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News, Politics, and Negativity

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Work in political communication has discussed the ongoing predominance of negative news, but has offered few convincing accounts for this focus. A growing body of literature shows that humans regularly pay more attention to negative information than to positive information, however. This article argues that we should view the nature of news content in part as a consequence of this asymmetry bias observed in human behavior. A psychophysiological experiment capturing viewers' reactions to actual news content shows that negative news elicits stronger and more sustained reactions than does positive news. Results are discussed as they pertain to political behavior and communication, and to politics and political institutions more generally.

Keywords negativity bias, mass media, political communication, psychophysiology

News content is dominated by the negative. Consider the well-known phrases "If it bleeds, it leads" or "No news is good news." Or simply consider any recent newspaper or television news broadcast. That news tends to be negative is clear enough to any regular news consumer.

Political news is of course no exception. And an increasing body of work in political science suggests that this negative information may matter a great deal. Research suggests asymmetry in responses to negative versus positive information, across a wide range of domains. There is evidence that negative information plays a greater role in voting behavior, for instance; that U.S. presidents are penalized electorally for negative economic trends but reap few electoral benefits from positive trends; asymmetries have been identified in the formation of more general impressions of U.S. presidential candidates and parties; and the significance of negativity has been examined as it relates to the effects of negative campaigning, and declining trust in governments.[1]

Why is there such an emphasis on negative information in mass media, and in political communications and politics more generally? This article explores one likely answer to this question. The paper reports findings from a lab experiment in which participants view a selection of real television news stories while we monitor a number of physiological indicators, including heart rate and skin conductance. Results confirm that negative information produces a much stronger psychophysiological response than does positive information;

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they suggest, in short, that people are more reactive and attentive to negative news than they are to positive news.

This study demonstrates this asymmetry for the first time using real television news content. Our work thus extends existing psychophysiological research (largely outside political communication) documenting asymmetric responses to positive versus negative information. It also adds to the literature in political communication: It demonstrates a negativity bias that may well help account for the predominance of negativity in mass media.[2] The aim of the work that follows is to (a) discuss the possibility that the structure of news content is intimately related to the functioning of the human brain, (b) connect observations of asymmetry in political science to existing accounts and explanations in psychology, economics, neurology, and physiology, and (c) begin to more fully account for, and address the potential consequences of, negativity in political communication.

Negativity in Psychology, Economics, Political Science, and Communication

Our work is motivated in large part by bodies of literature in psychology and economics that suggest that humans respond more to negative than to positive information. Given a unit of positive information and a unit of negative information (whatever a "unit" of information might be), we often react more to the latter than to the former.

There is evidence of this negativity bias—or, more broadly, the relative strength of negative over positive—throughout psychology. Indeed, evidence of a negativity bias has been the subject of several very valuable meta-reviews (e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Cacioppo & Gardner, 1999; Rozin & Royzman, 2001). Consider first the literature on "impression formation," which suggests that in our assessment of other individuals we tend to weight negative information much more highly than positive information.[3] Consider also the body of research on information processing, which suggests that people devote more cognitive energy to thinking about bad things than to thinking about good things (e.g., Abele, 1985; Fiske, 1980). Work on attributional processing—the process of trying to find explanations or meaning for events—suggests a similar asymmetry (e.g., Taylor, 1983). And not only does negative information induce a greater degree of processing, all information is subject to more processing when the recipient is in a bad mood (e.g., Bless, Hamilton, & Mackie, 1992; Isen, 1987; Isen, Daubman, & Gorgoglione, 1997; Schwarz, 1990).[4] These are just some of the areas in which psychologists have found that negative information has a greater impact than positive information.[5]

These findings in psychology are echoed in economics, where experimental work on loss aversion suggests that people care more strongly about a loss in utility than they do about a gain of equal magnitude (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991). Theories of loss aversion bear a close resemblance to "frequency-weight" accounts of impression formation in psychology—they too are a product of differential reactions to negative and positive information. Loss-averse behavior has been found at the individual level across a wide range of decision-making environments, both in the lab and in the real world.[6] It has also been evidenced in aggregate-level macroeconomic dynamics (e.g., Bowman, Minehart, & Rabin, 1999).

Work in political science finds evidence of negativity biases as well. Klein (1991), for instance, applies impression formation theories to survey data on U.S. presidential evaluations. Klein's (1991) article finds that traits on which a respondent ranks 1984 and 1988 presidential candidates lower matter more to their overall assessment of those candidates; a subsequent article (Klein, 1996) confirms the dynamic for 1992 presidential

candidates. And this role of negativity in respondents' perceptions of presidential candidates has been identified using a variety of different survey instruments (see, for example, Lau, 1982, 1985, and Holbrook and colleagues, 2001). Similar findings exist suggesting that while midterm congressional elections are partly a referendum on the popularity of the current president, unpopularity has a much greater effect on voting decisions than does popularity (Kernell, 1977).[7] There is an accumulation of similar findings in work on economic voting as well (Bloom & Price, 1975; Claggett, 1986; Headrick & Lanoue, 1991; Kiewiet, 1983; Nannestad & Paldam, 1997; Soroka, 2006).[8] And there is a burgeoning literature on the effects of negative advertising.[9] One thing is clearly not disputed: Over the postwar era, and particularly over the past two decades, there has been a steady increase in negative advertising in the United States (Geer, 2006; Fridkin & Kenney, 2004). Campaign strategists believe that negative advertising works, especially in competitive races (Able, Herrnson, Magleby, & Patterson, 2001; Goldstein, Krasno, Bradford, & Seltz, 2001). And negative ads are commissioned, and aired, accordingly. Whether negative ads have the intended effect is another matter, and here there is a good deal of disagreement in the literature. There are at least two general themes: (1) Does negative advertising win or lose votes? (2) Does negative advertising attract or repel voters? Put differently, negative advertising may affect who we vote for, but it may also affect whether we vote at all. Results, many of which are incorporated into a meta-analysis by Lau, Sigelman, Heldman, and Babbitt (1999), are for both issues rather divided (the literature is vast, but see, for example, Ansolabehere, Iyengar, Simon, and Valentino, 1994; Ansolabehere and Iyengar, 1995; Bullock, 1994; Hitchon, Chang, and Harris, 1997; Martinez and Delegal, 1990; Freedman and Goldstein, 1999; Geer and Lau, 1998; Kahn and Kenney, 1999).

