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‘Brexit’ Data Report:

Social Media and Political Participation Lab, New York University¹
July 14, 2016

As Britain’s vote to leave the European Union sent pundits [scrambling](#) and the stock market [plummeting](#), it also set off a global frenzy on social media. Topping off months of online campaigning, the days leading up to the vote saw a dramatic surge in Brexit-related tweets and posts by [celebrities](#), ordinary citizens, and even automated [bots](#).

Given that pollsters and prediction markets [missed the mark](#) in forecasting the June 23 vote, what—if anything—can social media data teach us about the motivations of Brexit voters and the global ramifications of the referendum?

Unfortunately, social media users do not constitute representative samples, and textual analysis of the data that they produce is often plagued by the linguistic complexities of sarcasm and slang. Nonetheless, social media platforms provide organic, immediate sources of big data that offer valuable perspective on how publics engage with issues over time.

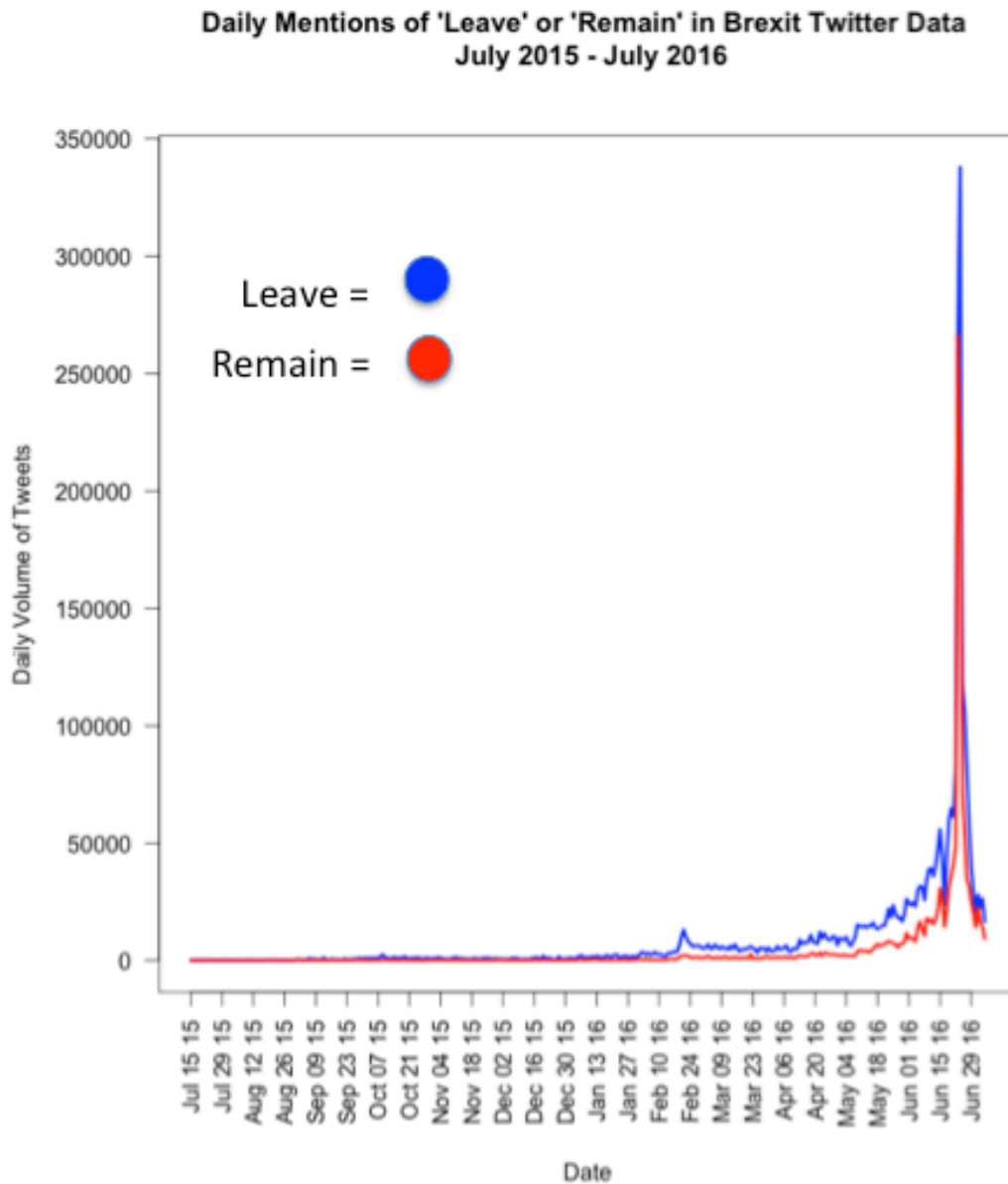
Analysis of over 29 million tweets collected at NYU’s Social Media and Political Participation (SMaPP) Lab provides the following insights into the success of the “leave” campaign, the surprising dominance of economic issues in the online debate, and the referendum’s increasingly global audience:

