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Abstract

We propose that political extremists use more negative language than moderates. Previous research found that conservatives report feeling happier than liberals and yet liberals "display greater happiness" in their language than do conservatives. However, some of the previous studies relied on questionable measures of political orientation and affective language; and no studies have examined whether political orientation and affective language are non-linearly related. Revisiting the same contexts (Twitter, U.S. Congress), and adding three new ones (political organizations, news media, crowdsourced Americans), we found that the language of liberal *and* conservative extremists' was more negative and angry in its emotional tone than that of moderates. Contrary to previous research, we found that liberal extremists' language was more negative than that of conservative extremists. Additional analyses supported the explanation that extremists feel threatened by the activities of political rivals, and their angry, negative language represents efforts to communicate as much to others.

Keywords: language, anger, extremism, liberals and conservatives, threat, happiness

Open Science Practices. The data and code are available at https://osf.io/va3hk/

Extremists on the Left and Right Use Angry, Negative Language

> For too many of our citizens, a different reality exists: Mothers and children trapped in poverty in our inner cities; rusted-out factories scattered like tombstones across the landscape of our nation; an education system flush with cash, but which leaves our young and beautiful students deprived of knowledge; and the crime and gangs and drugs that have stolen too many lives and robbed our country of so much unrealized potential. This American carnage stops right here and stops right now.
>
> *Inaugural Address, President Donald J. Trump*

The opening epigraph, from U.S. President Donald Trump's 2017 Inaugural Address, painted a dire picture of the state of the country. Does this negative portrayal reflect a general tendency among people of a conservative[1] or right wing political persuasion, such as Donald Trump[2], to use negative language? Recent research suggests that it might: Sylwester and Purver (2015), Turetsky and Riddle (2018), and Wojcik, Hovsasapian, Graham, Motyl, and Ditto (2015) reported that liberals "display greater happiness" in their language than conservatives. Noting limitations in the previous studies (described below), we revisit this question and report six new studies. We find that extremists—on both the political left *and* right—use more negative language than moderates. If anything, liberal extremists use the most negative language of all.

Definitions

We define extremism following past research (e.g., Brandt et al., 2015; van Prooijen, Krouwel, Boiten, & Eendebak, 2015), as the tendency to identify with, be seen as belonging to, and behave in a manner that strongly supports a liberal or conservative agenda. To study how extremism is associated with the use of negative language, we study how people with different political beliefs have differing levels of positivity (versus negativity) in spoken or written text, what is called emotional tone (McAdams, Diamond, de St. Aubin, & Mansfield, 1997).

Political Orientation and Negative Language: Three Competing Hypotheses

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[1] We use the terms *left wing* and *liberalism* synonymously, as well as *right wing* and *conservatism*. The two dimensions diverge in some countries. However, they converge in the U.S., the primary context under study.

[2] Although Donald Trump was a Democrat until 2009 and currently supports some left-leaning policies (e.g., investing in infrastructure), most of his policies and his inaugural address are right of center.

Our primary question is: Which political group—liberals, conservatives, or extremists on both sides—uses the most negative language? We consider two existing and propose one novel hypothesis.

Negative liberals hypothesis. The first hypothesis is that liberals use the most negative language. Conservatives report feeling happier than liberals (for a meta-analysis, see Onraet, Van Hiel & Dhont, 2013) in part because conservatives are less troubled by social and economic inequality (Napier & Jost, 2008), are more likely to have personality traits associated with happiness (Schlenker et al., 2012), or are more likely to deceive themselves when reporting their feelings (Wojcik et al., 2015). Ideological happiness gap researchers have not made explicit claims regarding affective language. However, if happy people adopt language with a similar emotional tone as their feelings, then liberals' relative unhappiness could surface in their use of more negative language. Alternatively, if the act of using negative language changes how a person feels, then liberals' relative unhappiness could be a result of their use of more negative language.

Negative conservatives hypothesis. The second hypothesis is that conservatives use more negative language than liberals, perhaps because conservatives are particularly sensitive to negativity (Hibbing, Smith, & Alford, 2014), defensive in response to perceived threat (Jost, Glaser, Kruglanski, & Sulloway, 2003), or have a negative view of human nature (Lakoff, 2002). Wojcik et al. (2015) and Sylwester and Purver (2015) reported that conservatives in the U.S. Congress and on Twitter use more negative language than liberals, and Turetsky and Riddle (2018) reported the same trend in news articles covering the 2014 shooting of Michael Brown.

However, these studies may have relied on questionable measures. Three of the four prior studies (Sylwester & Purver, 2015; Turetsky & Riddle, 2018; Wojcik et al., 2015, study 3) used a

measure of political orientation that may have confounded conservatism with extremism. The Twitter studies (Sylwester & Purver, 2015; Wojcik et al., 2015, study 3) operationalized political orientation as the tendency to "follow" the Republican Party and not the Democratic Party on Twitter. The issue with using whether a participant followed the Republicans or Democrats is that it is not possible to tease apart ideological direction from ideological extremism. Democrats and Republicans are ideologically different, with the Republicans being the more conservative party. But the two parties also differ on extremism. Currently, members of the Republican Party are more conservative/extreme than members of the Democratic Party are liberal/extreme (Lewis & Poole, 2004). Therefore, these two studies finding that Republican Party followers used more negative language than Democratic Party followers could reflect Republicans being more conservative, or more extreme, than Democrats, or both. The study of the media (Turetsky & Riddle, 2018) suffered from the same basic problem: it operationalized political orientation on a liberal-conservative linear continuum. It remains possible that the finding that liberals used more positive language reflects greater liberalism or less extremism on the part of the liberal news outlets in this sample.

In our Studies 1 and 4, we revisited the same contexts (Twitter, the media) and used validated continuous measures of political orientation, which allowed us to independently quantify political orientation and extremism, and thus test whether the potential extremism confound explains away the "liberals display greater happiness" finding. Finally, the analysis of U.S. Congress (Wojcik et al., 2015, Study 2) relied on text analysis dictionaries that did not pass our validity tests (see the Supplemental Materials). In Study 3, we revisit U.S. Congress with validated measures and report results that depart from the prior ones.

Negative extremists hypothesis. We propose a third and novel hypothesis: that the language of extremists on both the left and the right is more negative than the language of ideological moderates. Our hypothesis draws from Realistic Group Conflict Theory (Sherif, Harvey, White, Hood, & Sherif, 1961), which suggests that competition for fixed resources causes intergroup hostility. Political orientation is a salient form of group identity (Huddy, Mason, & Aarøe, 2015; Kinder & Kalmoe, 2017; Mason, 2018), and extremists by definition identify strongly with political causes and compete with extremists on the other side for political power.

Previous research established that extremists on each side feel threatened by the other side (Brandt & Van Tongeren, 2017; Crawford, 2014), and a Pew (2016) poll found that half of all U.S. Republicans and Democrats see the other party as a "threat to the nation's well-being". Compared to moderates, extremists may feel elevated threat from unlike-minded others because extremists' ideological differences with others are maximized, simply by virtue of them being on the ideological fringe (cf. Byrne, 1969; Wynn, 2016). Additionally, extremists tend to feel stronger moral conviction in their beliefs than do moderates (Ryan, 2014).

A common response to others violating one's morally convicted beliefs is feeling threatened and angry (Mullen & Skitka, 2006). While anger, anxiety, and sadness are all responses to unpleasant events, anger is distinguished from other negative emotions in that it is especially associated with attributions that other people have done something wrong (Smith & Ellsworth, 1985). This leads to the prediction that extremists perceiving threat will especially give rise to angry language (although, elevated sad and anxious language are also possible). Our proposal is that in response to these perceived threats, extremists on the left and right tend to "sound the alarm" by communicating in an angry, negative tone.

The Present Studies

Our primary goal is to test whether liberals, conservatives, or extremists of both varieties use the most negative language. We examined all three in five contexts—Twitter users (Study 1), organizations spanning the ideological spectrum (Black Panthers to ISIS; Study 2), U.S. Congress (Study 3), media outlets (Study 4), and online, ideologically diverse samples (Studies S1 & S2), followed by a meta-analysis (Study 5). Together, our studies sampled political and cultural elites and everyday people, and with a wide variety of political views. Our data also span multiple decades and multiple countries, allowing us to test whether extremists' language was less negative when they enjoyed political power (Studies 3 & 4). We operationalized political orientation in multiple ways, using behavioral measures (inferred from vote counts and Twitter following behavior), informant reports (reputation), and self-reports; and we operationalized language valence using both computerized text analyses and human coding (see the Supplemental Materials for an extensive discussion and validation of our operationalizations of emotional tone of language). In all studies, we also tested whether the use of angry language better distinguishes extremists from moderates than other negative emotions like sadness and anxiety.

As will become evident, the number of text documents varied substantially across the four main studies, ranging from 55 to 3,380,140 text documents. We decided to not use text documents as the unit of analysis for three reasons: (a) doing so would have resulted in highly variable statistical power across studies, (b) text documents were not always a "natural" unit of analysis (they sometimes aggregated the texts of multiple authors), and (c) documents varied widely in length. We circumvented these issues by dividing each text document into segments 1000 words in length before performing analyses. Although somewhat arbitrary, the decision to

create 1000 word segments strikes a balance between stable estimates of word densities (larger

files are more stable) and statistical power (many files of smaller size produce more power).

Results were relatively consistent when segmenting and not segmenting (see Table S5).

Studies 1 & 2

We tested whether political orientation and/or extremism predicted the emotional tone,

including anger, sadness, and anxiety, of the language in Twitter tweets (Study 1) and publicity

materials produced by organizations, including radical extremists (e.g., ISIS), spanning the

ideological spectrum (Study 2). We predicted that extremists on both ends of the political

spectrum would use more negative language than moderates, and that angry language would

better distinguish extremists from moderates than would sad and anxious language. Study 1

(Twitter) allowed us to test these predictions in a typical sample of relatively moderate

individuals, and Study 2 (organizations) allows us to test whether these effects extrapolate to

even more radical groups (see McClosky & Chong, 1985).

Method

Study 1 (Twitter). In the first four studies, we collected large samples to accurately

estimate the effect sizes. In Study 1, we scraped 3,380,140 tweets, amounting to 40,590,896

words, from the Twitter accounts of 14,480 politically active users (primarily from 2015-2016).

The average Twitter user produced 2,803 words ($SD = 4,315$). To allow Twitter users that

produced more words to have greater empirical influence, we divided each user's text into

34,809 segments of 1000 words each before conducting linguistic analyses.

Using computer software (Linguistic Inquiry and Word Count, LIWC; Pennebaker,

Booth, Boyd, & Francis, 2015), we content-analyzed the segments for the emotional tone of their

language. See the Supplemental Materials for details and evidence establishing the validity of

this procedure for assessing emotional tone. Emotional tone is derived from analyses using the dictionaries called *positive emotion* and *negative emotion*. LIWC does not offer sub-dictionaries for positive emotion whereas sub-dictionaries called *anxiety*, *anger*, and *sadness* comprise the *negative emotion* dictionary. To flesh out the locus of effects that we find with our primary operationalization of emotional tone, we include auxiliary analyses with *positive emotion*, *negative emotion*, *anxiety*, *anger*, and *sadness* dictionaries.

In this and all subsequent studies, political orientation varied from -1 (*extremely liberal*) to 0 (*moderate*) to +1 (*extremely conservative*). Extremism was operationalized as the absolute value of the distance from 0. In Study 1, we used the pattern of twitter accounts that Twitter users followed to estimate the person's political orientation (Barberá, Jost, Nagler, Tucker, & Bonneau, 2015; see the Methods Reporting for details). And we calculated their extremism as their ideological distance from centrism (we used this procedure in all subsequent studies).

Study 2 (Organizations). We built a list of 100 organizations that had publicly available information, such as newsletters and magazines, and spanned the ideological spectrum (see the Supplemental Materials for the complete list). We then downloaded the materials (3,569,992 words). Once again, there was considerable variability in how much text each source produced: 35,700 words on average (*SD* = 119,749), with a range of 1,253 to 883,988. Dividing transcripts into 3,621 segments of equal size (1000 words each), allowed organizations that produced more text to have a greater empirical influence than organizations that produced little text. Finally, we content-analyzed them as we did in Study 1.

To estimate the political orientation and extremism of each organization, we recruited Internet samples to provide ratings (see Methods Reporting for details). The full ideological spectrum was represented in the sample, including extreme liberals like the *Black Panther Party*

(political orientation = -0.79), moderate liberals like *Greenpeace* (-0.42), moderates like the *Red Cross* (-0.11), moderate conservatives like the *Minnesota Tea Party Alliance* (0.51), and extreme conservatives like *ISIS* (0.94).

Analytical Strategy

With the aim of testing the three hypotheses concerning which ideological group uses the most negative language, we developed the following analytic and interpretational strategy. We regressed the emotional tone of language on political orientation and extremism. Notably, much of the data we report in the paper are nested data requiring regression models that take such nesting into account. In Studies 1 and 2, we used multilevel models, including random intercepts, with text segments (i) nested within Twitter users (j) or organizations (j) (depending on the study):

$$\text{Tone}_{ij} = \beta_0 + \beta_1 \text{Political orientation}_j + \beta_2 \text{Extremism}_j + u_{0j} + e_{0ij} \tag{1}$$

We operationalized the three hypotheses as follows (see also Figure 1):

- Negative liberals hypothesis: political orientation is positive, extremism is null.

- Negative conservatives hypothesis: political orientation is negative, extremism is null.

- Negative extremists hypothesis: political orientation is null, extremism is negative.

Hybrid outcomes are also possible where effects of both political orientation and extremism reach significance. In these scenarios, we are interested in knowing whether the slope on the liberal side of (and including) political centrism is significant, as well as if the slope on the conservative side of (and including) political centrism is significant. Analytically, we split the data to include just the liberal side (political orientation ≤ 0) and re-ran the analysis, and then did the same on the conservative side (political orientation ≥ 0). We then used the following interpretational rule:

- Negative liberals hypothesis: extremism on the liberal side is negative whereas extremism on the conservative side is positive

- Negative conservatives hypothesis: extremism on the liberal side is positive whereas extremism on the conservative side is negative

- Negative extremists hypothesis: extremism on both sides is negative.

Figure 1. Strategy for interpreting the relationship between political orientation/extremism and emotional tone of language with respect to the three hypotheses that liberals, conservatives, or extremists have the most negative language. The bottom-right panel displays a hybrid outcome in which the Negative Extremist Hypothesis is supported.

Negative Extremists Hypothesis

Hybrid
(Negative Extremists Hypothesis)
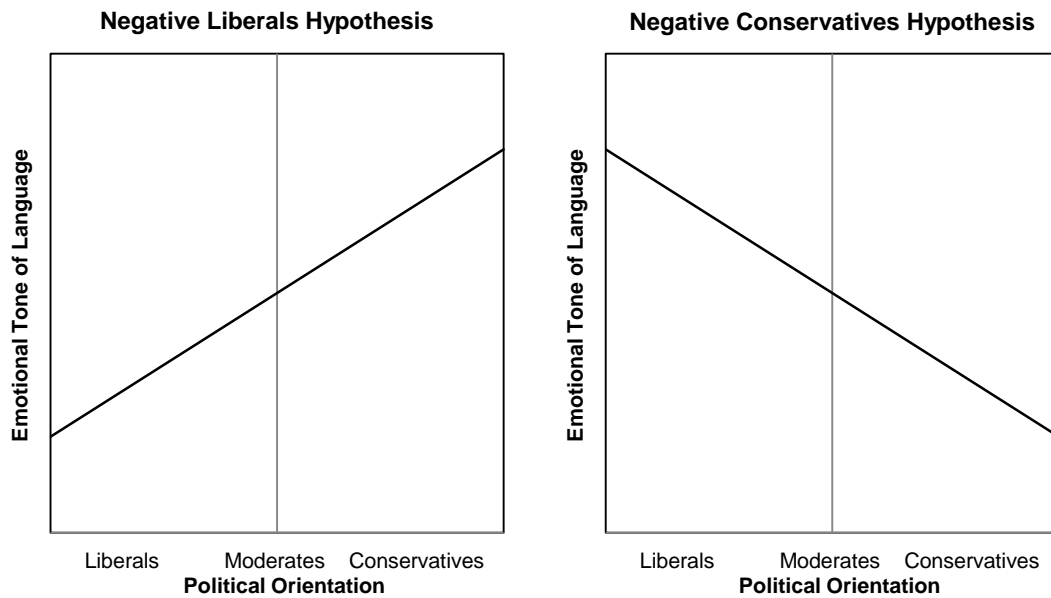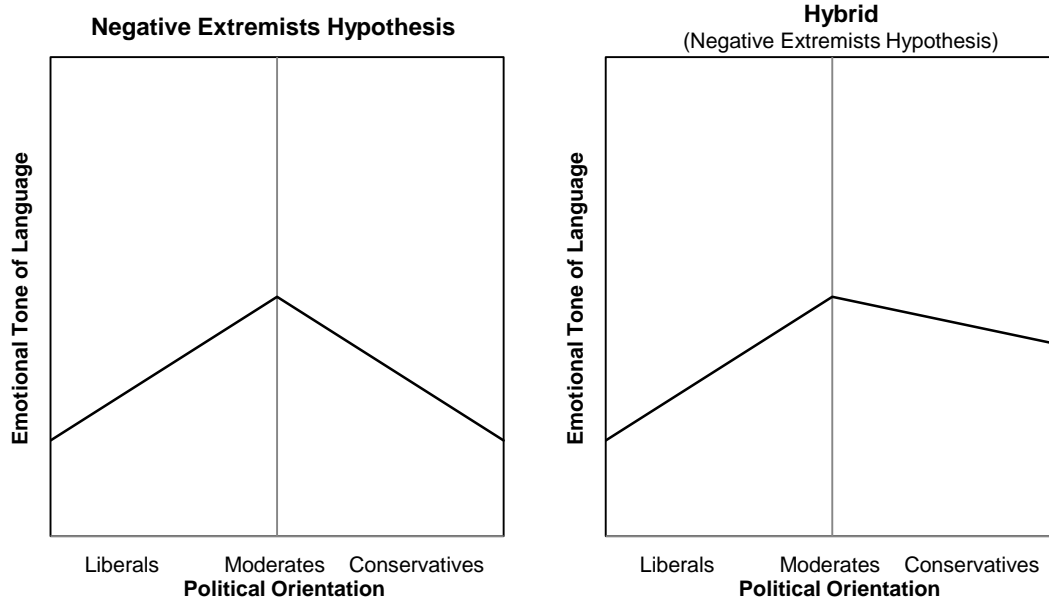
Results

Extremists' tone is the most negative. Figure 2 and Table 1 show how increasing extremism was associated with decreasing emotional tone of the language of Twitter users and organizations, whereas political orientation and emotional tone were unrelated. These results unequivocally support the negative extremists hypothesis. These results also suggest that the potential extremism confound in the prior Twitter studies (Sylwester & Purver, 2015; Wojcik et al., 2015, study 3) could explain away the apparent liberal-conservative differences that were reported therein. In both of our studies, extremists (compared to moderates) used more anger words. In Study 1, but not in Study 2, we also found that extremists used more positive and negative emotion, anxiety, and sadness words. And in Study 1, liberal extremists used more negative emotion, anger, and sadness, and less anxiety words than conservative extremists.