That said, there are some issues for which the body of evidence is somewhat more suggestive. For instance, and importantly given the current purposes, the information conveyed in negative ads is more likely to be remembered than the information conveyed in positive ads (e.g., Babbitt & Lau, 1994; Kahn & Kenney, 1998). And advertising is by no means the only communications domain in which there is a good degree of negative content. The same trend is apparent throughout media, both print and television. There exist content analyses showing the relatively high proportion of news content that is sensationalistic (e.g., Davie & Lee, 1995; Harmon, 1989; Hofstetter & Dozier, 1986; Ryu, 1982); and a good deal of work documenting a tendency toward negative stories as well (e.g., Diamond, 1978; Fallows, 1997; Just, Crigler, & Neuman, 1996; Kerbel, 1995; Lichter & Noyes, 1995; Niven, 2000; Patterson, 1994; Robinson & Levy, 1985; Sabato, 1991; Soroka, 2012).

What accounts for the apparent negativity in media content? Explanations include the administrative or financial structure of news organizations, the biases of editors or audiences, the behavior and priorities of journalists as a profession, and so on. The media "gatekeeping" literature plays a particularly prominent role here. (See Shoemaker, 1991, or Shoemaker and Vos, 2009, for thorough reviews.) One of the main focuses of that literature is the tendency for news to be both sensationalist and negative; a consequence not just of the preferences of individual journalists and editors, but of the entire structure of the practice of journalism, as well as of the mediums themselves—newspapers, but especially television (see also work by Altheide [1997], Ericson, Baranek, and Chan [1989], and Meyrowitz [1985]).

There is, however, another possible account for the nature and tone of news content: News is predominantly negative because humans are more interested in, or reactive to, negative information. The relative absence of this account in the existing literature on news content is, we believe, rather striking (though there are some exceptions, most importantly Shoemaker, 1996). A principal goal of the existing work is to make more explicit, then, the

role of a negativity bias—in humans, not just in journalists and editors—in accounting for biases in news content.

In sum: Humans have a reasonably well-established tendency to react more strongly to negative than to positive information; it follows that news content, created by humans, with the goal of getting attention from other humans, will tend to be biased toward the negative. Critical to this account is evidence that news content does indeed tend to generate stronger reactions and/or greater attentiveness when it is negative. It is to an investigation of these possibilities that we now turn.

The Experiment

The goal of our experiment is to demonstrate that the kinds of asymmetries found elsewhere also apply to individuals' reactions to real network news content. In so doing, we wish to draw a clearer link between the way humans react (psychophysiologically) to information, and the way journalists (and other political actors) select or create news stories.

Based on the work just reviewed, our expectation is that participants will react quite strongly to negative information and rather little to positive information. The "reaction" we are interested in here is an emotional one—emotional, that is, as captured by physiological measures. The use of psychophysiological methods is motivated in part by recent work in political science that uses these methods to explore the possibility that there are physiological and perhaps also genetic sources of political preferences (e.g., Oxley et al., 2008; also see citations in preceding paragraph), as well as work by Annie Lang and colleagues exploring psychophysiological reactions to media messages (e.g., Lang, Dhillon, & Dong, 1995). The experimental design draws on existing work in psychology, but also on recent work in communication.[10]

The experiment proceeded as follows. There were 63 participants, ranging from 18 to 38 years of age, 33 male and 30 female, reporting varying degrees of media attentiveness.[11] Participants knew only that this was an experiment about the news, and that we would be monitoring their physiological responses as they watched. They watched a news program on their own, on a large computer monitor in a quiet room, wearing noise-canceling headphones. They were connected to a number of biosensors on one hand, on their face, and around their torso. The experiment lasted roughly 25 minutes, during which participants viewed 7 news stories. Stories were separated by one minute of gray screen; there was a countdown indicated with a large white number on the gray screen for the last five seconds so respondents were not startled by the start of a new story. The experiment also began with a full two minutes of gray screen, to establish a baseline for the various physiological readings, and also to allow respondents to settle in and get used to the biosensors.

Stories were drawn from two months (mid-September to mid-November 2009) of national evening newscasts on Global Television, one of the three major English-language broadcasters in Canada. Stories were selected on a variety of topics, political as well as general news, and covered a range of tone, from very positive to very negative. The stories were viewed and coded for tone and topic by two coders. In the end, this pre-coding led to the selection of nine stories: one clearly neutral, about the Toronto Film Festival, four that showed varying degrees of positivity, and four that showed varying degrees of negativity. Topics varied from health care policy, to employment benefits, to vaccine shortages, to murder.

All respondents saw the Toronto Film Festival story first—a neutral and relatively boring story. They were then presented with six of the eight remaining stories. Those six were randomly drawn, and randomly ordered. Not all respondents saw the same batch of stories,

then; each viewed a somewhat different selection of stories, in a different order. Short descriptions of the stories are provided in Table 1.

The tone of the news stories was confirmed in three different ways. First, 7 of the 63 experimental participants had worked as coders in past content-analytic projects. They knew no more about the current project than the other participants, but they were asked to perform one additional task: as they viewed stories, they were asked to code each for tone, using a 7-point negative-to-positive scale. These are what we might call "expert" coders.[12] Stories were also rated on the same 7-point scale by 52 undergraduate students, during a lecture in a fourth-year political science class. Like the seven expert coders, undergraduate student codes are for stories as a whole. A third coding looked at variance for tone within stories. In this case, three other expert coders (that is, not the same coders as were used in the previous analysis) were asked to code the tone of news stories on a 5-point scale, second-by-second. There is of course some variance within stories; and that variance becomes useful in the analyses that follow, as we shall see. For the time being, however, we use this second-by-second analysis as a third test of the tone of stories.