For almost 5 months, “leave” tweets were twice as popular as “remain”

[Recent analyses](#) suggest that the “leave” campaign was more vocal than its rival across all social media platforms, and our data indicates that this dominance dates back to February 2016 when the term “Brexit” was initially popularized. In fact, the number of tweets containing the term “leave” is nearly double the number containing “remain” across the entire period. Of the approximately 25 million tweets referencing Brexit that were tweeted between July 15, 2015 and June 24, 2016, there were 3,152,747 tweets that contained the term “leave,” compared to

¹ Data analysis in this report was performed by Alexandra Siegel, Graduate Research Associate of the SMaPP lab under the direction of Professor Joshua Tucker, Co-Director of the SMaPP lab. We gratefully acknowledge financial support from the INSPIRE program of the National Science Foundation (Award #1248055).

1,531,404 containing the term “remain.” The figure below highlights this leave-remain gap, as well as the massive spike in Brexit-related tweets as the vote approached.



(Data: NYU Social Media and Political Participation (SMaPP) Lab; Figure: Alexandra Siegel)

On the one hand, this discrepancy could be due to the fact that the term “Brexit,” which we used to filter our data collection, may be biased toward “leave.” On the other hand, given that the

population of Twitter users is heavily biased toward young and educated citizens that tended to lean “remain,” this gap is still striking.

This finding is also evident in examining the top words (unigrams) and two-word phrases (bigrams) tweeted during before during, and after the Brexit vote. As the tables below indicate, leave-related messages were more popular than those referencing “remain” in all three periods. Hashtags like #strongerin or #votein were less popular than #voteleave or #leaveeu.

Top Unigrams Before, During, and After Brexit Vote

Before	During	After
#brexit	#brexit	#brexit
eu	vote	vote
#voteleave	eu	eu
vote	uk	uk
uk	#euref	after
#euref	britain	now
#leaveeu	#voteleave	people
cameron	referendum	trump
#voteleave	now	britain
#eu	trump	referendum
leave	people	leave
britain	remain	out
referendum	cameron	voted
campaign	british	over
remain	voted	#euref

(Data: NYU Social Media and Political Participation (SMaPP) Lab; Table: Alexandra Siegel)

Top Bigrams Before, During, and After Brexit Vote

Before	During	After
#voteleave #brexit	brexit vote	brexit vote
brexit vote	#brexit #euref	after brexit
eu referendum	#brexit vote	#brexit vote
#brexit #euref	for brexit	reino unido
boris johnson	reino unido	about brexit
david cameron	#euref #brexit	donald trump
#leaveeu #voteleave	david cameron	eu referendum
brexit fears	after brexit	post brexit
brexit campaign	oustria finish	david cameron
#brexit #strongerin	czechout oustria	#brexit #euref
#euref #voteleave	departugal italeave	about #brexit
vote leave	grexit departugal	who voted
#brexit #go	about #brexit	crooked hillary
jo cox	finish slovakout	boris johnson
#go #leaveeu	after #brexit	nigel farage

(Data: NYU Social Media and Political Participation (SMaPP) Lab; Table: Alexandra Siegel)

The geographic lines between “remain” and “leave” were quite blurry

Pundits were surprised that many regions that were predicted to vote “remain” in large numbers only won by narrow margins on the day of the referendum. Along these lines, geolocated Twitter data suggests that there was little difference in the locations of users tweeting “leave” and those tweeting “remain.” While geolocated data only represents a small fraction of the total set of tweets, this pattern is clearly reflected in the figure below.