Figure 2. The language of political extremists is more negative in its emotional tone than that of moderates. Results are from Twitter users (Study 1), political organizations (ranging from the Black Panther Party to ISIS; Study 2), members of the U.S. Congress between 1996-2014 (Study 3), and articles from the media written between 1987-2016 (Study 4). For the Twitter data (Study 1), we divided the political spectrum into five quintiles, and represented each quintile using a boxplot. Boxes represent first and third quartiles and medians. Error bars represent maximum and minimum values. For the organization data (Study 2), dots represent individual organizations (averaged across their segments). The line represents the model-implied function from the multilevel model described in the text. For the Congressional data (Study 3), each dot represents the emotional tone of the language of a single U.S. politician over a 2-year session of Congress. The line represents the model-implied function from the multilevel model described in the text. For the news media, each boxplot represent distinct political categories (Study 4). Boxes represent first and third quartiles and medians. Error bars represent maximum and minimum values.
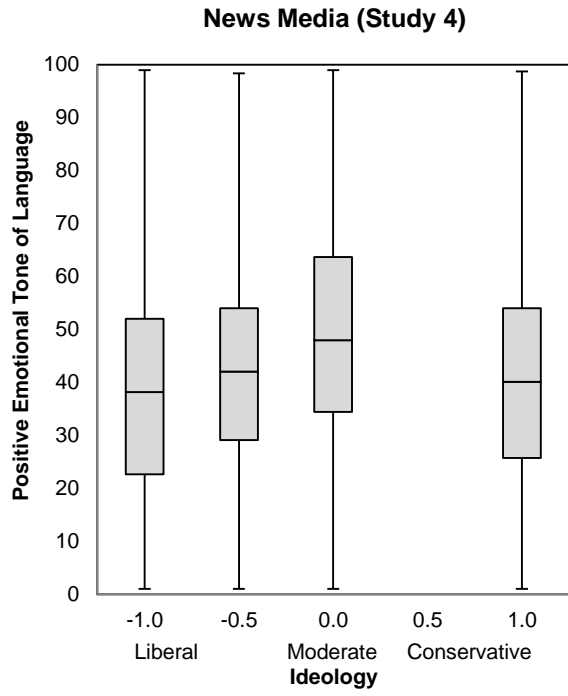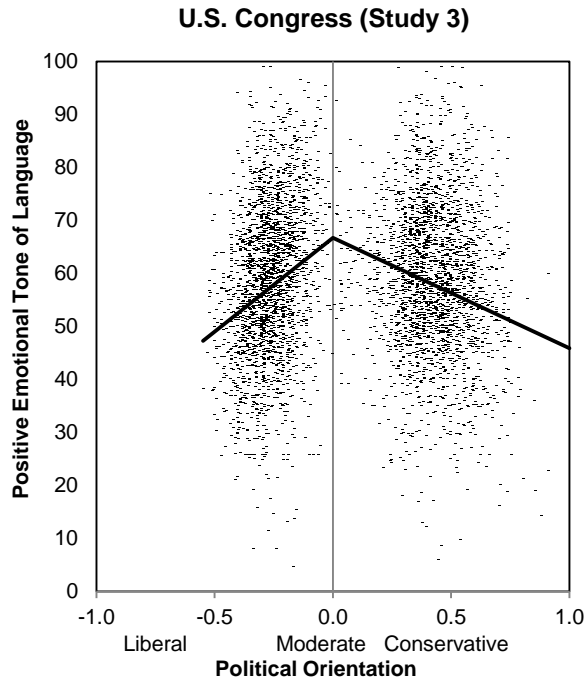
U.S. Congress (Study 3)
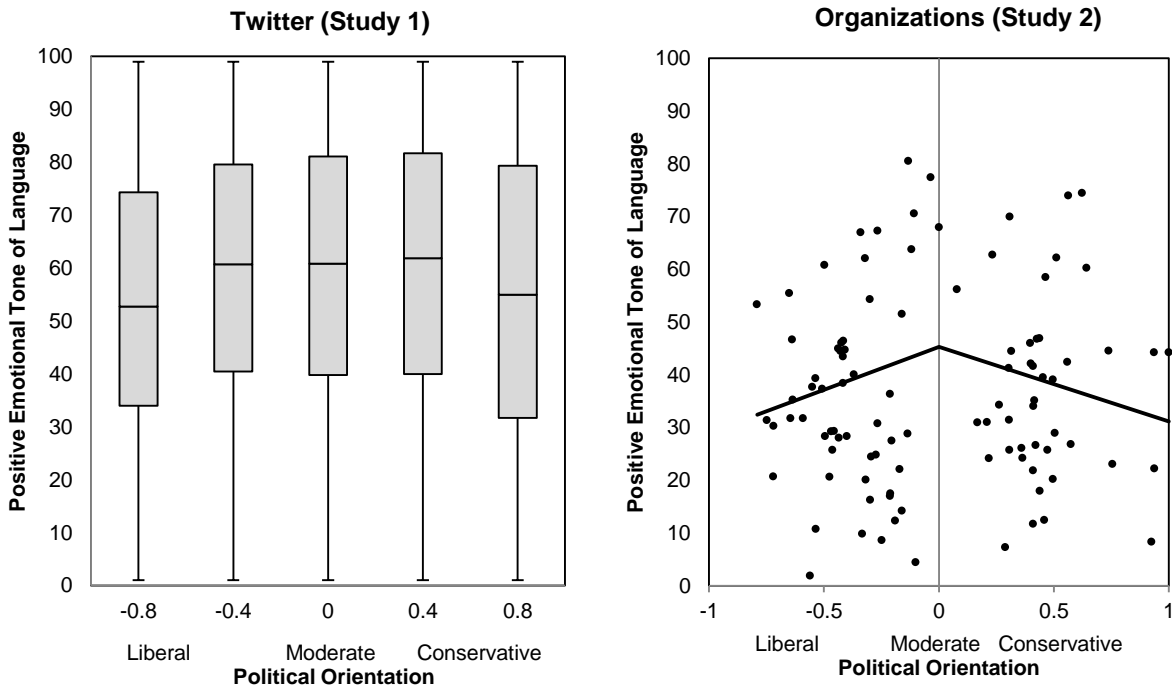
News Media (Study 4)

Table 1. Political extremism negatively predicted the emotional tone of the language of Twitter users (Study 1), Organizations (Study 2), members of the U.S. Congress (Study 3), and articles in the media (Study 4). Analyses used multilevel modeling, with text segments nested within sources. Numbers are unstandardized estimates (and standard errors). Bolded numbers are statistically significant. Multilevel modeling does not have a universally agreed upon method for estimating effect sizes. In all analyses using multilevel modeling, we estimated effect sizes by standardizing all variables (z-scores), re-running the analyses, and taking the unstandardized estimate to be an estimate of effect size, β. All p-values are from 2-tailed tests. Fixed-effects meta-analyses include all 4 studies and Study S1 and S2 (see the Supplemental Materials); effects of political orientation control for extremism, and vice versa.

	Emotional Tone		Positive Emotion		Negative Emotion		Anxiety		Anger		Sadness	
	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β
Twitter (Study 1)												
Political orientation	0.470 (0.340)	.010	-0.020 (0.020)	-.006	**-0.042 (0.020)***	-.017	**0.011 (0.001)***	.017	**-0.033 (0.010)***	-.024	-0.009 (0.010)	-.009
Extremism	**-7.602 (0.730)***	-.076	**0.154 (0.050)***	.024	**0.668 (0.030)***	.133	**0.098 (0.010)***	.072	**0.350 (0.020)***	.119	**0.054 (0.010)***	.027
Organizations (Study 2)												
Political orientation	1.083 (3.286)	.021	0.183 (0.137)	.074	0.104 (0.179)	.043	-0.050 (0.049)	-.064	0.045 (0.112)	.033	0.013 (0.041)	.026
Extremism	**-15.170 (7.307)***	-.160	-0.366 (0.297)	-.081	0.463 (0.401)	.103	-0.059 (0.109)	-.041	**0.530 (0.253)***	.214	0.030 (0.092)	.032
Congress (Study 3)												
Political orientation	**5.676 (0.515)***	.090	**0.079 (0.029)***	.026	**-0.291 (0.021)***	-.116	**-0.024 (0.005)***	-.033	**-0.079 (0.011)***	-.058	**-0.084 (0.005)***	-.117
Extremism	**-22.661 (1.384)***	-.129	**-0.914 (0.077)***	-.106	**0.564 (0.056)***	.080	**0.054 (0.014)***	.026	**0.245 (0.029)***	.064	**0.091 (0.013)***	.045
News Media (Study 4)												
Political orientation	**1.497 (0.146)***	.061	**0.029 (0.006)***	.027	**-0.072 (0.006)***	-.066	**-0.028 (0.002)***	-.082	**-0.040 (0.004)***	-.064	**-0.005 (0.002)***	-.016

Extremism	-8.721 (0.338)***	-.156	0.057 (0.015)***	.023	0.588 (0.015)***	.240	0.097 (0.005)***	.127	0.239 (0.009)***	.168	0.060 (0.004)***	.086

Meta-analysis	β [95%CI]	β [95%CI]	β [95%CI]	β [95%CI]	β [95%CI]	β [95%CI]
Political orientation	.078 [.075, .082]***	.023 [.020, .027]***	-.100 [-.103, -.096]***	-.032 [-.036, -.029]***	-.054 [-.057, -.051]***	-.095 [-.099, -.092]***
Extremism	-.126 [-.129, -.123]***	-.082 [-.085, -.078]***	.099 [.096, .102]***	.038 [.035, .042]***	.080 [.077, .083]***	.046 [.043, .050]***

Note. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Illustrations. To illustrate these trends, the relatively extreme liberal organization, *Anarchist Federation* (political orientation = -0.72; emotional tone = 30.32 on 1-99 scale), used an angry and negative tone to describe the perception that the powerful exploit the powerless:

> For thousands of years hierarchical armed groups have violently taken control of almost the entire world, fighting amongst themselves for control and enslaving the rest of humanity by denying it access to nature. …Why do we not rise up against this injustice? Sometimes we do. But so far our efforts have not been successful. We have not managed to join forces and become strong enough to overthrow all the various hierarchies that exist. And many of us do not even realize we are slaves.

Using a similarly negative and angry tone, the extremely conservative *Ku Klux Klan* (political orientation = 0.94, tone = 44.26) sounded the alarm about the perceived threat of secularism (allegedly organized by Jewish people) to Christianity:

> The same satanic forces which brought about the sentencing of our Lord to Calvary's cross are active in the world today. These forces are determined that our Lord shall be crucified anew and that the civilization and cultural environment which have grown out of His life and His teachings shall be mutilated, subdued and destroyed. The enemies of Christ operate on every front. Their chief underwriter is the organized Jew who is determined that Christ as the Son of God shall not be the determining factor in the destiny of our society whether it involves the individual, or the world, or the factors which lie between individual influence and world-wide influence.

In contrast, the politically moderate *Red Cross* (political orientation = -0.11) offered a more optimistic note (emotional tone = 70.60), ironically from an objectively dire situation, on the Syrian War:

> Nawaf was three years into a challenging five-year bachelor's degree in computer and information engineering in Damascus when the ongoing Syrian conflict forced him to put his dreams on pause. He had hoped to stay in Syria's capital city long enough to finish his degree, but with his home destroyed and attacks escalating in his community, he was forced to follow his family into neighbouring Jordan. Finding community in the midst of chaos prompted Nawaf to look for ways to support his old – and new – neighbours so he found himself volunteering in the Red Cross Red Crescent hospital that provides specialized medical care to Syrian refugees.

The following examples illustrate how extremists used more negative language than moderates on Twitter. The first example comes from a strongly conservative (political orientation = 0.87) Twitter user who used a negative emotional tone (9.45) when tweeting: "[Paul Ryan] is a drug-addled, squandering milksop spewing codswolop all over himself #Trump #MAGA", "RACIST MUSLIMS hate Jews and Blacks. They must be extricated from America",

and "Mainstream Americans are dumb as a post. They think America is not a corporation and

Barry an evil CEO. They think simply."

Like his/her conservative counterpart, a liberal extremist (political orientation = -0.95)

used a negative emotional tone (5.00) when criticizing Republicans. "Benghazi: 4 died. America:

90 daily die from guns. What is the GOP doing to protect us? NOTHING", "Can't stand listening

to Trumps lies but I really can't stand to look at that orange fat face, put a bag on it. UGLY", and

"[Jan Brewer] is an excellent example of what's WRONG with the GOP. She is a racist, rude

moron and Trump is the GOP's KARMA".

In contrast to the language of the two extremists, a moderate Hillary Clinton supporter

(political orientation = 0.03, emotional tone = 72.34) used more positive language: "Hillary

Clinton was right. It took courage for this woman to bring her children to the US. Great moment

#DemDebate", "I bet a Clinton/Sanders ticket would be unstoppable. Maybe not the other way

around #DemDebate", and "As the mother of 2 teachers [I] agree with Hillary Clinton we need

to invest in education again. Bet those bad teachers would disappear #DemDebate"

Topic selection. While illustrative of the difference in emotional tone between the

language of extremists and moderates, these examples give the impression that extremists and

moderates might spontaneously gravitate toward different topics. Some topics (e.g., death) might

evoke more negative language than others (e.g., leisure activities). Differences in topic selection

could thus explain why extremists and moderates differ in their tone. To test this possibility, we

re-ran the main analyses (political orientation and extremism predicting tone) but now holding

the topic constant. For this analysis, we used LIWC's pre-defined "personal concern"

dictionaries, which included dictionaries for the topics of *work*, *leisure*, *home*, *money*, *religion*,

and *death*. Table 2 shows how extremism remained a negative predictor of emotional tone when

holding the topic constant (marginally in Study 2), suggesting that extremists' negative language is not fully explained by differences in topic selection. We also (consistently) found that people used a negative tone when talking about death, and a positive tone when talking about work, leisure, and religion. Results for home and money were mixed.

Table 2. Effects (unstandardized estimates and SEs) of political orientation and extremism on emotional tone of language, while controlling for six topics. Extremism remained a negative predictor of emotional tone of language even when holding topic constant.

