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Disrupting Daesh: Measuring Takedown of Online Terrorist Material and Its Impacts

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Pages 141-160 | Published online: 29 Oct 2018

Cite this article <https://doi.org/10.1080/1057610X.2018.1513984>

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In the aftermath of the London Bridge attack in June 2017, the British prime minister, Theresa May, warned social media companies, including Twitter and Facebook, that they must eradicate extremist “safe spaces.”¹ She reiterated this in her speech to the World Economic Forum at Davos in January 2018, stating “technology companies still need to do more in stepping up to their responsibilities for dealing with harmful and illegal online activity. Companies simply cannot stand by while their platforms are used to facilitate ... the spreading of terrorist and extremist content.”² Prime Minister May’s concerns about the use of the Internet, particularly social media, by violent extremists, terrorists, and their supporters are shared by an assortment of others, including academics, policymakers, and publics. Much of this is due to apparent connections between the consumption of, and networking around, violent extremist and terrorist online content and the internalization³ of extremist ideology (i.e., “(violent) online radicalization”); recruitment into violent extremist or terrorist groups or movements; and/or attack planning and preparation. Apparently easy access to large volumes of potentially influencing violent extremist and terrorist content on prominent and heavily trafficked social media platforms is a cause of particular anxiety. The micro-blogging platform, Twitter, has been subject to particular scrutiny, especially regarding their response (or alleged lack of same) to use of their platform by the so-called Islamic State (IS).

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their being uploaded, the company said.⁶ Missing from the update however were figures on how much terrorist content (e.g., posts, images, videos) is removed from Facebook on a daily, weekly, or monthly basis. Twitter is much less reticent on this point.

According to the section “Combating Violent Extremism” in Twitter’s twelfth Transparency Report, published in September 2017, in the period 1 January to 30 June 2017:

... a total of 299,649 accounts were suspended for violations related to promotion of terrorism, which is down 20% from the volume shared in the previous reporting period. Of those suspensions, 95% consisted of accounts flagged by internal, proprietary spam-fighting tools, while 75% of those accounts were suspended before their first tweet.⁷

All told, Twitter claim to have suspended a total of 1,210,357 accounts for “violations related to the promotion of terrorism” in the period from 1 August 2015 to 31 December 2017.⁸

A disparity therefore exists between the assertions of policymakers, on the one hand, and major social media companies, on the other, as regards the levels and significance of their disruption activity. Although Twitter claims severe disruption of IS is occurring

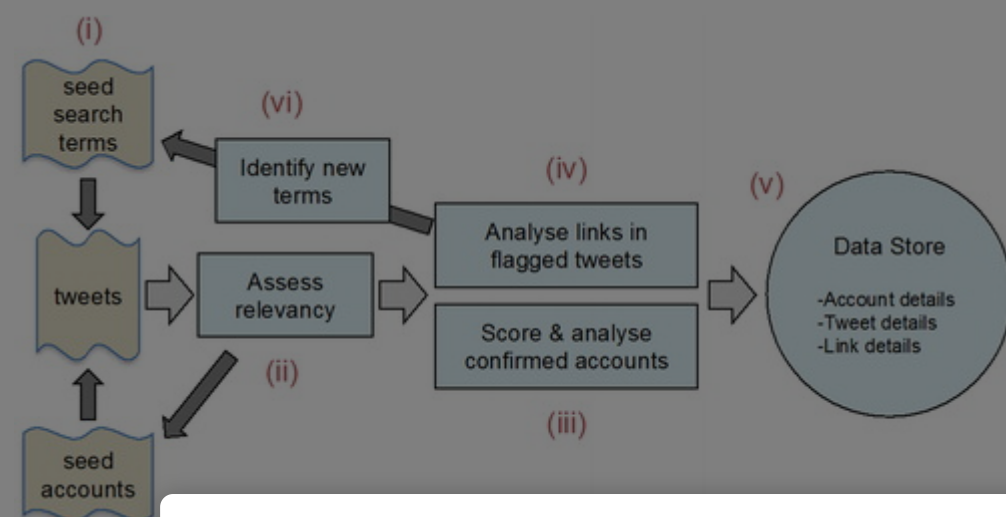
on their disruptive activity. This is in line with the academic literature which states on the value of disruption, by seeking to bring down, by challenging the findings and contributions of the community and to contribute to the same level of disruption. The presence of IS and of wider jihadi supplies



Methodology

To undertake the research, a semi-automated methodology for identifying pro-jihadist accounts on Twitter was developed (see [Figure 1](#)) and implemented using the social media analysis platform known as Method 52.¹⁰ In the first instance, a number of candidate accounts of interest were identified. The approach was grounded in finding tweets that contained specific terms of interest (i.e., “seed search terms”), and/or the identification of accounts that were, in some way, related to other accounts known to be of interest (i.e., “seed accounts”) (see step (i) in [Figure 1](#)).

Figure 1. Detailed flow diagram for semi-automated social media analysis.



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of the account's tweets were automatically analyzed, and details of the account, its tweets, and its links were stored in the database (see step (v) in [Figure 1](#)).

Information from new confirmed accounts was used by the system in a feedback loop to continually improve its efficiency, thereby identifying new seed search terms (see step (vi) in [Figure 1](#)) and providing additional seed accounts (see step (ii) in [Figure 1](#)).

Caveats

There were, however, a number of caveats attached to the data-collection that deserve mention. First, the bulk of the data was gathered over two months in early 2017 (February to April). The system to implement the semi-automated methodology was created, tested, and evolved throughout this period. The online accounts returned by the system were integrated with those found via traditional, manual search for accounts of interest. The overall approach was, therefore, a combination of automated and manual, and snowball and purposive sampling methods.

Second, not all available data were captured. There were some periods of downtime for the semi-automated system throughout this period as the methodology was developed and modified. In addition, certain accounts found via automated means were unable to be included due to them being taken down before the human analyst could assess and confirm their affiliation,¹² providing an early indication of the high levels of disruption

taking place. Initially, 100 percent of the accounts were confirmed, reflecting the high level of activity (see [Table 1](#) below).

