

## **Web Appendix 1**

### **References for Appendix 1**

- Bakliwal, A., Foster, J., van der Puil, J., O'Brien, R., Tounsi, L., & Hughes, M. (2013, June). Sentiment analysis of political tweets: Towards an accurate classifier. Association for Computational Linguistics.
- Bermingham, A., & Smeaton, A. (2011). On using Twitter to monitor political sentiment and predict election results. In *Proceedings of the Workshop on Sentiment Analysis where AI meets Psychology (SAAIP 2011)* (pp. 2-10).
- Bollen, J., Mao, H., & Pepe, A. (2011). Modeling public mood and emotion: Twitter sentiment and socio-economic phenomena. *Icwsrm*, 11, 450-453.
- Burnap, P., Gibson, R., Sloan, L., Southern, R., & Williams, M. (2016). 140 characters to victory?: Using Twitter to predict the UK 2015 General Election. *Electoral Studies*, 41, 230-233.
- Chin, D., Zappone, A., & Zhao, J. (2016). Analyzing Twitter sentiment of the 2016 presidential candidates. *News & Publications: Stanford University*.
- Choy, M., Cheong, M. L., Laik, M. N., & Shung, K. P. (2011). A sentiment analysis of Singapore Presidential Election 2011 using Twitter data with census correction. *arXiv preprint arXiv:1108.5520*.
- Conover, M., Ratkiewicz, J., Francisco, M. R., Gonçalves, B., Menczer, F., & Flammini, A. (2011). Political polarization on twitter. *Icwsrm*, 133, 89-96.
- Dang-Xuan, L., Stieglitz, S., Wladarsch, J., and Neuberger, C. (2013), “An investigation of influential and the role of sentiment in political communications on Twitter during election periods”, *Information, Communication, and Society*, 16(5), 795-825.
- Diakopoulos, N. A., & Shamma, D. A. (2010, April). Characterizing debate performance via aggregated twitter sentiment. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 1195-1198). ACM.
- Hansen, Lars Kai, Arvidsson, Adam, Nielsen, Finn Arrup, Colleoni, Elanor, and Michael Etter (2011), “Good Friends, Bad News-Affect and Virality in Twitter”, in *Future Information Technology*, vol. 185 of *Communications in Computer and Information Science*, pp. 35-43.
- Houston, J. B., Hawthorne, J., Spialek, M. L., Greenwood, M., & McKinney, M. S. (2013). Tweeting during presidential debates: Effect on candidate evaluations and debate attitudes. *Argumentation and Advocacy*, 49(4), 301-311.

- Jahanbakhsh, Kazem & Moon, Yumi. (2014). The Predictive Power of Social Media: On the Predictability of U.S. Presidential Elections using Twitter. Accessed at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.766.5272&rep=rep1&type=pdf>
- Jensen, M. J., & Anstead, N. (2013). Psephological investigations: Tweets, votes, and unknown unknowns in the republican nomination process. *Policy & Internet*, 5(2), 161-182.
- Kalsnes, B., Krumsvik, A. H., & Storsul, T. (2014). Social media as a political backchannel: Twitter use during televised election debates in Norway. *Aslib Journal of Information Management*, 66(3), 313-328.
- Kanavos A., Perikos I., Vikatos P., Hatzilygeroudis I., Makris C., Tsakalidis A. (2014) Modeling ReTweet Diffusion Using Emotional Content. In: Iliadis L., Maglogiannis I., Papadopoulos H. (eds) Artificial Intelligence Applications and Innovations. AIAI 2014. IFIP Advances in Information and Communication Technology, vol 436. Springer, Berlin, Heidelberg
- Kollanyi, B., Howard, P. N., & Woolley, S. C. (2016). Bots and automation over Twitter during the first US presidential debate. *Comprop data memo*, 1, 1-4.
- Larsson, A. O., & Moe, H. (2012). Studying political microblogging: Twitter users in the 2010 Swedish election campaign. *New Media & Society*, 14(5), 729-747.
- Maruyama, M., Robertson, S. P., Douglas, S. K., Semaan, B. C., and Faucett, H. A. (2014), "Hybrid media consumption: How tweeting during a televised political debate influences the vote decision". In *Proceedings of the 17th ACM conference on Computer supported Cooperative work & social computing*, 1422-1432.
- McKelvey, K., DiGrazia, J., & Rojas, F. (2014). Twitter publics: How online political communities signaled electoral outcomes in the 2010 US house election. *Information, Communication & Society*, 17(4), 436-450.
- Mejova, Y., Srinivasan, P., & Boynton, B. (2013, February). Gop primary season on twitter: popular political sentiment in social media. In *Proceedings of the sixth ACM international conference on Web search and data mining* (pp. 517-526). ACM.
- Nooralahzadeh, F., Arunachalam, V., & Chiru, C. G. (2013, May). 2012 Presidential Elections on Twitter--An Analysis of How the US and French Election were Reflected in Tweets. In *Control Systems and Computer Science (CSCS), 2013 19th International Conference on* (pp. 240-246). IEEE.
- O'Connor, B., Balasubramanyan, R., Routledge, B. R., & Smith, N. A. (2010). From tweets to polls: Linking text sentiment to public opinion time series. *Icwsrm*, 11(122-129), 1-2.
- Pancer, E., & Poole, M. (2016). The popularity and virality of political social media: hashtags, mentions, and links predict likes and retweets of 2016 US presidential nominees' tweets. *Social Influence*, 11(4), 259-270.