Results from both experienced coders and students are shown in the right columns of Table 1. Note that they are nearly perfectly in line— all approaches completely confirm the initial three-fold coding of stories as either positive, negative, or neutral, and all produce similar interval-level measures of the degree of negativity or positivity. There are some minor differences in the ranking of the positive stories, and the negative ones; though in each case the most positive or negative clearly stand out. Most importantly, in no case is a story listed as positive by one method and negative by another, and vice versa.

When the experiment ended, participants filled out a short survey capturing demographics, media use preference, and past federal vote. All experiments were conducted by one of two female research assistants. (The scripts for the pre-experiment explanation and the post-experiment debriefing are available upon request.)

Physiological responses were captured using a ProComp Infiniti encoder from Thought Technology Ltd., and purpose-built software designed at the Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT) at McGill University. We focus here on two responses in particular: skin conductance and heart rate.

Skin conductance (SC), reflecting the level of moisture exuded by the eccrine sweat glands, was captured by passing an infinitesimally small electrical current through a pair of electrodes on the surface of the skin—in this case, electrodes attached to the tips of the distal phalanx (outer segment) of the index and ring fingers, captured using Thought Technology's SC-Flex/Pro sensor. The current is held constant, and the electrodes monitor variations in current flow. More moisture (sweat) leads to less resistance, or, conversely, more conductance. The resulting conductance data can be used to look at both skin conductance levels (SCL) and skin conductance responses (SCR). The former is simply the level of conductance, measured in microsiemens. The latter is focused on the number of peaks in the SCL signal.

Variations in skin conductance are useful as an indicator of physiological arousal (Simons, Detenber, Roedema, & Reiss, 1999; Lang, Bolls, Potter, & Kawahara, 1999; Bolls, Lang, & Potter, 2001; see review in Ravaja, 2004). Note that arousal is not the same thing as valence—arousal refers only to the degree of activation, not the direction (positive or negative, pleasant or unpleasant) of the reaction (Larsen & Diener, 1992; Russell, 1980). But the degree of arousal is what is most critical in this experiment. We have stories, coded as positive and negative, and are interested in which ones generate the strongest reactions. The expectation is that negative stories will elicit a stronger reaction.

Table 1
Story descriptions and codes

Title	Description	Coded tone [a]		
		Experts, by story	Students, by story	Experts, by second
Neutral				
Toronto Film Festival	Filmmakers and actors arriving for the Toronto International Film Festival	0.50 (.22)	.096 (1.35)	−.10 (.72)
Positive				
Ambassador Doer	Gary Doer, former Manitoba Premier, now taking over as Canadian ambassador to the United States	1.00 (.52)	1.06 (.80)	.43 (.89)
Cancer child	An "Everyday Hero" story about a boy who survived leukemia, and now raises money to provide video games for children stuck in hospitals for cancer treatment	2.83 (.17)	2.61 (.69)	1.27 (1.60)
Tuition-free schools	A man who raises money from corporations to build tuition-free training schools in the United States, coming to do the same in Canada	2.00 (.26)	1.65 (.81)	.81 (.91)
EI benefits	The extension of Employment Insurance benefits to self-employed Canadians, many of whom will now be able to claim benefits such as maternity and sick leave	1.50 (.22)	.81 (1.28)	.25 (1.25)
Negative				
Baby assaulted	A recent case in which a neighbor saw and reported a mother who was smashing her baby's head on the sidewalk	−2.50 (.50)	−2.21 (1.13)	−1.95 (1.22)
Vaccine shortages	Potential shortages in H1N1 vaccines, and the federal government's role in those shortages	−2.00 (.37)	−1.42 (1.16)	−1.09 (.80)
Afghan War	"Are we winning?" the war in Afghanistan, focusing on the relative lack of success thus far in Canadian military's ongoing mission there	−1.50 (.22)	−1.62 (1.16)	−1.23 (.95)
Food banks	How current economic circumstances mean that donations to food banks have declined, even as more people need to come to food banks	−1.67 (.42)	−.88 (1.10)	−1.37 (.92)

[a]Tone was coded by (a) expert coders ($N = 7$), (b) a larger student sample ($N = 52$), and (c) expert coders, on a second-by-second basis. Each is scaled here from –3 to + 3, where low scores are negative and high scores are positive. Cells contain mean scores with standard errors in parentheses.

Heart rate was measured using a blood volume pulse (BVP) sensor, captured using Thought Technology's BVP-Flex/Pro sensor. The sensor uses photoplethysmography (measuring the amount of light transmitted through the finger tissue) to detect variations in the volume of blood in the distal phalanx of the middle finger. Because the volume of blood in vessels varies with heartbeats, the resulting waveform can be used to determine heart rate. In our study, heart rate is examined at 5-second (5-s) intervals.

Heart rate is often used as a measure of attentiveness, where decreasing heart rate indicates increasing attentiveness (Lang, 1990; Mulder & Mulder, 1981). Note, however, that existing work suggests that heart rate is not exclusively related to attentiveness, but can be linked to emotional arousal as well; indeed, the literature suggests that heart rate likely reflects a combination of arousal and attentiveness. Our interpretation of heart rate relies in particular on work by Lang (1994) and hinges on the assumption that whatever acceleration in heart rate comes from arousal will be overwhelmed by the deceleration that comes with attentiveness.[13] We thus expect heart rate to be lower, showing greater levels of attentiveness (and perhaps arousal as well) for negative stories.

Results

Figures 1 and 2 show results for two representative respondents. The beginning and end of stories, as well as the beginning and end of the gray-screen periods between stories, are marked with a thin vertical line. Negative stories are grayed out between those lines; positive and neutral stories are not. (Note that the two respondents see stories in a different order.)

For skin conductance (SC) analyses, data are originally sampled 256 times per second, but downsampled for analysis by taking averages over 125-millisecond (ms) intervals. The SC signal is smoothed slightly for analysis, using locally weight scatterplot smoothing (LOWESS) with a bandwidth of .02. Skin conductance measures can tend to decrease over the experiment (a consequence of measurement issues with the electrodes), so the skin conductance levels (SCL) shown in the figures (and used in analyses) have also been de-trended. The SC signal is de-trended by regressing the entire time series on a count variable, capturing time in 125-ms intervals. The count variable was included in both its linear and quadratic form, allowing for the possibility of nonlinear effects; predicted values were then subtracted from the original variable to produce the final de-trended series. Analyses of SCLs rely on these downsampled, smoothed, and de-trended SC series; for analyses of covariance (ANCOVAs), values are also averaged over 5-s intervals. The raw skin conductance data are shown in Figures 1 and 2 as small dots; the final series used in analyses are represented by dark lines.