Third, the system was only able to identify English and Turkish accounts, with the possibility of other languages being present. In generating in the system, the human analyst, or the system's algorithm, could identify other languages. For example, the system's algorithm could identify accounts with very high activity that the human analyst could not identify.

Data

The research dataset comprised 722 pro-IS accounts (labeled Pro-IS hereafter) and 451 other jihadist accounts (labeled “Other Jihadist” hereafter), with at least one follower¹⁴ active on Twitter at any point between 1 February and 7 April 2017 (see Table 1). Accounts were determined to be Pro-IS if their avatar or carousel images contained explicitly pro-IS imagery and/or text, and/or at least one recent tweet by the user (i.e., not a retweet) contained explicitly pro-IS images and/or text, such as referring to IS as “Dawlah” or their fighters as “lions.” Accounts maintained by journalists, academics, researchers, and others who tweeted, for example, Amaq News Agency content for informational purposes, were manually excluded. The Other Jihadist category included, among others, those supportive of Hay'at Tahrir al-Sham (HTS), Ahrar al-Sham, the Taliban, and al-Shabaab. Similar parameters were employed to categorize these accounts.

Table 1. Description of final dataset.



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Accounts in the research database were located and identified in three different ways (see Table 2). The first set of accounts was manually identified by the research team, principally through a review of the Twitter profiles of individuals of interest to jihadi supporters. The second set of accounts was identified through a monitoring system that automatically scans tweets for specific terms (a) whether or not the terms were associated with a specific account, and (b) whether the approach to analyzing the tweets was based on a specific period of time. The third set of accounts was identified through a system, called the Locators, which searches for specific terms in tweets based on a specific period of time. Finally, a third set of accounts was identified through a system, called the Locators, which searches for specific terms in tweets based on a specific period of time. Finally, a third set of accounts was identified through a system, called the Locators, which searches for specific terms in tweets based on a specific period of time.



on the Internet). These links were first identified through other tracking procedures, including (but not limited to) being spotted in confirmed IS tweets.

Table 2. Location and identification of Twitter accounts.



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It is important to underline here that the Pro-IS account dataset is as close as possible—taking into account the caveats already made—to a full dataset of explicitly IS-supportive accounts with at least one follower for the period studied. On the other hand, the Other Jihadist dataset is a convenience sample of non-IS jihadist Twitter accounts collected for comparison purposes and in no way reflects the actual number of these accounts present on Twitter.

Measuring Disruption and Its Effects

Twitter was one of the most preferred online spaces for IS and their “fans,”¹⁵ even prior to the establishment of their so-called caliphate in June 2014. It was estimated that there were between 10,000 and 100,000 IS Twitter accounts during the period September 2014 to June 2015. The number of IS Twitter accounts increased significantly from mid-2015 through early 2016, peaking in the region of 100,000 in mid-July 2016. This increase in the number of IS Twitter accounts per month remained relatively stable until early 2017, when it began to decline, relaying the message of IS and its supporters routinely. This decline was raised by the disruption of IS operations in the region, which continued until now.



reestablished accounts.²⁰ As well as updating these data, this research also examined the longevity or survival time of accounts, and compared Pro-IS to Other Jihadist accounts on both measures (i.e., follower numbers and longevity). The overall finding was that IS-supportive accounts were being significantly disrupted, which in turn has effectively eliminated IS's once vibrant Twitter community. Differential disruption is taking place, however, meaning Other Jihadist accounts were subject to much less pressure.

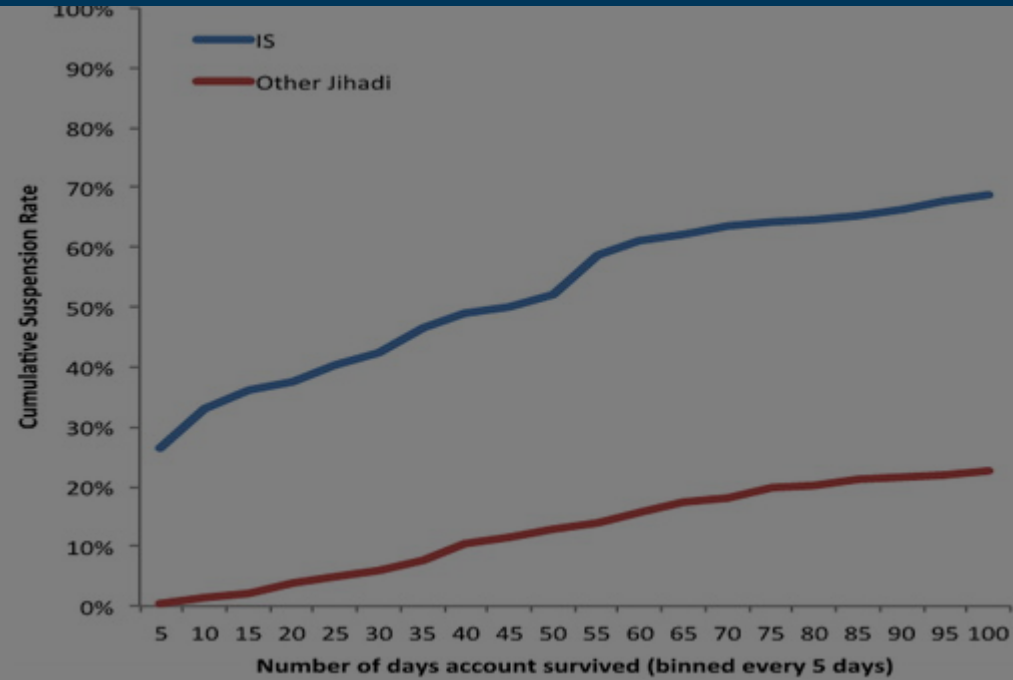
Account Longevity

This section addresses the survival time of accounts in the research database. All were active at the point they were identified and classified as Pro-IS or Other Jihadist. Once an account was added to the database, its status was monitored and the system recorded when it was suspended, if this subsequently occurred. This enabled the research team to measure the age of each account (i.e., the time elapsed since the account's creation) at the date of suspension. Worth underlining here is that the below-described survival rates of Pro-IS accounts would likely have been considerably shorter if the analysis included those accounts suspended—often within minutes of creation—before they could be captured by the research team for inclusion in the dataset.

