News, Politics, and Negativity

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Abstract:
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 paper 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.

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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 US 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 US 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 paper 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; they suggest, in short,

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

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.

[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 hardwired to do this; and media content may reflect this tendency. We do not discuss this possibility in detail here; see, e.g., Shoemaker 1996; Fuller 2010; Soroka 2014.

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 et al. 2001; Cacioppo and Gardner 1999; Rozin and 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 and Mackie 1992; Isen 1987; Isen et al. 1997; Scharz 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]

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[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 their current emotional state.

[5] Consider also, for instance, work on "person memory," e.g., Ybarra and Stephen 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 and Lavin 1999; and on daily "mood," e.g., David, Green, Martin and Suls 1997.

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 and Tversky 1979; Tversky and 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 and Rabin 1997).

Work in political science finds evidence of negativity biases as well. Klein, for instance, applies impression formation theories to survey data on US presidential evaluations. A 1991 paper 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 paper (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, esp. Lau 1982, 1985; Holbrook et al. 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

[6] The literature is vast, but see, e.g., 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, but based on a prospect theory account that

findings in work on economic voting as well (Bloom and Price 1975; Claggett 1986; Headrick and Lanoue 1991; Kiewet 1982; Nannestad and 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 US (Geer 2006; Fridkin and Kenney 2004). Campaign strategists believe that negative advertising works, especially in competitive races (Able et al. 2001; Goldstein et al 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?, and (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 et al (1999), are for both issues rather divided. (The literature is vast, but see, e.g., Ansolabehere et al. 1994; Ansolabehere and Iyengar 1995; Bullock 1994; Hitchon et al. 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

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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 et al.'s (1960) work on electoral behavior, and Muller's (1973) study of US 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, e.g., Levy 2003; McDermott 2004; Mercer 2005.

conveyed in positive ads (e.g., Babbitt and Lau 1994; Kahn and Kenney 1998b). 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 and Lee 1995; Harmon 1989; Hofstetter and Dozier 1986; Ryu 1982); and a good deal of work documenting a tendency towards negative stories as well (e.g., Diamond 1978; Fallows 1997; Just et al. 1996; Kerbel 1995; Lichter and Noyes 1995; Niven 2000; Patterson 1994; Robinson and 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 and others, e.g., Altheide 1997; Ericson et al. 1989; 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 towards 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 reviewed above, 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 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 seven news stories. Stories were separated by one minute of grey screen; there was a countdown indicated with a large white number on the grey 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 grey 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

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

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

four that showed varying degrees of negativity. Topics varied from healthcare 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.

[Table 1 about here]

The tone of the news stories was confirmed in three different ways. First, seven 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, there were asked to code each for tone, using a seven-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 4th-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 five-point scale, second-by-second. There is of course some variance within stories; and that variance becomes useful in analyses below, as we shall see. For the time being,

[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 below.

however, we use these 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 — that is, 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 heartrate.

Skin conductance (SC), reflecting the level of moisture exuded by the ecrine 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 et al. 1999; Lang et al. 1999; Bolls et al. 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 and 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.

Heartrate 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 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 heartrate. Below, heartrate is examined at 5-second intervals.

Heart rate is often used as a measure of attentiveness, where decreasing heart rate indicates increasing attentiveness (Lang 1990; Mulder and 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.)

[Figures 1 and 2 about here]

For skin conductance (SC) analyses, data are originally sampled 256 times per second, but downsampled for analysis by taking averages over 125-ms intervals. The SC signal is smoothed slightly for analysis, using Lowess smoothing 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

[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 above) suggesting that decreased heart rate indicates increased information processing (i.e., increased attentiveness).

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 non-linear 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 (above) 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, small x's on that line denote SCRs.

Heartrate in Figures 1 and 2 is shown as a Lowess-smoothed 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 (ANCOVA) of both SCL and Heartrate, averaged over 5-s intervals. In each case, the physiological measure is modeled as a function of the following:

(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-second intervals) and time squared, to capture the (potentially non-linear) tendency for both SCL and heartrate to decline slightly over the course of the experiment; and

(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.

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[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).

[Table 2 about here]

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-second 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.