	Study 1	Study 2	Study 3	Study 4
	Twitter	Organizations	Congress	Media
Individual Differences				
Political Orientation	0.585 (0.320)†	-0.383 (2.678)	**4.964 (0.467)***	**0.517 (0.135)***
Extremism	**-5.396 (0.690)***	-11.337 (5.910)†	**-19.568 (1.256)***	**-3.789 (0.335)***
Topics				
Work	**0.875 (0.110)***	**0.659 (0.130)***	**1.280 (0.023)***	**0.262 (0.071)***
Leisure	**3.978 (0.130)***	**5.267 (0.481)***	**6.116 (0.101)***	**6.767 (0.155)***
Home	0.448 (0.360)	**-4.576 (0.816)***	**-1.317 (0.106)***	**-3.731 (0.320)***
Money	**-0.569 (0.210)**	**3.639 (0.217)***	-0.003 (0.031)	**1.270 (0.109)***
Religion	**0.604 (0.220)**	**2.623 (0.472)***	**4.399 (0.126)***	**0.986 (0.119)***
Death	**-11.430 (0.410)***	**-15.342 (0.970)***	**-17.538 (0.153)***	**-17.470 (0.320)***

Note. †$p < .10$, ** $p < .01$, *** $p < .001$

Studies 3 & 4

Studies 3 and 4 again tested whether extremists use more negative language than moderates, this time in politicians' speeches and news media articles, both of which spanned decades. We suggest that extremists use angrier, more negative language than do moderates as a way of signalling to others that they disapprove of what they perceive to be a threatening state of society and the world. By criticizing an opponent group or their agenda, extremists may establish their social identity, virtues, and credentials as a member of a resistance movement. Angry language may be particularly effective for this purpose because it tends to get more attention than making positive statements (Brady, Wills, Jost, Tucker, & Van Bavel, 2017; Pew, 2017).

Negative language may also reflect an attempt to persuade others to oppose what is seen as a threatening agenda. Although they are not always effective (Feinberg & Willer, 2015), persuasion attempts may be aimed at alerting their political opponents about perceived negative consequences of their efforts, or at persuading moderates and ideological allies to mobilize against the other side's agenda.

If extremists' negative language is sourced to an effort to communicate, then their language should become less negative when the perceived threats lose their potency, such as when extremists with the opposing political orientation lose power. This is because losing political power strips the opposing group of its authority to make the threatening proposals a reality.

Method

Study 3 (U.S. Congress). We downloaded 262,935,589 words in the *U.S. Congressional Record*, which included all the words spoken in U.S. Congress during floor debates between 1996-2014 inclusive. To operationalize political orientation and extremism, we used a behavioral measure of political orientation (DW-Nominate, dimension 1; Lewis & Poole, 2004) derived from each politician's tendency to vote along party lines (extremism) or in a more nuanced, bipartisan fashion (moderate). Finally, we examined whether the U.S. Presidency, House of Representatives, and/or Senate being under control of ideologically like-minded people reduced the negativity of extremists' language.

We used multilevel modeling, with extremism and political orientation predicting emotional tone. Each transcript comprised of all the words of a single politician within a single 2-year session of Congress. Politicians often served multiple terms, meaning that some politicians had multiple transcripts. We divided each transcript into 1000-word segments and

then accommodated the nested nature of the data with three-level multilevel models with transcripts (i) nested within politicians (j), and politicians nested within sessions of Congress (k). The analysis included random intercepts for politicians and sessions.

$$\text{Tone}_{ijk} = \beta_0 + \beta_1\text{PoliticalOrientation}_{jk} + \beta_2\text{Extremism}_{jk} + u_{ojk} + u_{ok} + e_{oijk} \qquad (2)$$

Study 4 (News Media). The sample was 17 news media sources spanning the political spectrum. It included outlets from the far left (e.g., *New Republic*) and the far right (e.g., *American Spectator*), as well as from the center (e.g., *Associated Press*). For each source, we downloaded political articles from LexisNexus written between 1987-2016 (28,966,798 words total), and divided them into segments of 1000 words each. We used multilevel modeling, with extremism and political orientation predicting emotional tone. The unit of analysis was the text file segment (i). Each text file was comprised of all the words of news articles from a particular political orientation within a single 2-year session of Congress (j):

$$\text{Tone}_{ij} = \beta_0 + \beta_1\text{PoliticalOrientation}_{ij} + \beta_2\text{Extremism}_{ij} + u_{oj} + e_{oij} \qquad (3)$$

Results

Extremists' tone is the most negative. In both studies, extremism negatively and political orientation positively predicted emotional tone (see Table 1 and Figure 2. (These effects held when controlling for the topic; see Table 2). Examining the effect of extremism on each side of centrism in the U.S. Congress, we found that extremism negatively predicted emotional tone among liberals, $B = -32.115$, $SE = 2.178$, $\beta = -.183$, $p < .001$, and among conservatives in Congress, $B = -13.054$, $SE = 1.677$, $\beta = -.074$, $p < .001$. Similarly, extremism negatively predicted emotional tone among liberal media organizations, $B = -10.199$, $SE = 0.359$, $\beta = -.183$, $p < .001$, and among conservative media organizations, $B = -7.333$, $SE = 0.415$, $\beta = -.131$, $p < .001$. These results again support the negative extremists hypothesis, with the caveat that liberal

extremists' tone was more negative than conservative extremists' in both studies. In both studies, extremists (compared to moderates) used more negative emotion words, and more anxiety, anger, and sadness words, with anger words being the most distinguishing of the negative emotion word categories. In the study of U.S. Congress, extremists used fewer positive emotion words whereas in the media study, extremists used more positive emotion words.

Reconciling difference with prior research. The results reported in the present Studies 3 and 4 suggest a full reversal of the conclusion from previous analyses of the media (Turetsky & Riddle, 2018) and U.S. Congress (Wojcik et al., 2015, study 2). We found that liberals use more negative language than conservatives, and not vice versa. The potential extremism-political orientation confound and the context being limited to coverage of the 2014 Michael Brown shooting in the prior analysis (Turetsky & Riddle, 2018) might explain the different findings in the former.

Regarding the analyses of U.S. Congress, the differences between the present and prior analysis were manifold and nuanced. We identified eight analytic differences between the prior analysis of U.S. Congress (Wojcik et al., 2015, study 2) and our study 3, and systematically examined the empirical consequences of these analytic factors by changing one at a time and observing changes to the conclusions (see Table 3). Two of the seven methodological differences turned out to explain the diverging conclusions about affective language and political orientation.

Table 3. Original analysis of the U.S. Congressional Record by Wojcik et al. (2015; study 2; analysis 1 in this table) and our reanalyses (analyses 2-9), which adjusted analytic features sequentially. Two features accounted for the differences between the two studies. First, Wojcik et al. operationalized affective language as a word count (and statistically controlled for "wordiness") whereas we used word density. Second, Wojcik et al. used text analysis dictionaries derived from the PANAS-X, which have poor validity (see "Operationalizing Language Valence" in the Supplemental Materials) whereas we used dictionaries from LIWC (which have adequate validity). Analyses 1-7 were OLS regression; Analysis 8-9 were multilevel models (see Study 3). Significant effects are in bold. The critical changes are indicated.

			B (SE), β	
Analysis	Description	Predictor	Political Orientation	Extremism
1	Original (Wojcik et al., 2015, Study 2)	Positive Affect	**-0.88 (0.19), -.16*****	—
		Negative Affect	0.04 (0.05), .04ns	—
2 (critical change	Replace [word count and wordiness covariate] with [word density]	Positive Affect	-4×10^{-3} (5×10^{-3}), -.04ns	
		Negative Affect	-0.01 (0.01), -.04ns	
3	Use emotional tone composite (=PA-NA)	Emotional Tone	1×10^{-3} (9×10^{-3}), .00ns	—
4	Add extremism	Emotional Tone	-2×10^{-3} (0.01), -.02ns	-0.02 (0.02), -.04ns
5	Use DW-Nominate instead of *That's my Congress* measure of political orientation and extremism	Emotional Tone	0.11 (0.21), .05ns	-0.62 (0.46), -.10ns
6 (critical change)	Use LIWC instead of the PANAS-X text analysis dictionaries	Emotional Tone	**6.65 (2.19), .25****	**-21.77 (4.87), -.33*****
7	Remove demographics	Emotional Tone	**8.17 (1.86), .31*****	**-17.83 (4.62), -.27*****
8	Expand from 1 to 20 years of data (current research)	Emotional Tone	**7.24 (0.66), .19*****	**-28.04 (1.75), -.29*****
9	Divide each transcript into 1000-word segments	Emotional Tone	**5.68 (0.52), .09*****	**-22.66 (1.38), -.13*****

Note. *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$, ns $p > .10$

There are several methodological differences that *cannot* fully explain the differences between our results and prior studies. The prior analysis used separate positive and negative affect dictionaries whereas we relied on a single metric of emotional tone (analysis 2→3), the two analyses used different measures of ideology, with the prior analysis using ratings from http://thatsmycongress.com and our analysis using DW Nominate dimension 1 (analysis 4→5), the prior analysis statistically controlled for demographic and political variables whereas we did not (analysis 6→7), the prior analysis included 1 year of data whereas ours spanned 20 years (analysis 7→8), and the current analysis introduced text segmentation (analysis 8→9).

The critical differences between the prior and current analyses concerned the text analysis

dictionaries themselves. First, to isolate the qualities of language from its quantity, a common

procedure when performing text analyses is to use word *densities* (# words in a dictionary/ #

words total). Wojcik et al. (2015) used an alternative operationalization of positive and negative

language as word *counts*, and included (a proxy measure of) word count (called "wordiness") as

a covariate in their analyses. This seemingly trivial difference turned out to be important. In

Table 3, analysis 1, we used their original data and operationalizations to reproduce the results of

Wojcik et al.'s (2015; Study 2). Analysis 2 introduced a critical change: we replaced the word

count and wordiness covariates with a single word density (= word count/wordiness × 100%).

This ostensibly trivial operational adjustment reduced the association between political

orientation and affective language to non-significance, meaning that Wojcik et al.'s Study 2

results were not robust with respect to this analytic feature. To adjudicate between this positive

and null result, we independently assessed the validity of using separate measures of affective

word count and total word count as a covariate, and found no supportive evidence to suggest that

this method is valid (see *Operationalizing emotional tone of language* in the Supplemental

Materials). Creating a word density score by dividing affective word count by the total word

count slightly improved the validity of these dictionaries—one test yielded a null while the other

had $p = .04$ (see the Supplemental Materials).

This raises the second critical difference between the prior and current analyses of U.S.

Congress—the text analysis dictionaries themselves. In identifying positive and negative

emotion words, Wojcik et al. relied on dictionaries derived from the Positive and Negative

Affect Schedule: Expanded Form (PANAS-X, Watson & Clark 1994). Whereas the PANAS-X is

a validated measure of self-reported emotion (Watson, Clark & Tellegen 1988), its validity as a

dictionary for text analysis remains to be established. To date, three attempts have been made

(our own two in the Supplemental Materials, and Pressman & Cohen, 2012) to validate the

PANAS-X positive and negative affect dictionaries; evidence of their validity remains slim.

Meanwhile, we established the validity of the Linguistic Inquiry and Word Count

(Pennebaker et al. 2015) variable called "emotional tone" in the Supplemental Materials. With

these validated tools, we re-analyzed the *U.S. Congressional Record* (now including extremism

as a predictor; see Analysis 6 in Table 3). Extremists on both sides used more negative language

than moderates (our primary prediction), and liberal extremists used more negative language

than conservative extremists (a reversal of the Wojcik et al., Study 2, finding). To summarize,

prior research used unvalidated measures, whereas we used validated ones. Therefore, we

believe that the current approach represents the best estimate of the effect of political orientation

and extremism on emotional tone.

Illustrations. Illustrative of the reported trends, Representative Ron Paul (R-TX), a

conservative extremist (political orientation = 0.85) with a negative emotional tone (19.03 on the

1-99 scale) in the 110th session of Congress (2008-9) sounded the alarm in September 2008 about

the bailout of the U.S. financial system in the wake of the 2008 financial crisis. At the time, the

Senate and the House were under Democratic majorities and the president was Republican.

> Just imagine the results if a construction company was forced to use a yardstick whose measures changed daily to construct a skyscraper. The result would be a very unstable and dangerous building. No doubt the construction company would try to cover up their fundamental problem with patchwork repairs, but no amount of patchwork can fix a building with an unstable inner structure. Eventually, the skyscraper will collapse, forcing the construction company to rebuild—hopefully this time with a stable yardstick. This $700 billion package is more patchwork repair and will prove to be money down a rat hole and will only make the dollar crisis that much worse.

Similarly, Rep. James McDermott (D-WA), a somewhat extreme liberal (political orientation = -

0.50) with a negative emotional tone (30.27) in the 108th session of Congress (2003-4) sounded

the alarm about the War in Iraq and its management. At the time, the presidency, Senate, House

were in Republican control.

> Mr. Speaker, the ship of state sails without a rudder. Increasingly, the world sees our presence in Iraq as an occupation, not a liberation. Any talk of democracy has been replaced with images of brute and brutal force. The President talks about a superb Cabinet Secretary, but America and the world reel in horror and shame over what was done in the name of defending our country. If only the administration had paid attention. The Red Cross knew, but the administration would not listen. American leadership and credibility have cratered deeper and deeper, yet the administration remains deaf to what happened and the need to act.

In contrast, Rep. Travis Childers (D-MS), a political moderate (political orientation = 0.01) with

a positive emotional tone (92.54) in the 111th session of Congress (2009-10) spoke more

positively in support of legislation that would increase student aid:

> I want to see these education benefits accessed by veterans, and help those veterans to succeed in their college careers. I would like to especially commend the unprecedented investments in community colleges included in H.R. 3221 [Student Aid and Fiscal Responsibility Act of 2009]. Community colleges in Mississippi are some of the best in the Nation. They play an important role in preparing students for tomorrow's workforce. A community college education is one of the best investments a student can make.

Moderation by political power. Stemming from our view that extremists' negative

language is derivative of perceived threat from political rivals, we also predicted that when their

political rivals lost power, extremists' negativity would be reduced. This idea suggests that that

political orientation would positively interact with conservatives holding political power in the

House, Senate, and Presidency.

In Study 3, we ran the same multilevel model as before but now splitting the House and

Senate to test whether extremists use more negative language in both chambers. The predictors

of emotional tone were political orientation, extremism, political power in the presidency, the

House, and the Senate (all three coded 1 = Republican, -1 = Democrat), and the interactions

between political orientation or extremism and the three indicators of political power:

$$\text{Tone}_{ijk} = \beta_0 + \beta_1 \text{PoliticalOrientation}_{jk} + \beta_2 \text{Extremism}_{jk} +$$
$$\beta_3 \text{President}_k + \beta_4 \text{House}_k + \beta_5 \text{Senate}_k +$$
$$\beta_6 \text{President} \times \text{PoliticalOrientation}_{jk} + \beta_7 \text{President} \times \text{Extremism}_{jk} +$$

$$\beta_8 \text{House} \times \text{PoliticalOrientation}_{jk} + \beta_9 \text{House} \times \text{Extremism}_{jk} +$$
$$\beta_{10} \text{Senate} \times \text{PoliticalOrientation}_{jk} + \beta_{11} \text{Senate} \times \text{Extremism}_{jk} +$$
$$u_{ojk} + u_{ok} + u_{1k} + u_{2k} + e_{oijk} \tag{4}$$

with i = segment, j = politician, k = session. The model included random intercepts for politicians and sessions. It also included random slopes at the session level for political orientation and extremism.

We did the same thing in Study 4 (with the exception of there being no chambers to split):

$$\text{Tone}_{ij} = \beta_0 + \beta_1 \text{PoliticalOrientation}_{ij} + \beta_2 \text{Extremism}_{ij} +$$
$$\beta_3 \text{President}_j + \beta_4 \text{House}_j + \beta_5 \text{Senate}_j +$$
$$\beta_6 \text{President} \times \text{PoliticalOrientation}_{ij} + \beta_7 \text{President} \times \text{Extremism}_{ij} +$$
$$\beta_8 \text{House} \times \text{PoliticalOrientation}_{ij} + \beta_9 \text{House} \times \text{Extremism}_{ij} +$$
$$\beta_{10} \text{Senate} \times \text{PoliticalOrientation}_{ij} + \beta_{11} \text{Senate} \times \text{Extremism}_{ij}$$
$$+ u_{oj} + u_{1j} + u_{2j} + e_{oij} \tag{5}$$

with i = segment, j = session. The model included random intercepts for sessions. It also included random slopes at the session level for political orientation and extremism.

The two studies provided nine distinct tests of whether political orientation interacted with political power (political orientation × president, etc.). Seven of the nine tests were in the predicted (positive) direction, of which three reached significance (see Table 4). Two effects were nonsignificantly in the unpredicted (negative) direction. Extremists reacted most consistently to the presidency, and less consistently to political control in the House and Senate, perhaps because Americans tend to think that the Presidency is more powerful than the other branches of government (Brownlow, 1969; Meindl, Ehrlich, & Dukerich, 1985; Nyhan, 2009), even though the founding fathers designed the presidency to be co-equal with Congress and the Supreme Court. These results generally, albeit imperfectly, support the theory that extremists' negative language is linked to perceived threat. We supply further tests in subsequent studies and analyses.