Figure 2 depicts the estimated cumulative suspension rate for all Twitter accounts in the dataset, outlining the probability of an account being suspended against its age (represented by the x-axis). The y-axis represents the cumulative suspension rate. The majority of accounts were suspended within 70 days of creation. For Other Jihadist accounts, the suspension rate reached approximately 25% after 70 days, while for Pro-IS accounts, it reached more than 25% within 25 days. The suspension rate for Pro-IS accounts is negligible after 70 days, while for Other Jihadist accounts, it remains the same swift

Figure 2

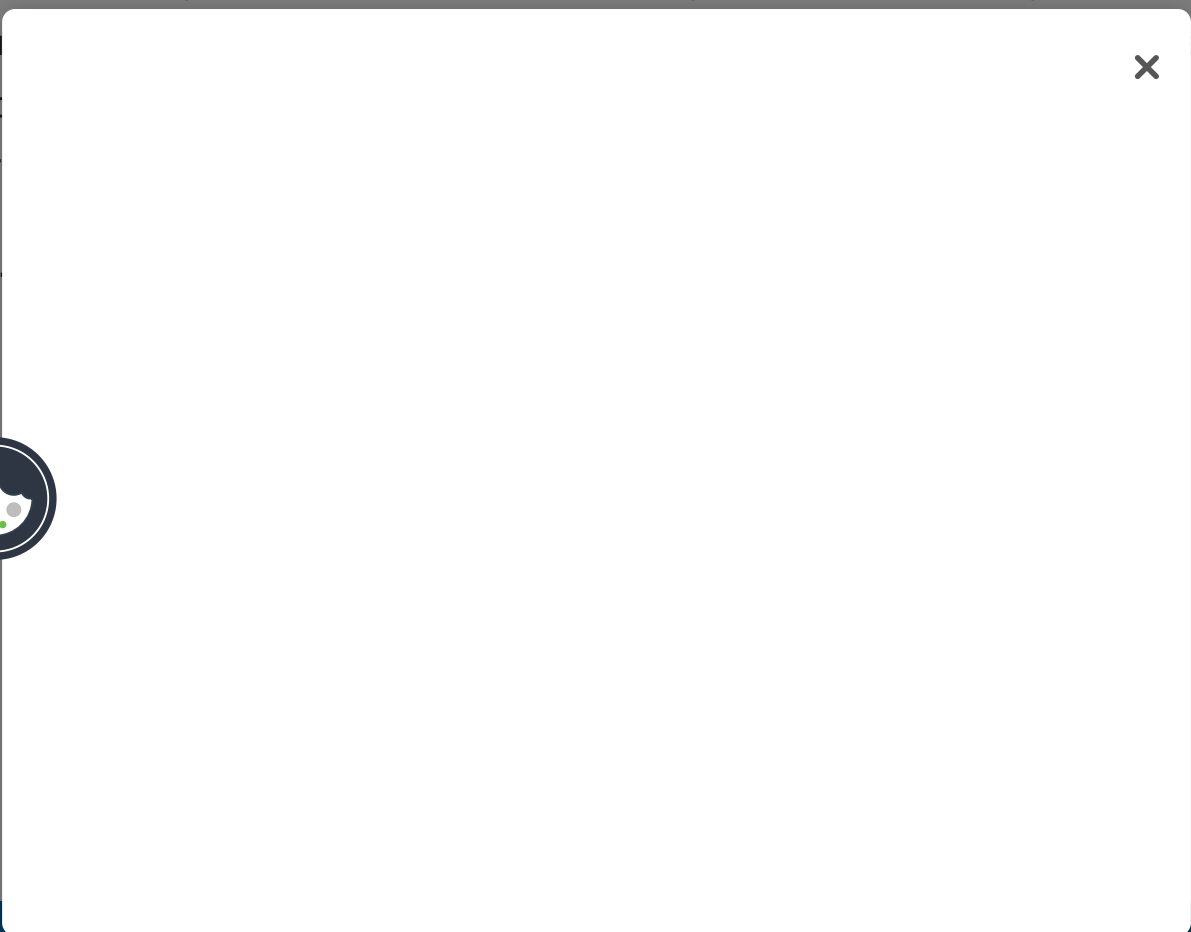


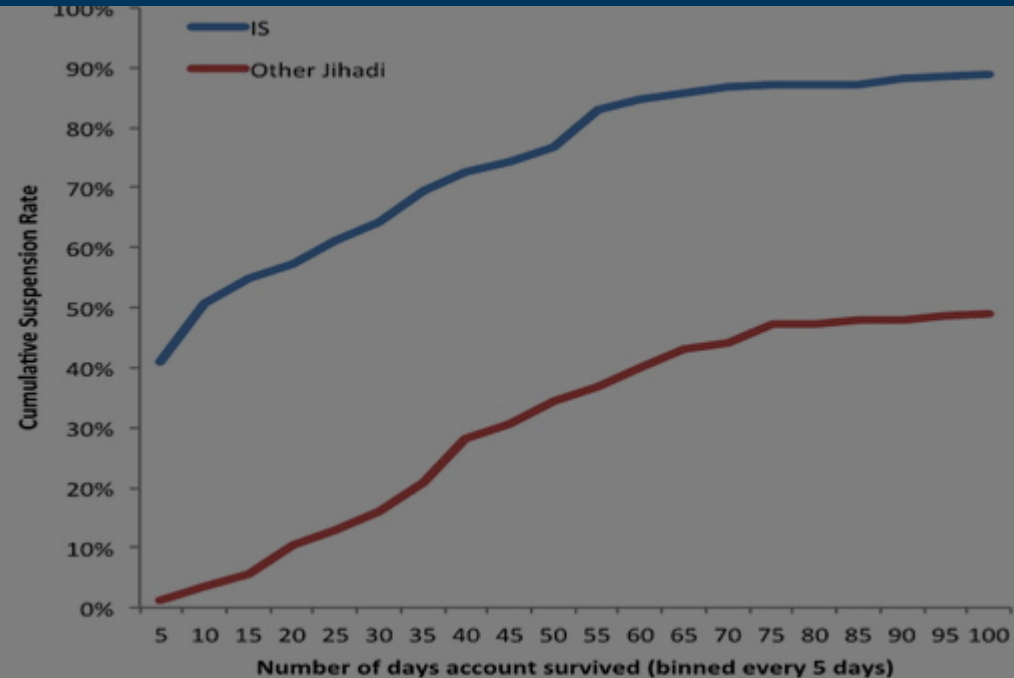


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The categorization of these accounts as jihadist in orientation was necessarily subjective. It is possible that others may disagree with our decisions. To address this possibility, [Figure 3](#) focuses on those accounts in the dataset that were eventually suspended: 455 Pro-IS accounts and 163 Other Jihadist accounts. The rationale is that these