- Pfitzner, Renem Garas, Antonios, and Frank Schweitzer (2012), “*Emotional Divergence Influences Information Spreading in Twitter*”, *Proceedings of the Sixth International AAAI Conference on Weblogs and Social Media*, ICWSM.
- Ramteke, J., Shah, S., Godhia, D., & Shaikh, A. (2016, August). Election result prediction using Twitter sentiment analysis. In *Inventive Computation Technologies (ICICT), International Conference on* (Vol. 1, pp. 1-5). IEEE.
- Razzaq, M. A., Qamar, A. M., & Bilal, H. S. M. (2014, August). Prediction and analysis of Pakistan election 2013 based on sentiment analysis. In *Proceedings of the 2014 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining* (pp. 700-703). IEEE Press.
- Ringsquandl, M., & Petkovic, D. (2013, March). Analyzing Political Sentiment on Twitter. In *AAAI Spring Symposium: Analyzing Microtext* (pp. 40-47).
- Sang, E. T. K., & Bos, J. (2012, April). Predicting the 2011 dutch senate election results with twitter. In *Proceedings of the workshop on semantic analysis in social media* (pp. 53-60). Association for Computational Linguistics.
- Shamma, D.A., Kennedy, L., and E. F. Churchill. “Tweet the debates: Understanding community annotation of uncollected sources”. In WSM ’09: Proceedings of the international workshop on Workshop on Social Media, pp. 3-10.
- Shamma, D. A., Churchill, E. F., & Kennedy, L. (2010). Tweetgeist: Can the Twitter timeline reveal the structure of broadcast events? Paper presented at the 2010 ACM conference on computer supported cooperative work and social computing—CSCW (pp. 589–593). New York, NY: ACM.
- Skoric, M., Poor, N., Achananuparp, P., Lim, E. P., & Jiang, J. (2012, January). Tweets and votes: A study of the 2011 singapore general election. In *System Science (HICSS), 2012 45th Hawaii International Conference on* (pp. 2583-2591). IEEE.
- Stieglitz, Stefan, and Lin Dang-Xuan (2013), “Emotions and Information Diffusion in Social Media—Sentiment of Microblogs and Sharing Behavior”, *Journal of Management and Information Systems*, 29(4), 217-248.
- Stieglitz, S., & Dang-Xuan, L. (2012, January). Political communication and influence through microblogging--An empirical analysis of sentiment in Twitter messages and retweet behavior. In *System Science (HICSS), 2012 45th Hawaii International Conference on* (pp. 3500-3509). IEEE.
- Suh, Bongwon, Lichan Hong, Peter Pirolli, and Ed H. Chi (2010), “Want to be Retweeted? Large Scale Analytics on Factors Impacting Retweet in Twitter Network”, *Social Computing (SocialCom), 2010 IEEE Second International Conference on* (pp. 177-184).

