

United States Politicians' Tone Became More Negative with 2016 Primary Campaigns

Jonathan Külz¹, Andreas Spitz², Ahmad Abu-Akel³, Stephan Günnemann¹, Robert West^{4*}

¹TU Munich, ²University of Konstanz, ³University of Lausanne, ⁴EPFL

December 15, 2021

Supplementary Information

Contents

1	Figures	2
2	Tables	9

*To whom correspondence should be addressed: robert.west@epfl.ch

1 Figures

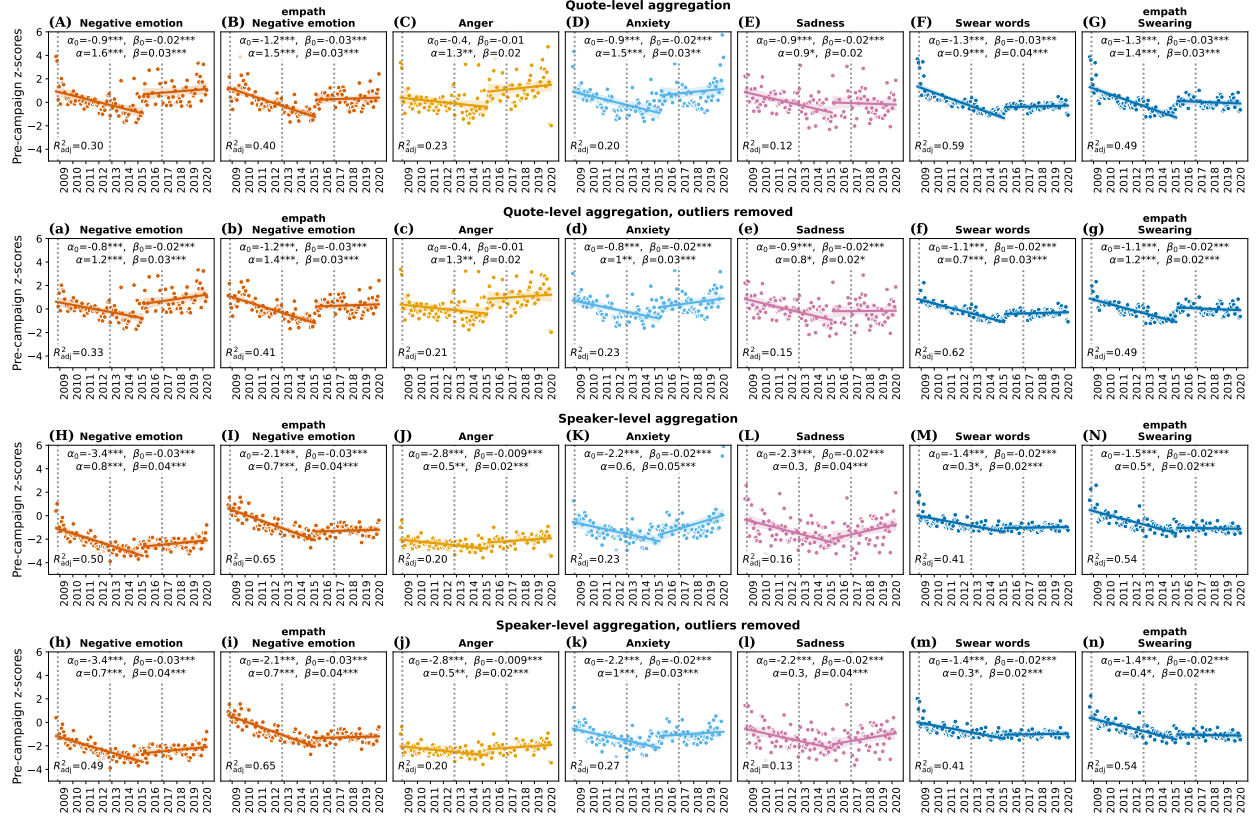


Figure 1: Quote-level and speaker-level aggregation, with and without outliers (+ empath control categories)