accounts were independently judged to have breached Twitter’s terms of service. Again, regarding differential disruption, the data illustrates that 85 percent of Pro-IS accounts were suspended within the first 60 days of their life, compared to 40 percent of accounts in the Other Jihadi category. For Pro-IS accounts, 1 percent of accounts were suspended after 100 days, compared to 1 percent of Other Jihadi accounts.

Figure 3.



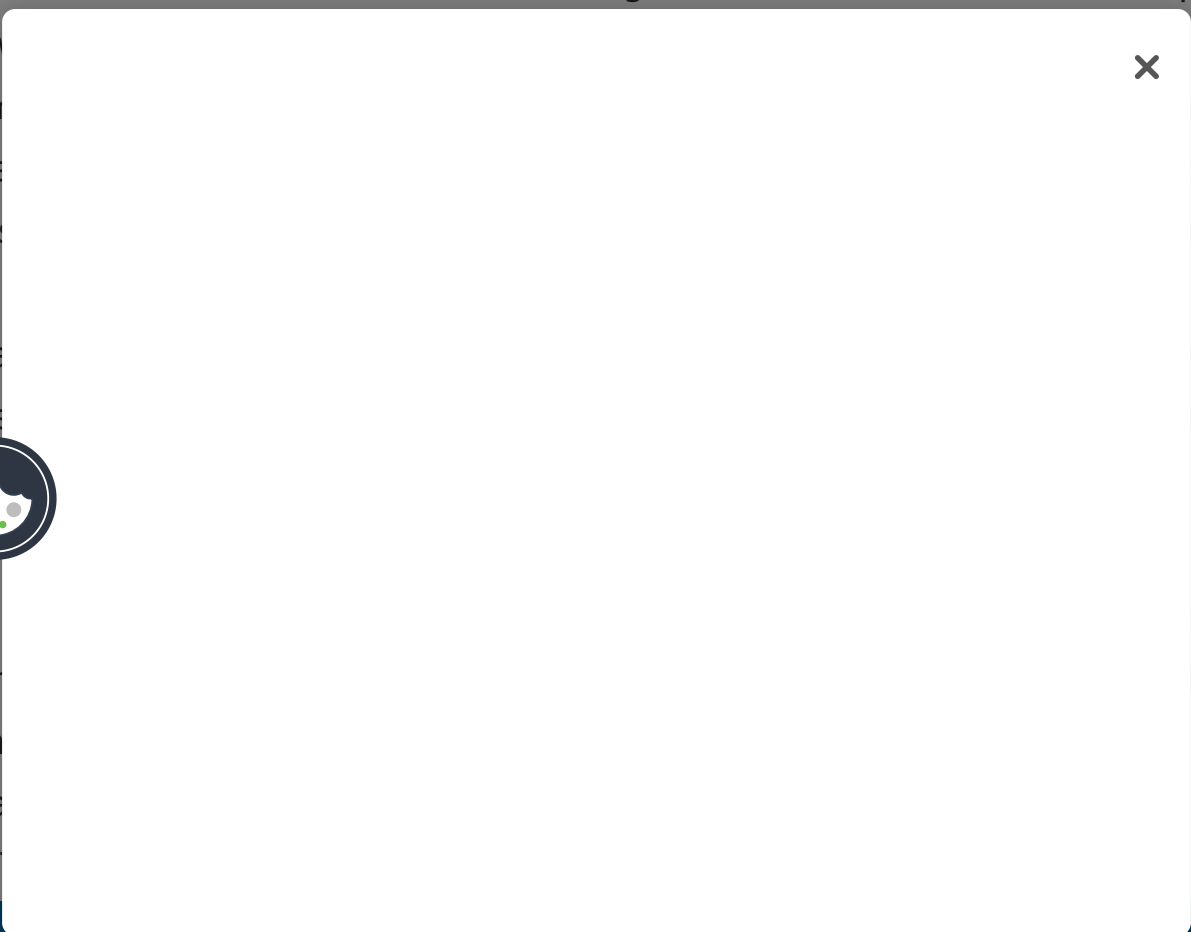


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Further analysis of suspended accounts revealed that the three subsets of Pro-IS accounts (i.e., those identified manually, semi-automatically based on general tweet content, and advanced semi-automatically as a result of linking to official IS propaganda) also displayed different survival and activity patterns. From the 722 Pro-IS accounts in the dataset, the manually identified accounts (27 percent) survived disruption for longer periods and were primarily tweeting about general IS and non-IS related news. The accounts identified through semi-automated means (30 percent) had