Table 4. Tests of whether sharing a political orientation with those in political power reduced the negativity of extremists' language in U.S. Congress (Study 3) and in the media (Study 4). The critical prediction was that political orientation would positively interact with the political orientation of the presidency and with majority control of the House and Senate (bolded predictors). Analyses were multilevel models. Numbers represent unstandardized estimates (and *SE*s). Bolded numbers are statistically significant.

Predictor of Emotional Tone of Language	U.S. Congress (Study 3)		Media (Study 4)
	Senate	House	
Political orientation	2.055 (1.480)	**4.118 (0.723)***	**1.732 (0.448)**
Extremism	**-24.019 (4.037)***	**-25.71 (1.910)***	**-9.169 (1.031)***
Political orientation of President	1.018 (1.204)	0.476 (0.735)	1.086 (0.897)
Political orientation of House	-0.008 (1.496)	**-3.236 (1.057)**	0.527 (1.193)
Political orientation of Senate	-1.535 (1.383)	-1.005 (0.883)	-0.477 (1.152)
Political orientation × President	**5.023 (1.253)***	**2.755 (0.574)***	0.215 (0.392)
Political orientation × House	1.246 (1.491)	**4.940 (0.852)***	-0.011 (0.524)
Political orientation × Senate	0.530 (1.399)	-0.994 (0.705)	0.154 (0.479)
Extremism × President	-3.262 (3.486)	-2.782 (1.577)†	-1.989 (0.945)†
Extremism × House	-0.697 (3.945)	3.164 (2.219)	0.091 (1.257)
Extremism × Senate	-0.295 (4.021)	-0.590 (1.926)	0.148 (1.187)

Note. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Study 5

Study 5 reports a meta-analysis using all of the available data to test which political group uses the most negative language and to test a key moderator. Since anger is the characteristic emotional response to threat, we tested whether extremists' negativity is especially sourced to their use of angry language (compared to sad and anxious language).

Results

Including the data from all four studies and Studies S1 and S2 (see the Supplemental Materials for details), we applied fixed-effects models on the standardized effects of extremism, controlling for political orientation, on the linguistic categories. We repeated the analyses to test the effects of political orientation (controlling for extremism) on the various linguistic categories. Our analyses revealed that extremists used a more negative emotional tone than moderates (see

Table 1). Liberal extremists used more negative language than conservative extremists, contradicting Sylwester and Purver (2015), Turetsky and Riddle (2018), and Wojcik et al. (2015). However, the effect of extremism dwarfed this trend, meaning that extremists on both ends of the political spectrum used more negative language than moderates. Additionally, extremists used less positive and more negative emotion words, and more anxious, angry, and sad words than moderates.

In five of the six studies, extremism was more strongly associated with the use of anger words than anxiety and sadness words; Meta-analytically, extremists used more angry words than anxious words, $\chi^2(1, N=343,701) = 299.52, p < .001, \varphi = .030$, and more angry words than sad words, $\chi^2(1, N=343,701) = 193.98, p < .001, \varphi = .024$. Insofar as anger is the characteristic emotional response to threat (Smith & Ellsworth, 1985), these results are consistent with the idea that extremists' negative language is linked to their heightened attention to perceived threat.

General Discussion

We began with three competing hypotheses about which group uses the most negative language—liberals, conservatives, or extremists of both liberal and conservative orientations. Six new studies consistently supported the view that extremists use the most negative language. Just comparing liberal and conservative extremists, we found that liberal extremists used a more negative emotional tone. Unlike the previous studies, ours considered the possibility that political orientation and emotional tone are non-linearly related and employed validated measures to produce conclusions that depart from the incumbent views.

Mechanisms

Extremists' negative language may be a product of their perceived threat from their political rivals as they (verbally) sound the alarm to persuade others and signal their virtues or

opposition. This mechanism departs from the view that liberals "display greater happiness" in their language than conservatives (Wojcik et al., 2015), which implies that negative language is a form of venting—an outward expression of an inner feeling. Although our results are not obviously inline with a venting mechanism, we decided to directly test it in Study S2 (see the Supplemental Materials). Contrary to what the venting mechanism would predict, extremists reported being in a marginally *better* mood than moderates before communicating about the state of society. These results suggest the affective correlate of extremism is limited to language, and does not generalize to mood.

If extremists' negative language is not a vent, then what is it? We believe our data point to the possibility that it is a reaction to perceived threat. But who or what is the cause of the threat? To explore the possibility that extremists are reacting to the activities of political rivals, we asked a new sample of Americans (Study S3) to write down the threats they perceive (see Figure 3 for results and the Supplemental Materials for methodological details). For extremists on both sides opponent political causes were prevalent, as were international threats. While domestic and international threats are conceptually distinct entities, they may be politically and psychologically linked (Berinsky, 2009).

Figure 3. Word clouds representing the most common threats that liberal and conservative extremists implicated. The size of each word is proportional to the frequency of its mentioning.

Liberal Extremists | Conservative Extremists
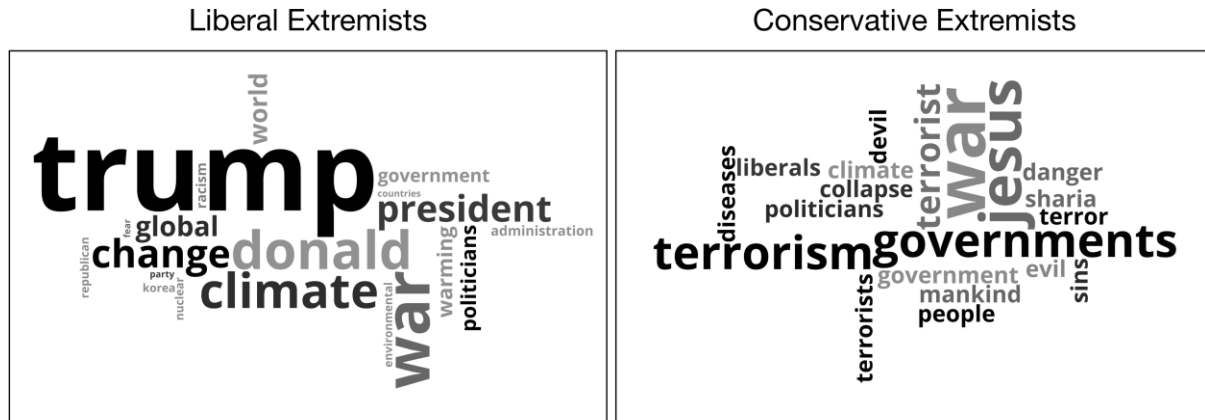
A limitation of the present research is that it did not fully establish the social functions of extremists' negative language. We leave it to future research to investigate whether the negative language is intentionally or unintentionally an effort to signal a social identity and/or gain acceptance in a resistance movement and/or an effort to persuade political opponents, allies, or moderates. Extremists of both the liberal and conservative varieties have some important psychological similarities, and among them is the tendency to perceive threat in their environment and use angrier, negative language than moderates in response.

Another limitation of the present studies is the correlational nature of the data, which leave open the possibilities that being an extremist causes people to use negative language and that using negative language causes a person to become an extremist. Future research might test these causal pathways. A final limitation of the present studies is that they leave open the possibilities that extremists' negative language is the result of extremists talking about particular issues that tend to evoke negativity (such as the war in Iraq) or a tendency for extremists to use negative language when talking about any particular issue. The illustrative examples from Studies 1-3 seem to reveal topical differences between the texts from moderates and extremists. We attempted to address this issue by statistically controlling for six topics (work, leisure, home, money, religion, and death) in a supplementary analysis and still found that extremists used a

more negative tone than moderates. It remains possible that some other topic (e.g., war) explains

the tonal differences between moderates and extremists. Future research might experimentally

investigate the contexts in which extremists end up using more negative language.

Implications

The *negative extremists hypothesis* could have real-world implications. Ideological

extremism is on the rise (Pew, 2014; Voteview, 2015). Extremists tend to get more attention than

moderates (Hong & Kim, 2016; Hughes & Lam, 2017) and their words can influence others

(Clifford, Jerit, Rainey, & Motyl, 2015; Frimer, Aquino, Gebauer, Zhu, & Oakes, 2015; Kramer,

Guillory, & Hancock, 2014), which could have consequences for mental health and civic

discourse. This is because, along with using angry, negative words, extremists tend to be self-

righteous (Toner, Leary, Asher, & Jongman-Sereno, 2013), cognitively inflexible (Brandt,

Evans, & Crawford, 2015; Conway et al., 2016; Tetlock, 1984, 1986), highly deferential to their

own authorities (Frimer, Gaucher, & Schaefer, 2014), and have a simplistic understanding of the

political domain (Lammers, Koch, Conway, & Brandt, 2017) and of how their preferred policies

would work (Fernbach, Rogers, Fox, & Sloman, 2013). Understanding the inner life and

communicative tendencies of extremists could be crucial for developing strategies to neutralize

extremists' appeals, and thus help stabilize democracies strained by extremists' language.

This research contributes to the literature in three ways. First, there is a growing interest

in the relationship between ideology and affective language (e.g., Tumasjan et al., 2010; Young

& Soroka, 2012). The current state of knowledge about the relationship between political

orientation and emotional tone of language suggests that liberals "display greater happiness" in

their language than conservatives (Sylwester & Purver, 2015; Wojcik et al., 2015). We provide

the first tests of whether political orientation and the emotional tone of language are non-linearly

related. Second, the notion of "displaying greater happiness" implicitly characterizes language as

an outward expression of an inner feeling. We offer a different characterization of language of

varying emotion tone as serving social functions (e.g., persuasion). Third, the current state of

knowledge is that conservatives perceived more threat than liberals (e.g., Altemeyer, 1998;

Duckitt, 2001). We develop a perspective about why extremists on the left and right may

perceive greater threat than moderates.

Conclusion

In the opening epigraph, Donald Trump described many threats—poverty, deteriorating

work environments, poor education, crime, drugs, and murder. As we have found, left wing

extremists may also feel threatened, only by different forces, such as bigotry, social inequality,

and climate change; in turn, liberal extremists use similarly (or even more) negative and angry

language than their conservative counterparts. For instance, on the floor of the U.S. Senate in

June 2012, Senator Bernie Sanders (I-VT), a liberal extremist (political orientation = -0.53)

offered the following words,

> The American people are angry. They are angry because they are living through the worst recession since the great depression. Unemployment is not 8.2%, real unemployment is closer to 15%... There are workers out there 50, 55 years old who intended to work the remainder of their working lives, suddenly they got a pink slip, their self-esteem is destroyed, they're never going to have another job again and now they're worried about their retirement security. What the American people are angry about is they understand that they did not cause this recession. Teachers did not cause this recession. Firefighters and police officers who are being attacked daily by governors all over this country did not cause this recession. Construction workers did not cause this recession. This recession was caused by the greed, the recklessness and illegal behavior of the people on Wall Street.

Compared to moderates, extremists on both ends of the spectrum seem to perceive danger and

sound the alarm.

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Methods Reporting

Study 1 (Twitter)

We relied on a scraping process that relies on a large sampling of an individuals' following preference on Twitter. We began by building a sample of Twitter users. To do so, we used the "streamR" package in R (Barberá, 2015). To sample users that were at least somewhat engaged in politics, we included in our sample Twitter users that tweeted with one of several search parameters during one of four political events (see below).

Events that produced the sample in Study 1 on Twitter. Subjects were Twitter users that tweeted with any of the search parameters between the pertinent start time and end time (Central Standard Time).

Event	Sample Identification			User Tweet Range	
	Start Time	End Time	Search Parameter	Oldest	Newest
Iowa Caucuses	1 Feb 2016 9:05 pm	2 Feb 2016 1:07 am	Trump, Cruz, Rubio, Carson, Kasich, Clinton, O'Malley, Sanders, "#IACaucus"	18 Nov 2008	1 July 2016
Fourth Democratic Party Presidential Debate	17 Jan 2017 8:41pm	17 Jan 2017 9:47 pm	Trump, Cruz, Rubio, Carson, Kasich, Paul, Clinton, O'Malley, Sanders, "#DemDebate", "#SCDebate"	1 Apr 2009	1 July 2016
Fourth Democratic Party Presidential Forum	25 Jan 2017 8:50 pm	26 Jan 2017 12:56 am	Trump, Cruz, Rubio, Carson, Kasich, Paul, Clinton, O'Malley, Sanders, "#DemForum", "#DemDebate", "#IADebate"	25 Nov 2008	1 July 2016
Eighth Republican Party Presidential Debate	6 Feb 2017 8:42 pm	7 Feb 2017 12:42 am	Trump, Cruz, Rubio, Carson, Kasich, Clinton, O'Malley, Sanders, "#GOPDebate", "#NHDebate"	8 Aug 2007	1 July 2016

We chose these search parameters by examining hash tags that were considered "Trends" by Twitter's home screen and using the hash tags that are specific to the political event of interest. For example, one of the most used event-relevant hash tags on Twitter during the Iowa Caucuses was "#IACaucus", so that was included as a collection parameter along with the names of each presidential candidate running at that point. This produced tweets from 16,090 Twitter users. Following recently established procedures (Barberá, 2015), we excluded accounts that were likely fake (accounts that had fewer than 25 followers) and relatively inactive users (followed fewer than 100 accounts, or tweeted fewer than 100 times). Including these accounts produced similar results (see Table S3). The final sample included 14,480 Twitter users.

We collected the most recent tweets of each user in our sample using the "smappR" package in R (Barberá, Jost, Nagler, Tucker, & Bonneau, 2015). The Twitter Application Program Interface (API) produces the most recent tweets for a given user, with a maximum number of tweets for each user being 3,200. We excluded any retweets or reposts of another user's tweet, as these tweets do not represent the natural language use of our users. The final sample of tweets spanned approximately 8 years (2007-2016), however the vast majority (90%-95%) was from 2015-16. Within the final sample, we had an average of 233 tweets per user ($SD = 347$), which summed to 2,803 words per user ($SD = 4,315$). Collectively, the sample was comprised of 3,380,140 tweets, which amassed to 40,590,896 words.

Political orientation. We used Barberá et al.'s (2015) validated procedure to estimate the political orientation of each subject. The procedure is premised on the well-established

confirmation bias (e.g., Nickerson, 1998): people tend to selectively consume ideologically congenial information. Liberals and conservatives are similarly prone to selective exposure (Frimer, Skitka, & Motyl, 2017).

The accounts that Twitter users followed determined their estimated political orientation. To summarize the procedure (see Barberá et al., 2015, for full details and validation), we matched the accounts that subjects followed to accounts on a pre-estimated list of conservative and liberal politicians, celebrities, and news outlets (using the political orientation estimates from Barberá et al., 2015). For example, Barack Obama and Rachel Maddow had political orientation scores of -1.50 and -1.93, respectively, which are on the liberal end of the spectrum. In contrast, Mitt Romney and Glenn Beck had political orientation scores of 1.07 and 1.62, respectively, which are on the conservative end of the spectrum. We then used correspondence analysis to situate Twitter users on this same ideological spectrum. Through this process, each user received a point estimate. Users that mainly followed liberal accounts like Barack Obama and Rachel Maddow would receive similarly negative scores, whereas users that primarily followed conservative accounts such as Mitt Romney and Glenn Beck would receive similarly positive scores.

Political orientation scores ranged from -2.45 to +2.45. For the sake of consistency across studies, we scaled these political orientation estimates to range from -1 to 1, where -1 is the most liberal user in our sample, 1 is the most conservative user in our sample, and 0 is ideologically moderate. Note that scaling did not alter 0 as a point of ideological moderation since the minimum and maximum values for this estimate are of the same magnitude in our sample.

Extremism. We calculated an extremism score as the absolute value of the political orientation score, meaning that extremism scores can range from 0 to 1 ($M = 0.49$, $SD = 0.25$).

Text analysis. Before performing text analyses, we removed non-traditional characters (i.e. embedded hyperlinks and special emoticons) and punctuation. Tweets are short, limited to 140 characters. To make the text files long enough to give reliable computer-scored results, we combined each user's tweets into a single text file, then split them into 34,809 1000-word text segments to allow Twitter users who produced more words to have more empirical clout.

The size of the Twitter database necessitates the use of computerized text analyses (rather than human coding). Following the conclusions of the validation analyses (see the Supplemental Materials), we operationalized emotional tone of language using the metric called *emotional tone* in Linguistic Inquiry and Word Count (LIWC; Pennebaker et al. 2015). Emotional tone is derived from analyses using the dictionaries called *positive emotion* and *negative emotion*. LIWC does not offer sub-dictionaries for positive emotion whereas sub-dictionaries called *anxiety*, *anger*, and *sadness* comprise the *negative emotion* dictionary. To flesh out the locus of effects that we find with our primary operationalization of emotional tone, we include auxiliary analyses with *positive emotion*, *negative emotion*, *anxiety*, *anger*, and *sadness* dictionaries.

Study 2 (Organizations)

List of organizations. The first author and two research assistants used brainstorming and Internet searches to build a list of 100 organizations that had publicly available information, such as newsletters and magazines, and spanned the ideological spectrum. See Table S4 for the full list. The full ideological spectrum was represented in the sample, including extreme liberals like the *Black Panther Party* (political orientation = -0.79), moderate liberals like *Greenpeace* (-0.42), Centrists like the *Red Cross* (-0.11), moderate conservatives like the *Minnesota Tea Party Alliance* (0.51), and extremists conservatives like *ISIS* (0.94).