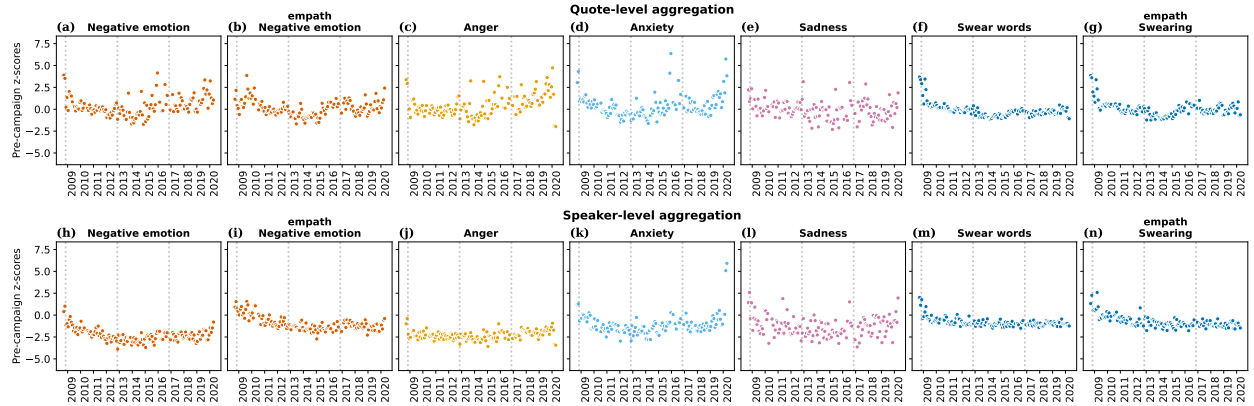


Figure 2: Standardized raw data for quote-level and speaker-level aggregates

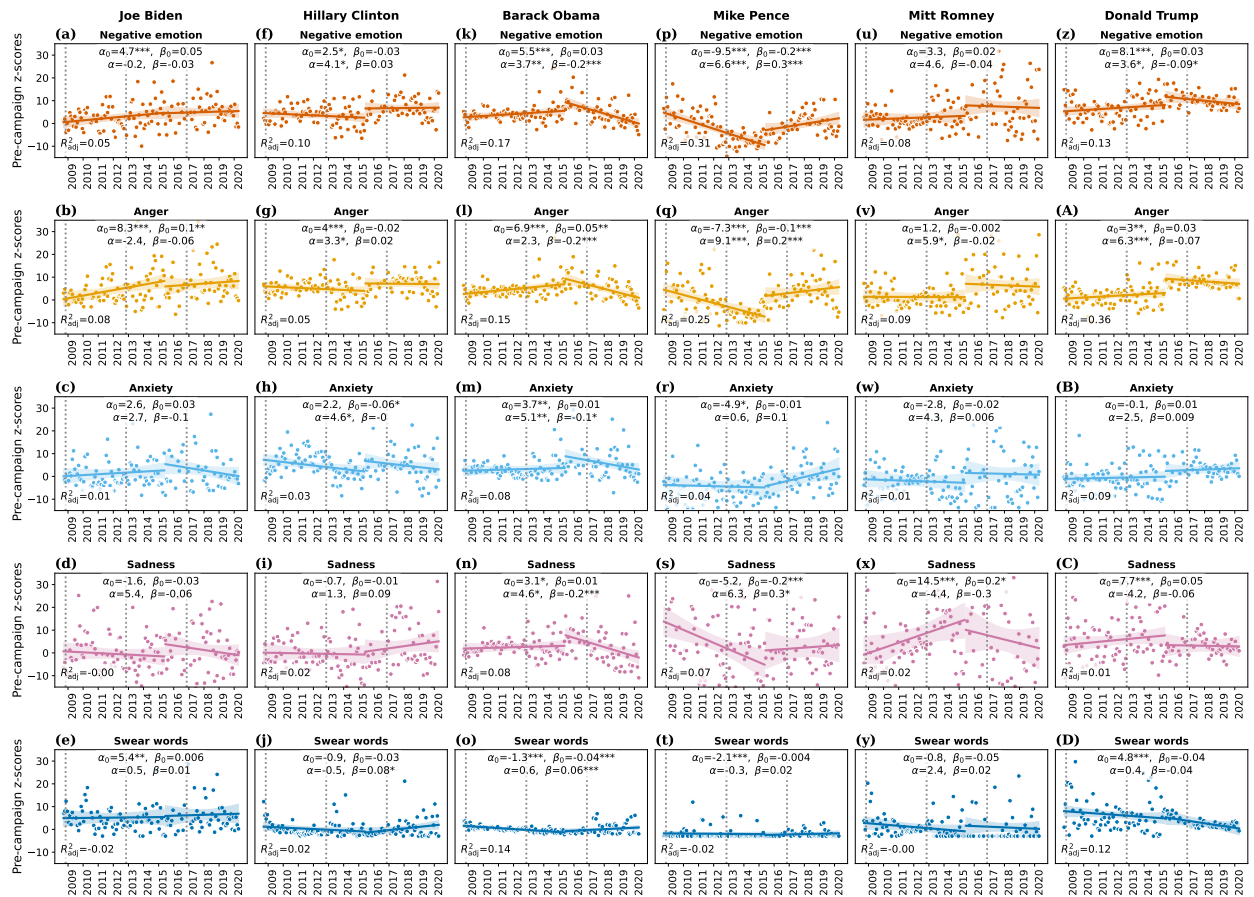


Figure 3: Quote-level aggregation for prominent politicians. John McCain died in 2018 but was frequently quoted thereafter still.

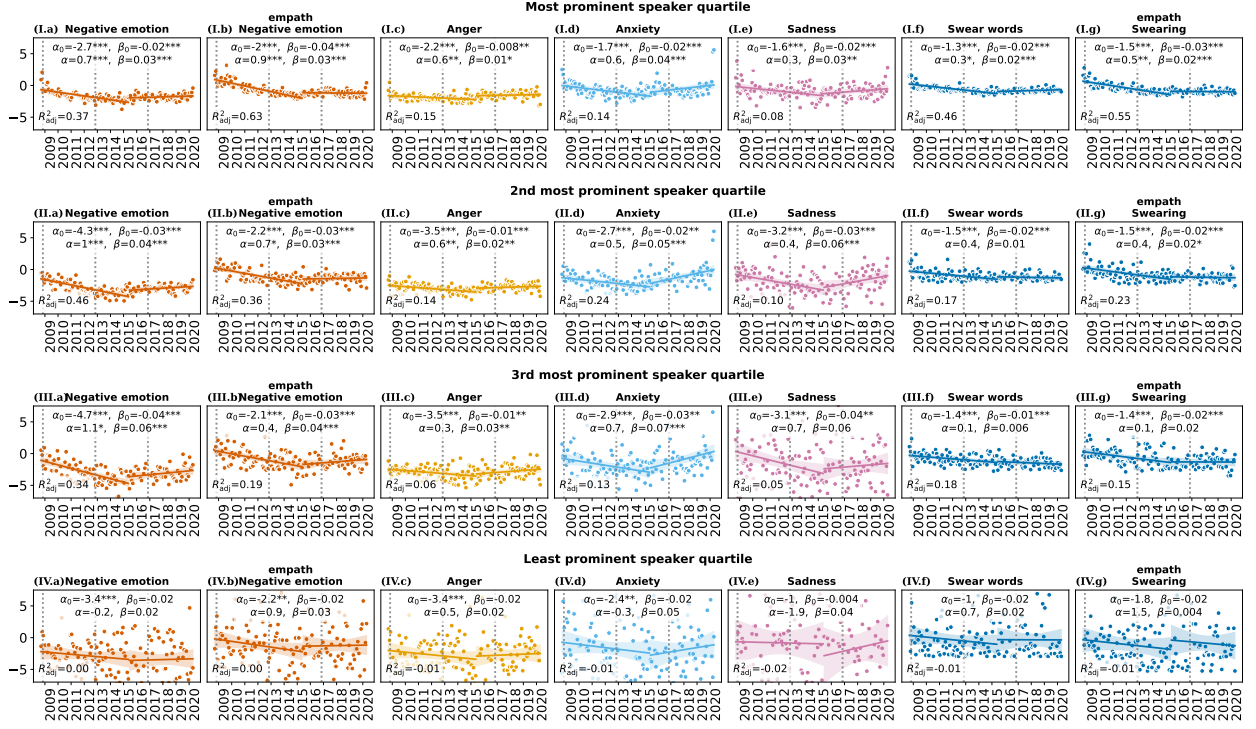


Figure 4: Speaker-level aggregation by prominence quartiles (extended version of Fig. 3 in the main text)