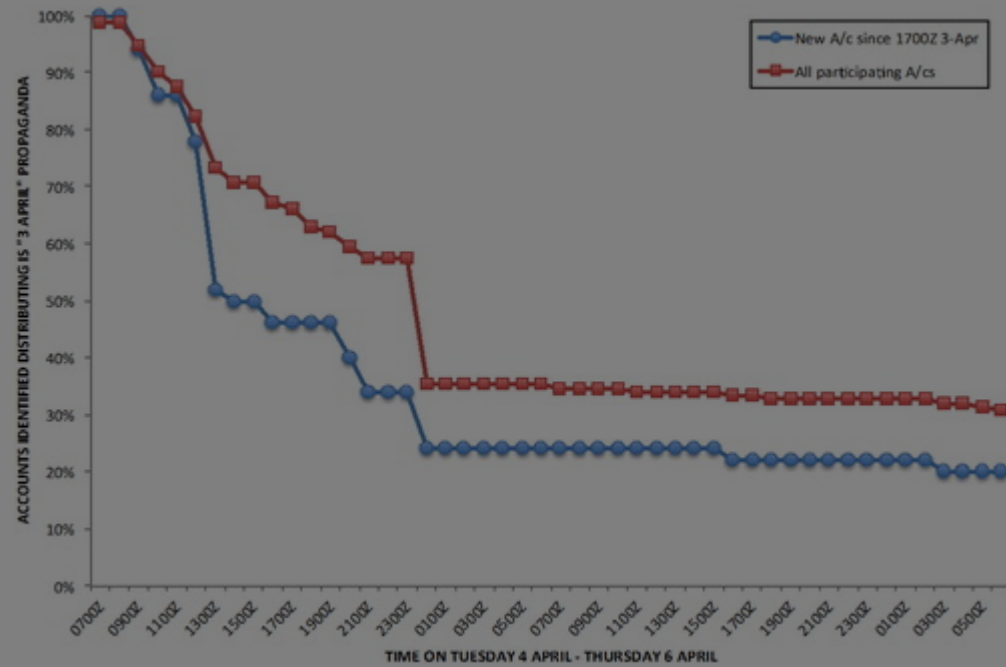
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the effectiveness of intervention over a single 24-hour period. Figure 4 depicts survival curves for those Twitter accounts in the research database that disseminated links to one or more pieces of official IS propaganda produced on Monday, 3 April 2017²² (based on data collected on Monday, 3 April and Tuesday, 4 April 2017).²³

Figure 4. Case study of intervention effectiveness.



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On Monday, 3 April 2017, IS uploaded its daily propaganda content to a variety of social media and daily news that tells and other evening with link propaga indep ident with no propaga Method sending GMT on

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50 throwaway accounts specifically created on the Monday evening. The data shows that at 07.00 GMT on Tuesday, 4 April 2017, 100 percent of these accounts were active. However, by 13.00 GMT, this figure had reduced to just 73 percent, falling to 58 percent by 23.00 GMT. This then dropped sharply to 35 percent surviving un-suspended by midnight on Tuesday. Very few of these surviving accounts were suspended over the subsequent 48 hours tracked. The fifty throwaway accounts created on Monday evening specifically to disseminate propaganda were suspended or deleted even faster: by 13.00 GMT only 52 percent were still active, falling to 34 percent by 23.00 GMT and 24 percent by midnight on Tuesday.

This demonstrates that the response to official IS propaganda being distributed via Twitter was reasonably effective in terms of identifying and taking down disseminator accounts in the first 24 hours after they linked to official IS content. Pro-IS accounts disseminating this official IS propaganda were taken down at a higher rate, compared to those Pro-IS accounts not disseminating it. However, it must be borne in mind that some Pro-IS accounts were operating on a 24-hour “news cycle” and a large number of accounts were created daily to disseminate this propaganda. As these accounts were being taken down during Tuesday, a similar number of fresh accounts were being created and used to distribute the next day’s official IS content. Therefore, it could be argued that, while efforts to remove permanent traces of IS propaganda links from Twitter were relatively successful, pro-IS users were still able to broadcast links to its daily pro-

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importantly, gain 13 times as many followers as the Pro-IS accounts. An even more stark comparison is between median figures for Pro-IS accounts in 2017 versus those recorded for similar accounts in 2014. The median number of followers for pro-IS accounts in 2017 was 14 versus 177 in 2014,²⁵ a decrease of 92 percent. The median number of accounts followed by IS supporters in 2014 was 257, whereas this research found a median of thirty-three “friends” per pro-IS account—a decrease of 87 percent.²⁶ In an analysis of 20,000 IS supporter accounts in a five-month period between September 2014 and January 2015, Berger and Morgan observed suspension of just 678 accounts,²⁷ a total loss of 3.4 percent. In the research dataset outlined in this article, the total loss of Pro-IS accounts in just four months (between January and April 2017) was conservatively 63 percent.

Table 3. Median number of tweets, followers, and friends for accounts not yet suspended.



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Throughout what may be referred to as the IS Twitter “Golden Age” in 2013 and 2014, a variety of official IS “fighter” and an assortment of other IS “fan” accounts were accessible with relative ease. For the uninitiated user, once one IS-related account was located, a list of related accounts was typically supplied. This process was often quick, and their user handles were often easy to come across. Some of these accounts were active for a long time and had a large following—often in the thousands—even if they were not particularly prominent. The whole series of accounts (including those in Turkish) were of interest to me, and I followed several (e.g., for a special interest in the “caliphate” or with a stated purpose). The latter



celebrating suicide attackers and other “martyrs,” and networking around and disseminating IS content.

In 2014, pro-IS accounts were already experiencing some pressure from Twitter; for example, official IS accounts were some of the first to be suspended that summer. Twitter’s disruption activity increased significantly over time, forcing pro-IS users to develop and institute a host of tactics to allow them to maintain their Twitter presences, remain active, and preserve their communities of support on the platform.³² For example, the group employed particular hashtags, such as #baqiyyafamily (“baqiyya” means “remain” in Arabic), to announce the return of suspended users to the platform, in an attempt to regroup after their suspension. Twitter eventually responded by including these hashtags in their disruption strategies. Interestingly, this increased disruption only strengthened some IS supporters’ resolve and they became more determined to reestablish their accounts, even after repeated suspensions. During this time, suspension was, for some, considered to be a “badge of honor.” Thus, although disruption may have resulted in decreased numbers of pro-IS users, it may also have contributed to the generation of more close-knit and unified communities, as those who remained needed a high level of commitment and virtual community support to do so.³³

Eventually, however, the costs of remaining on Twitter began to outweigh the benefits.

Research continued even after turning accounts and followers and friends. supporters were forced to take publicly accessible was no longer hold that the vast innocuous images, meaningless combinati on, and influential loss of access to community-building activity.