Brexit Geolocated Tweets in the UK

“Leave”



“Remain”



(Data: NYU Social Media and Political Participation (SMaPP) Lab; Figure: Alexandra Siegel)

When examining users' top self-reported locations—a larger sample of the data—there is still a great deal of overlap between “remain” and “leave” voters. For example, it appears that more of the “remain” Twitter users were located in Scotland, where voters largely opposed the Brexit. But Scotland was also a very popular location for “leave” Twitter users. Providing a bit more distinction, heavily pro-Brexit regions like Essex and South East England appeared as top location for “leave” Twitter users, but were less common among those who voted “remain.” Additionally, Bristol and Liverpool, which both voted against the Brexit, were more popular locations among users that tweeted “remain.” However, Manchester, which voted heavily against the Brexit, was a very popular location for users tweeting both “leave” and “remain.”

Top User Locations “Leave” vs. “Remain”

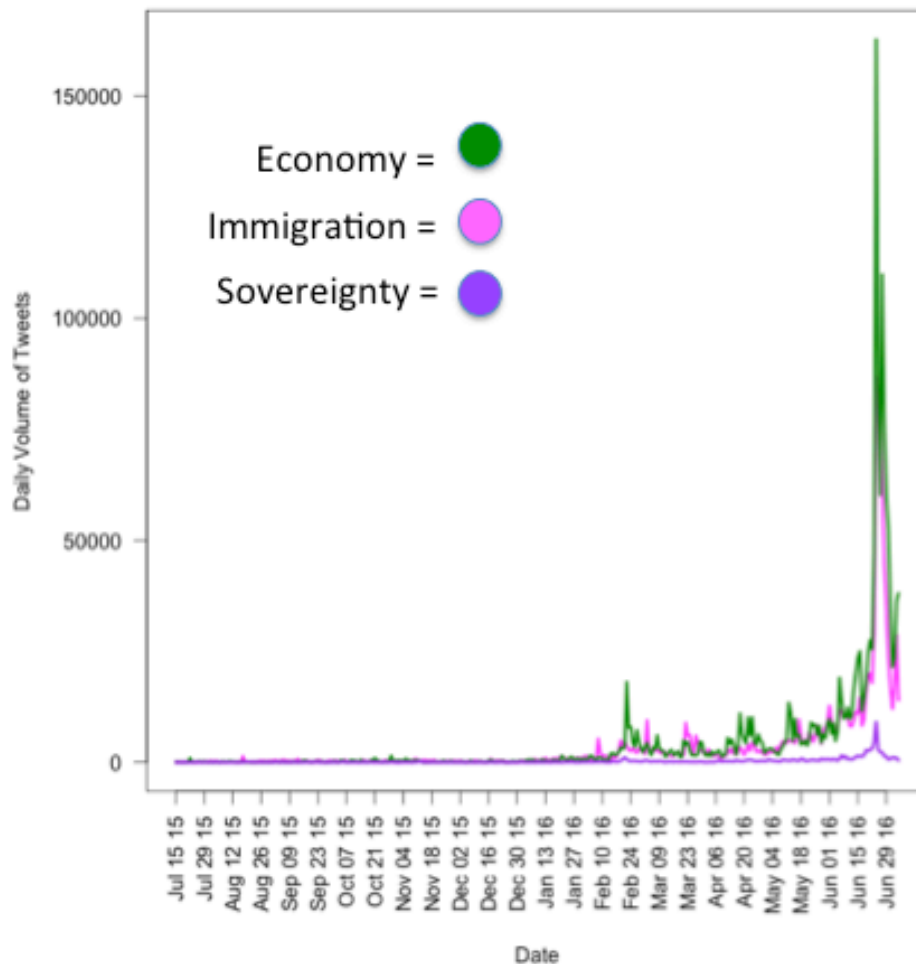
Leave	Remain
London	London
United Kingdom	United Kingdom
United States	United States
North West, England	Scotland
Scotland	Manchester
South West, England	Europe
Manchester	Bristol
Earth	Edinburgh
Sheffield	Silicon Valley
Yorkshire	North East, England
Europe	North West, England
Essex	Glasgow, Scotland
Silicon Valley	Edinburgh, Scotland
South East, England	Liverpool
Australia	Ireland