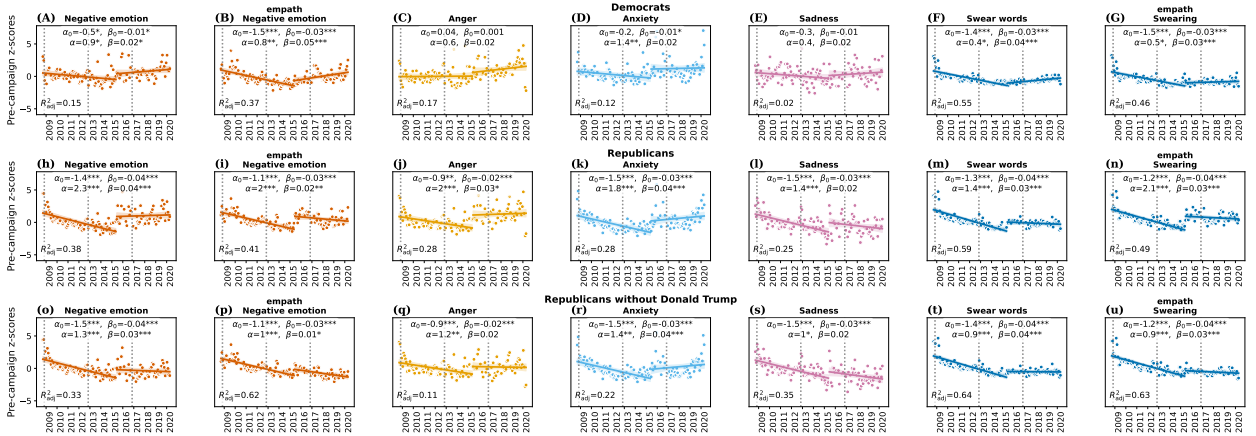


Figure 5: Quote-level aggregation split by party

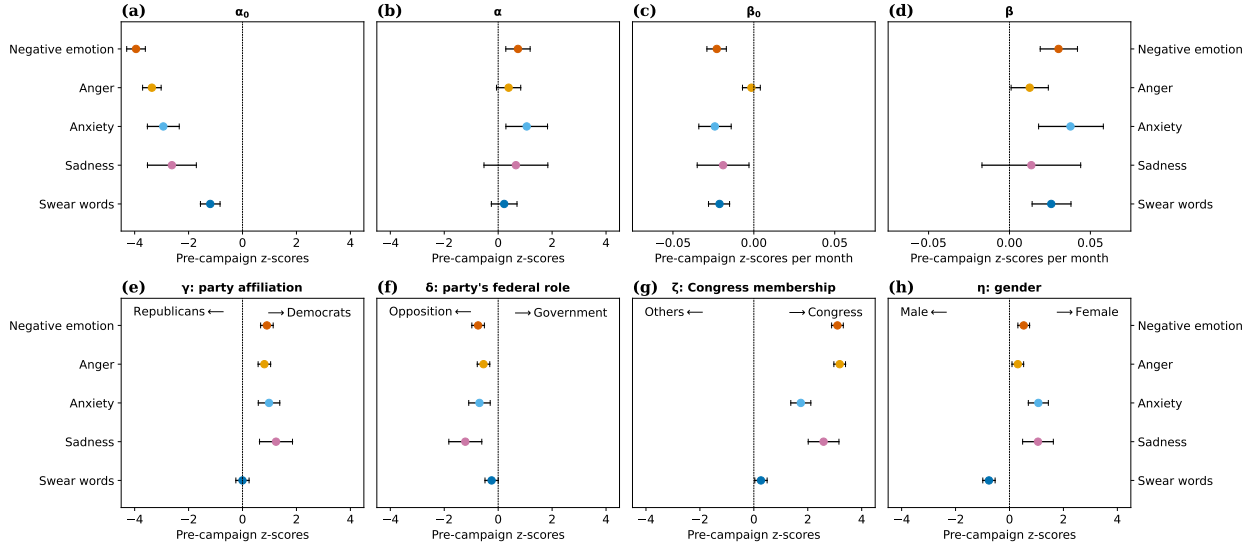


Figure 6: Biographic correlates of negative language based on speaker-level aggregation

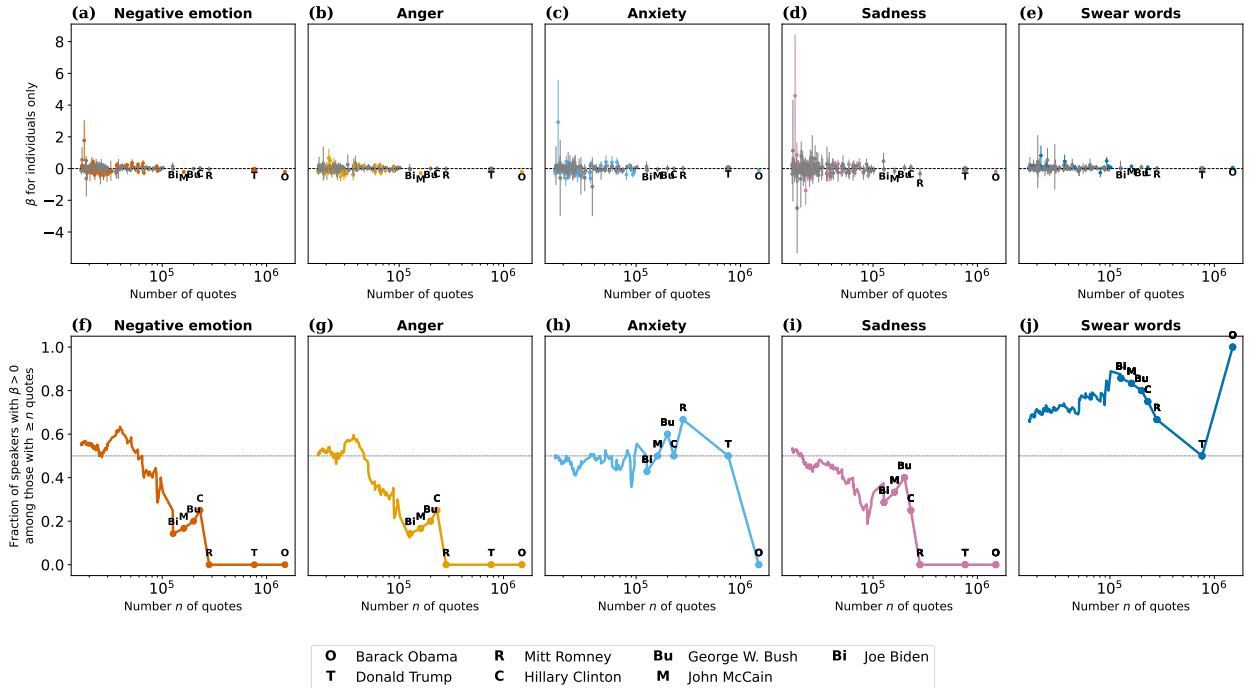


Figure 7: Regression parameter β resulting from an ordinary least squares regressions fitted separately to the time series of each of the 200 most quoted speakers.

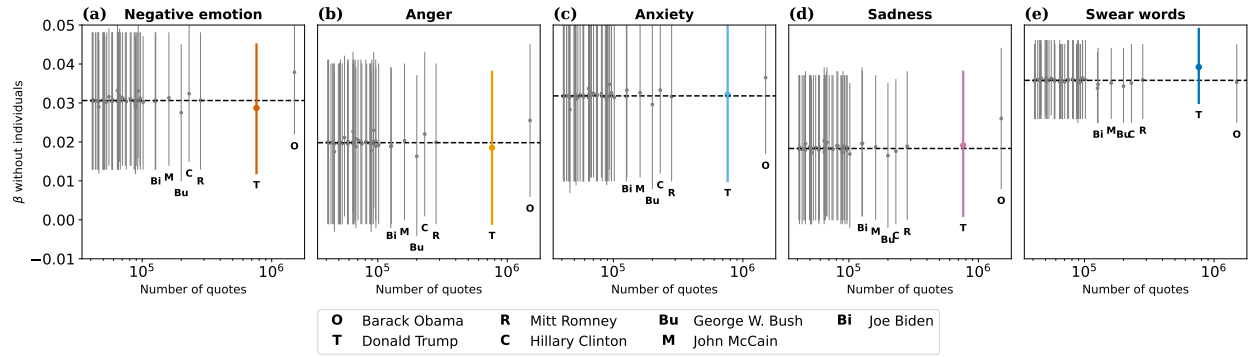


Figure 8: Regression parameter β obtained by removing all quotes by one target speaker, using the 50 most quoted speakers as target speakers