Table 4. Changes in account name types due to disruption activity.*



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From a quantitative perspective, the data discussed in this section demonstrate three key findings. First, IS and their supporters were being significantly disrupted by Twitter, where the rate of disruption depended on the content of tweets and out-links. Second, although all accounts experienced some type of suspension over a period of time, Pro-IS accounts experienced this at a much higher rate compared to the Other Jihadist accounts in the dataset. Third, this severely affected IS's ability to develop and maintain robust and influential communities on Twitter. As a result, pro-IS Twitter activity has largely been reduced to tactical use of throwaway accounts for distributing links to pro-IS content on other platforms, rather than as a space for public IS support and influencing activity.

Beyond Twitter: The Wider Jihadi Online Ecology

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remedied this difficulty. In terms of link activity in the data collected for this research, most links were not out-links, but rather in-links (i.e., within Twitter): 8,086 or 14 percent for Pro-IS and 4,650 or 7.5 percent for Other Jihadist tweets. Of the Pro-IS and Other Jihadist Twitter accounts identified, one in eight (around 13 percent) contained non-Twitter URLs or out-links. This is a considerable reduction from the 40 percent of tweets reportedly containing URLs in 2014. Analysis of Twitter out-links nonetheless provides an interesting snapshot of the Top 10 platforms linked to by Pro-IS and Other Jihadist accounts during our data-collection period (see [Table 5](#)).

Table 5. Top 10 other platforms (based on out-links from Twitter).



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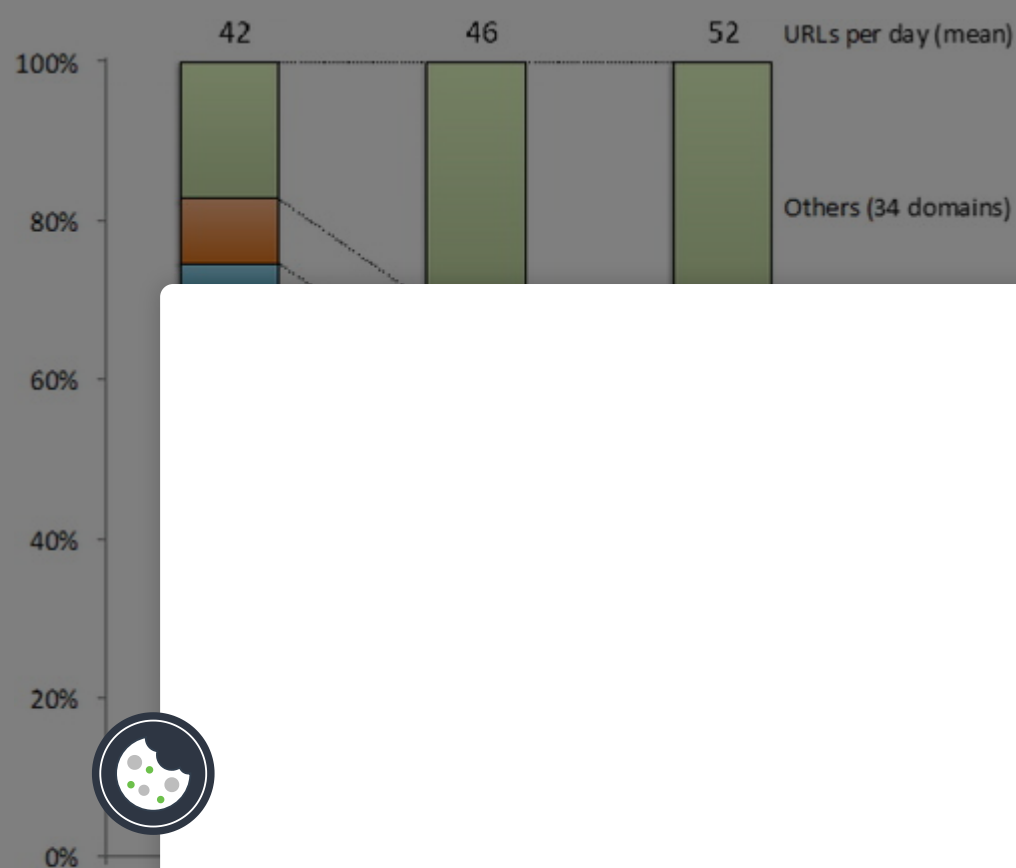
YouTube was the top linked-to platform for both Pro-IS and Other Jihadist accounts, pointing to the overall importance of the site—and of video generally in Web 2.0—in the jihadist online scene. Facebook does not appear in the Top 10 out-links for Pro-IS accounts, albeit a recent report claims that IS content and IS-supportive users are still easily locatable on Facebook.⁴² What our findings indicate is that, like Twitter, Facebook is engaged in differential disruption as it is the second most preferred platform for out-linking by Pro-IS accounts. This is a significant finding as Facebook has been known to have a high ranking status for its content. Other common platforms include Drive, Sendvid, and YouTube. 10. One traditional platform mentioned (0.04 percent) is a paucity of two of 7.5 percent contained ways into



Case Study: Destinations of Official IS Propaganda

As mentioned, during the research period, IS was operating a 24-hour “news cycle,” disseminating a daily batch of new official propaganda via social media channels, including Twitter. Links to this propaganda were circulated through tweets and other means. These links pointed to a wide variety of other social media and content hosts that contained newly uploaded propaganda daily. A sample of these propaganda destinations were analyzed at three time points: 4–8 February, 4–8 March (excluding 7 March, see below), and 4–8 April 2017. The research team obtained the full daily roster of IS propaganda and the sites where it appeared for each of these time periods. This allowed the identification of the most frequently linked-to platforms, along with how many pieces of propaganda were posted by host domains, and what proportion of these URLs were subsequently taken down (see [Figure 5](#)).

Figure 5. Destinations of official IS propaganda: Number of URLs and URL destinations February to April 2017.