Texts. We searched each organization's webpage for publicly available materials, such as magazines and newsletters, and downloaded what we found. We then aggregated all materials for a single organization into a single text file. On average, each organization produced 35,700 words (SD = 119,749; range: 1,253 to 883,988). The full corpus contained 3,569,992 words. We attempted to empirically capture the large variance in the amount of text that each organization produced by dividing each organization's texts into 1000-word segments (3,621 segments across all organization) before performing text analyses with LIWC.

Political orientation/extremism of organizations. We recruited two Internet samples to help us estimate the political orientation and extremism of the organizations. Both samples were Americans on http://crowdflower.com, a crowdsourcing website similar to Mechanical Turk. Sample 1 (N = 189) was 40 years old on average (SD = 13) and 64% male. Participants read:

> In this study, you will rate the political ideology of 30 organizations. If you are familiar with any of the organizations, please rate them based on that knowledge. Otherwise, give your best guess based on the description provided. Descriptions were gathered from the official websites of each organization. Where organizations lacked an official website, descriptions were taken from the organization's Wikipedia page.

Next, to avoid overtaxing participants, we presented to each participant 3 of 10 randomly selected blocks of organizations. Each block contained 10 organizations, all of which appeared on a single page. At the top of each page was a list of the organizations and a brief description of each (taken from the organization's webpage or Wikipedia.org; see Table S4).

The rating scale asked, "What is the ideology of each organization?" Participants responded on a 201-point slider scale anchored at -100 (*extremely liberal*), -50 (*somewhat liberal*), 0 (*moderate*), 50 (*somewhat conservative*), and 100 (*extremely conservative*). We averaged all the judgments for a particular organization to form a metric of political orientation. Participants later rated their own political orientation on social issues using the same scale.

Examining the sorted list of political orientation ratings, we noted anomalies, which caused us to doubt their validity. For example, the National Rifle Association (political orientation = 59) was rated as more politically extreme than ISIS (political orientation = 33). This anomaly seems to have been the result of conservative participants not wanting to identify with stigmatized right wing groups like ISIS, and thus calling ISIS a liberal organization (see Figure S2).

We circumvented this problem in two steps. First, we used the average political orientation rating to classify groups as either liberal (scores less than 0) or conservative (scores greater than 0). Second, using the same basic survey design, we asked a new sample (Sample 2) of 189 Americans on the same crowdsourcing website to rate *how extreme* each organization was on a 101-point scale anchored at 0 (*ideologically moderate*) and 100 (*ideologically extreme*). For each organization separately, we then regressed (OLS) extremism ratings on the political orientation of participants and took the intercept—the model implied extremism rating for politically moderate participants—as the extremism score for each organization. Extremism scores ranged from 33 to 85. So we scaled extremism scores to range from 0 to 1. We then multiplied liberal groups' extremism score by -1 and conservative groups' extremism scores by +1 to derive political orientation scores. Table S4 presents the political orientations of each organization.

Study 3 (U.S. Congress)

The text corpus was the *U.S. Congressional Record*, the words spoken in U.S. Congress during floor debates between 1996-2014 inclusive (104th - 113th sessions of Congress), which we downloaded from http://capitolwords.org. Each of the 5,416 documents contained the words that a single member of Congress uttered during a single 2-year session of Congress. The average

document contained 48,588 words (*SD* = 76,414) and the entire corpus contained 262,935,589 words. We divided each transcript into 1000-word segments (274,486 segments in total) before performing content analyses. Representatives were 56.8 years old on average (*SD* = 10.3) and predominantly (85.4%) male.

Political orientation. We used a behavioral measure of political orientation called DW-Nominate, dimension 1 (Lewis & Poole, 2004) to operationalize political orientation and extremism. DW-Nominate is a metric that describes how liberal (negative values), moderate (values near zero), or conservative (positive values) each representative is, based on roll call votes. The metric is calculated using multidimensional scaling to estimate politicians' ideal points. These points represent their position on the issues and these points are comparable across years and politicians. Politicians that voted along party lines had DW-Nominate scores far from zero; politicians whose votes were generally unrelated to the party lines had DW-Nominate scores near zero. We were able to match the codes identifying transcripts (bioguides; e.g., K000336) to the codes identifying voting records (ICPSRs; e.g., 29748) in 4,979 of the 5,416 documents. Voting data were unavailable for an additional 21 representatives. Thus, we had full data on 4,958 transcripts.

The full spectrum of ideologies were represented in the sample, including extremely liberal politicians like Bernie Sanders (DW-Nominate = -0.72) and Elizabeth Warren (-0.70), moderates like Democrat Joe Manchin (-0.09) and Republican Susan Collins (0.04), and extremely conservative politicians like Ted Cruz (0.88) and Rand Paul (1.36).

DW-Nominate scores ranged from -0.75 to +1.36 in this sample. The distributions of the two political parties were effectively non-overlapping, with a DW-Nominate score of 0 meaningfully bifurcating the two parties. Nearly all (99.1% of) Democrats scored below zero and almost all (99.9% of) Republicans scored above zero. To form a measure of political orientation and to use a scale consistent across all of our studies, we scaled DW-Nominate scores by dividing them by 1.36. Political orientation scores ranged from -0.55 to +1.00, and 0 remained the centrist point.

Extremism. We calculated an extremism score as the absolute value of the political orientation scores. Republicans were more politically extreme (*M* = 0.43, *SD* = 0.14) than were Democrats (*M* = 0.27, *SD* = 0.10), $t(4939) = 45.03$, $p < .001$, $d = 1.29$.

Study 4 (News Media)

The website http://allsides.com lists 59 featured news media sources, along with a "bias rating" for each (determined within the website by crowdsourcing). Bias ratings were *Left Wing* (which we coded as political orientation = -1.0), *Leans Left* (-0.5), *Center* (0.0), *Leans Right* (0.5), and *Right Wing* (1.0). For each media source, we searched the LexisNexis database. If LexisNexis offered the full texts from a source, we included the source in our sample. The result was 17 sources that spanned the political spectrum: *Left Wing* (New Republic), *Leans Left* (ABC, LA Times, New York Times, Newsweek, Slate, and Washington Post), *Center* (Associated Press, BBC, Bloomberg, Christian Science Monitor, NPR, Politico, and USA Today), and *Right Wing* (American Spectator, New York Post, and Weekly Standard). None of the *Leans Right* sources had full texts available on LexisNexus. Note that the sample including just 17 news outlets somewhat limits our ability to generalize from these results to the media in general. We took the absolute value of the political orientation score to form an extremism score.

We included articles that spanned Republican and Democratic presidencies and majorities in Congress to sample from a variety of political climates, which would boost the generalizability of the findings, and allow us to test whether political power moderates

extremists' negative language. Using the search terms "politics or political", we searched LexisNexus for articles within 15 different sessions of Congress, from the 100th session (1987-88) to the 114th (2015-16). For each political orientation, we searched all of the sources at once, then downloaded the full text of the 500 most relevant results for each term of office, with "relevance" determined by the LexisNexus sorting algorithm. We used this political search term because the ideological bent of newspapers may be circumscribed to their coverage of social and political topics. We chose to download 500 articles because this is the maximum number of articles that LexisNexus will download at a time. The complete corpus contained 28,966,798 words.LexisNexus combines all results into a single text file. We divided text files into 1000-word segments (28,992 segments in total). Finally, we applied LIWC text analysis.

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Extremists on the Left and Right Have Angry, Negative Messages

SUPPLEMENTAL MATERIALS

Operationalizing Emotional Tone of Language

Examining the relationship between the emotional tone of language and political orientation requires a valid operationalization of the former. Here, we review existing measures of emotional tone of language with the aim of identifying valid measures. McAdams, Diamond, de St. Aubin, and Mansfield (1997) introduced a procedure for coding the emotional tone of language, which entailed human coders reading text passages and rendering judgments about the perceived tone. We see the McAdams et al. (1997) procedure as an excellent measure because it directly measures *perceived* tone; a limitation of the McAdams approach, however, is its labor intensity, limiting its utility to smaller samples and shorter text passages.

To move beyond these limitations, researchers have turned to assessing the emotional tone of language using computer analyses. Several types of computer analyses exist. The approach that we employ is user-defined dictionaries analyses because of their face validity and widespread use. User defined dictionary analyses rely on dictionaries of words that researchers identified as connoting a particular theme. For instance, researchers may identify the words *happy*, *joy*, and *elation* as belonging in a *positive emotion* dictionary. Conventionally, analyses yield word density scores, calculated as the number of words in a target text that match a particular dictionary, divided by the total number of words in the target text.

Compared to other text analytic techniques (such as topic modeling, semantic analysis, and machine learning) user-defined dictionary analyses have the benefit of high face validity and clear theoretical validity. An associated limitation of user defined dictionary analyses is that they sacrifice some precision. For instance, user-defined dictionary analyses miss negations (e.g., *I am not happy* would be coded as a "hit" for *happy*), intensifiers, and diminishers (e.g., Garten et al. 2017; Kennedy & Inkpen, 2006; Taboada, Brooke, Tofiloski, Voll, & Stede, 2011). Future research might apply some of these other techniques to the same research question.

To our knowledge, three studies (Sylwester & Purver, 2015; Turetsky & Riddle, 2018; Wojcik et al., 2015) have employed user-defined dictionary text analyses to examine the relationship between emotional tone and political orientation in "big data". The three papers collectively operationalized emotional tone using eight distinct dictionaries—positive affect, joviality, negative affect, and sadness derived from the Positive and Negative Affect Schedule: Expanded Form (PANAS-X, Watson & Clark 1994), positive and negative emotion using the LIWC (Pennebaker, Booth, Boyd, & Francis, 2015) dictionaries, and happy and sad emoticons. There is not just one right way to measure emotional tone, nor are all ways likely to be equally valid. We propose that identifying a unitary operationalization of emotional tone using computerized text analysis brings with it some advantages, reducing researcher degrees of freedom during hypothesis testing and providing a rigorous test of the competing hypotheses that frame this research.

Theoretically, emotional tone should capture how optimistic and upbeat—as opposed to pessimistic and downbeat—a text passage seems. Emotional tone needs to be distinguished from emotional expressiveness—the expression of both positive *and* negative emotion. Language that is emotionally expressive would likely display elevated levels of both positive and negative affect (e.g., showing both excitement and anxiety). In contrast, language that is positively

valenced would exude positive emotion and/or a lack of negative emotion. Accordingly, a critical metric of emotional tone might compare positive-to-negative emotional displays—for example, using a difference score. Given some of the psychometric concerns and interpretational ambiguity regarding difference scores (Johns, 1981), we also perform analyses using the elemental variables comprising the difference scores. These follow-up analyses will allow us to assess whether negative language is the result of more negative emotion words and/or fewer positive emotion words.

The 2015 edition of LIWC introduced a new aggregate score called "emotional tone", which can range from 1 (*negative tone*) to 99 (*positive tone*). Although its formula is proprietary, the authors disclosed that its origin is Cohn, Mehl, & Pennebaker (2004), which included a variable derived by subtracting standardized negative emotion word density from standardized positive emotion word density. Our own analyses suggest that such a composite variable correlates with emotional tone scores at $r = .99$, meaning that the formula is approximately correct. Given its face validity, we examine whether LIWC's "emotional tone" metric is an especially valid metric for emotional tone.

The *positive emotion* dictionary has 642 words (e.g., *charm, love,* and *success*) whereas the *negative emotion* dictionary has 745 words (e.g., *horrible*, *wrong*, and *fake*). LIWC also includes three negative emotion sub-dictionaries (see Figure S1)—*anxiety* (116 words, such as *afraid*, *fear*, and *worried*), *anger* (230 words, such as *hatred*, *offensive*, and *threat*), and *sadness* (136 words, such as *cried*, *remorse*, and *wept*). Prior work (Kahn, Tobin, Massey & Anderson, 2007) validated earlier editions of LIWC's positive and negative emotion dictionaries. We are unaware of any attempts to validate the emotional tone variable.

Figure S1. Emotion categories included in all text analyses, in their hierarchical relationship. We operationalize language valence using the emotional tone variable.
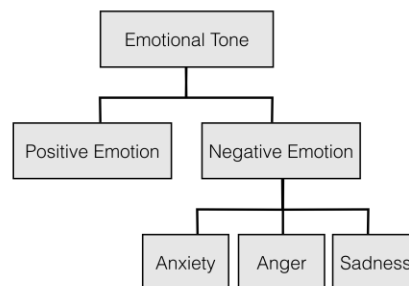
Validation

Next, we describe tests of the validity of the LIWC emotional tone metric (and its constituting positive and negative emotion elements) and an analogous metric derived from the PANAS-X dictionaries employed in Wojcik et al. (2015), the latter of which have just 10 words each. For an emotional tone dictionary to be valid, analyses using it should be able to correctly classify content of known valence.

Given that our secondary finding (that liberal extremists use more negative language than their conservative counterparts) directly contradicts the findings of previous studies, we assess the validity of the measures used in the preceding studies as well. Wojcik et al. (2015) included dictionaries derived from the Positive and Negative Affect Schedule: Expanded Form (PANAS-X, Watson & Clark 1994). Whereas the PANAS-X is a validated measure of *self-reported* emotion (Watson, Clark & Tellegen, 1988), its validity as a dictionary for text analysis remains

to be established. Previous attempts to validate the PANAS-X dictionaries used to measure emotional tone (positive affect, negative affect, joviality, and sadness) failed to establish their validity (Pressman & Cohen, 2012).

　　　　To test the validity of the LIWC emotional tone and PANAS-X emotional tone dictionaries, and to test the validity of their elemental positive and negative emotion variables, we relied on existing data a set of positively valenced text responses and a set of negatively valenced text responses. Our analyses (described below in detail) found consistent evidence that the LIWC emotional tone dictionary has validity, its PANAS-X compliment has little or none, and that emotional tone consistently outperformed its elemental variables.

Data Sets

　　　　Life events. Frimer, Walker, Dunlop, Lee & Riches (2011) asked 50 people (25 recipients of the Caring Canadian Award and 25 demographic matched comparison persons) to describe an event that represented a high point in their life, and to describe a low point event. Event responses were 748 words long on average ($SD = 581$). We text analyzed each response for its emotional tone (LIWC variable), LIWC's positive emotion and negative emotion variables, and for the *density* of positive affect and negative affect word density (using the dictionaries that Wojcik et al. 2015) used. We then derived a PANAS-X emotional tone variable in the same way that the LIWC emotional tone variable is derived: by subtracting standardized negative emotion density scores from standardized positive emotion density scores, then scaling the result to range from 1 to 99. We also included simple difference scores of raw positive emotion scores minus raw negative emotion scores because some researchers do not use LIWC and thus do not have access to the emotional tone variable (due to its proprietary calculation).

　　　　Movie Reviews. We used an existing corpus of positive and negative movie reviews (Pang & Lee, 2004). The database contained 1000 positive and 1000 negative movie reviews, which were determined based on the explicit ratings (e.g., star system) from the reviews' authors and the application of an arbitrary cut-off (e.g., 3 or 4 stars out of 4 being positive, otherwise negative). Reviews were 652 words long on average ($SD = 288$). We analyzed the data in the same was as for the life events.

Results

　　　　Table S1 displays the average emotional tone scores. If a dictionary is valid, it should be able to correctly classify high versus low point life events, and positive versus negative movie reviews. Table S2 presents results from independent logistic regression analyses for life events and movie reviews, respectively. We found that the LIWC dictionaries consistently outperformed the PANAS-X counterparts. The emotional tone and positive-minus-negative emotion metrics consistently outperformed the elemental positive emotion and negative emotion dictionaries. These results suggest that, among the language valence variables considered here, LIWC's emotional tone (or positive minus negative emotion, which is almost equivalent) is best able to classify content of known valence, and the PANAS-X text analysis dictionaries have little or no validity.

Table S1. Mean (and *SD*s) emotional tone scores of content of known valence—descriptions of high point and low point life events, and positive and negative movie reviews, for both the LIWC and PANAS-X dictionaries. Emotional tone scores can range from 1-99.

Dictionary	Life Events		Movie Reviews	
	High Point	**Low Point**	**Positive**	**Negative**
LIWC	66 (22)	31 (20)	59 (24)	41 (26)

| PANAS-X | 53 (15) | 47 (11) | 65 (7) | 65 (7) |

Table S2. Inferential statistics from independent logistic regressions classifying high point and low point life events, and positive and negative movie reviews. Analyses included four metrics from the LIWC and six metrics from the PANAS-X dictionaries. LIWC consistently outperformed the PANAS-X, and the emotional tone or positive-minus-negative emotion word density score consistently outperformed the elemental positive and negative emotion density metrics. We omitted correct classification and Nagelkerke R^2 statistics for affective word count with total word count covariate analyses because these statistics reflect the effects of both total word count and affective word counts.