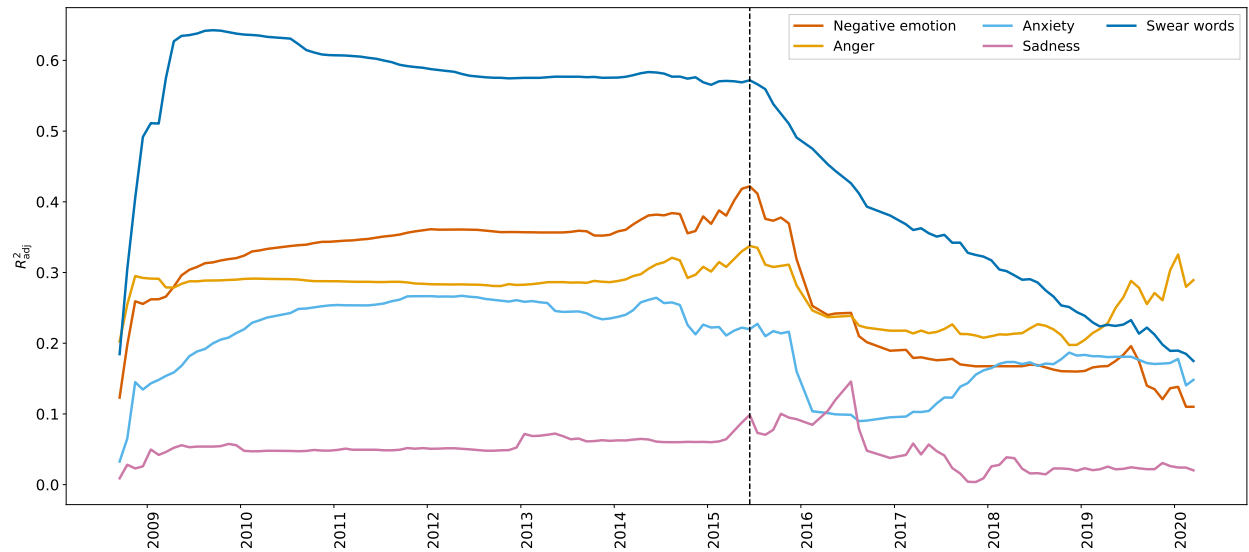


Figure 9: Adjusted R^2 score of the RDD as a function of the discontinuity placement

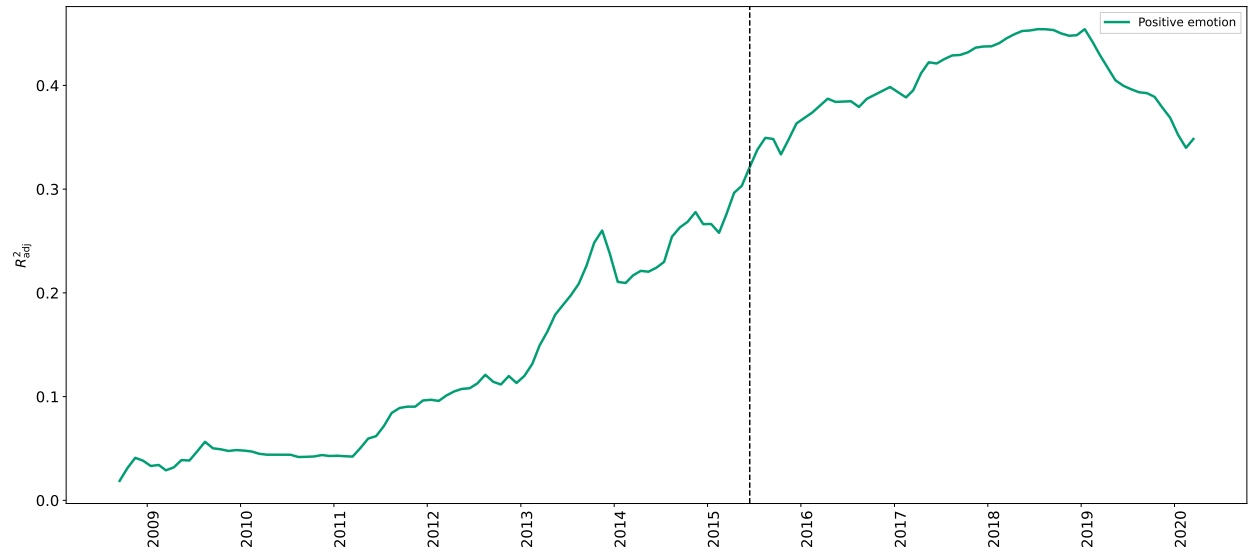


Figure 10: Adjusted R2 score of the RDD as a function of the discontinuity placement for positive emotions

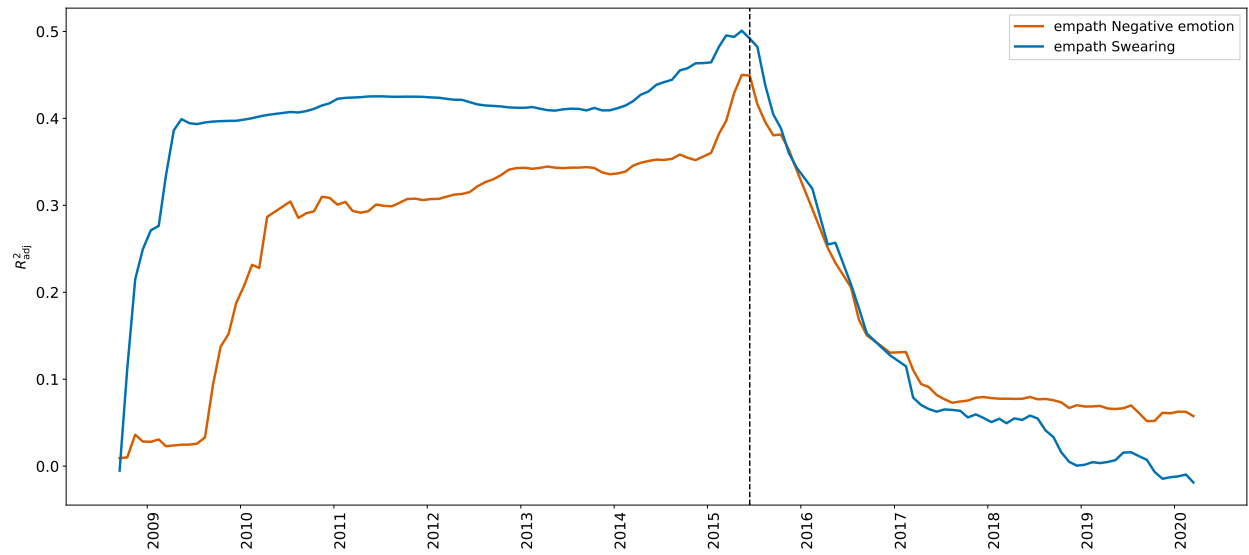


Figure 11: Adjusted R2 score of the RDD as a function of the discontinuity placement for empath-based sentiment scores