[Tables 3 and 4 about here]

The same is true for heartrate, shown in Table 4.[18] These results are based again on 5-second averages, and the same model as is used for SCL. Negativity is, as we expect, associated with a decreased heartrate. This likely suggests heightened attentiveness, though recall that heartrate may actually reflect some combination of attentiveness and arousal. That there is another possibility as well: heartrate 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 heartrate, to see both if SCL and heartrate are systematically related, and if negativity continues to matter to heartrate, independent of SCL. Doing so shows no significant relationship between SCL and heartrate, however and no significant changes in the other coefficients in

[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.

the model either. These results offer some evidence that heartrate does indeed capture something independent of arousal.[19]

[Figures 3-5 about here]

Results for SCR, SCL and heartrate are made clearer in Figures 3 through 5. The figures show the predicted levels of each measure, based on the regression models in Tables 2 to and 4.[20] Note the difference between positive and negative stories in each case. Negative stories are associated with decreased heartrate (more attention) and increased SCRs and SCL (more activation); positive stories are associated with increased heartrate (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. (Indeed, the strong mediating influence of time on both skin conductance and heartrate make clear that this 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

[19] Results are available upon request.
[20] Predicted values and associated margins of error are based on leaving all other variables in the dataset at their actual values, and shifting just the direct and interacted values for tone.

negative information on healthcare differently than positive information on healthcare, 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 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 heartrate. All across-respondent and across-story variance is captured through the inclusion of (a) respondents (categorical), (b) stories (categorical), and (c) 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.

[Table 5 and 6 about here]

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 heartrate. Here, there are no discernible direct effects. We expect this is partly a consequence of the fact that both physiological measures, and especially heartrate, cumulate over the course of news stories; put differently, while the ANOVAs 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 & 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 above). 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, 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

[21] See note 2.

genetic accounts for political behavior (e.g., Alford and Hibbing 2004; Alford et al. 2005; Fowler et al. 2009; Hatemi et al. 2010a, 2010b. 2009; Smith et al. 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 et al. (2008) find that subjects more sensitive to threatening images also tend to be more supportive of a range of conservative policies (incl. defense spending and capital punishment); more recently, Smith et al. (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

[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.

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 towards focusing on the negative. One of 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 and Lowenstein 1971; Hage et al. 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 paper 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.

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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 US	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 US, 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.

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 (c)	5.173	1	3.89*	Order (c)	-.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. * p < .05, ** p < .01, *** p < .001. Results are based on data for 8 positive or negative stories only, aggregated by story.

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 (c)	5.975	1	8.76**		Order (c)	.013 (.004)
Time (c)	157.028	1	230.21***		Time (c)	-.070 (.006)
$Time^2$ (c)	65.128	1	95.48***		$Time^2$ (c)	.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. * p < .05, ** p < .01, *** p < .001. Results are based on 8 positive or negative stories only, using data averaged at 5-second intervals.

Table 4. Within-Respondent ANCOVAs, Heartrate, 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 (c)	3996.264	1	78.89***	Order (c)	-.342 (.038)
Time (c)	1524.096	1	30.09***	Time (c)	-.250 (.048)
$Time^2$ (c)	1276.758	1	25.21***	$Time^2$ (c)	.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=10865. * p < .05, ** p < .01, *** p < .001. Results are based on 8 positive or negative stories only, using data averaged at 5-second intervals.

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 (c)	.380 (.119)
Resp*Story	3040.00	287	37.11***		
Order (c)	3.97	1	10.15***		
Time (c)	121.66	1	311.38***	Time (c)	-.046 (.002)
$Time^2$ (c)	36.93	1	94.53***	$Time^2$ (c)	.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=9935. [a] p < .10, * p < .05, ** p < .01, *** p < .001. Results are based on 8 positive or negative stories only, using data averaged at 5-second intervals.

Table 6. Within-Respondent ANCOVAs, Skin Conductance Levels, 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 (c)	30.87	1	0.76	Order (c)	-1.061 (1.221)
Time (c)	1121.60	1	27.43***	Time (c)	-.139 (.027)
$Time^2$ (c)	869.79	1	21.27***	$Time^2$ (c)	.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=9847. [a] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. Results are based on 8 positive or negative stories only, using data averaged at 5-second intervals.