(Data: NYU Social Media and Political Participation (SMaPP) Lab; Table: Alexandra Siegel)

The economy, not sovereignty or immigration, dominated the discussion on Twitter

Our data suggests that discussions of the economy—rather than immigration or sovereignty—dominated the online conversation about the Brexit. The figure below shows the daily volume of tweets referencing each issue that also mentioned the Brexit between July 2015 and July 2016. While immigration occasionally surpassed the economy in the months preceding the vote, the economy was a much more popular topic in the days directly leading up to the vote.

**Daily Mentions of Immigration, Economy, and Sovereignty in Brexit Twitter Data
July 2015 - July 2016**



(Data: NYU Social Media and Political Participation (SMaPP) Lab; Figure: Alexandra Siegel)

As the table below indicates, immigration and border security are discussed somewhat more frequently than economic issues in the “leave” tweets, while the reverse is true for the “remain” tweets, perhaps highlighting a successful effort on the part of the remain campaign to highlight the economic costs of leaving the EU. Sovereignty is the least discussed issues across both categories, but is especially rare in the “remain” tweets. Economic issues are referenced in a surprisingly large portion of the “leave” tweets. This perhaps suggests that the pro-Brexit Twitter campaign did not rely solely on jingoistic fear mongering and propagated more mainstream messages as well.

Topic Mentions in Brexit Tweets All vs. "Leave" vs. "Remain"

	Immigration/ Security	Economy	Sovereignty	Total
All Brexit Tweets	1,222,628	1,656,280	93,334	29,236,173
Leave Tweets	146,321	136,514	24,537	3,152,747
Remain Tweets	42,988	56,981	3,949	1,531,404

(Data: NYU Social Media and Political Participation (SMaPP) Lab; Table: Alexandra Siegel)

The tweet topics were determined using keyword filtering. The table below shows the keywords used to classify tweets in the dataset.

Keywords Used to Define Topics

Immigration / Border Security

Immigration
Migrant
Refugee
Border
Security
Terrorism
ISIS
Terrorist
Muslim
Islam
Syria