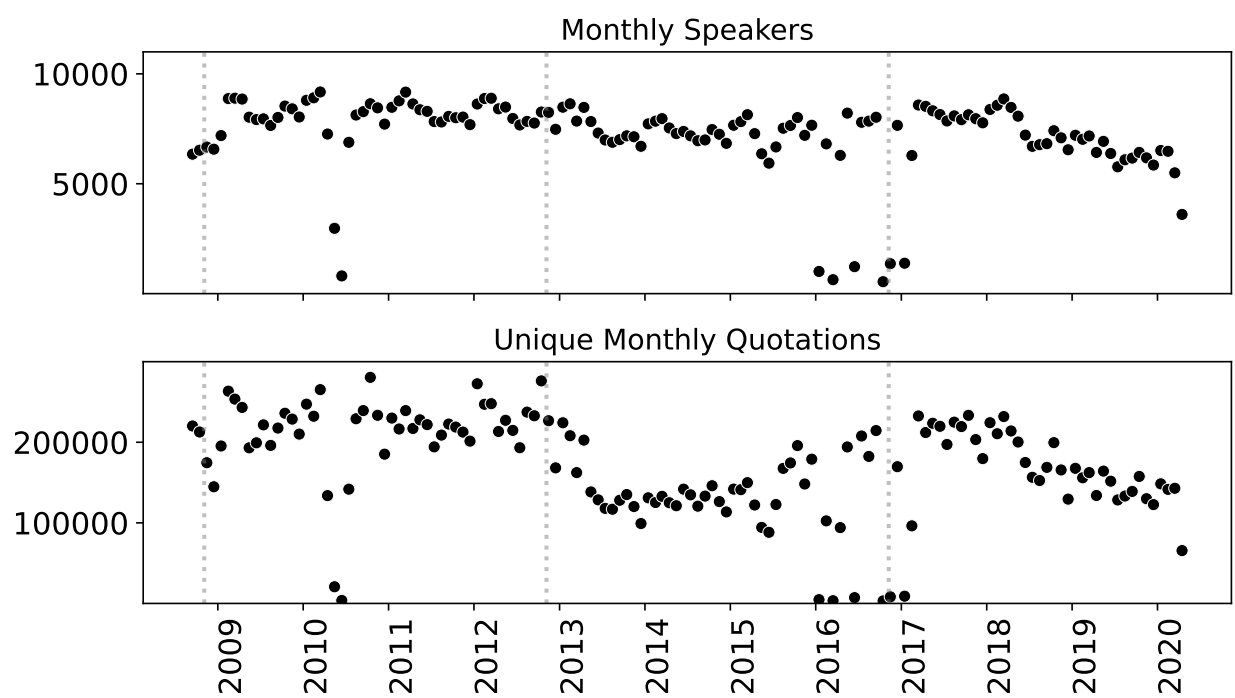


Figure 12: Monthly number of speakers and unique quotations in Quotebank

2 Tables

Table 1: **(Extended version of Table 1 in the main text) Key metrics for all sentiment attributes, including results for empath word categories.** Means μ and standard deviations σ were calculated over monthly quote-level aggregates from the pre-campaign period (September 2008 through May 2015). The value $n = 1/\mu$ in the fourth column implies that, in an average quote, on average every n -th word belongs to the respective category. The coefficients of variation, σ/μ , shown in the fifth column, allow to easily translate pre-campaign standard deviations (as shown on the y-axes of time series plots) into fractions of pre-campaign means. The most frequent words per category are listed in Tables *old*₁₇ and *old*₁₈.

Word category	μ	σ	$1/\mu$	σ/μ
negative emotion	0.01853	0.00090	54.0	4.8%
empath negative emotion	0.00820	0.00054	122.0	6.6%
anger	0.00647	0.00055	154.6	8.4%
anxiety	0.00295	0.00022	339.4	7.3%
sadness	0.00351	0.00014	284.8	4.1%
swear words	0.00043	0.00015	2328.9	33.9%
empath swearing	0.00069	0.00013	1449.1	19.1%

Table 2: **RDD parameters for quote-level aggregation shown in Figure 2 in the main text.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger		anxiety		sadness		swear words
α_0	-0.932*** (0.209)	-0.391 (0.249)		-0.903*** (0.263)		-0.867*** (0.226)		-1.347*** (0.117)
α	1.622*** (0.337)	1.299** (0.402)		1.501*** (0.424)		0.855* (0.365)		0.923*** (0.189)
β_0	-0.023*** (0.004)	-0.010 (0.005)		-0.022*** (0.006)		-0.021*** (0.005)		-0.033*** (0.002)
β	0.031*** (0.009)	0.020 (0.010)		0.032** (0.011)		0.018 (0.009)		0.036*** (0.005)
R^2	0.315	0.251		0.215		0.136		0.599
Adj. R^2	0.299	0.234		0.197		0.116		0.590
No. Observations	132	132		132		132		132

Table 3: **RDD parameters for quote-level aggregation, excluding outliers.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger	anxiety	sadness	swear words
α_0	-0.780*** (0.184)	-0.391 (0.231)	-0.816*** (0.187)	-0.944*** (0.209)	-1.110*** (0.075)
α	1.222*** (0.299)	1.260** (0.382)	0.989** (0.317)	0.756* (0.340)	0.686*** (0.120)
β_0	-0.017*** (0.004)	-0.010 (0.005)	-0.019*** (0.004)	-0.022*** (0.004)	-0.024*** (0.002)
β	0.031*** (0.008)	0.016 (0.010)	0.031*** (0.008)	0.023* (0.009)	0.027*** (0.003)
R^2	0.347	0.224	0.250	0.168	0.632
Adj. R^2	0.331	0.206	0.232	0.149	0.623
No. Observations	129	129	127	130	128

Table 4: **RDD parameters for speaker-level aggregation shown in Figure 2 in the main text.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger	anxiety	sadness	swear words
α_0	-3.413*** (0.121)	-2.800*** (0.105)	-2.170*** (0.223)	-2.268*** (0.238)	-1.374*** (0.092)
α	0.790*** (0.195)	0.522** (0.169)	0.573 (0.359)	0.304 (0.384)	0.328* (0.149)
β_0	-0.029*** (0.003)	-0.009*** (0.002)	-0.020*** (0.005)	-0.024*** (0.005)	-0.017*** (0.002)
β	0.038*** (0.005)	0.016*** (0.004)	0.048*** (0.009)	0.045*** (0.010)	0.018*** (0.004)
R^2	0.509	0.220	0.251	0.181	0.421
Adj. R^2	0.498	0.202	0.234	0.161	0.408
No. Observations	132	132	132	132	132

Table 5: **RDD parameters for speaker-level aggregation, excluding outliers.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger	anxiety	sadness	swear words
α_0	-3.360*** (0.115)	-2.800*** (0.105)	-2.170*** (0.150)	-2.206*** (0.219)	-1.374*** (0.092)
α	0.737*** (0.184)	0.522** (0.169)	1.010*** (0.245)	0.346 (0.354)	0.328* (0.149)
β_0	-0.027*** (0.002)	-0.009*** (0.002)	-0.020*** (0.003)	-0.021*** (0.005)	-0.017*** (0.002)
β	0.036*** (0.005)	0.016*** (0.004)	0.026*** (0.007)	0.036*** (0.009)	0.018*** (0.004)
R^2	0.498	0.220	0.286	0.153	0.421
Adj. R^2	0.486	0.202	0.269	0.132	0.408
No. Observations	131	132	130	129	132