Figure 1. Skin Conductance and Heartrate: Respondent 12

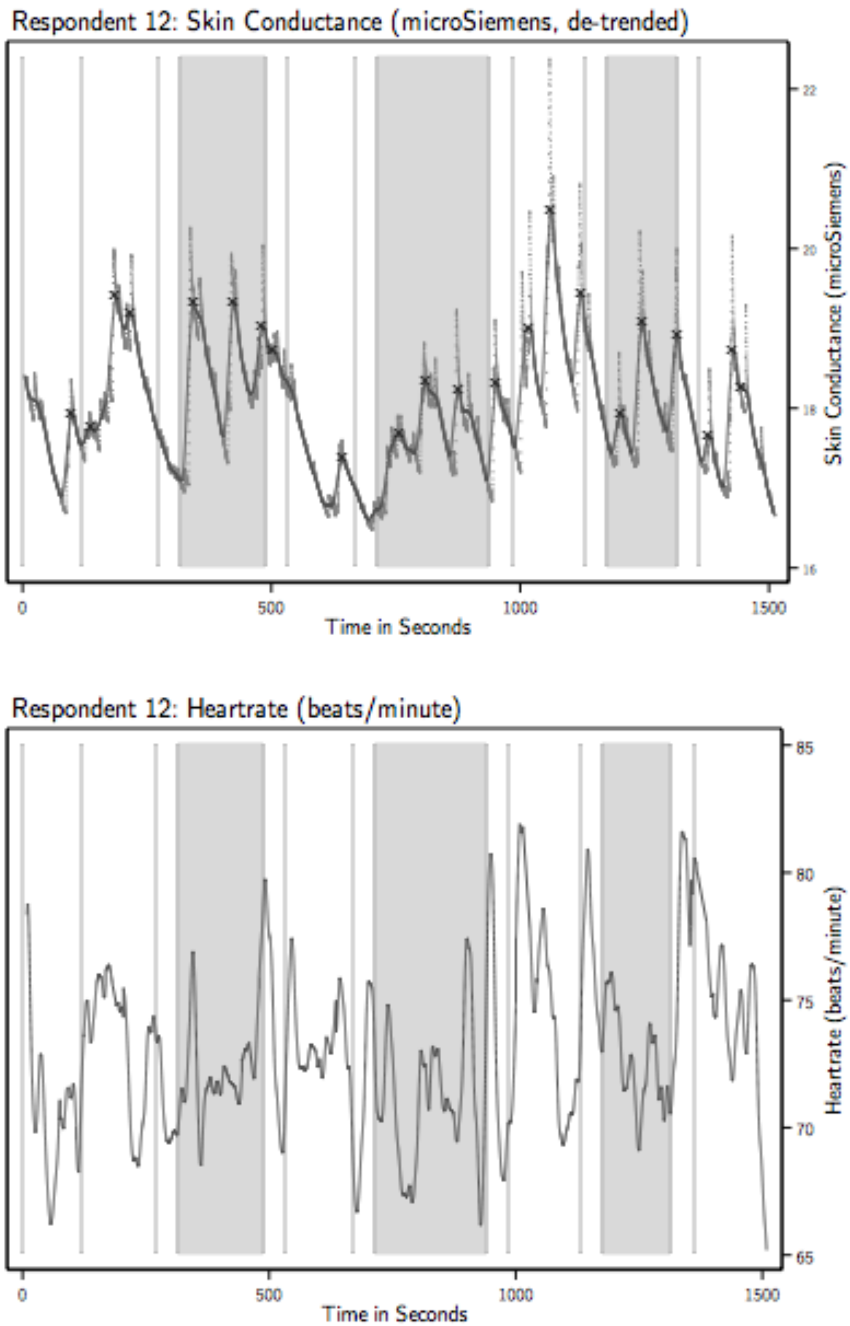
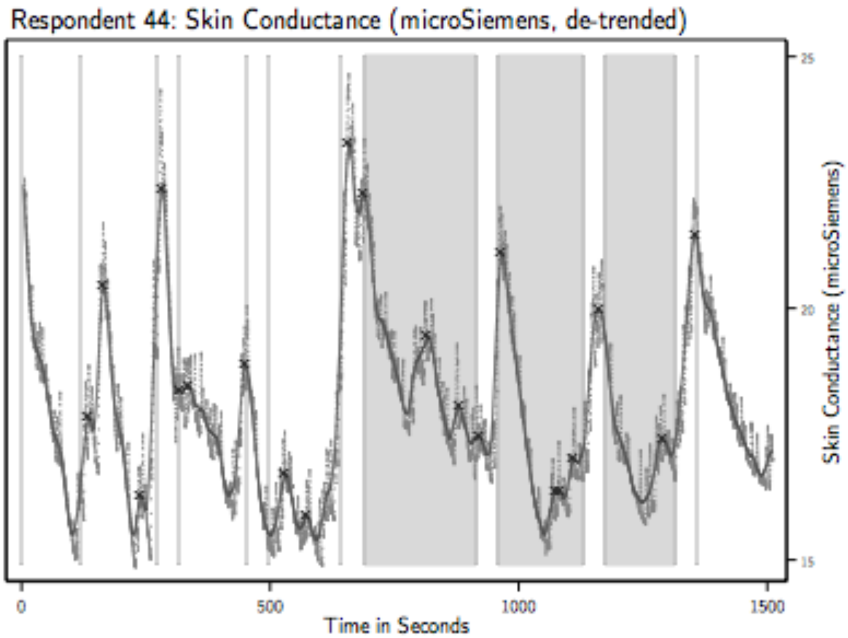