Analyses of skin conductance responses (SCR) rely on the identification of peaks within this series, using a simple algorithm that identifies time points preceded and then followed by sustained (roughly 10 125-ms intervals) increases or decreases in the SC signal. These statistically identified peaks in the SC signal are confirmed manually before preceding with the analyses. In Figures 1 and 2, a small letter x on that line denotes SCRs. Heart rate in Figures 1 and 2 is shown as a LOWESS trend, based on signals also downsampled to 125-ms intervals.

We explore differences in psychophysiological reactions to negative versus positive news content using relatively simple within-respondent analyses of covariance (ANCOVAs) of both SCL and heart rate, averaged over 5-s intervals. In each case, the physiological measure is modeled as a function of the following:

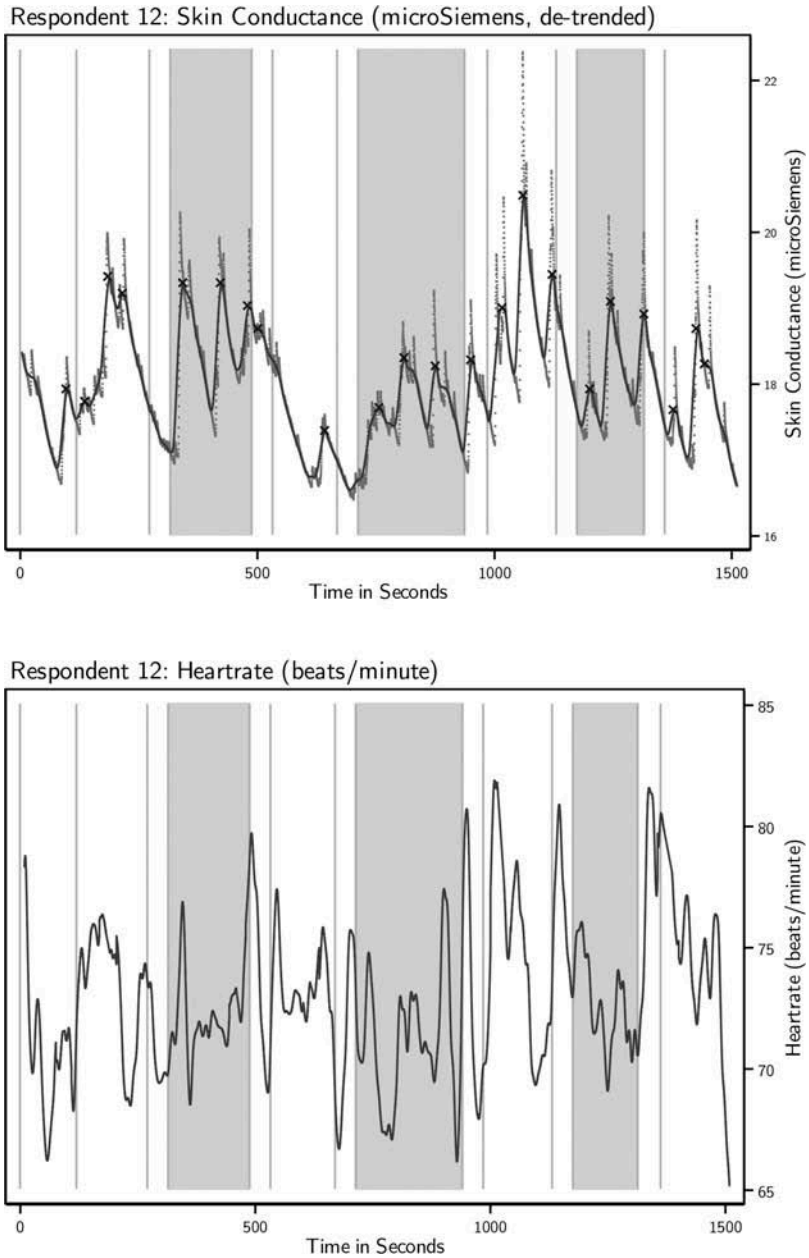

Figure 1. Skin conductance and heart rate: Respondent 12.

1. respondent IDs, to account for level differences in physiological symptoms across respondents;
2. an ordinal variable representing order of presentation of the stories, to capture the possibility that respondents' reactions change based on the number of stories they have seen thus far;
3. time (in 5-s intervals) and time squared, to capture the (potentially nonlinear) tendency for both SCL and heart rate to decline slightly over the course of the experiment; and