Table 6: **RDD parameters for quote-level aggregation on speaker groups based on party affiliation, party's federal role, Congress membership, and gender.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger	anxiety	sadness	swear words
α_0	-1.787*** (0.183)	-1.520*** (0.207)	-1.681*** (0.203)	-1.198*** (0.266)	-0.853*** (0.100)
α	1.293*** (0.240)	0.800** (0.271)	1.960*** (0.265)	0.983** (0.347)	0.522*** (0.131)
β_0	-0.013*** (0.003)	0.002 (0.004)	-0.018*** (0.004)	-0.013** (0.005)	-0.033*** (0.002)
β	0.014* (0.006)	0.009 (0.007)	0.006 (0.007)	-0.006 (0.009)	0.043*** (0.003)
γ : party affiliation	0.479*** (0.124)	0.559*** (0.140)	0.964*** (0.137)	0.668*** (0.179)	-0.193** (0.068)
η : gender	-0.215 (0.115)	-0.172 (0.130)	0.480*** (0.128)	0.413* (0.167)	-0.828*** (0.063)
ζ : Congress membership	3.412*** (0.115)	3.767*** (0.130)	1.734*** (0.128)	2.255*** (0.167)	-0.150* (0.063)
δ : party's federal role	-0.335** (0.124)	-0.185 (0.140)	-0.357** (0.137)	-0.976*** (0.179)	-0.328*** (0.068)
R^2	0.478	0.473	0.235	0.184	0.390
Adj. R^2	0.475	0.470	0.230	0.178	0.386
No. Observations	1056	1056	1056	1056	1056

Table 7: **RDD parameters for speaker-level aggregation on speaker groups based on party affiliation, party's federal role, Congress membership, and gender.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger	anxiety	sadness	swear words
α_0	-3.949*** (0.176)	-3.361*** (0.175)	-2.938*** (0.301)	-2.619*** (0.462)	-1.196*** (0.185)
α	0.734** (0.230)	0.388 (0.229)	1.058** (0.393)	0.658 (0.603)	0.223 (0.242)
β_0	-0.023*** (0.003)	-0.002 (0.003)	-0.024*** (0.005)	-0.019* (0.008)	-0.021*** (0.003)
β	0.030*** (0.006)	0.013* (0.006)	0.038*** (0.010)	0.013 (0.016)	0.026*** (0.006)
γ : party affiliation	0.904*** (0.119)	0.810*** (0.118)	0.983*** (0.203)	1.242*** (0.312)	-0.002 (0.125)
η : gender	0.528*** (0.111)	0.308** (0.110)	1.070*** (0.189)	1.057*** (0.290)	-0.761*** (0.116)
ζ : Congress membership	3.101*** (0.111)	3.184*** (0.110)	1.742*** (0.189)	2.586*** (0.290)	0.264* (0.116)
δ : party's federal role	-0.744*** (0.119)	-0.544*** (0.118)	-0.694*** (0.203)	-1.219*** (0.312)	-0.243 (0.125)
R^2	0.472	0.472	0.142	0.104	0.099
Adj. R^2	0.469	0.469	0.137	0.098	0.093
No. Observations	1056	1056	1056	1056	1056

Table 8: **RDD parameters for speaker-level aggregation on speaker groups based on party affiliation, party's federal role, Congress membership, and gender.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger	anxiety	sadness	swear words
α_0	-3.949*** (0.176)	-3.361*** (0.175)	-2.938*** (0.301)	-2.619*** (0.462)	-1.196*** (0.185)
α	0.734** (0.230)	0.388 (0.229)	1.058** (0.393)	0.658 (0.603)	0.223 (0.242)
β_0	-0.023*** (0.003)	-0.002 (0.003)	-0.024*** (0.005)	-0.019* (0.008)	-0.021*** (0.003)
β	0.030*** (0.006)	0.013* (0.006)	0.038*** (0.010)	0.013 (0.016)	0.026*** (0.006)
γ : party affiliation	0.904*** (0.119)	0.810*** (0.118)	0.983*** (0.203)	1.242*** (0.312)	-0.002 (0.125)
η : gender	0.528*** (0.111)	0.308** (0.110)	1.070*** (0.189)	1.057*** (0.290)	-0.761*** (0.116)
ζ : Congress membership	3.101*** (0.111)	3.184*** (0.110)	1.742*** (0.189)	2.586*** (0.290)	0.264* (0.116)
δ : party's federal role	-0.744*** (0.119)	-0.544*** (0.118)	-0.694*** (0.203)	-1.219*** (0.312)	-0.243 (0.125)
R^2	0.472	0.472	0.142	0.104	0.099
Adj. R^2	0.469	0.469	0.137	0.098	0.093
No. Observations	1056	1056	1056	1056	1056

Table 9: **RDD parameters for quote-level aggregation for democrats shown in Figure 2 in the main text.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger		anxiety		sadness		swear words
α_0	-0.481* (0.223)	0.041 (0.269)		-0.247 (0.296)		-0.297 (0.289)		-1.397*** (0.110)
α	0.892* (0.360)	0.573 (0.433)		1.375** (0.477)		0.426 (0.466)		0.362* (0.178)
β_0	-0.012* (0.005)	0.001 (0.006)		-0.013* (0.006)		-0.011 (0.006)		-0.028*** (0.002)
β	0.024* (0.009)	0.015 (0.011)		0.016 (0.012)		0.020 (0.012)		0.041*** (0.005)
R^2	0.172	0.190		0.141		0.039		0.561
Adj. R^2	0.153	0.171		0.120		0.016		0.550
No. Observations	132	132		132		132		132

Table 10: **RDD parameters for quote-level aggregation for republicans shown in Figure 2 in the main text.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger		anxiety		sadness		swear words
α_0	-1.417*** (0.231)	-0.856** (0.256)		-1.543*** (0.259)		-1.469*** (0.255)		-1.345*** (0.143)
α	2.323*** (0.372)	1.990*** (0.413)		1.772*** (0.418)		1.437*** (0.411)		1.394*** (0.231)
β_0	-0.035*** (0.005)	-0.022*** (0.005)		-0.032*** (0.006)		-0.034*** (0.005)		-0.041*** (0.003)
β	0.040*** (0.010)	0.026* (0.011)		0.045*** (0.011)		0.018 (0.011)		0.035*** (0.006)
R^2	0.394	0.299		0.295		0.267		0.601
Adj. R^2	0.380	0.282		0.278		0.249		0.592
No. Observations	132	132		132		132		132

Table 11: **RDD parameters for quote-level aggregation for republicans, but excluding Donald Trump.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger		anxiety		sadness		swear words
α_0	-1.456*** (0.211)	-0.870*** (0.237)		-1.548*** (0.266)		-1.508*** (0.244)		-1.369*** (0.141)
α	1.252*** (0.340)	1.156** (0.382)		1.414** (0.429)		0.979* (0.393)		0.889*** (0.227)
β_0	-0.035*** (0.005)	-0.022*** (0.005)		-0.032*** (0.006)		-0.034*** (0.005)		-0.041*** (0.003)
β	0.030*** (0.009)	0.019 (0.010)		0.045*** (0.011)		0.015 (0.010)		0.039*** (0.006)
R^2	0.343	0.134		0.235		0.370		0.644
Adj. R^2	0.328	0.113		0.217		0.355		0.636
No. Observations	132	132		132		132		132