Economy

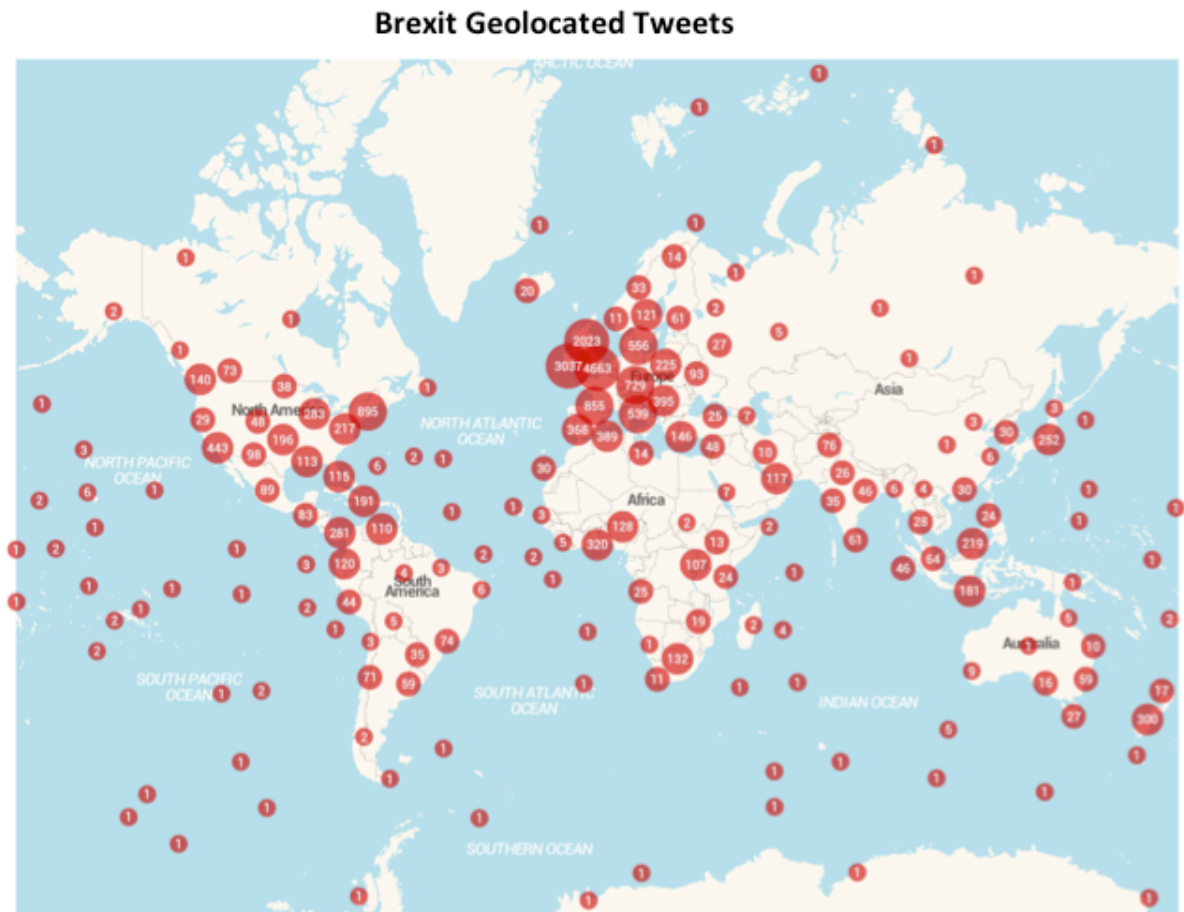
Economy
Economic
Bank
GDP
Pound
Finance
Trade

Sovereignty

Sovereignty
Take control
Take back control
#takecontrol

‘Brexit’ became an increasingly global phenomenon

While the Brexit vote clearly had global repercussions, how much attention were Twitter users around the world paying over the past year? Between July 2015 and July 2016, Twitter users on all seven continents were tweeting about Brexit in a wide variety of languages. The regional diversity of Brexit tweets is represented visually in the map of geolocated tweets below.



(Data: NYU Social Media and Political Participation (SMaPP) Lab; Figure: Alexandra Siegel)

Online discussions of the Brexit were primarily concentrated in the United States and Europe throughout the entire period under study. However, as the vote neared, interest became increasingly global. This is visualized below in the shifting maps of geolocated tweets in the periods preceding the vote, during the vote, and following the vote:

Pre-Brexit Geolocated Tweets



(Data: NYU Social Media and Political Participation (SMaPP) Lab; Figure: Alexandra Siegel)

During Brexit Geolocated Tweets



(Data: NYU Social Media and Political Participation (SMaPP) Lab; Figure: Alexandra Siegel)

Post-Brexit Geolocated Tweets



(Data: NYU Social Media and Political Participation (SMaPP) Lab; Figure: Alexandra Siegel)

This trend is also reflected in examining the top self-reported locations of users before, during, and after the Brexit vote. Before the vote, the top 15 locations were entirely in Europe and the United States. During the vote, India, Mexico, and Canada made the top 15, and after the vote Australia, Venezuela, and Indonesia also cracked the top 15.

Top User Locations Before, During, and After Brexit Vote

Before	During	After
London	London	London
UK	United States	United States
United States	UK	UK
France	France	France
Brussels	Paris	Paris
Paris	New York, NY	Silicon Valley
Scotland	Washington, DC	Canada
Silicon Valley	Madrid	Australia
France	Silicon Valley	India
Europe	India	New York, NY
UK, not EU	Spain	Venezuela
Manchester	Mexico	Washington, DC
Spain	Canada	Madrid
North West, England	Germany	Spain
South West, England	Ireland	Indonesia

(Data: NYU Social Media and Political Participation (SMaPP) Lab; Table: Alexandra Siegel)

The global nature of the online conversation about the Brexit is further demonstrated by the wide diversity of languages used in each period under study. In the months preceding the vote, four non-EU languages made the top 15—Indonesian, Turkish, and Japanese, and Russian. During the vote, Thai also reached the top 15, and remained a top language following the vote. The wide variety of European languages—from Greek to Swedish—across all three periods is also noteworthy.