Figure 2. Skin Conductance and Heartrate: Respondent 44



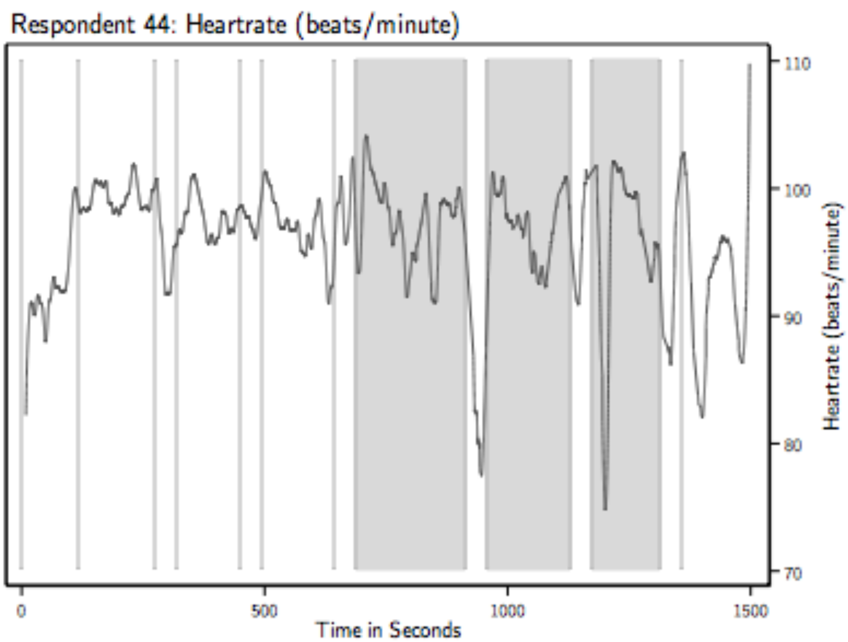


Figure 3. Predicted Values, Skin Conductance Responses