- Sylwester, Karolina and Matthew Purver (2015). “Twitter Language Use Reflects Psychological Differences between Democrats and Republicans.” *PloS one* vol. 10, 16 Sep. 2015,
- Thomson, D., & Ehizokhale, E. (2015). Analysing Social Network Reactions to 2016 Republican Primaries.
- Trilling, D. (2015), “Two Different Debates? Investigating the Relationship Between a Political Debate on TV and Simultaneous Comments on Twitter”, *Computer Science Review*, 33(3), 259-276.
- Tumasjan, A., Sprenger, T. O., Sandner, P. G., & Welpe, I. M. (2011). Election forecasts with Twitter: How 140 characters reflect the political landscape. *Social science computer review*, 29(4), 402-418.
- Tunggawan, E., & Soelistio, Y. E. (2016, October). And the winner is...: Bayesian Twitter-based prediction on 2016 US presidential election. In *Computer, Control, Informatics and its Applications (IC3INA), 2016 International Conference on* (pp. 33-37). IEEE.
- Tsur, Oren, and Ari Rappoport, “What’s in a Hashtag? Content based Prediction of the Spread of Ideas in Microblogging Communities”, *WSDM’12*, Feb. 8-12, 2012.
- Wang, H., Can, D., Kazemzadeh, A., Bar, F., & Narayanan, S. (2012, July). A system for real-time twitter sentiment analysis of 2012 us presidential election cycle. In *Proceedings of the ACL 2012 System Demonstrations* (pp. 115-120). Association for Computational Linguistics.
- Zheng, Pei, and Shahin, S. (2018): Live tweeting live debates: How Twitter reflects and refracts the US political climate in a campaign season”, *Information, Communication & Society*, 1-20.

## Web Appendix 2

### Transcript sources

#### **August 2015 GOP debate:**

Time Staff (2015, August 7). Transcript: Read the Full Text of the Primetime Republican Debate, *Time*. Retrieved from <http://time.com>. Link: <http://time.com/3988276/republican-debate-primetime-transcript-full-text/>

#### **February 2016 GOP debate:**

Team Fix (2016, February 25). The CNN-Telemundo Republican debate transcript, annotated, *The Washington Post*. Retrieved from <https://www.washingtonpost.com>..  
Link: [https://www.washingtonpost.com/news/the-fix/wp/2016/02/25/the-cnntelemundo-republican-debate-transcript-annotated/?utm\\_term=.1a4941b9b06e](https://www.washingtonpost.com/news/the-fix/wp/2016/02/25/the-cnntelemundo-republican-debate-transcript-annotated/?utm_term=.1a4941b9b06e).

#### **March 2016 GOP debate:**

New York Times staff (2016, March 4). Transcript of the Republican Presidential Debate in Detroit, *The New York Times*. Retrieved from <https://www.nytimes.com>.  
Link: <https://www.nytimes.com/2016/03/04/us/politics/transcript-of-the-republican-presidential-debate-in-detroit.html>

#### **Presidential debate:**

Politico Staff (2016, October 20). Full transcript: Third 2016 presidential debate, *Politico*. Retrieved from <https://www.politico.com>. Link:  
link: <https://www.politico.com/story/2016/10/full-transcript-third-2016-presidential-debate-230063>)

#### **2016 State-of-the-Union Address:**

New York Times staff (2016, January 12). Transcript of Obama's 2016 State of the Union Address, *The New York Times*. Retrieved from <https://www.nytimes.com>.  
Link: <https://www.nytimes.com/2016/01/13/us/politics/obama-2016-sotu-transcript.html>

### Web Appendix 3: Topic clusters

**Table WA3-1: Policy Topics**

Cluster	Illustrative Keywords
Asia	China, Japan, Korea, India
Europe	England, Russia, Ukraine, NATO
Middle East	Arab, Afghanistan, Iran, Israel
Terrorism	Terrorists, Qaida, ISIS,
Defense	Army, Military, Defense
Education	Education, Schools, Pell
Immigration, Latin America	Mexico, border, citizenship
Healthcare	Obamacare, mandate, premiums
Economy	Jobs, spending, deficit, TARP
Courts	Supreme Court, Judge, Laws
Abortion	Roe, Parenthood, Prolife
Environment	Climate, environment, warming

**Table WA3-2: Contentious Exchanges**

Event	Illustrative Keywords
August 2015 exchange between moderator Megyn Kelly and Donald Trump over his views toward women	Megyn Kelly, Rosie, Apprentice
February 2016 exchange between candidate Ted Cruz and Donald Trump on the topic of lying	Lyin' Ted, Lies
March 2016 exchange between candidate Marco Rubio and Donald Trump over having “small hands”	Small Hands
March 2016 exchange between Megyn Kelly and Donald Trump over his complicity in lawsuits involving Trump University	Trump University, Plaintiffs, Better Business Bureau
Donald Trump’s reference to some Mexican immigrants as “bad hombres” in the Presidential debate.	Bad Hombres
Hillary Clinton defending herself from Donald Trump’s allegations that she destroyed emails in the Presidential debate	Emails, Server
Donald Trump describing Hillary Clinton as a “nasty woman” in the Presidential debate.	Nasty Woman