Overall, over these three time periods, Pro-IS users linked to thirty-nine different third-party platforms or sites, as well as IS running its own server⁴⁴ to host its propaganda material. It is important to note that the former were exclusively, it is believed, “leaf” destinations. That is, they contained content but no links to other sites, so did not have a networking or community-building aspect. Someone visiting such a page would not be able to discover more about the network of other sites. Important exceptions to this were YouTube and a small number of other sites that algorithmically “recommend” similar content in their inventory, which may have resulted in their pointing to other available IS propaganda.⁴⁵ During the period of the research, the average number of URLs populated rose from forty-two per day in February to fifty-two per day in April. This hints at increasing fragmentation and dispersal, possibly in response to takedown activity by a variety of platforms and sites. However, there was a large inter-day variation (twenty to sixty-five) and one outlier day on 7 March was excluded, as it was the publication date of issue 7 of IS’s Rumiya online magazine. On this day, IS pushed 240 separate URLs, a quarter of which contained direct reference to Rumiya in the link, and many more that probably linked to the new issue of the magazine.⁴⁶

Of the forty domains used (thirty-nine external, one internal server), a consistent “big 6” became apparent across the three time periods: justpaste.it; IS’s own server; archive.org; sendvid.com; YouTube; and Google Drive. These six domains accounted for 83 percent, 70 percent, and 67 percent of the URLs in the February, March, and April

sampling. The use of justpaste.it rose from 10 percent in February to 40 percent in March and April. The use of archive.org varied heavily across the three time periods, from 12 percent in February to 33 percent in March and April. The use of sendvid.com was exclusively, it is believed, for the purpose of hosting propaganda material. The use of YouTube and Google Drive was also exclusively for the purpose of hosting propaganda material. The use of justpaste.it was also exclusively for the purpose of hosting propaganda material. The use of archive.org was also exclusively for the purpose of hosting propaganda material. The use of sendvid.com was also exclusively for the purpose of hosting propaganda material. The use of YouTube and Google Drive was also exclusively for the purpose of hosting propaganda material.

The proportion of URLs that were still live on 1 February was 100 percent. The proportion of URLs that were still live on 1 March was 100 percent. The proportion of URLs that were still live on 1 April was 100 percent.



over a matter of days after propaganda was posted) and widespread (across a multiplicity of sites and platforms).

Conclusion

The costs for most pro-IS users of engaging on Twitter (in terms of deflated morale, diffused messages and persistent effort needed to maintain a public presence) now largely outweigh the benefits. This means that the IS Twitter community is now almost non-existent. In turn, this means that radicalization, recruitment, and attack planning opportunities on this platform have probably also decreased. However, a hard core of users remain persistent. In particular, a subset of established throwaway disseminator accounts pushed out “official” IS content in a daily cycle during our data-collection period and continue to do so. These accounts were generally suspended within 24 hours, but not before they promoted links to content hosted on other platforms.

This article was mainly concerned with pro-IS Twitter accounts and their disruption. However, IS are not the only jihadists active on Twitter, and a host of other violent jihadists were shown to be subject to much lower levels of disruption by Twitter. Also, IS and other jihadist groups remain active on a wide range of other social media platforms, content hosting sites and other cyberspaces, including blogs, forums, and

dedicated sites. The article is available in many of these

The Telegram channel is widely preferred and obviously provides a means of cutting down on the number of pro-IS accounts. Telegram “owners” and content



function(s). While Telegram restricts users from uploading files larger than 1.5GB—roughly a two-hour movie—it provides seemingly unlimited amounts of storage.

In terms of proactive steps taken by Telegram with respect to IS and their supporters' use of their service, in December 2016, Telegram established a dedicated "ISIS Watch" channel, which provides a running tally of numbers of "ISIS bots and channels banned" by them. On 11 March, 2017 a message on the channel stated "Our abuse team actively bans ISIS content on Telegram. Following your reports, an average of 70 ISIS channels are terminated each day before they reach any traction." Between January and May 2018, the average number of terminations per days had jumped sixfold to 422. All told, Telegram claims to have banned 106,573 "ISIS bots and channels" in the period December 2016 to 31 May 2018, with May 2018 (9,810) having the highest number of bans yet recorded.⁴⁹ While it is clear therefore that Telegram routinely bans pro-IS users, channels, and bots, interpreting the numbers that Telegram has supplied is difficult absent knowing the overall numbers of users, channels, and bots actually active on the platform at any given time. Also worth pointing out is that in addition to exploiting the channels feature, IS began taking advantage of Telegram's groups function around summer 2017. So-called Supergroups allow for intra-group communication among up to 30,000 members⁵⁰ and like all other group chats on Telegram are private among participants; Telegram does not, in other words, process requests, including termination requests, related to them.⁵¹

Recommendations

The recommendations for social media monitoring are effective and effective solutions, including the case such as pipelines technology human v



Second, some IS supporters remain active on Twitter. Content disseminators using throwaway accounts could probably be degraded further—although this may have both pros (e.g., detrimental impact on last remaining significant IS supporter Twitter activity) and cons (e.g., further degradation of Twitter as a source of data or open source intelligence on IS). Like all disruption activity, whether this is viewed positively or negatively depends on one’s perspective and institutional interests. For example, law enforcement tends to favor this approach, whereas free-speech advocates warn against corporate policing of political speech, even if that speech is deeply objectionable. Some intelligence professionals, on the other hand, advocate for greater attention to social media intelligence.⁵²

Third, the focus of this article has not just been Twitter, but the importance of the wider jihadist online ecology was also pointed to. The analysis was also not restricted to IS users and content; the presence and often uninterrupted online activity of non-IS jihadists was underlined too. In recent years, many counterterrorism professionals tasked with examining the role of the Internet in violent extremism and terrorism have narrowed their focus to IS. Scholarly researchers have acted similarly, many narrowing their focus further to IS Twitter activity. Continued analytical contraction of this sort should be guarded against. Maintenance of a wide-angle view of online activity by diverse other jihadists across a variety of social media and other online platforms is recommended. This is particularly important due to the shifting fortunes of IS and HTS

on the ground. In Syria, the continued presence of HTS in Idlib should not be underestimated. The presence of HTS in Idlib is significant for them and for other jihadist groups. HTS is available for comparison with IS and other jihadist groups.