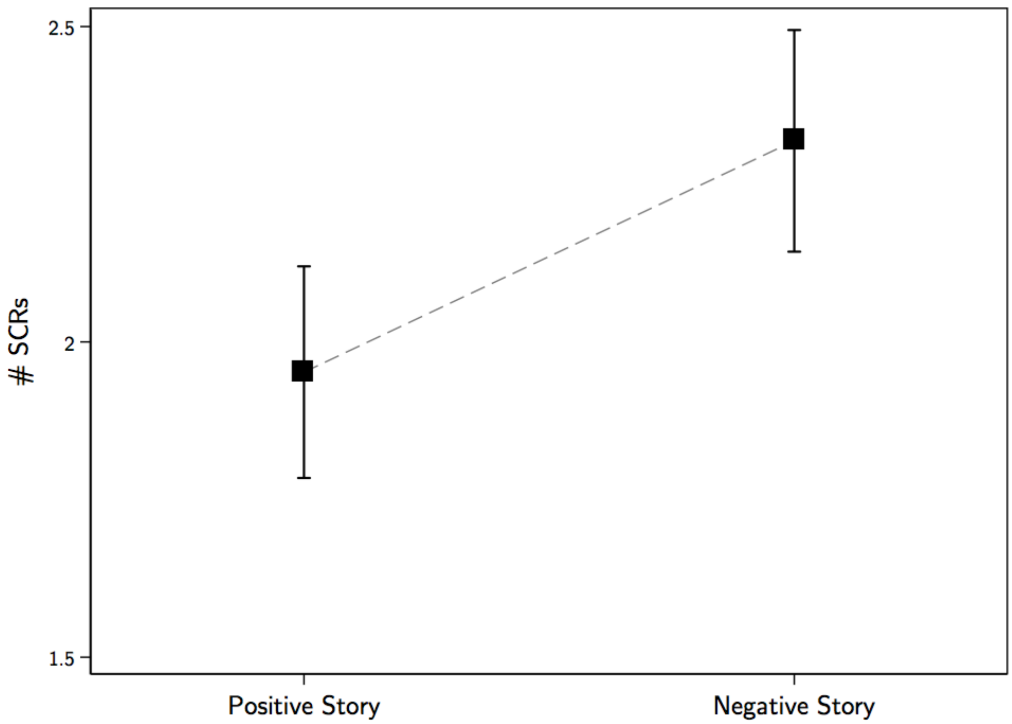


Figure 4. Predicted Values, Skin Conductance Levels

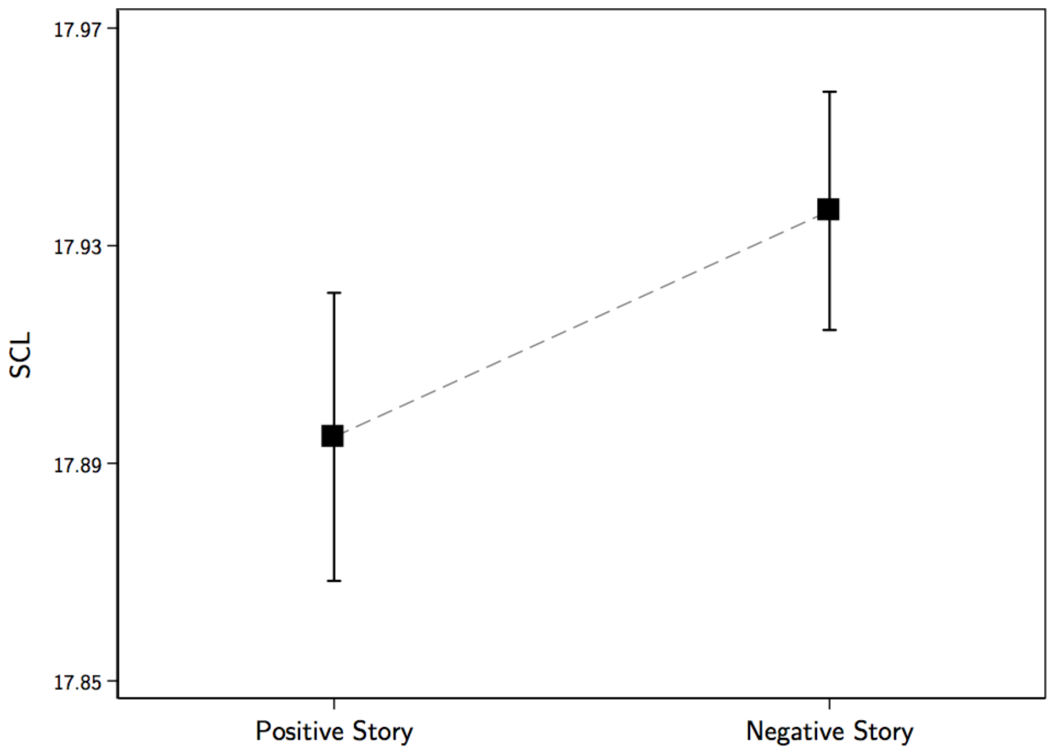


Figure 5. Predicted Values, Heartrate