Top Tweet Languages Before, During, and After Brexit Vote

Before	During	After
English	English	English
French	Spanish	Spanish
Spanish	French	French
Italian	Italian	Italian
German	German	German
Dutch	Dutch	Indonesian
Greek	Indonesian	Dutch
Indonesian	Greek	Russian
Portuguese	Japanese	Portuguese
Russian	Russian	Greek
Swedish	Turkish	Japanese
Turkish	Portuguese	Turkish
Japanese	Polish	Thai
Polish	Swedish	Swedish
Danish	Thai	Polish

(Data: NYU Social Media and Political Participation (SMaPP) Lab; Table: Alexandra Siegel)

Celebrities, ordinary “tweeps,” and jokes dominated the ‘Brexit’ discussion

Examining the top retweets in the periods before, during, and after the Brexit vote provides insight into which Twitter users produced the most popular content, as well as the types of messages that users were most likely to disseminate to their followers.

In the period preceding the Brexit vote, only 4 of the top 15 most retweeted tweets were sent by verified or official accounts. Interestingly, none of these accounts were journalists, politicians, or other relevant actors. Instead, the verified tweets were sent by English celebrities—Harry Potter author @jk_rowling, actress @ElizabethHurley, actor @StephenMangan, and member of the British alternative rock band the 1975 @Truman_Black. As the table below demonstrates, most of these top tweets contained Brexit-related jokes. These include, “Brexit. Grexit. Departugal. Italeave. Fruckoff. Czechout. Oustria. Finish. Slovakout. Latervia. Byegium”

and “The Brexit campaign doesn't have any politician that would make it to the end of a Willy Wonka factory tour.”

Pre-Brexit Vote Most Retweeted Tweets

Verified	Handle	Tweet Text
No	benphillips76	Peak #Brexit: UK protestor tries to burn the EU flag, but can't, because of EU regulation on flammable materials https://t.co/BiKKKAMms1
No	JonBond6	OK Google, define #Brexit @StrongerIn @IanMcKellen @UKLabourIN @ProfBrianCox @OwenJones84 @CarolineLucas #VoteRemain https://t.co/iDrfmWGj3J
No	Missingfaktor	Brexit. Grexit. Departugal. Italeave. Fruckoff. Czechout. Oustria. Finish. Slovakout. Latervia. Byegium.
No	Robmanuel	A vote for Brexit is a vote for a man who doesn't understand how capos work. https://t.co/QNRLaaE5GX
Yes	StephenMangan	#Brexit now backed by Donald Trump, Vladimir Putin, Nigel Farage, George Galloway, Marine Le Pen and Katie Hopkins. https://t.co/mqOcsrwQnT
No	sturdyAlex	A fascinating insight into #Brexit and Boris Johnson, by his former colleague. https://t.co/ilXXrykvaK
No	AndrewBloch	Brexit summed up in one photo #Flotilla #Thames https://t.co/IJXqy6U9Yg

No	EmyBemy2	Sometimes the pen is mightier than the keyboard. #brexit https://t.co/nbhlrq9gvc
No	StyleFashionHub	Brexit: every thing you need to know in two minutes flat - https://t.co/exwbUlt8ae https://t.co/wFvS6iu3Ui
No	JamesMelville	The Brexit campaign doesn't have any politician that would make it to the end of a Willy Wonka factory tour.
No	LiveMatchInfo	Brexit & #039; would not affect F1, says Ecclestone - https://t.co/mRLOg3V3Ae
Yes	jk_rowling	I know I've said it before, but I love John Oliver. Watch the funniest, sharpest thing you'll see on Brexit. https://t.co/0lSI9oguk
Yes	ElizabethHurley	Beautiful graphics: Beautiful sentiment #VoteLeave #Brexit https://t.co/8sN9Q3WARr
No	TheBitCoinPRO	Brexit May Push Bitcoin and FinTech Companies Out from Britain - https://t.co/2FtgbGWOOnK
Yes	Truman_Black	Also, can we all stop saying 'Brexit' as it's not a word