**Web Appendix 4**  
**Pearson Correlations Between User Bot Probabilities and Retweet Counts and Tweet Characteristics (N=31,524 users)**

Feature	r/Prob r
Total Retweets	0.002
	0.671
Policy Topic	0.008
	0.182
Contentious exchange	-0.007
	0.212
Appearance	0.004
	0.468
Abstract Theme	0.000
	0.960
Humor	0.003
	0.627
Graphics	-0.007
	0.205
Word Count	0.002
	0.679
Pos Emotion	0.005
	0.344
Neg Emotion	0.002
	0.770
Achievement words	0.001
	0.889
Power Words	-0.004
	0.500
Reward Words	-0.005
	0.342
Informal Words	0.002
	0.692
Percent Subjective	0.007
	0.199
Specificity	-0.006
	0.325
Quote	-0.006
	0.303
Donald Trump	-0.005
	0.369



## Web Appendix 6: Tweet features by Users Posting during and After the Debate

Category	Measure		LS Mean	Lower 95%	Upper 95%
Surface Features	Word Count	After	15.99	15.97	16.02
		During	14.65	14.64	14.67
	%Video or Photo	After	9.02	8.92	9.11
		During	6.84	6.78	6.89
	%Quotes	After	1.62	1.59	1.65
		During	2.64	2.62	2.66
	Specificity	After	0.43	0.43	0.43
		During	0.40	0.40	0.40
	Analytic	After	78.87	78.75	79.00
		During	74.96	74.88	75.03
Linguistic Style	Authentic	After	23.34	23.21	23.47
		During	24.60	24.52	24.67
	Positive Emotion	After	3.82	3.80	3.85
		During	3.12	3.11	3.13
	Negative Emotion	After	2.57	2.55	2.60
		During	2.79	2.77	2.80
	%Achievement	After	1.59	1.58	1.60
		During	1.15	1.15	1.16
	%Reward	After	1.68	1.67	1.69
		During	1.29	1.28	1.30
	% Power	After	2.93	2.91	2.95
		During	2.96	2.95	2.97
LIWC Emotion and Drive	%Policy	After	4.93	4.79	5.06
		During	13.43	13.35	13.51
	%Contentious Exchange	After	7.58	7.48	7.69
		During	5.57	5.51	5.63
	%Abstract Theme	After	1.73	1.68	1.79
		During	1.95	1.92	1.99
	Appearance or Expression	After	13.66	13.53	13.80
		During	12.97	12.89	13.04
Topic					

Table WA6: Mean features of Tweets created during versus after debate by users who created Tweets in both phases. All contrasts are significant at  $p < .0001$

## Web Appendix 7

### Model Robustness Checks

Table WA7-1

Comparison of Negative Binomial, Poisson, and Log Linear Models of Retweet Counts During the Debates

	Predictor	Negative Binomial		Poisson		Log Linear	
	Predictor	Estimate	SE	Estimate	SE	Estimate	SE
<b>User Features</b>	log(followers)	0.350	0.000	0.513	0.000	0.133	0.000
	User Tweets	-0.001	0.000	-0.003	0.000	0.000	0.000
<b>Surface Features</b>	Word Count	0.017	0.000	0.018	0.000	0.007	0.000
	Graphics	0.372	0.003	0.230	0.001	0.167	0.001
	Quote	0.002	0.000	0.002	0.000	0.001	0.000
<b>Linguistic Style</b>	Specificity	-0.010	0.003	-0.036	0.001	-0.018	0.001
	Analytic	0.000	0.000	-0.157	0.001	0.005	0.001
	Authentic	0.000	0.000	-0.002	0.000	0.000	0.000
<b>LIWC Emotion and Drive</b>	Pos Emotion	0.000	0.000	0.000	0.000	0.000	0.000
	Neg Emotion	0.002	0.000	0.000	0.000	0.000	0.000
	Achievement	0.005	0.000	0.006	0.000	0.001	0.000
	Power	0.005	0.000	0.008	0.000	0.001	0.000
	Reward	-0.002	0.000	0.010	0.000	0.002	0.000
<b>Topic</b>	Policy Topic	0.081	0.002	-0.003	0.000	-0.001	0.000
	Cont. Exchange	0.132	0.003	0.108	0.001	0.036	0.001
	Abstract Theme	0.017	0.006	0.243	0.001	0.053	0.001
	Appearance	-0.034	0.002	0.028	0.003	0.022	0.003
<b>Controls</b>	Trump	0.036	0.002	-0.040	0.001	0.016	0.001
	Aug Debate	-0.006	0.002	-0.048	0.001	0.003	0.001
	Feb Debate	-0.022	0.002	-0.106	0.001	0.009	0.001
	March Debate	-0.011	0.002	-0.105	0.001	0.014	0.001
<b>Model</b>	Intercept	-1.894	0.003	-2.866	0.002	-0.685	0.001
	Dispersion	0.462	0.001				
		LL	-4754548	LL	-9098823	R^2	0.219