High and Low Point Life Events	LIWC				Affective Word Count with Total Word Count Covariate		PANAS-X		Affective Word Densities	
	Emotional Tone	Positive - Negative Emotion	Positive Emotion	Negative Emotion	Positive Affect	Negative Affect	Emotional Tone	Positive - Negative Emotion	Positive Affect	Negative Affect
Correct Classification	84%	84%	67%	77%	—	—	60%	59%	58%	54%
Nagelkerke R^2	.531	.490	.245	.420	—	—	.066	.085	.097	.007
χ^2	50.82	45.83	20.31	37.89	2.25	1.42	5.10	6.60	7.56	0.54
Odds Ratio	1.08	3.05	2.44	0.18	1.00	1.00	1.04	17.30	53.27 [1.95, 14565.40]	0.20
[95%CI]	[1.05, 1.11]	[1.90,4.90]	[1.51, 3.94]	[0.08, 0.39]	[1.00, 1.01]	[0.99,1.00]	[1.00, 1.07]	[1.53, 195.90]		[0.00, 15.03]
p	< .001	< .001	< .001	< .001	0.17	1.00	.04	.02	.02	.47
Movie Reviews										
Correct Classification	64%	64%	58%	63%	—	—	51%	51%	50%	49%
Nagelkerke R^2	.148	.148	.065	.112	—	—	.000	.000	.001	.000
χ^2	236.12	234.93	100.25	174.84	0.61	0.05	0.65	0.72	0.78	0.09
Odds Ratio	1.03	1.52	1.44	0.56	1.00	1.00	1.01	1.17	1.25	0.91
[95%CI]	[1.02, 1.03]	[1.43,1.61]	[1.33, 1.55]	[0.51,0.61]	[1.00,1.00]	[1.00,1.00]	[0.99, 1.02]	[0.81, 1.70]	[0.76, 2.04]	[0.49,1.69]
p	< .001	< .001	< .001	< .001	0.44	0.82	.42	.40	.38	.77

Study 1: Twitter

Table S3. The same analyses as those reported in Study 1, except with the "fake" Twitter accounts included (16,090 Twitter users who produced 38,761 segments)

	Emotional Tone		Positive Emotion		Negative Emotion		Anxiety		Anger		Sadness	
	B (*SE*)	β	*B* (*SE*)	β	*B* (*SE*)	β	*B* (*SE*)	β	*B* (*SE*)	β	*B* (*SE*)	β
Political orientation	0.224 (0.330)	.005	-0.014 (0.020)	-.004	-0.038 (0.020)*	-.016	**0.009 (0.001)***	.015	**-0.035 (0.010)***	-.025	-0.009 (0.010)†	-.010
Extremism	**-8.250 (0.700)***	-.082	**0.154 (0.050)**	.022	**0.701 (0.030)***	.140	**0.089 (0.010)***	.074	**0.380 (0.020)***	.129	**0.072 (0.010)***	.039

Study 2: Organizations

Table S4. Political orientation scores, names, and descriptions of the 100 organizations.

Emotional Tone	Political orientation	Name	Description
53.36	-0.791	Black Panther Party	The Black Panther Party or BPP (originally the Black Panther Party for Self-Defense) was a revolutionary black nationalist and socialist organization active in the United States.
31.38	-0.749	The Communist	We fight to smash capitalism and the dictatorship of the capitalist class. We organize workers, soldiers, and youth into a revolutionary movement for communism
20.73	-0.720	The Free Communist	Puts forward a revolutionary internationalist perspective and is anti-statist in outlook. Releases free magazine annually.
30.32	-0.719	Anarchist Federation	As anarchist communists we fight for a world without leaders, where power is shared equally amongst communities, and people are free to reach their full potential.
55.50	-0.651	The Nation	The periodical, devoted to politics and culture, is self-described as "the flagship of the left".
31.80	-0.645	SQUAT (Pro Choice organization)	SQUAT sought to fill a desperately needed gap in print media for alternative, anarchist, radical birth workers
46.68	-0.639	Liberation	Newspaper of the Party for Socialism and Liberation.
35.28	-0.636	Capitalist Nature Socialist	Encompasses anti-capitalist perspectives that are both egalitarian and environmental in orientation.
31.80	-0.591	Amandla!	Provides coverage and analysis of current political, economic and social processes from a radical left perspective. Coverage is given to issues such as climate change, labour, food sovereignty and national

healthcare while adding to debates around South Africa's social movements and popular organizations. The magazine takes its name from the Zulu word amandla, which means power

|			
1.90	-0.561	Individual Action Center	An activist group founded in 1992 by former United States Attorney General Ramsey Clark. It supports anti-imperialist movements around the world, and opposes U.S. military intervention in all circumstances.
37.72	-0.551	Dissent	Dissent is a quarterly, left-wing magazine focusing on politics and culture edited by Michael Kazin and David Marcus.
39.36	-0.537	In These Times	An American politically progressive/democratic socialist monthly magazine of news and opinion.
10.77	-0.535	Banned Thought	Struggling against the suppression of ideas
37.35	-0.508	Class War University	A primary goal of this project is to create tools for anti-capitalist, anti-authoritarian, anti-oppressive movements on the terrain of universities.
60.85	-0.497	CounterPunch	A monthly magazine published in the United States that covers politics in a manner its editors describe as "muckraking with a radical attitude". It has been described as left-wing by both supporters and detractors.
28.37	-0.495	The New Left Project	Dedicated to producing high quality comment and analysis on issues of concern to the political left
20.65	-0.476	Economic and Political Weekly	Known for its strong editorial stance with a "social conscience" and for taking left-leaning positions in its editorials, which were occasionally critical of the Communist Party of India (Marxist) government in West Bengal for not being radical enough
29.27	-0.469	New Socialist	The New Socialist Group (NSG) is a network of socialists active in community, labour and campus organizing.
25.77	-0.463	Pride Life	Lifestyle guide for the LGBT community.
29.34	-0.456	Canadian Dimension	Canadian Dimension is Canada's longest standing magazine of the Left.
44.99	-0.438	The Independent Australian	A politically incorrect magazine of ideas and comment outside the mainstream
28.08	-0.436	New Left Review	The New Left Review is a bimonthly political magazine covering world politics, economy, and culture.
44.53	-0.429	The Economist	Aims "to take part in a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress". It takes an editorial stance of classical and economic liberalism which is supportive of free trade, globalisation, free immigration and cultural liberalism (such as supporting legal recognition for same-sex marriage).
46.11	-0.424	The American Prospect	A journal of liberal ideas, committed to a just society, an enriched democracy, and effective liberal politics which focuses on United States politics and public policy. Politically, the magazine is in support of modern American liberalism
38.42	-0.418	Affirmative Action	Advocate for greater inclusion for performers who have been historically underrepresented and also enforce the nondiscrimination and diversity provisions
43.48	-0.417	Greenpeace	Greenpeace is an independent global campaigning organization that acts to change attitudes and behaviour, to protect and conserve the environment and to promote peace.
46.43	-0.416	Forced Migration Review	The most widely read publication on forced migration. authors from around the world analyse the causes and

impacts of displacement; debate policies and programmes

44.74	-0.409	The Advocate	The Advocate is the world's leading source of LGBT news and politics.
28.35	-0.400	The Huffington Post	A liberal-oriented American online news aggregator and blog.
40.11	-0.369	The Big Issue	Challenging, independent journalism, renowned for securing exclusive interviews with the most elusive of superstars. Street newspaper - distributed by homeless people.
66.99	-0.341	INSIGHT into Diversity	INSIGHT Into Diversity is the oldest and largest diversity magazine and website in higher education today. For nearly 40 years, INSIGHT Into Diversity has connected potential employees with institutions and businesses choosing to embrace a workforce more reflective of our local and national communities.
9.84	-0.333	The Rutherford Institute	A non-profit organization based in Charlottesville, Virginia, US dedicated to the defense of civil liberties and human rights.
62.11	-0.321	Invisible Children	Invisible Children, Inc. is an organization founded in 2004 to bring awareness to the activities of the Lord's Resistance Army in Central Africa, and its leader, Joseph Kony.
20.13	-0.318	Foreign Policy	A news publication, founded in 1970, that is focused on global affairs, current events, and domestic and international policy.
54.31	-0.301	Mother Jones	An American magazine featuring investigative and breaking news reporting on politics, the environment, human rights, and culture.
16.31	-0.299	New Internationalist	The world's leading independent publisher of magazines and books on politics, global justice and equality.
24.47	-0.295	Dhaka Courier	The longest running English current affairs magazine in the country. Its content is largely focused on politics, international affairs, economics, travel, literature, society and the arts.
24.85	-0.274	Harvard Political Review	A quarterly, nonpartisan political journal and dynamic online platform produced entirely by undergraduates.
67.32	-0.267	New African	An English-language monthly news magazine based in London. Published since 1966, it is read by many people across the African continent and the African diaspora. It claims to be the oldest pan-African monthly in English, as well as "the bestselling pan-African magazine".
30.79	-0.266	Vice	Vice is a print magazine and website focused on arts, culture, and news topics.
8.67	-0.249	EUobserver	EUobserver is a non-profit independent online newspaper. It aims to support European democracy by giving people the information they need to hold the EU establishment to account.
17.03	-0.213	Accuracy in Media	An American non-profit news media watchdog.
36.39	-0.212	The Monthly	An Australian national magazine of politics, society and the arts.
17.53	-0.211	Standpoint	A monthly British cultural and political magazine.
27.51	-0.205	Save the Children	Save the Children is an international non-governmental organization that promotes children's rights, provides relief and helps support children in developing countries.
12.35	-0.190	International Organization	A peer-reviewed academic journal that covers the entire field of international affairs.
22.13	-0.171	Harper's Magazine	A monthly magazine of literature, politics, culture, finance, and the arts.

51.54	-0.161	American Educator	American Educator is a quarterly journal published by the American Federation of Teachers focusing on various issues about children and education
14.25	-0.161	Quadrant	Australia's leading journal of ideas, essays, literature, poetry, and historical and political debate.
28.85	-0.135	The Atlantic	Created as a literary and cultural commentary magazine, growing to achieve a national reputation as a high-quality review with a moderate worldview.
80.56	-0.133	Alberta Views	A magazine based in Alberta, Canada. A place for Innovators in politics, education, industry, public service and the arts share and discover fresh perspectives related to the public interest of Albertans.
63.81	-0.119	PSRP Reporter	The national publication of aft paraprofessionals and school-related personnel.
70.60	-0.109	Red Cross	The Canadian Red Cross mission is to improve the lives of vulnerable people by mobilizing the power of humanity in Canada and around the world
4.49	-0.101	Midwest Academy	A learning community designed to meet the needs of students for whom the process of schooling elsewhere has been unsuccessful.
77.46	-0.035	Health wire	Health Wire is a free, daily newsletter offering access to important health news and cutting-edge advice from respected members of the personal fitness field.
68.00	0.000	American Library Association	Library issues and trends.
56.24	0.079	Focus on the Family	An American non-profit organization founded in 1977 by psychologist James Dobson, based in Colorado Springs, Colorado.
31.01	0.167	Frontline	As a current affairs magazine, it covers domestic and International news
31.04	0.209	The Independent Review	A quarterly peer-reviewed academic journal covering political economy and the critical analysis of government policy
24.21	0.217	The Diplomat	The Diplomat is an online international news magazine covering politics, society, and culture in the Asia-Pacific region. It is based in Tokyo, Japan.
62.80	0.233	Policy Review	We aim to be the online knowledge hub for those wanting the inside track on European politics, public administration, management issues and game-changing developments in the business world.
34.29	0.262	Herald (Pakistan)	The Herald is considered to be a neutral magazine and produces many large or breaking stories.
7.30	0.288	Organiser	The official publication of the Hindu nationalist volunteer organisation Rashtriya Swayamsevak Sangh (RSS) launched as a newspaper in 1947 in the weeks before the Partition of India
41.32	0.304	Foreign Affairs	An American journal of international relations and U.S. foreign policy
31.48	0.306	National Vanguard	National Vanguard was founded by William Pierce (1933-2002) in 1969 and is now edited by Kevin Alfred Strom and volunteers on four continents. It is the flagship publication of the National Alliance, the leading organization advocating for the interests of men and women of European descent worldwide.
25.77	0.306	Human Events	A conservative American political news and analysis website.
70.00	0.308	Jewish Journal	An independent, nonprofit community weekly newspaper serving the Jewish community.

44.51	0.315	The Middle East	A magazine which covers news, business and culture in the Arab world.
26.11	0.360	The Beijing Review	China's only national news magazine in English.
24.24	0.364	The Spectator	The Spectator is a weekly British conservative magazine.
46.02	0.397	The Weekly Standard	An American conservative opinion magazine published 48 times per year.
42.12	0.400	The European	Features opinion articles, regular columns and interviews. Its claim is "Views, not News". According to its mission statement, "The European is an opinion magazine". Its authors "debate important political and cultural issues within the framework of journalistic news analysis."
21.91	0.409	Newsmax	a conservative American news media organization
41.63	0.410	The New American	The essential news source for freedom-loving Americans.
11.74	0.410	Relevant	Covering faith, culture and intentional living, the stories we tell are at the intersection of where a Christ-centered life is really lived
34.05	0.412	The American Interest	Focuses primarily on foreign policy, international affairs, global economics, and military matters.
35.16	0.415	American Enterprise Institute	The American Enterprise Institute is a community of scholars and supporters committed to expanding liberty, increasing individual opportunity and strengthening free enterprise.
26.65	0.421	The American Spectator	A conservative U.S. monthly magazine covering news and politics.
46.79	0.427	The American Conservative	In both domestic and foreign affairs, The American Conservative promotes a conservatism of realism and reform. A conservatism of ideas over ideology, and principles over party
46.91	0.437	Catholic Answers	To explain and defend the faith.
17.99	0.439	Federation for American Immigration Reform	a national, nonprofit, public-interest, membership organization of concerned citizens who share a common belief that our nation's immigration policies must be reformed to serve the national interest.
39.55	0.453	Americans for Constitutional Liberty	Founded in 1974 as The Conservative Caucus (TCC) in the belief that conservatives could win in Washington only by mobilizing conservative strength at the state and Congressional district level.
12.45	0.458	World Affairs	An American right-leaning bimonthly magazine covering international relations. It is an official publication of the American Peace Society.
58.53	0.464	Townhall	The top source for conservative news, political cartoons, breaking news, election news and commentary on politics and the media culture.
25.77	0.473	The National Interest	An American bi-monthly international affairs magazine published by the Center for the National Interest. It is associated with the realist school of foreign policy thought
39.13	0.496	American Renaissance	The Internet's premier race-realist site. Every weekday we publish articles and news items from a world-wide race-realist perspective.
20.24	0.497	The League of the South	We seek to advance the cultural, social, economic, and political well-being and independence of the Southern people by all honourable means.
28.95	0.505	The Resolve - LRA crisis	The LRA Crisis Tracker is a crisis-mapping social web platform that broadcasts the attacks and other activities

		initiative	perpetrated by the Lord's Resistance Army (LRA) in near real time.
62.21	0.512	Minnesota Tea Party Alliance	The MN Tea Party Alliance is a grassroots organization focused on solutions at the local and state level. Our core principles are the belief that the market place should be free; our elected officials should be fiscally responsible; and our government should operate within the confines of the Constitution.
42.44	0.558	Family Research Council	An American conservative Christian group and lobbying organization formed in the United States in 1981 by James Dobson.
74.00	0.563	Nation of Islam	An Islamic religious movement founded in Detroit, United States.
26.84	0.574	Christian Coalition of America	Represents the pro-family point of view before local councils, school boards, state legislatures and Congress
74.47	0.622	Texas Nationalist Movement	The Texas Nationalist Movement's mission is to secure and protect the political, cultural and economic independence of the nation of Texas and to restore and protect a constitutional Republic and the inherent rights of the people of Texas.
60.26	0.643	National Rifle Association	American non-profit organization which advocates for gun rights.
44.58	0.739	Tea Party Express	Tea Party Express is proud to stand for six simple principles: No more bailouts, Reduce the size and intrusiveness of government, Stop raising our taxes, Repeal Obamacare, Cease out-of-control spending, Bring back American prosperity
23.09	0.754	The American Freedom Party	The American Freedom Party (formerly the American Third Position Party or A3P) is a third position American political party that promotes white supremacy.
8.35	0.925	Stormfront	A white nationalist, white supremacist and neo-Nazi Internet forum that was the Web's first major racial hate site
44.26	0.936	KKK	Three distinct past and present movements in the United States, which have advocated extremist reactionary currents such as white supremacy, white nationalism, and anti-immigration, historically expressed through terrorism
22.22	0.937	ISIS	Salafi jihadist extremist militant group and self-proclaimed Islamic state and caliphate led by Sunni Arabs from Iraq and Syria.
44.25	1.000	Imperial Klans of America	A white supremacist organization styled after the original Ku Klux Klan (KKK)
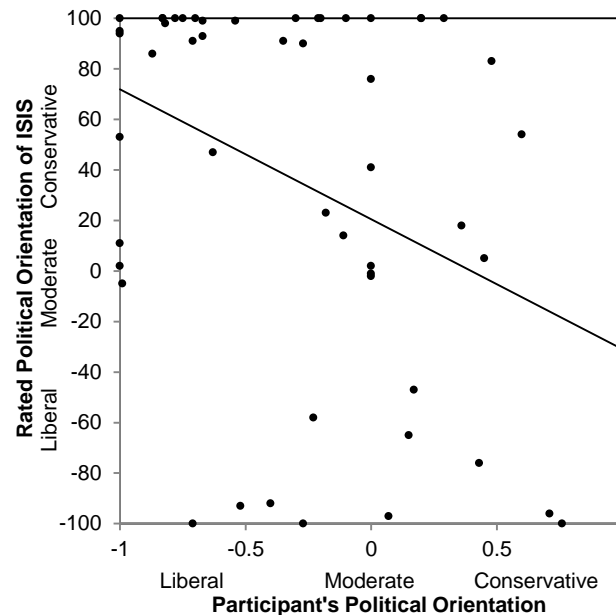
Possible validity threat. Might the inclusion of descriptions bias and invalidate the extremism ratings? The descriptions of some organizations (e.g., ISIS, the Black Panther Party) might have had included text that depicted them as extremist organizations, whereas more moderate organizations (e.g., Mother Jones) might not have had such extremist labels. If this were the case, then ratings of the same organizations without descriptions would yield lower extremism scores for the former organizations (and perhaps not change the ratings of the more moderate organizations). We tested this possibility by asking participants in Study S1 to rate all three organizations. These participants did *not* see descriptions. Figure S3 displays the raw ratings.

