Combined	2.76	-3.17
	Details, data, critiques, rebuttals	
	Capital punishment	
Prodeterrence	2.24	-1.13
Antideterrence	0.34	-1.93
Combined	2.58	-3.06
	Deterrent efficacy	
Prodeterrence	2.64	-1.26
Antideterrence	0.12	-2.19
Combined	2.76	-3.46

3.3 Discussion

Our replication of Lord, Ross and Lepper (1979) was remarkably successful. The same analysis strategy applied to both datasets yields the same results. Our disagreement with the conclusions of Lord, Ross and Lepper (1979) does not stem from a concern that their results do not replicate, but rather that their results do not demonstrate what the authors claim they demonstrate. When we randomly assign subjects to different doses of information, we see that they respond by updating their beliefs in the direction of evidence, rather than

(as claimed in the original study) by holding more strongly to their initially held beliefs.

References

Corner, Adam, Lorraine Whitmarsh and Dimitrios Xenias. 2012. "Uncertainty, Scepticism and Attitudes towards Climate Change: Biased Assimilation and Attitude Polarisation." *Climatic Change* 114(3-4):463–478.

Gerber, Alan and Donald Green. 1999. "Misperceptions About Perceptual Bias." *Annual Review of Political Science* 2(1):189–210.

Kuhn, Deanna and Joseph Lao. 1996. "Effects of Evidence on Attitudes: Is Polarization the Norm." *Psychological Science* 7(2):115–120.

Lord, Charles S., L. Ross and M. Lepper. 1979. "Biased Assimilation and Attitude Polarization: The Effects of Prior Theories on Subsequently Considered Evidence." *Journal of Personality and Social Psychology* 37:2098–2109.

Miller, Arthur G., John W. McHoskey, Cynthia M. Bane and Timothy G. Dowd. 1993. "The Attitude Polarization Phenomenon: Role of Response Measure, Attitude Extremity, and Behavioral Consequences of Reported Attitude Change." *Journal of Personality and Social Psychology* 64(4):561–574.

Munro, Geoffrey D. and Peter H. Ditto. 1997. "Biased Assimilation, Attitude Polarization, and Affect in Reactions to Stereotype-Relevant Scientific Information." *Personality and Social Psychology Bulletin* 23(6):636–653.

Pyszczynski, Tom, Jeff Greenberg and Kathleen Holt. 1985. "Maintaining Consistency between Self-Serving Beliefs and Available Data: A Bias in Information Evaluation." *Personality and Social Psychology Bulletin* 11(2):179–190.