Table 12: **RDD parameters for aggregation on the most prominent speaker quartile.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger		anxiety		sadness		swear words
α_0	-2.661*** (0.131)	-2.217*** (0.121)		-1.673*** (0.243)		-1.611*** (0.244)		-1.288*** (0.089)
α	0.712*** (0.210)	0.601** (0.194)		0.602 (0.391)		0.323 (0.394)		0.337* (0.143)
β_0	-0.025*** (0.003)	-0.008** (0.003)		-0.021*** (0.005)		-0.018*** (0.005)		-0.019*** (0.002)
β	0.029*** (0.005)	0.011* (0.005)		0.040*** (0.010)		0.031** (0.010)		0.024*** (0.004)
R^2	0.387	0.170		0.162		0.099		0.468
Adj. R^2	0.373	0.150		0.143		0.078		0.456
No. Observations	132	132		132		132		132

Table 13: **RDD parameters for aggregation on the 2nd most prominent speaker quartile.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger	anxiety	sadness	swear words
α_0	-4.272*** (0.153)	-3.539*** (0.141)	-2.721*** (0.273)	-3.229*** (0.398)	-1.534*** (0.155)
α	1.012*** (0.247)	0.599** (0.227)	0.547 (0.440)	0.417 (0.641)	0.391 (0.250)
β_0	-0.035*** (0.003)	-0.013*** (0.003)	-0.018** (0.006)	-0.030*** (0.009)	-0.016*** (0.003)
β	0.045*** (0.006)	0.018** (0.006)	0.055*** (0.011)	0.062*** (0.017)	0.013 (0.006)
R^2	0.476	0.157	0.255	0.123	0.194
Adj. R^2	0.464	0.137	0.238	0.102	0.175
No. Observations	132	132	132	132	132

Table 14: **RDD parameters for aggregation on the 3rd most prominent speaker quartile.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger	anxiety	sadness	swear words
α_0	-4.703*** (0.260)	-3.539*** (0.225)	-2.937*** (0.455)	-3.128*** (0.705)	-1.397*** (0.186)
α	1.067* (0.419)	0.331 (0.363)	0.686 (0.733)	0.734 (1.136)	0.145 (0.300)
β_0	-0.045*** (0.006)	-0.013** (0.005)	-0.027** (0.010)	-0.043** (0.015)	-0.014*** (0.004)
β	0.062*** (0.011)	0.026** (0.009)	0.071*** (0.019)	0.057 (0.029)	0.006 (0.008)
R^2	0.352	0.081	0.149	0.068	0.198
Adj. R^2	0.337	0.060	0.129	0.046	0.179
No. Observations	132	132	132	132	132

Table 15: **RDD parameters for aggregation on the least prominent speaker quartile.** SEs of coefficients are in parantheses. *** $p < 0.001$, ** $p < 0.01$ and * $p < 0.05$

	negative emotion	anger	anxiety	sadness	swear words
α_0	-3.425*** (0.623)	-3.402*** (0.600)	-2.429** (0.929)	-0.980 (1.738)	-1.042 (0.735)
α	-0.163 (1.005)	0.493 (0.967)	-0.327 (1.497)	-1.859 (2.801)	0.729 (1.185)
β_0	-0.015 (0.013)	-0.017 (0.013)	-0.021 (0.020)	-0.004 (0.037)	-0.017 (0.016)
β	0.019 (0.026)	0.024 (0.025)	0.049 (0.039)	0.044 (0.073)	0.017 (0.031)
R^2	0.023	0.015	0.015	0.006	0.009
Adj. R^2	0.000	-0.008	-0.008	-0.017	-0.014
No. Observations	132	132	132	132	132

Table 16: **Most frequently quoted politicians and the Wikidata identifiers (QID).**

	QID	Name	Number of quotes	Party	Gender
1	Q76	Barack Obama	1499080	Democrat	M
2	Q22686	Donald Trump	762822	Republican	M
3	Q4496	Mitt Romney	281774	Republican	M
4	Q6294	Hillary Clinton	230306	Democrat	F
5	Q207	George W. Bush	200013	Republican	M
6	Q10390	John McCain	160805	Republican	M
7	Q6279	Joe Biden	127182	Democrat	M
8	Q43144	Sarah Palin	125980	Republican	F
9	Q170581	Nancy Pelosi	101583	Democrat	F
10	Q359442	Bernie Sanders	96701	Democrat	M
11	Q63879	Chris Christie	96361	Republican	M
12	Q22316	John Kerry	93036	Democrat	M
13	Q203966	Paul Ryan	92407	Republican	M
14	Q215057	Rick Perry	89975	Republican	M
15	Q23505	George H. W. Bush	88859	Republican	M
16	Q11673	Andrew Cuomo	88433	Democrat	M
17	Q1124	Bill Clinton	88173	Democrat	M
18	Q182788	Newt Gingrich	86670	Republican	M
19	Q355522	Mitch McConnell	82061	Republican	M
20	Q11702	John Boehner	80793	Republican	M
21	Q380900	Chuck Schumer	75358	Democrat	M
22	Q314459	Harry Reid	73980	Democrat	M
23	Q324546	Marco Rubio	70349	Republican	M
24	Q434706	Elizabeth Warren	67699	Democrat	F
25	Q22212	Lindsey Graham	66895	Republican	M
26	Q439729	Rick Scott	65523	Republican	M
27	Q13133	Michelle Obama	65410	Democrat	F
28	Q2036942	Ted Cruz	64380	Republican	M
29	Q607	Michael Bloomberg	64366	Democrat	M
30	Q553254	Scott Walker	64326	Republican	M

Table 17: **The most common 30 words for each sentiment category, before 15 June 2015.** Bold values deviate from the second period (after 15 June 2015) by more than one percentage point