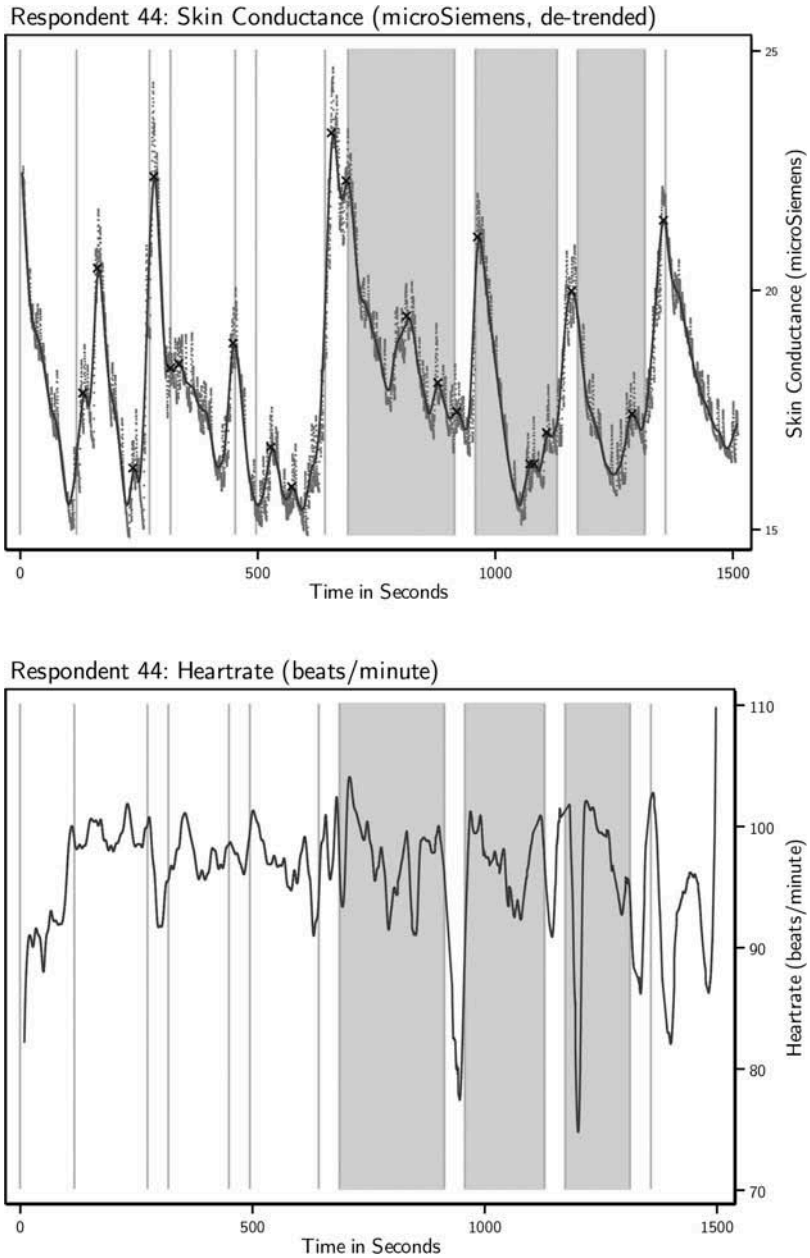

Figure 2. Skin conductance and heart rate: Respondent 44.

4. a binary variable contrasting negative with positive and neutral stories was included directly and in interaction with the time variables. The direct effect captures the possibility that negative stories produce an initial impact which is greater or lesser in magnitude than positive stories; the interaction with time allows for the possibility that the effect of negative stories is more (or less) long-lasting.[14]

Table 2 shows the basic ANCOVA results for SCRs in the left panel and the corresponding ordinary least squares (OLS) regression coefficients in the right.[15] The unit of analysis here is each story for each respondent; the dependent variable is the number of identified SCRs in each story. A good deal of the respondent/story-level variance in SCRs is accounted for by differences across respondents.[16] Story order does not matter to the number of SCRs. Negativity does, however: the regression coefficient shows that the effect is in the direction we would expect; that is, a negative story produces on average .38 more SCRs than does a positive story. Participants are, in short, more activated by negative stories than by positive ones.

Results are similar for SCL, shown in Table 3.[17] Again, the model includes respondent IDs, an ordinal variable capturing story order, a variable capturing time within each story (in 5-s intervals), and a dummy variable for negative stories. The results confirm the expectation that negativity results in a higher SCL overall, and that it reduces the tendency for respondents' SCL to gradually return to its previous value. So, participants have stronger and longer reactions to negative stories than to positive stories. Coefficients show that all effects are in the expected direction.

The same is true for heart rate, shown in Table 4.[18] These results are based again on 5-s averages, and the same model as is used for SCL. Negativity is, as we expect, associated with a decreased heart rate. This likely suggests heightened attentiveness, though recall that heart rate may actually reflect some combination of attentiveness and arousal. There is another possibility as well: that heart rate captures attentiveness alone, that attentiveness is not driven by negativity but by arousal, and arousal is driven by negativity. One way to explore this possibility with these data is to add the measure of arousal (SCL) to the ANCOVA for heart rate, to see both if SCL and heart rate are systematically related, and if negativity continues to matter to heart rate, independent of SCL. Doing so shows no significant relationship between SCL and heart rate, however, and no significant changes in the other coefficients in the model either. These results offer some evidence that heart rate does indeed capture something independent of arousal.[19]

Results for SCR, SCL, and heart rate are made clearer in Figures 3, 4, and 5. The figures show the predicted levels of each measure, based on the regression models in Tables 2, 3, and 4 .[20] Note the difference between positive and negative stories in each case. Negative

Table 2

Within-respondent ANCOVA, skin conductance responses, by-story analysis

ANCOVA				OLS regression	
	Partial SS	*df*	*F*		Raw coef
Model	388.119	60	4.87***		
Respondent	366.775	58	4.76***		
Order	5.173	1	3.89*	Order	−.068 (.034)
Negative	11.384	1	8.57**	Negative	.367 (.125)
Residual	389.160	293		Constant	.689 (.452)
Total	777.280	353		Rsq	.500

$N = 354$. Results are based on data for eight positive or negative stories only, aggregated by story. ANCOVA = analysis of covariance; OLS = ordinary least squares; Rsq. = R-squared.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 3
Within-respondent ANCOVAs, skin conductance levels, by-story analysis

ANCOVA				OLS regression	
	Partial SS	*Df*	*F*		Raw coef
Model	638.995	64	14.64***		
Respondent	223.835	58	5.66***		
Order	5.975	1	8.76**	Order	.013 (.004)
Time	157.028	1	230.21***	Time	−.070 (.006)
Time^2	65.128	1	95.48***	Time^2	.002 (.000)
Negative	9.506	1	13.94***	Negative	−.179 (.047)
Neg*Time	27.740	1	40.67***	Neg*Time	.042 (.007)
Neg*Time^2	27.044	1	39.65***	Neg*Time^2	−.001 (.000)
Residual	7439.800	10907		Constant	18.115 (.067)
Total	8078.795	10971		Rsq	0.079

$N = 10972$. Results are based on eight positive or negative stories only, using data averaged at five-second intervals. ANCOVA = analysis of covariance; OLS = ordinary least squares; Rsq. = R-squared; Neg ∗ Time = Negativity ∗ Time interaction.
* $p < .05$. ** $p < .01$. ***$p < .001$.