During the Brexit vote, five of the top 15 most retweeted tweets were sent from verified accounts. This time, the verified accounts were somewhat more relevant to the topic at hand. They included infamous whistle blower @Snowden, Italian sports correspondent @tancredipalmeri, news anchor @WilfredFrost, Spanish online news aggregator @pictoline, and

American reporter @timothypmurphy. Again, these tweets were primarily comprised of jokes, such as “Dear Britain, This Brexit vote is all wrong. If you want to leave the EU, dump some tea in the harbor and fight a war. Sincerely, America” or “A Brexit vote would be historic because England usually exits Europe on penalty kicks.”

These top retweets also included references to voting and the status of polling stations such as “RT if you have voted to LEAVE the EU today #iVoted #Brexit #Freedom” and “Campaigning is illegal near polling stations. What is going on here? #Brexit <https://t.co/yJ9m14VbyI>,” which includes an image of a woman handing out fliers at a polling station.

During Brexit Vote Most Retweeted Tweets

Verified	Handle	Tweet Text
Yes	Snowden	No matter the outcome, #Brexit polls demonstrate how quickly half of any population can be convinced to vote against itself. Quite a lesson.
No	Golub	'Brexit' to be followed by Grexit. Departugal. Italeave. Fruckoff. Czechout. Oustria. Finish. Slovakout. Latervia. Byegium.
Yes	Tancredipalmeri	Absolutely brilliant poll on Brexit by @YouGov https://t.co/EPevG1MOAW
No	NicholasPegg	Twass Brexit, and the slithy Goves Did lie and grumble in the Mail, All Menschy were the Boris droves, And Nigel Farage is a fascist
Yes	WilfredFrost	What could follow Brexit? Italeave. Czechout. Oustria. Finish. Slovakout. Latervia. Byegium. Or my personal favourite - Departugal.

No	SheikhItHaris	After #Brexit ppl dont realise that it will be followed by: Grexit Departugal Italeave Czechout Oustria Finish Slovakout Latervia Byegium
Yes	Pictoline	La Batalla del Brexit ha comenzado: Reino Unido esta votando si se va o se queda en la Union Europea https://t.co/AudmrcOx20
No	XplodingUnicorn	Dear Britain, This Brexit vote is all wrong If you want to leave the EU, dump some tea in the harbor and fight a war. Sincerely, America
No	PoliticsGhost	True Capitalist Radio NOW LIVE . https://t.co/SA211HCFvq #Trump2016 #SCOTUS #Brexit #ThursdayThoughts #DemocraticSitIn #Politics
No	AlvinCarpio	Here's what else might happen if we Brexit: Grexit Departugal Italeave Czechout Oustria Finish Slovakout Latervia Byegium #EUref #iVoted
No	LoganDobson	but let's be real the best brexit already happened https://t.co/AHk1RHhJTa

Yes	Timothypmurphy	A Brexit vote would be historic because England usually exits Europe on penalty kicks.
No	Philstockworld	O Brexit Day! Callooh! Callay! \$\$SCHN \$\$SPY \$CLF #Futures -- https://t.co/NfYWt2NpsJ https://t.co/je0ef2LawL
No	DavidJo52951945	RT if you have voted to LEAVE the EU today #iVoted #Brexit #Freedom https://t.co/a5JkBNjKwE
No	PrisonPlanet	Campaigning is illegal near polling stations. What is going on here? #Brexit https://t.co/yJ9m14VbyI