Finally, the analysis of HTS in Idlib was a convenient way to replicate the analysis of IS in Syria, and the analysis of Taliban in Afghanistan. The analysis of HTS in Idlib is significant



regional terrorism profile (i.e., Taliban), and a party to the Syria conflict (i.e., Ahrar al-Sham).⁵³ Such an analysis could help to ascertain the vibrancy of their contemporary Twitter communities and Twitter out-linking practices, and allow their preferred other online platforms to be identified.

Additional research is also clearly warranted into the wider violent jihadist online ecology. Wider and more in-depth research into the following is therefore recommended:

1. patterns of use, including community-building and influencing activity;
2. levels of disruption on other platforms besides Twitter, including other major platforms such as YouTube, but also other smaller or more obscure platforms, such as justpaste.it and others.

Analysis of pro-IS and other violent jihadist activity on Telegram and comparing this with our present findings is suggested too. It would also be worthwhile analyzing out-linking trends on Telegram to determine how the functionalities of different platforms have an impact on linking practices.

Acknowledgment

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Notes

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Notes

1 George Parker, "Theresa May Warns Tech Companies: 'No Safe Space' for Extremists," Financial Times, 4 June 2017, <https://www.ft.com/content/0ae646c6-4911-11e7-a3f4-c742b9791d43?mhq5j=e3> (accessed 1 Oct. 2018).

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3 For a detailed discussion on "internalization" see Herbert C. Kelman, "Compliance, Identification and Internalization: Three Processes of Attitude Change," *The Journal of Conflict Resolution* 2, no. 1 (1958), 51-60; in relation to radicalization and violent extremism, see Suraj Lakhani, *Radicalisation as a Moral Career: A Qualitative Study of How People Become Terrorists in The United Kingdom*, Ph.D. thesis (Universities Police Science Institute: Cardiff University, 2014).

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10 Method52 was developed by the TAG Laboratory at the University of Sussex. For more information, see www.taglaboratory.org (accessed 1 Oct. 2018).

11 Classifiers were trained using supervised machine-learning approaches. Method52 provides components that enable this to be done swiftly and in a manner that is bespoke to a project.

12 Berger and Morgan, "The ISIS Twitter Census," 41 and 44.

13 J. M. Berger and Heather Perez, "The Islamic State's Diminishing Returns on Twitter: How Suspensions are Limiting the Social Networks of English-speaking ISIS Supporters," Washington DC: George Washington University Program on Extremism, 2016, 6, https://cchs.gwu.edu/sites/cchs.gwu.edu/files/downloads/Berger_Occasional%20Paper.pdf (accessed 1 Oct. 2018).

14 The data from the latter stages of this project suggest that fifty or more throwaway IS accounts were produced daily. These accounts appeared to be set up solely to distribute propaganda, typically had no followers, and sent only IS propaganda tweets until they were suspended. If the throwaway accounts from across the whole research period had been included in the dataset, the total number could have been as many as 2,000.

15 Walid, "Using Twitter to Track ISIS Propaganda," *Journal of Terrorism Studies*, 2015, 3, <https://a>

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22 By early April 2017, the research had reached the stage where there was complete access to IS's main Twitter propaganda apparatus. This enabled the semi-automated system to determine what IS and supporter tweets would be linking to before those tweets were sent. It is thought that this occurred several hours before Twitter themselves become aware of these accounts and their tweets. Much of this may have been due to the research team being able to access data and intelligence across multiple sites, allowing early prediction of tweet material, where Twitter's disruption team were likely restricted to monitoring their own platform only. The system was thus able to immediately identify when an account disseminated one of these propaganda links on Twitter. It was then possible to capture the rate and speed of suspension.

23 It should be noted that this date was chosen at random. Propaganda represented in this graph had no relation to the chemical attack on the town of Khan Shaykhun, also on 4 April, as content was produced by IS on Monday 3 April 2017.

24 The term "friends" refers to accounts the Pro-IS accounts were following.

25 Berger and Morgan, "The ISIS Twitter Campaign," 20

26 Berl

27 Ibid.

28 Online arms that they might have on that t Carthy, and Pádraig and Online Recomm 459-478.

29 See, Witness who, in Bangalore- based by inent IS supported ended in early 20 was is



30 Pearson, "Wilayat Twitter and the Battle Against Islamic State's Twitter Jihad."

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32 For examples, see Berger and Perez, "The Islamic State's Diminishing Returns on Twitter," 15-18.

33 Pearson, "Wilayat Twitter and the Battle Against Islamic State's Twitter Jihad." See also Elizabeth Pearson, "Online as the New Frontline: Affect, Gender, and ISIS-takedown on Social Media," *Studies in Conflict & Terrorism* 5 (September 2017).

34 Berger and Perez, "The Islamic State's Diminishing Returns on Twitter," 9.

35 Such meaningless combinations of letters and numbers are also characteristic of "bots" (i.e., automated social media accounts that pose as real users). See Ben Nimmo, Digital Forensics Research (DFR) Lab, "#BotSpot: Twelve Ways to Spot a Bot: Some Tricks to Identify Fake Twitter Accounts," Medium, 28 August 2017, <https://medium.com/dfrlab/botspot-twelve-ways-to-spot-a-bot-aedc7d9c110c> (accessed 1 Oct. 2018).

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43 The term "Twittersphere" is used to refer to Twitter users as a collectivity. The term "jihadisphere" has been used to refer to online jihadis as a collectivity; see Benjamin Ducol, "Uncovering the French-speaking Jihadisphere: An Exploratory Analysis," *Media, War & Conflict* 5, no. 1 (2012).

44 Due to the domain names experiencing rapid removal, this server had five names over the three research periods studied.

45 O'Callaghan et al., "Down the (White) Rabbit Hole," 37.

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53 Nationally, Syria, Russia, Iran, Egypt, and the UAE have designated Ahrar al-Sham as a terrorist organization. Internationally, the United States, Britain, France, and Ukraine blocked a May 2016 Russian proposal to the United Nations to take a similar step.

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