Table 4
Within-respondent ANCOVAs, heart rate, by-story analysis

ANCOVA				OLS regression	
	Partial SS	*df*	*F*		Raw coef
Model	1584103.52	64	488.64***		
Respondent	1554880.24	58	529.24***		
Order	3996.264	1	78.89***	Order	−.342 (.038)
Time	1524.096	1	30.09***	Time	−.250 (.048)
Time^2	1276.758	1	25.21***	Time^2	.007 (.002)
Negative	631.289	1	12.46**	Negative	−1.466 (.415)
Neg*Time	568.212	1	11.22***	Neg*Time	.189 (.057)
Neg*Time^2	601.115		11.87***	Neg*Time^2	−.006 (.002)
Residual	547068.573	10800		Constant	71.782 (.586)
Total	2131172.09	10864		Rsq	0.743

$N = 10{,}865$. Results are based on eight positive or negative stories only, using data averaged at five-second intervals. ANCOVA = analysis of covariance; OLS = ordinary least squares; Rsq. = R-squared; Neg ∗ Time = Negativity ∗ Time interaction.
* $p < .05$. ** $p < .01$. ***$p < .001$.

stories are associated with decreased heart rate (more attention) and increased SCRs and SCL (more activation); positive stories are associated with increased heart rate (less attention) and decreased SCRs and SCL (less activation). All indications are that participants are more aroused by, and pay more attention to, negative stories.

Analyses have thus far focused on by-story differences in tone. We expect these to be strongest, since physiological symptoms will likely accumulate over the length of a story.

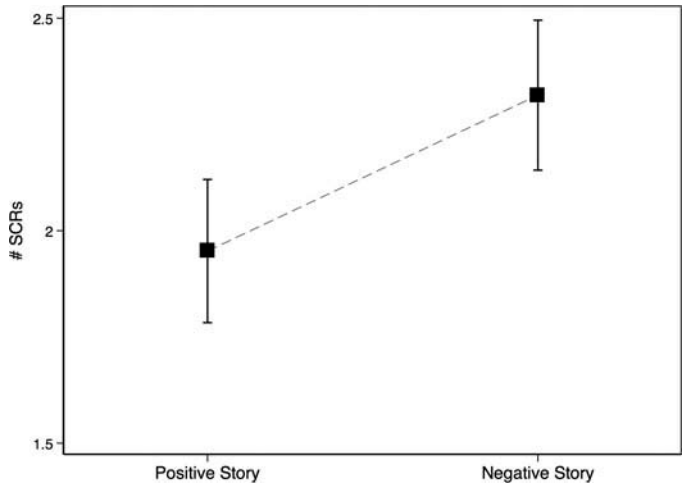

Figure 3. Predicted values, skin conductance responses.

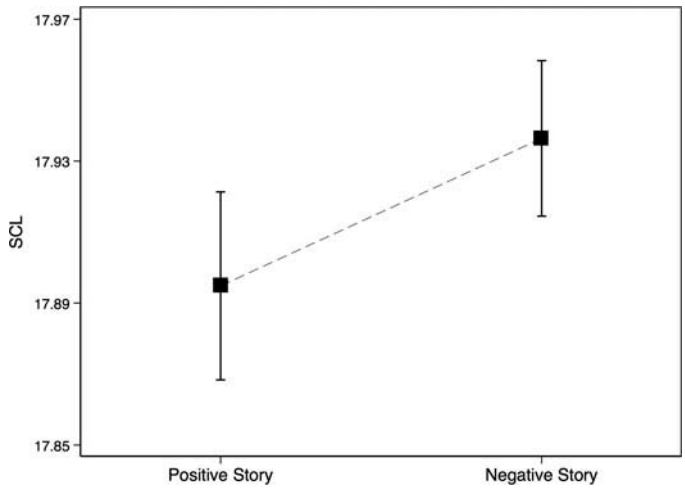

Figure 4. Predicted values, skin conductance levels.

(Indeed, the strong mediating influence of time on both skin conductance and heart rate make clear that this is the case.) That said, there is one important weakness to by-story analyses: Our aim is to manipulate tone, and only tone, but the tone of stories likely covaries alongside other factors, such as subject matter. Our first inclination is simply to treat subjects as elements of tone—the subject matter and presentation style of stories are all part of the sentiment represented in news stories. In this case, story-by-story examinations are most appropriate.

There is, however, another perspective, interested in "tone" independent of other aspects of stories. We might be interested in whether participants are affected by negative information on health care differently from positive information on health care, holding all other elements of the story (including topic) constant. It is not clear that such a manipulation is feasible—it is not clear that tone can change completely independent of all other

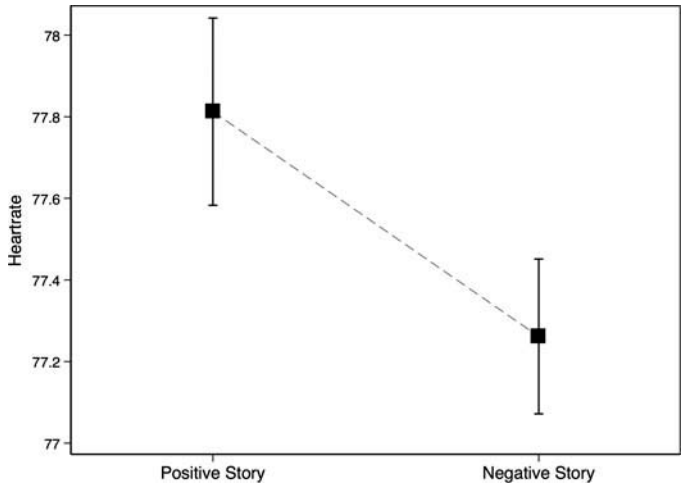

Figure 5. Predicted values, heart rate.

aspects of content. Even so, we can examine tone independently of subject matter by taking advantage of within-story variance in tone.