Since participants in Study 2 rated only one of the three organizations, we analyzed the effect of descriptions separately for each organization. In each, we ran an ANCOVA with descriptions as a factor and the political orientation of the rater as a covariate. The results did not support the view that the descriptions of the extremist organizations increased their extremism scores of ISIS and the Black Panthers. For ISIS, extremism scores were *lower* when descriptions were present, $F(1,1066) = 6.24$, $p = .013$, $\eta_p^2 = .006$. For the Black Panther Party, descriptions did not affect extremism scores, $F(1,1065) = 0.52$, $p = .470$, $\eta_p^2 < .001$. And for Mother Jones, descriptions lowered extremism scores, $F(1,1047) = 7.60$, $p = .006$, $\eta_p^2 = .007$.

More importantly, the rank ordering extremism ratings was preserved. Without descriptions, the Black Panthers were 19 points more extreme than Mother Jones; with prompts, the gap was very similar (16 points). And without prompts, ISIS was 19 points more extreme than the Black Panthers; with prompts, the gap was very similar (24 points).

Figure S3. Extremism ratings of Mother Jones, the Black Panther Party, and ISIS, both with descriptions and without. Error bars are 95% CIs.
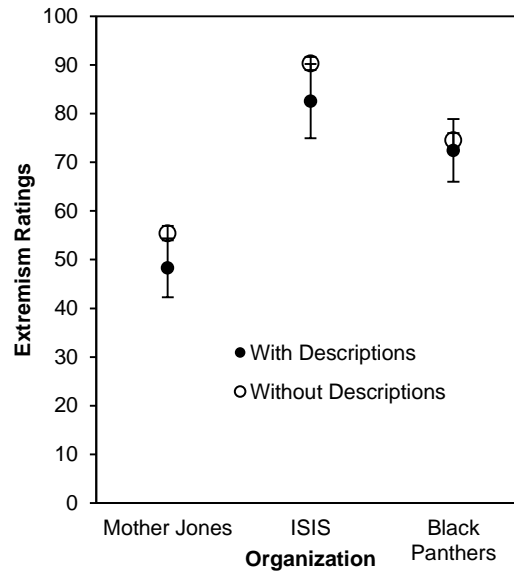
Table S5. Effects of political orientation and extremism on emotional tone of language when transcripts are not segmented. Bolded numbers are significant.

	N	Emotional Tone	
		B (SE)	β
Twitter (Study 1)	3,380,140		
Political orientation		-.004 (0.130)	.000
Extremism		**-0.393 (0.110)***	**-.007**
Organizations (Study 2)	100		
Political orientation		2.486 (3.985)	.064
Extremism		-8.500 (9.144)	-.095
Congress (Study 3)	4,958		
Political orientation		**7.236 (0.656)***	**.191**
Extremism		**-28.040 (1.746)***	**-.286**
News Media (Study 4)	55		
Political orientation		**2.277 (0.627)****	**.278**
Extremism		**-10.759 (0.082)***	**-.765**

Note. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Study S1

Study S1 provides an additional test of whether the language of extremists is more negative than that of moderates, and examines whether individual differences in perceived threat

are correlated with this trend. Our notion that liberals and conservatives feel more threatened than moderates departs from some previous research that found that conservatives perceive more threat than do liberals (e.g., Duckitt, 2001). The scales used in these studies specified particular entities that conservatives might find more threatening than liberals (e.g., anarchy, bestiality, instability). Liberal extremists may perceive danger from other forces not fully captured in some scales, such as climate change and policy brutality (Jost et al., 2017). We used a more generic measure of perceived threat to test our primary prediction that perceived threat would help explain extremists' negative language.

Method

  Participants. We recruited 1,019 Americans on Amazon's Mechanical Turk, a crowdsourcing website. The sample was 53% female and 38 years old on average ($SD = 12$). Each received $0.40 for participating.

  Procedure. In October 2017, participants wrote a short essay about the state of society, responded to three self-report mediators (perceived threat, competitive world, dissatisfaction with the status quo), completed a self-affirmation task to reduce any possible negative affect resulting from the essay task, rated the extremism of three organizations (validity check for Study 2; see above for results) and reported demographics, which included an item about political orientation/extremism. We included more than one covariate because Duckitt et al. (2002) proposed that the conservative social worldview includes the belief that the world is dangerous (perceived threat) and the belief that the world is a competitive place. We included both beliefs in our study to test these different worldviews. A third possibility is that extremists merely feel dissatisfied with the status quo (which they find threatening), and this dissatisfaction explains their negative language. Although some prominent social psychological accounts of support for the status quo suggests that liberals are particularly dissatisfied with the status quo (Jost, Banaji, & Nosek, 2004), it remains a possibility that this sentiment is in the province of extremist groups on both sides.

  Political orientation/Extremism. The rating scale asked, "When it comes to politics, how do you identify on social issues" Participants responded on a 201-point slider scale anchored at -100 (*extremely liberal*), -50 (*somewhat liberal*), 0 (*moderate*), 50 (*somewhat conservative*), and 100 (*extremely conservative*). We divided participants response by 100 to form a political orientation measure that could vary from -1.00 to 1.00, and took the absolute value of political orientation as a measure of extremism.

  Writing Task. The instructions were, "The next task is to describe the current state of the country and the world. In your view, how are the country and the world doing? Please explain. How did it come to be this way? Please explain. What makes this situation good or bad (or somewhere in between) in your opinion?" Participants wrote 83 words on average ($SD = 63$). We used computer software for content analysis.

  Mediators. We included three mediators. For all three, the question asked, "How much do you agree or disagree with each statement?" Participants responded on a 21-point scale anchored at -10 (*strongly disagree*), 0 (*neither agree nor disagree*), and 10 (*strongly agree*). The mediator items were presented in random order and were:

  Perceived threat ($\alpha = .68$)
- People in society that I care about are under threat.
- The world is a dangerous place.
- In general, I feel safe. (reverse scored)

  Competitive world ($\alpha = .24$)

- The world is a competitive place.
- Winning is the ultimate goal.
- If one person wins, everyone should share in the bounty. (reverse scored)
  Dissatisfaction with the status quo ($\alpha = .47$)
- I am dissatisfied with the status quo.
- I am frustrated by how slowly social change is happening.
- The way forward for society is baby steps. (reverse scored)

Although the alpha levels for the latter two scales are lower than anticipated, because our original intention was to combine the items and because of their face validity, we report the results with the combined scale in the main text and analyze each item from each scale.

Results

Extremism negatively (and marginally) predicted the emotional tone of the language in short essays (see Table S6).

Table S6. Regression analyses of political orientation and extremism predicting emotional qualities of the language of short essays written by Mechanical Turk workers (Study S1).

	Emotional Tone		Positive Emotion		Negative Emotion		Anxiety		Anger		Sadness	
	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β
Political Orientation	2.921 (1.915)	.049	0.226 (0.193)	.038	**-0.482 (0.245)** *	-.064	-0.094 (0.078)	-.039	-0.172 (0.140)	-.040	0.030 (0.059)	.017
Extremism	-6.574 (3.380)†	-.063	-0.617 (0.340)†	-.059	-0.493 (0.433)	-.037	**-0.332 (0.137)** *	-.078	-0.179 (0.246)	-.024	0.163 (0.104)	.051

To test which beliefs are most closely associated with extremists' more negative language, we first examined whether political orientation and/or extremism were related to the covarying beliefs. Table S7 shows that both extremism and political orientation predicted perceived threat. When breaking down the effect of extremism, extremism positively predicted perceived threat among liberals and conservatives respectively, albeit non-significantly for conservatives. Although extremism was associated with more threat, the fact that the extremism effect was not symmetrical on the left and the right might make sense in light of conservatives controlling the U.S. Presidency and both chambers of Congress at the time of the study. Unlike perceived threat, the other two covariates were less linked to extremism and more to political orientation.

Table S7. Associations between political orientation and extremism and the three mediators in Study S1. Analyses were regression analyses. Bolded numbers are statistically significant.

| Predictor	Perceived Threat		Competitive World		Dissatisfied with Status Quo	
	B (SE)	β	B (SE)	β	B (SE)	β
Political Orientation	**-0.649 (0.285)***	-.073	**-2.006 (0.287)***	.220	**-2.366 (0.319)***	-.231

Extremism	1.321 (0.504)**	.085	-1.289 (0.507)*	-.080	1.838 (0.564)**	.102
Effect of Extremism…						
…Among Liberals	2.410 (0.693)**	.139	-3.421 (0.637)***	-.212	5.198 (0.763)***	.265
…Among Conservatives	0.032 (0.629)	.002	1.381 (0.729)†	.090	-1.535 (0.711)*	-.102

Note. †$p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

We did not manipulate the independent variable (extremism) or the mediators in this study, meaning that the causal relationship between extremism, perceived threat, and negative language remains unclear. That said, for the sake of thoroughness and transparency, we tested which belief(s) mediate(s) extremisms' association with negative emotional tone. We ran a bias corrected bootstrapped mediation analysis in which extremism predicted emotional tone, the three covariates were entered simultaneously as potential mediators, and political orientation was entered as a covariate to isolate the effect of extremism on the mediators and emotional tone. Figure S4 shows how perceived threat mediated the negative emotional tone of political extremists. The belief that the world is a competitive place did too, albeit in the opposite direction that one might expect: extremists were less likely than moderates to believe that the world is a competitive place. Dissatisfaction with the status quo did not mediate extremists' negative emotional tone.

Figure S4. Mediation model showing that extremists' language has a negative emotional tone in part because they perceive threat (Study 5). All mediators were entered simultaneously, and political orientation was entered as a covariate to isolate the effects of extremism on the mediators and emotional tone. Solid lines and bolded numbers are statistically significant. *$p < .05$, **$p < .01$ *** $p < .001$.
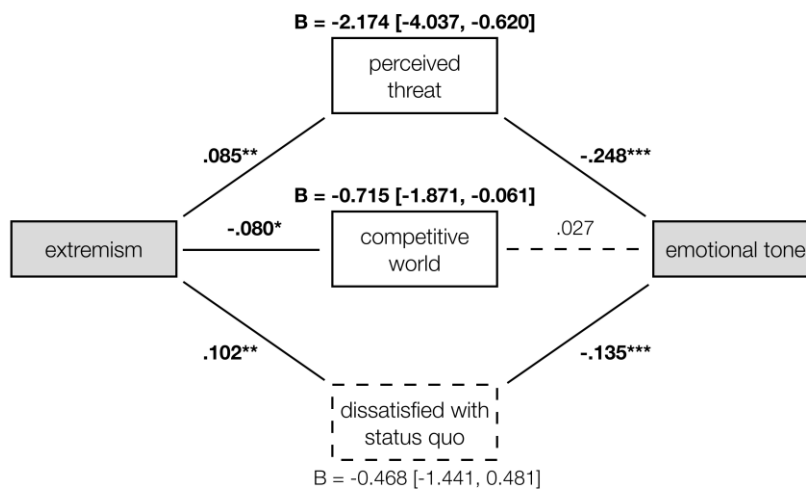
Noting that the reliability of some of the mediators was somewhat low, we also ran the mediation analysis using nine separate mediators (i.e. items). Table S8 displays the results. Items from the perceived threat scale tended to mediate extremists' negativity. These results are generally consistent with our idea that perceived threat helps explain extremists' use of negative language. However, this analysis does help us understand that extremists' threat perceptions may be more proximately associated with negative emotional tone than extremism itself.

Table S8. Regression and mediation analyses with all nine items. The regression analyses were conducted with political orientation and extremism as predictors of each mediator. The mediation analysis involved extremism predicting emotional tone through all nine mediators entered simultaneously and political orientation as a covariate. All items were scores such that higher numbers represent a negative (threat, competitive, dissatisfied) outlook. Items are presented in descending order of strength of mediation. Bolded numbers are statistically significant.

Scale	Item	Regression				Mediation
		Political Orientation		Extremism		Effect of extremism
		B (SE)	β	B (SE)	β	B [95%CI]
PT	People in society that I care about are under threat.	**-1.158 (0.278)***	**-.131**	**2.883 (0.490)***	**.185**	**-1.662 [-3.547, -0.27]**
DSQ	I am dissatisfied with the status quo.	**-2.005 (0.260)***	**-.240**	**1.673 (0.460)***	**.113**	**-1.556 [-3.129, -0.573]**
PT	The world is a dangerous place.	**0.844 (0.244)**	**.111**	**1.081 (0.432)***	**.081**	**-0.994 [-2.404, -0.201]**
CW	Winning is the ultimate goal.	**2.255 (0.304)***	**.231**	**-2.206 (0.537)***	**-.128**	**-0.945 [-2.199, -0.209]**
DSQ	The way forward for society is baby steps.	**-0.947 (0.259)***	**-.117**	**1.498 (0.457)**	**.105**	-0.395 [-1.243, 0.142]
CW	If one person wins, everyone should share in the bounty.	**3.263 (0.280)***	**.352**	**-1.214 (0.493)***	**-.074**	-0.087 [-0.787, 0.413]
CW	The world is a competitive place.	**0.533 (0.188)**	**.092**	0.104 (0.333)	.010	-0.025 [-0.571, 0.176]
PT	In general, I feel safe.	**-1.003 (0.277)***	**-.117**	0.011 (0.488)	.001	0.013 [-1.153, 1.220]
DSQ	I am frustrated by how slowly social change is happening.	**-3.619 (0.278)***	**-.385**	**1.606 (0.490)**	**.097**	**0.773 [0.094, 2.008]**

Note. PT = Perceived Threat Scale; CW = Competitive World Scale; DSQ = Dissatisfied with the Status Quo Scale; * $p < .05$, ** $p < .01$, *** $p < .001$

Study S2

In Study S2, we aimed to again test the extremist hypothesis with a crowdsourced sample. A second goal was to test, and rule out the venting mechanism: that extremists' negative language is merely a cathartic expression of chronically depressed mood. If it were, then we would predict that extremists would report being in a more depressed mood than moderates prior to verbal expression, and their lower mood would predict their negative language. Our theory is that extremists' negative language reflects perceived threat from ideological adversaries; it does not necessarily suggest that extremists would be chronically unhappy in their lives. Thus, this test helps us establish the specificity of our proposed mechanism.

A second objective was to test the boundary conditions of the extremist hypothesis. In Studies 1-4 and S1, the topic of conversation may have uniformly been political issues—Twitter users tweeting about an election (Study 1), politically minded organizations writing newsletters and magazines (Study 2), politicians debating policy (Study 3), the media covering politics (Study 4), and a crowdsourced sample describing the state of society and the world (Study S1).

This raises the question of whether extremists' usage of negative language is limited to political topics, or whether it is a tendency that generalizes to other topics, such as the state of television. Our final goal was to (again) test the validity of the LIWC emotional tone dictionary by comparing such analyses to subjective judgments made by human judges.

Method

        Participants. We collected these data in April 2017 by recruiting a diverse sample from a variety of English-speaking countries using http://crowdflower.com, a crowdsourcing website like Mechanical Turk. The sample ($N = 774$; 58.5% female) was from the U.S. ($n = 317$), India ($n = 249$), Canada ($n = 101$), the U.K. ($n = 92$), Ireland ($n = 8$), and Australia ($n = 7$). On average, participants were 34 years old ($SD = 13$, range 18-78).