Top N words	Negative emotion		Anger		Anxiety		Sadness		Swear words	
1	problem.*	4.35%	fight.*	7.67%	risk.*	10.84%	low.*	10.88%	hell	17.14%
2	numb.*	3.20%	attack.*	4.98%	terror.*	8.35%	fail.*	9.85%	damn.*	8.68%
3	fight.*	2.67%	threat.*	4.93%	worr.*	5.89%	lost	7.37%	heck	6.72%
4	low.*	2.11%	cut	4.87%	struggl.*	5.21%	hurt.*	5.22%	screw.*	6.62%
5	bad	1.92%	war	4.83%	pressur.*	5.16%	lose	5.11%	dumb.*	6.47%
6	fail.*	1.91%	defens.*	4.21%	doubt.*	4.43%	loss.*	4.23%	dick	6.20%
7	difficult.*	1.87%	kill.*	4.03%	avoid.*	4.17%	disappoint.*	4.12%	ass	4.95%
8	tough.*	1.79%	critical	3.71%	fear	3.52%	damag.*	3.88%	shit.*	4.86%
9	wrong.*	1.77%	danger.*	3.10%	horr.*	2.50%	alone	2.89%	crap	3.41%
10	attack.*	1.73%	weapon.*	2.65%	overwhelm.*	2.47%	losing	2.61%	fuck	3.07%
11	risk.*	1.73%	argu.*	2.45%	vulnerab.*	2.38%	overwhelm.*	2.03%	fuckin.*	2.92%
12	threat.*	1.71%	victim.*	2.21%	afraid	2.34%	devastat.*	2.01%	butt	2.85%
13	cut	1.69%	violat.*	2.20%	craz.*	2.34%	defeat.*	1.96%	bitch.*	2.75%
14	war	1.68%	battl.*	2.01%	uncertain.*	2.18%	miss	1.91%	darn	2.68%
15	serious	1.51%	offens.*	1.99%	desperat.*	1.97%	traged.*	1.90%	bloody	2.28%
16	defens.*	1.46%	abuse.*	1.87%	stress.*	1.96%	reject.*	1.89%	piss.*	2.09%
17	lost	1.43%	aggress.*	1.68%	scare.*	1.87%	sad	1.81%	suck	2.04%
18	kill.*	1.40%	frustrat.*	1.53%	confus.*	1.76%	missed	1.61%	sucks	1.43%
19	terror.*	1.33%	destroy.*	1.42%	upset.*	1.75%	suffering	1.31%	sucked	1.22%
20	critical	1.29%	hate	1.23%	shame.*	1.71%	depress.*	1.30%	bastard.*	1.20%
21	danger.*	1.08%	blam.*	1.19%	distract.*	1.62%	missing	1.30%	butts	1.02%
22	hurt.*	1.01%	critici.*	1.06%	embarrass.*	1.61%	resign.*	1.23%	goddam.*	0.78%
23	lose	0.99%	fought	1.00%	guilt.*	1.33%	regret.*	1.23%	asshole.*	0.78%
24	worr.*	0.94%	murder.*	1.00%	emotional	1.27%	broke	1.21%	motherf.*	0.68%
25	weapon.*	0.92%	assault.*	0.98%	shake.*	1.21%	tragic.*	1.16%	nigger.*	0.62%
26	mistak.*	0.89%	outrag.*	0.92%	disturb.*	1.21%	abandon.*	1.06%	queer.*	0.55%
27	argu.*	0.85%	violent.*	0.88%	anxi.*	1.13%	isolat.*	1.00%	boob.*	0.49%
28	struggl.*	0.83%	hell	0.87%	alarm.*	1.04%	empt.*	0.95%	fucked.*	0.48%
29	pressur.*	0.82%	punish.*	0.85%	nervous.*	1.02%	suffer	0.93%	dang	0.47%
30	loss.*	0.82%	offend.*	0.83%	suspicio.*	0.92%	grave.*	0.93%	prick.*	0.47%
Total nr Expressions	499		184		91		101		53	
Total Matches	5763501		2005132		918339		1117453		101773	

Table 18: **The most common 30 words for each sentiment category, after 15 June 2015.** Bold values deviate from the second period (before 15 June 2015) by more than one percentage point

Top N words	Negative emotion		Anger		Anxiety		Sadness		Swear words	
1	problem.*	3.79%	fight.*	9.15%	risk.*	10.82%	low.*	11.05%	hell	24.09%
2	fight.*	3.36%	threat.*	5.72%	terror.*	8.92%	fail.*	9.05%	damn.*	11.48%
3	numb.*	3.03%	attack.*	5.43%	worr.*	5.50%	lost	6.89%	dumb.*	7.11%
4	threat.*	2.10%	critical	3.90%	pressur.*	4.94%	hurt.*	5.38%	screw.*	6.71%
5	low.*	2.04%	danger.*	3.80%	horr.*	4.27%	lose	4.95%	heck	6.08%
6	attack.*	1.99%	kill.*	3.60%	struggl.*	4.26%	damag.*	4.22%	shit.*	4.71%
7	bad	1.95%	war	3.59%	fear	4.03%	loss.*	3.78%	ass	4.47%
8	risk.*	1.78%	defens.*	2.94%	doubt.*	3.91%	disappoint.*	3.73%	crap	3.43%
9	wrong.*	1.78%	weapon.*	2.82%	vulnerab.*	3.42%	alone	2.90%	darn	2.75%
10	fail.*	1.67%	cut	2.79%	avoid.*	3.20%	devastat.*	2.57%	fuckin.*	2.51%
11	terror.*	1.47%	victim.*	2.74%	craz.*	2.54%	traged.*	2.34%	bitch.*	2.47%
12	critical	1.43%	abuse.*	2.41%	overwhelm.*	2.38%	losing	2.32%	piss.*	2.42%
13	difficult.*	1.43%	violat.*	2.26%	afraid	2.34%	defeat.*	2.31%	butt	2.37%
14	tough.*	1.43%	hate	1.94%	shame.*	1.95%	sad	2.19%	suck	2.18%
15	danger.*	1.40%	argu.*	1.87%	shy.*	1.87%	overwhelm.*	2.12%	bloody	2.17%
16	serious	1.38%	offens.*	1.86%	uncertain.*	1.85%	reject.*	2.00%	sucks	1.70%
17	kill.*	1.32%	destroy.*	1.54%	desperat.*	1.79%	resign.*	1.66%	fuck	1.62%
18	war	1.32%	battl.*	1.53%	stress.*	1.77%	suffering	1.60%	sucked	1.39%
19	lost	1.28%	aggress.*	1.52%	confus.*	1.65%	miss	1.59%	motherf.*	1.09%
20	defens.*	1.08%	assault.*	1.44%	embarrass.*	1.56%	missed	1.54%	queer.*	0.95%
21	weapon.*	1.04%	frustrat.*	1.43%	disturb.*	1.55%	tragic.*	1.47%	butts	0.80%
22	cut	1.02%	murder.*	1.27%	scare.*	1.53%	missing	1.29%	bastard.*	0.78%
23	victim.*	1.01%	fought	1.08%	distract.*	1.51%	regret.*	1.15%	goddam.*	0.73%
24	hurt.*	1.00%	violent.*	1.06%	guilt.*	1.50%	isolat.*	1.13%	pussy.*	0.58%
25	lose	0.92%	blam.*	0.99%	upset.*	1.48%	abandon.*	1.11%	tit	0.53%
26	worr.*	0.91%	hell	0.95%	alarm.*	1.29%	broke	1.04%	asshole.*	0.52%
27	abuse.*	0.89%	critici.*	0.93%	emotional	1.22%	grave.*	1.01%	asses	0.49%
28	violat.*	0.83%	outrag.*	0.92%	anxi.*	1.17%	suffer	0.92%	dick	0.47%
29	mistak.*	0.82%	harass.*	0.92%	shake.*	0.95%	suffered	0.87%	dang	0.44%
30	pressur.*	0.81%	punish.*	0.79%	tension.*	0.80%	empt.*	0.83%	crappy	0.42%
Total nr Expressions	499		184		91		101		53	
Total Matches	3695279		1357629		608580		683988		53284	