Tables 5 and 6 thus present supplementary analyses of skin conductance and heart rate. All across-respondent and across-story variance is captured through the inclusion of (1) respondents (categorical), (2) stories (categorical), and (3) an interaction between the two. This model thus provides an especially high bar where the effects of tone are concerned—only over-time variance within stories remains in the models.

Even so, Table 5 shows statistically significant results for skin conductance, and the regression coefficients make clear that the effect is as we would expect; the direct effect of negativity is to increase SCL. The same is not true for heart rate. Here, there are no discernible direct effects. We expect this is partly a consequence of the fact that both physiological measures, and especially heart rate, cumulate over the course of news stories; put differently, while the ANCOVAs model physiology as a function purely of concurrent tone (controlling for the mediating impact of time), it is likely that physiological effects are driven by some as-yet-unknown combination of current tone, and past tone (over the past 5 seconds, or past 10 seconds, or minute). We do not engage in a full-scaled time-series analysis here, however. Rather, we take Tables 5 and 6 as evidence that, at least where SCL is concerned, effects are evident even in the most restrictive model. Negativity appears to matter, controlling for subject matter.

Discussion and Conclusions

Our experiment shows, using for the first time actual network news broadcasts, that participants react more strongly to negative than to positive news content. Viewed from a media effects perspective, the implication is that negative news content is likely to have a greater, and possibly more enduring, impact than is positive news content. This is in line with work on negative political advertising, as well as with a diverse body of work in political behavior, communication, and other fields (reviewed earlier). Our demonstration makes clear that the asymmetry carries over to regular news content as well.

In so doing, our results highlight one often overlooked psychophysiological account for the focus on negative information in news media, and indeed in communications, behavior,

Table 5
Within-respondent ANCOVAs, skin conductance levels, within-story analysis

ANCOVA				OLS regression	
	Partial SS	*df*	*F*		Raw coef
Model	3654.99	358	26.13***		
Respondent	210.36	58	9.28***		
Story	48.39	7	17.69***	Order	.380 (.119)
Resp*Story	3040.00	287	37.11***		
Order	3.97	1	10.15***		
Time	121.66	1	311.38***	Time	−.046 (.002)
Time^2	36.93	1	94.53***	Time^2	.0007 (.0001)
Negative	2.15	1	5.49*	Negative	−.053 (.023)
Neg*Time	3.66	1	9.36**	Neg*Time	.009 (.003)
Neg*Time^2	3.098	1	7.93**	Neg*Time^2	−.0002 (.0000)
Residual	3741.36	9576		Constant	17.958 (.790)
Total	7396.34	9934		Rsq	0.494

$N = 9{,}935$. Results are based on eight positive or negative stories only, using data averaged at five-second intervals. ANCOVA = analysis of covariance; Rsq. = R-squared; Neg ∗ Time = Negativity ∗ Time interaction; OLS = ordinary least squares.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 6
Within-respondent ANCOVAs, heart rate, within-story analysis

ANCOVA				OLS regression	
	Partial SS	*df*	*F*		Raw coef
Model	1537288.49	358	105.03***		
Respondent	1335315.57	58	563.10***		
Story	6488.65	7	22.67***		
Resp*Story	90215.79	287	7.69***		
Order	30.87	1	0.76	Order	−1.061 (1.221)
Time	1121.60	1	27.43***	Time	−.139 (.027)
Time^2	869.79	1	21.27***	Time^2	.004 (.001)
Negative	4.87	1	0.12	Negative	.081 (.234)
Neg*Time	79.87	1	1.95	Neg*Time	.044 (.031)
Neg*Time^2	118.47	1	2.90[a]	Neg*Time^2	−.002 (.001)
Residual	547265.685	10800		Constant	77.465(8.088)
Total	2131172.09	10864		Rsq	0.799

$N = 9{,}847$. Results are based on eight positive or negative stories only, using data averaged at five-second intervals. ANCOVA = analysis of covariance; OLS = ordinary least squares; Rsq. = R-squared; Neg ∗ Time = Negativity ∗ Time interaction; Resp ∗ Story = Respondent ∗ Story Interaction.
[a]$p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

and political affairs more generally. This account is, we believe, much more convincing than what seems to be the implicit, popularized argument about political news, and indeed news more generally—that journalists or editors are just cynical people, drawn to present negative news whenever possible. (The same has been said of politicians and party strategists, of course.)

There are also more conjectural interpretations of these findings. One links negativity biases to theories in evolutionary psychology.[21] Another links physiological reactions to political attitudes. There is a growing, and fascinating, body of work in political science interested in finding physiological as well as genetic accounts for political behavior (e.g., Alford & Hibbing, 2004; Alford, Funk, & Hibbing, 2005; Fowler, Dawes, & Christakis, 2009; Hatemi et al., 2010; Hatemi et al., 2011; Smith, Littvay, Larimer, & Hibbing, 2007). Most salient here is the work that finds a relationship between left-right political orientations and the magnitude of reactions to negative information. For instance, Oxley and colleagues (2008) find that subjects more sensitive to threatening images also tend to be more supportive of a range of conservative policies (including defense spending and capital punishment); more recently, Smith, Oxley, Hibbing, Alford, and Hibbing (2011) find that subjects demonstrating greater levels of "disgust sensitivity" are more likely to self-identify as conservatives. The implication is that higher levels of fear or disgust can lead people to take on more conservative (i.e., cautious) political attitudes. This argument is of course contested (see, e.g., Charney, 2009), but where our work is concerned it does point to the possibility of heterogeneity in subjects' negativity biases. That said, our study is ill-equipped to examine differences across political-ideological groups: the post-experiment survey includes prospective vote, but just 11% of our respondents indicate a preference for the Conservative Party.[22] There clearly is a partisan bias in our student sample. But to the extent that partisanship is related to negativity biases, the effect here will be to compress rather than augment our findings. That we find negativity biases in what is a rather left-leaning sample is important, then. It also fits with results in previous work: the argument is not that liberals show no reactions to negative cues, after all, just smaller ones.