        Procedure. After reporting their mood, participants wrote a short essay either about the state of society or about the state of television (randomly assigned, between subjects), then reported their mood again. Finally, participants completed a self-affirmation task to mitigate possible negative affect caused by the writing task, and reported demographics, which included a question about their political orientation. Later, computer software and research assistants independently coded the text passages for emotional tone.

        Political orientation and extremism. The question asked, "When it comes to politics, what best describes your views?" Participants responded on a 5-point scale anchored at -1.0 (*Left Wing*), -0.5 (*Center-Left*), 0 (*Moderate*), 0.5 (*Center-Right*), and 1.0 (*Right Wing*). We used the left-right dimension of political orientation because it has a more similar meaning between countries than does the liberal-conservative dimension. We took the absolute value of their political orientation score as a measure of extremism.

        Writing task. We randomly assigned participants to write about either the state of society or the state of television. The instructions were as follows: "The next task is to write a paragraph in which you describe the state of society [television] these days. To do so, please: (a) describe your thoughts about how things are going; (b) describe how it came to be this way; (c) describe what makes the situation good or bad or somewhere in between in your opinion, and (d) describe any consequences of the current state of affairs that are important to you." Participants wrote 50 words on average ($SD = 52$). We later coded the passages for their language valence both using computer coding and human coding.

        Computer coding. We used LIWC to analyze the emotional tone along with the density of positive emotion, negative emotion, anxiety, anger, and sadness words.

        Human coding. Two research assistants, blind to the study design and hypotheses, independently (from one another, and without knowledge of the computer analysis) coded the emotional tone of each text passage using McAdams et al.'s (1997) procedure. The instructions were from McAdams et al. (1997; p. 685): "Read each passage and provide a rating for overall positivity, on a 5-point scale ranging from -2 (*completely negative and pessimistic*) to +2 (*completely positive and optimistic*). Code responses that are meaningless or not in English as 9999." Of the 774 passages, 10 received a code of 9999 from both judges (2.6%); we dropped these 10 participants from all analyses. In the 20 cases where only one coder assigned an emotional tone score and the other scored it 9999, we used the assigned rating as the final emotional tone score. For the remaining 744 passages, neither coder assigned a score of 9999; on these responses, inter-rater reliability was $r = .81$. We averaged the two coders' responses to form a single metric of human-coded emotional tone

        To test the validity of computer coded language valence, we examined whether the LIWC category of emotional tone converged with human coding, and found supportive evidence, $r(752)$

= .65, *p* < .001 (positive emotion and negative emotion correlated with human coded language valence too, *r*s = .42 and -.51, respectively).

   Mood. The question asked, "How do you feel right now?" Participants responded to six items (*angry*, *anxious*, *sad*, *at ease*, *relaxed*, and *happy*; which appeared in random order) on a 7-point scale anchored at 0 (*not at all*), 2 (*slightly*), 4 (*moderately*), and 6 (*extremely*). To form a mood composite where higher scores mean a more positive mood, we forward-scored *at ease*, *relaxed*, and *happy* and reverse-scored *angry*, *anxious*, and *sad* (α = .81 at pre-test and α = .83 at post-test).

Results

   Replication and boundary conditions. To test whether extremism and/or political orientation predicted the emotional tone of their language (replication), and whether these effects are limited to discussing the state of society or generalize to other topics, we ran a series of regression analyses. In each, the outcome was a linguistic emotion category (emotional tone, positive emotions, and so on). The predictors were uniformly: participant political orientation and extremism, the experimental condition (coded 1=society and -1=TV), and the interactions between political orientation and condition and extremism and condition.

   Table S9 shows how emotional tone varied by political orientation and experimental condition. Extremism was the only significant (and negative) predictor of emotional tone, meaning that extremists' language was more negative than those of moderates (supporting the extremist hypothesis), and the effect generalized to descriptions of society and television. Using human-coded language valence as a dependent variable yielded similar results as using computer-coded language valence, with the one exception being a main effect of experimental condition: society essays were more negative than TV essays. (This difference may simply be a product of human coding being more sensitive/reliable.) Compared to moderates, extremists used less positive emotion, more negative emotion, and more anger words. Like in 4 of the 5 preceding studies, anger better distinguished moderates from extremists than anxiety and sadness.

Table S9. Predictors of the emotional tone (and its subcategories) in the language of Internet users writing either about the state of society or the state of television (Study S2). Extremism negatively predicted the emotional tone of the language. The effect generalized to both experimental conditions, meaning that extremists' language is more negative on multiple topics. Analyses were multiple regression analyses. Bolded numbers are statistically significant.

Predictor	Computer Coded												Human Coded	
	Emotional Tone		Positive Emotion		Negative Emotion		Anxiety		Anger		Sadness		Emotional Tone	
	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β
Political orientation	-0.782 (3.167)	-.009	0.964 (1.063)	.034	0.125 (0.292)	.016	0.098 (0.124)	.030	0.039 (0.149)	.010	0.057 (0.088)	.025	-0.115 (0.090)	-.047
Extremism	**-18.027 (4.016)*** **	**-.168**	**-2.870 (1.348)* **	**-.081**	**1.013 (0.371)** **	**.102**	0.257 (0.157)	.062	**0.569 (0.189)** **	**.113**	0.019 (0.111)	.006	**-0.672 (0.114)*** **	**-.217**
Condition (1=Society, -1=TV)	-2.971 (1.895)	-.072	0.523 (0.636)	.039	**0.502 (0.175)** **	**.133**	**0.237 (0.074)** **	**.149**	0.156 (0.089)†	.081	0.061 (0.053)	.055	**-0.160 (0.054)** **	**-.135**
Condition × Political orientation	3.570 (3.167)	.043	0.073 (1.063)	.003	**-0.653 (0.292)* **	**-.085**	**-0.325 (0.124)** **	**-.101**	-0.156 (0.149)	-.040	-0.130 (0.088)	-.057	0.069 (0.090)	.029
Condition × Extremism	-2.920 (4.016)	-.035	-0.361 (1.348)	-.013	-0.159 (0.371)	-.021	-0.241 (0.157)	-.074	0.077 (0.189)	.020	-0.120 (0.111)	-.053	-0.100 (0.114)	-.041

Note. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Testing the venting hypothesis. If extremists' negative language is the result of emotional venting, then extremists should be in a more negative mood than moderates before the writing task. This possibility did not receive support: in fact, extremists reported feeling in a marginally better mood than moderates at pre-test (see Table S10). Moreover, higher mood at pre-test was associated with a more negative emotional tone of language within each condition, rs ≤ -.133, ps ≤ .010.

In contrast, the act of expressing negativity seems to have lowered extremists' mood. To remove pre-existing differences in participants' mood before the essay task, we calculated a change-in-mood score by subtracting pre-test mood from post-test mood for each participant. Extremism predicted a decrease in mood (see Table S10). We also found an effect of political orientation, such that right wing participants experienced a larger mood reduction than did left wing participants, and an interaction with the experimental topic. Within each condition, we found that extremists experienced more mood depression than did moderates after writing about society but not after writing about TV.

Table S10. Predictor of self-reported mood of Internet users both before and after writing either about the state of society or the state of television (Study S2). Extremism positively predicted pre-test mood, countering the view that extremists are drawn to using negative language to express unhappiness. In contrast, extremism negatively predicted post-test mood (marginally) and the change in mood that occurred after writing about the state of society or TV. This induced negative mood among extremists occurred after writing about society but not about TV. Analyses were multiple regression analyses. Bolded numbers are statistically significant.

	Mood						Change-in-Mood, by Condition			
	Pre-test		Post-Test		Change		TV Condition		Society Condition	
	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β
Political orientation	**0.619 (0.178)****	**.133**	0.295 (0.191)	.059	**-0.368 (0.145)***	**-.095**	-0.267 (0.176)	-.082	**-0.468 (0.229)***	**-.109**
Extremism	0.416 (0.225)†	.071	-0.413 (0.241)†	-.065	**-0.895 (0.183)*****	**-.182**	-0.308 (0.221)	-.076	**-1.482 (0.291)*****	**-.271**
Condition	-0.113 (0.106)	-.050	-0.251 (0.113)*	-.104	-0.132 (0.086)	-.071				
Condition × Political orientation	0.095 (0.178)	.021	0.064 (0.191)	.013	-0.101 (0.145)	-.026				
Condition × Extremism	0.258 (0.225)	.056	-0.241 (0.241)	-.049	**-0.587 (0.183)****	**-.154**				

Note. † p < .10, * p < .05, ** p < .01, *** p < .001

We also ran the analyses separately for each country (Table S11), and repeated all of the analyses while controlling for the country of origin of the author. To do so, we created dummy codes for all but one country, and included them in all analyses. Tables S12-13 present the results. The following effects of controlling for country were noteworthy:
- Controlling for country reduced the effect of LIWC emotional tone on extremism to marginal significance.

- Controlling for country did not affect the effect of human coded emotional tone on extremism.
- Controlling for country did not affect the effects of topic on emotional tone
- Controlling for country reduced the relationship between extremism and pre-test mood from marginal to non-significance.
- Controlling for country made the relationship between extremism and post-test mood significant.
- Controlling for country did not alter the pattern of results concerning change-in-mood: right wing and extremist participants experienced a more negative shift, and these effects were limited to the society condition.
- The language of participants from India was particularly positive. Examining the histograms, we noted that the Indian sample tended to identify as political centrist more so than samples from other countries. Controlling for country thus reduced the effect of extremism on emotional tone.

Table S11. Predictors of the emotional tone in the language of Internet users writing either about the state of society or the state of television, by country. We included only the countries that had a substantial sample (ns ranged from 92 to 317 in these four countries), and did not analyze countries with small ns (Ireland and Australia, ns < 10). The relationship between extremism and the emotional tone of language was in the predicted (negative) direction in three of four countries. India yielded the strongest result. Analyses were multiple regression analyses. Numbers represent unstandardized estimates (and *SE*s). Bolded numbers are statistically significant.

	Canada	India	UK	US
Political orientation	5.313	7.288	-1.029	-1.327
	(7.503)	(8.685)	(8.932)	(4.088)
Extremism	3.725	**-26.514**	-2.442	-3.846
	(10.064)	**(9.603)****	(12.591)	(5.572)
Condition	-6.039	-0.733	**-20.453**	-1.056
(1=Society, -1=TV)	(5.130)	(2.731)	**(5.755)****	(3.064)
Condition × Political	**19.609**	-11.188	-4.113	3.383
orientation	**(7.503)***	(8.685)	(8.932)	(4.088)
Condition × Extremism	14.523	-8.225	5.401	-7.012
	(10.064)	(9.603)	(12.591)	(5.572)

Table S12. Predictors of the emotional tone (and its subcategories) in the language of Internet users writing either about the state of society or the state of television, while controlling for the country of original of the author. Extremism negatively predicted the emotional tone of the language. The effect generalized to both experimental conditions, meaning that extremists' language is negative on multiple topics. Analyses were multiple regression analyses. Numbers represent unstandardized estimates (and *SE*s). Bolded numbers are statistically significant.

Predictor	Computer Coded						Human Coded
	Emotional Tone	Positive Emotion	Negative Emotion	Anxiety	Anger	Sadness	Emotional Tone
Political orientation	-1.178	1.026	0.143	0.122	0.042	0.063	-0.127
	(2.988)	(1.011)	(0.283)	(0.122)	(0.148)	(0.087)	(0.082)
Extremism	-6.762	0.559	0.184	0.063	0.319	-0.100	**-0.294**

	(3.959)†	(1.331)	(0.375)	(0.162)	(0.197)	(0.116)	**(0.109)****
Condition (1=Society, -1=TV)	-3.507 (1.788)*	0.295 (0.599)	**0.542 (0.169)****	**0.257 (0.073)*****	0.169 (0.089)†	0.068 (0.052)	**-0.178 (0.049)*****
Condition × Political orientation	4.459 (2.989)	0.190 (1.011)	-0.722 (0.283)*	**-0.342 (0.122)****	-0.176 (0.148)	-0.145 (0.087)†	0.104 (0.082)
Condition × Extremism	-3.991 (3.797)	-0.526 (1.277)	-0.094 (0.360)	-0.238 (0.155)	0.090 (0.189)	-0.114 (0.111)	-0.134 (0.104)
Country							
United States	9.938 (14.531)	1.687 (4.956)	-0.963 (1.377)	-0.351 (0.593)	-0.056 (0.722)	0.080 (0.425)	0.605 (0.399)
India	**39.937 (14.573)****	9.610 (4.968)†	**-3.182 (1.381)***	-0.821 (0.595)	-0.733 (0.724)	-0.285 (0.426)	**1.629 (0.400)*****
Canada	8.507 (14.870)	1.083 (5.073)	-0.979 (1.409)	-0.429 (0.607)	-0.145 (0.738)	-0.014 (0.435)	0.575 (0.408)
United Kingdom	5.032 (14.919)	0.787 (5.090)	-0.661 (1.414)	0.199 (0.609)	0.009 (0.741)	-0.023 (0.436)	0.487 (0.409)
Ireland	0.794 (19.666)	-0.832 (6.709)	-1.362 (1.864)	-0.575 (0.803)	-0.653 (0.977)	0.636 (0.575)	0.115 (0.540)

Note. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table S13. Predictor of self-reported mood of Internet users both before and after writing either about the state of society or the state of television, while controlling for the country of the author. Analyses were multiple regression analyses. Numbers represent unstandardized estimates (and *SE*s). Bolded numbers are statistically significant.

	Feelings			Change-in-Feelings, by Condition	
	Pre-test	Post-Test	Change	TV Condition	Society Condition
Political orientation	**0.596 (0.174)****	0.269 (0.191)	**-0.363 (0.143)***	-0.271 (0.176)	**-0.451 (0.224)***
Extremism	-0.002 (0.231)	**-0.525 (0.254)***	**-0.596 (0.190)****	-0.148 (0.235)	**-1.125 (0.297)*****
Condition	-0.114 (0.104)	**-0.258 (0.114)***	-0.138 (0.085)		
Condition × Right Wing	0.066 (0.174)	0.054 (0.191)	-0.073 (0.143)		
Condition × Extremism	0.306 (0.221)	-0.231 (0.242)	**-0.615 (0.181)****		
Country					
United States	-0.330 (0.835)	-0.079 (0.915)	0.244 (0.682)	-0.070 (0.887)	0.489 (1.014)
India	-1.516 (0.838)†	-0.413 (0.918)	1.052 (0.684)	0.435 (0.891)	1.538 (1.018)

	-0.306	-0.075	0.213	0.151	0.225
Canada	(0.854)	(0.936)	(0.698)	(0.906)	(1.040)
	-0.970	-0.510	0.444	0.353	0.371
United Kingdom	(0.857)	(0.939)	(0.700)	(0.902)	(1.054)
	-0.942	-1.013	-0.098	0.384	-1.171
Ireland	(1.130)	(1.238)	(0.922)	(1.110)	(1.528)

Note. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Discussion

Study S2 again found that extremism negatively predicted emotional tone, and political orientation was unrelated to emotional tone, supporting the extremist hypothesis. Extremists' language was more negative than that of moderates both when describing the state of society and when describing the state of television. This result might mean that extremists have a general tendency to use negative language. Alternatively, extremists may have described the state of television in politicized terms. For example, a left-wing American described the state of television as follows:

> In regards to cable news programs, I believe the angry politics were created and fueled by Fox News and the way they tapped into the fears and prejudice of a certain group of Americans. The consequence is that to those Americans, the truth doesn't matter. They only believe what they want to and whatever the angry political pundits tell them regardless of how wrong it is.

An informal inspection of the descriptions of the state of television found that ~20% of them were in explicitly political terms. A significant number of additional descriptions offered a social commentary without explicitly invoking politics:

> The state of television is very unique these days because there is so much reporting on the terrible things that are happening in the world today. Bullying, murders, violence seem very prevalent on television every day. It's hard to turn on the tv and not see this almost every hour.

Although participants were not asked to comment on politics or asked any questions about politics, the survey was titled, "The State of the World Study". This could have primed participants in both conditions to think about societal issues. These observations suggest that social and political issues might pervade many aspects of people's lives, and thus attest to the far-reaching tendency of extremists' to use negative language.

Study S3 (Common Threats)

Method

To describe the most common threats that liberal and conservative extremists perceive, we asked 666 Americans on Crowdflower to indicate their level of agreement with the statement, "people that I care about are in danger" on a 6-point scale anchored at 1 (*strongly disagree*) 2 (*disagree*), 3 (*slightly disagree*), 4 (*slightly agree*), 5 (*agree*), and 6 (*strongly agree*). For those who answered 3 or above, three follow-up questions appeared. They asked, (a) "Who might be in danger?" (b) "What is the danger?" and (c) "Who or what is likely responsible for the danger?"

Results

We began by forming two groups: Liberal extremists were people whose political orientation was between -0.60 and -1.00. And conservative extremists were people whose political orientation was between 0.60 and 1.00. We then analyzed their answers to the final two questions by simply counting up the most frequent words, and used those data to form word clouds.

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