Table WA7-2

Negative Binomial Regression Model of Retweets During the Debates, Estimated with and Without Candidate Fixed Effects

	Predictor	With Fixed Effects		Without Fixed Effects	
		Estimate	SE	Estimate	SE
<b>User Features</b>	log(followers)	0.350	0.000	0.351	0.000
	User Tweets	-0.001	0.000	-0.001	0.000
<b>Surface Features</b>	Word Count	0.017	0.000	0.017	0.000
	Graphics	0.372	0.003	0.364	0.003
	Quote	0.002	0.000	0.002	0.000
<b>Linguistic</b>	Specificity	-0.010	0.003	-0.042	0.002
	Analytic	0.000	0.000	-0.001	0.002
	Authentic	0.000	0.000	0.000	0.000
<b>LIWC</b>	Pos Emotion	0.000	0.000	0.000	0.000
<b>Emotion and Drive</b>	Neg Emotion	0.002	0.000	-0.001	0.000
	Achievement	0.005	0.000	0.001	0.000
	Power	0.005	0.000	0.004	0.000
	Reward	-0.002	0.000	0.004	0.000
<b>Topic</b>	Policy Topic	0.081	0.002	-0.003	0.000
	Cont. Exchange	0.132	0.003	0.080	0.002
	Abstract Theme	0.017	0.006	0.142	0.002
	Appearance	-0.034	0.002	0.037	0.005
<b>Controls</b>	Trump	0.036	0.002		
	Aug Debate	-0.006	0.002		
	Feb Debate	-0.022	0.002		
	March Debate	-0.011	0.002		
<b>Model</b>	Intercept	-1.894	0.003	-1.881	0.003
	Dispersion	0.462	0.001	0.452	0.001



**Web Appendix 8:**  
**Negative Binomial Regression of retweets of Tweets created after the debate**

	Parameter	Estimate	Standard Error	t Value	Pr >  t
<b>User Features</b>	log(followers)	0.352	0.001	507.28	<.0001
	User Tweets	-0.001	0.000	-24.42	<.0001
<b>Surface Features</b>	Word Count	0.010	0.000	31.12	<.0001
	Graphics	0.441	0.006	73.01	<.0001
	Quote	0.003	0.000	9.29	<.0001
<b>Linguistic Style</b>	Specificity	-0.126	0.005	-25.19	<.0001
	Analytic	0.023	0.006	3.76	0.0002
	Authentic	0.001	0.000	16.83	<.0001
<b>LIWC Emotion and Drive</b>	Pos Emotion	0.000	0.000	-4.56	<.0001
	Neg Emotion	0.004	0.000	11.07	<.0001
	Achievement	0.002	0.000	6.34	<.0001
	Power	0.022	0.001	37.92	<.0001
	Reward	0.003	0.000	8.99	<.0001
<b>Topic</b>	Policy Topic	0.013	0.001	21.12	<.0001
	Cont. Exchange	0.086	0.007	12.22	<.0001
	Abstract Theme	0.192	0.006	31.33	<.0001
	Appearance	0.175	0.013	13.04	<.0001
<b>Controls</b>	Trump	0.033	0.004	8.49	<.0001
	Aug Debate	-0.097	0.005	-20.52	<.0001
	Feb Debate	-0.102	0.007	-15.03	<.0001
	March Debate	-0.055	0.006	-8.84	<.0001
<b>Model</b>	Intercept	-1.893	0.008	-233.74	<.0001
	Dispersion	0.596	0.002	338.26	<.0001