We cannot provide an adequate test of the relationship between physiological reactivity and political attitudes. We wish only to highlight the connections between what we have identified here, and what others have identified in related fields. We do not require inter-partisan heterogeneity to make our results interesting or important to the study of political psychology and political communication, however. That humans react more strongly to negative news content is on its own enough— enough, that is, to lead to a serious reconsideration of how and why negative news is so prevalent.

News is likely negative in part because news consumers are more attentive to negative information. But the propensity to over-represent negativity in mass media need not be a product of profit-maximization alone. Journalists and editors are also humans, after all, and thus have the same tendencies as their audience. Moreover, the design of mass media as an institution likely predisposes media toward focusing on the negative. One of the main functions of media in a democracy is holding current governments (and companies, and indeed some individuals) accountable. This notion of mass media as a "fourth estate" (Carlyle, 1841) has been prominent both in the literature on newspapers (e.g., Merrill & Lowenstein, 1971; Hage, Dennis, Ismach, & Hartgen, 1976; Small, 1972), as well as in the pages of newspapers themselves. Surveillance of this kind mainly involves identifying problems. We might consequently expect that media emphasize negative information in part because it is their job to do so.

There is certainly more work to be done with these, or similar, psychophysiological data. For the time being, this article has focused on a simple, but we believe

profound, hypothesis; namely, that negative news elicits quite different (i.e., stronger and longer) reactions from media consumers than does positive news. Evidence here suggests that it does, and in so doing it suggests a psychophysiological explanation for the focus on negative information in mass media: it is more arousing and attention grabbing.

Notes

1. We do not provide citations to this work here, but the literature on each of these topics is discussed in detail later.

2. There is some work that links the negativity bias to evolution, in short: it may be evolutionarily advantageous to prioritize negative over position information; humans may thus be hard-wired to do this; and media content may reflect this tendency. We do not discuss this possibility in detail here; see, for example, Shoemaker, 1996; Fuller, 2010; Soroka, 2014.

3. For early work see Feldman, 1966; Hodges, 1974; Hamilton and Huffman, 1971. For more recent work see Fiske, 1980; Ronis and Lipinski, 1985; Singh and Teoh, 2000; Van der Pligt and Eiser, 1980; Vonk, 1993, 1996.

4. The implication is that there will be an especially large degree of information processing when someone in a bad mood receives bad news. See Forgas, 1992. See also a related body of work on mood-congruence and mood-state-dependent memory (e.g., Bower, 1981; Ucros, 1989). That said, the emphasis in this work is not on the relative importance of negativity, but rather the relationship between one's ability to remember positive or negative information based on his or her current emotional state.

5. Consider also, for instance, work on "person memory" (e.g., Ybarra & Stephan, 1996), work on performance evaluations of employees and students (e.g., Ganzach, 1995; Rowe, 1989), work on the effects of positive versus negative events on psychological distress (e.g., Hobfoll, 1988, Wells, Hobfoll, & Lavin 1999), and on daily "mood" (e.g., David, Green, Martin, & Suls, 1997).

6. The literature is vast, but see, for example, Tversky, Slovic, and Kahneman, 1990; Kahneman and Thaler, 1991; Shoemaker and Kunreuther, 1979; Arkes and Blumer, 1985; Diamond, 1988. For a partial review, see Edwards, 1996.

7. Though note that these "negative voting" results have been contested by other authors, suggesting alternative hypotheses that account for the regularity with which presidents' parties lose seats in midterm elections (e.g., Hinckley, 1981; Cover, 1986; Born, 1990). Recent work suggests a story more in line with Kernell (1977), but based on a prospect theory account that emphasizes the relationship between disappointment with the current presidential administration and electoral turnout (Patty, 2006). Aragones' (1997) work suggests a related negative-reaction account for declining popularity the longer a candidate stays in office.

8. These findings reflected observations in several earlier studies, including Campbell, Converse, Miller, and Stokes' (1960) work on electoral behavior, and Mueller's (1973) study of U.S. foreign policy.

9. Though note that prospect theory, loss aversion, and asymmetry more broadly construed have played an important role in a number of political science subfields as well. There exist several recent reviews of the political science literature informed by prospect theory; see, for example, Levy, 2003; McDermott, 2004; Mercer, 2005.

10. For a thorough review of psychophysiological approach in communication studies, see Ravaja, 2004.

11. The experiment was run at 2 different times—42 respondents participating in early 2010, and the remaining 21 in fall 2012. There are no significant differences in results across the two groups, so we lump them together in analyses here.

12. There is no evidence that these expert coders had different physiological reactions to news stories; dropping them from the analyses has no significant impact on results, so we include them here.

13. See Potter and Bolls (2012) for a particularly useful discussion of heart rate (and other physiological measures as well, including skin conductance) in media studies. These authors also note that the relationship between heart rate and attentiveness is still being explored; and some work suggests that heart rate variability may be a better indicator of information processing (e.g., Ravaja, 2004). Our sense of the literature is in line with Potter and Bolls; however, there is a considerable body of evidence (including Lang's seminal work, cited earlier) suggesting that decreased heart rate indicates increased information processing (i.e., increased attentiveness).

14. This and all subsequent analyses were conducted both with a simple dummy variable to capture tone, and by using the interval-level measure produced by the coders. Both work similarly in every case. For the sake of simplicity, we use the simple dummy variable here.

15. Basic descriptive statistics for the dependent variable, SCRs, are as follows: mean, 1.602; standard deviation, 1.326; min, 0; max, 7.

16. Indeed, respondent IDs account for roughly 45% of the total variance (248.208/551.60).

17. Basic descriptive statistics for the dependent variable, SCRs, are as follows: mean, 15.096; standard deviation, .344; min, 13.616; max, 19.174.

18. Basic descriptive statistics for the dependent variable, SCRs, are as follows: mean, 76.197; standard deviation, 13.330; min, 30.782; max, 167.612.

19. Results are available upon request.

20. Predicted values and associated margins of error are based on leaving all other variables in the data set at their actual values, and shifting just the direct and interacted values for tone.

21. See note 2.

22. Preliminary tests did not reveal stronger negativity biases in these more conservative voters; but this is no surprise given how few conservative voters there are to work with.

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