Ten of the top 15 post-Brexit vote retweets were from verified accounts. Four of these were from Donald Trump—who has a “tremendous” Twitter following and has taken on the Brexit as a campaign issue. For example, he tweeted, “Crooked Hillary called it totally wrong on BREXIT - she went with Obama - and now she is saying we need her to lead. She would be a disaster.” The other six verified accounts are journalists including @billmaher, @SayeedaWarsi, @MazMHussain, @Nicoleperlroth, @Tancredipalmeri, and @ StigAbell. Aside from the @realDonaldTrump tweets, the top retweets in the post-vote period are more substantive and news-oriented than the top retweets in the other two periods. They include, for example, “This is not the post Brexit Britain we want to see. Politicians from all sides need to speak out #MoreInCommon <https://t.co/toNLX31ABv>” or “Age breakdown on Brexit polls tells underlying story. Older generation voted for a future the younger don't want: <https://t.co/kMPECqQF6u>

Post-Brexit Vote Top Retweets

Verified	Handle	Tweet Text
No	DoctorAngry	Here is a message for all those who voted Brexit to stop immigration. https://t.co/0FwjdeH9tU

No	Joffley	How do I tell them?? #Brexit https://t.co/6Y7hRIKINi
No	DougalMurphy	Daily Mail explains how Brexit will affect your holiday money, mortgages, passports, health cover. Comments tragic. https://t.co/lr388vQTMD
Yes	Billmaher	Final #Brexit tally is in: 48% Sense and Sensibility, 52% Pride and Prejudice.
Yes	SayeedaWarsi	This is not the post Brexit Britain we want to see. Politicians from all sides need to speak out #MoreInCommon https://t.co/toNLX31ABv
Yes	MazMHussain	Age breakdown on Brexit polls tells underlying story. Older generation voted for a future the younger don't want: https://t.co/kMPECqQF6u
Yes	Nicoleperloth	The most articulate take on #Brexit is actually this FT reader comment today. https://t.co/98b4DwsrTV
Yes	Tancredipalmeri	Absolutely brilliant poll on Brexit by @YouGov https://t.co/EPevG1MOAW
Yes	realDonaldTrump	Many people are equating BREXIT, and what is going on in Great Britain, with what is happening in the U.S. People want their country back!
Yes	realDonaldTrump	Crooked Hillary called it totally wrong on BREXIT - she went with Obama - and now she is saying we need her to lead. She would be a disaster
No	Imbadatlfe	Brexit in a single gif. https://t.co/HBQKT6FwLI

Yes	StigAbell	Amazing Guardian comment on the poisoned chalice of #Brexit. https://t.co/WEQjs1SGkA
Yes	realDonaldTrump	So funny, Crooked Hillary called BREXIT so incorrectly, and now she says that she is the one to deal with the U.K. All talk, no action!
No	Rukkisanta	อ่านเจอเมนต์นี้ บรรยายได้ปะและเข้าใจมาก 55555 #อังกฤษไม่อยู่กับอียู #Brexit
No	FliDiFlouFliFla	Le #Brexit en un gif. https://t.co/KAOOdagp2Q
Yes	realDonaldTrump	The media is unrelenting. They will only go with and report a story in a negative light. I called Brexit (Hillary was wrong), watch November

This preliminary analysis of top retweets suggests that in the pre-vote and voting day period, the conversation about the Brexit was not particularly dominated by political elite actors. Instead, everyday citizens and celebrities with little connection to politics lead the online conversation. Journalists and politicians have only begun to dominate the conversation about the Brexit in the post-vote period.

Preliminary Conclusions:

While hindsight is always 20-20, our data suggests that the “leave” campaign was consistently more popular than “remain” on Twitter dating all the way back to February 2016. Furthermore, preliminary analysis of location data indicates that regions which had polled as solidly “remain” may have been more divided. Additionally, our observation that discussions of the economy were almost as popular as mentions of immigration among those tweeting “leave” could suggest that the pro-Brexit Twitter camp was reaching a wider base than the anti-immigrant constituency.

Regarding the international reach of the Brexit debate, the referendum’s large European—and increasingly global—audience indicates that the vote has had key ramifications for public opinion across Europe that should be monitored closely in the coming months.

Finally, the fact that journalists, policy organizations, and trusted elites did not begin to dominate the Twitter conversation until after the vote is particularly troubling. The content produced by reputable sources may not be as flashy as celebrity tweets or funny memes. But ensuring that balanced, vetted, information can reach the public—especially if citizens are expected to participate in direct democracy—should be a higher priority both on and offline.

