

# Islamic State Propaganda and Attacks: How Are They Connected?

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## Abstract

*What is the relationship between the words and deeds of a terrorist group? Despite frequent speculation in media and policy circles, few studies have tested this relationship. This study aims to verify a potential correlation between the volume of propaganda produced by Islamic State (IS)—including statements by the group’s leadership—and the number of attacks carried out in its name. We examine this issue by comparing two datasets: one of all official propaganda produced by the Islamic State in 2016, and another of the completed, failed, and disrupted plots carried out by the group and its supporters in Europe in the same year. We find no strong and predictable correlation between the volume of propaganda Islamic State produces and the number of attacks the group and its supporters carry out. There is no regular rise in IS propaganda output before or after its attacks. In particular, there is no regular rise in attacks after leadership statements. However, the results may have identified differences in how IS central and regional media offices respond to attacks. The findings suggest that rather than merely looking at the volume of IS propaganda, it is necessary to also examine its content. As such, the deliberately broad premise of this study is intended as the first in a series of papers examining the potential relationship between IS propaganda and IS attacks.*

**Keywords:** Terrorism; Islamic State, propaganda; attacks; plots

## Introduction

On May 21, 2016, then-spokesman for the Islamic State (IS), Abu Mohamed al-Adnani, issued a warning.[1] Stating that civilians were fair game, he encouraged the group’s supporters to carry out terrorist attacks and make the upcoming month of Ramadan one of “calamity everywhere.”[2] A wave of deadly violence followed. On June 12, a gunman killed 49 people at a nightclub in Orlando, Florida, and the next day, there was a fatal stabbing of a police officer and his partner in Magnanville, France. Subsequent attacks saw 49 people die from shootings and suicide bombings at Atatürk airport in Istanbul, Turkey; eight suicide bomb attacks in northern Lebanon; an enormous truck bomb that killed 323 people in Baghdad, Iraq; and a hostage-taking situation that left 24 people dead in Dhaka, Bangladesh.[3]

These examples demonstrate how terrorist groups can signal attacks with propaganda and follow it with catastrophic violence.[4] While much ink has been spilled researching a terrorist group’s propaganda or its attacks, few studies have compared the two to determine whether and how they relate to each other. This paper therefore asks a simple question: how are terrorist group propaganda and attacks related? The aim of this study is to determine whether the volume of official Islamic State propaganda correlates with the number of attacks carried out in the group’s name, and—if there is a pattern—to understand how regular that pattern is. In particular, it examines whether such a correlation holds when the Islamic State’s leadership releases a statement, as well as how propaganda output responds after an attack occurs.

To answer this question, we developed and then compared two datasets: one of official Islamic State propaganda in 2016, and another of the attacks perpetrated by IS supporters in Europe during the same year. The database of attacks includes all known completed, failed, and disrupted attacks in Europe in 2016, thereby avoiding a narrow focus on only those attacks that the perpetrators were able to execute successfully.

We focused on the year 2016 as a period of analysis for two principal reasons. First, it marked the crest of an unprecedented wave of jihadist attacks in Europe, with more attacks in 2016 than in preceding years.[5] Second, it featured a relatively consistent propaganda output by Islamic State, including leadership statements. Although there was a slight decline in IS propaganda output between the first and second half of 2016, the group’s subsequent battlefield defeats and territorial losses meant its propaganda declined precipitously starting

in 2017.[6]

Verifying such a correlation can be insightful. It is often expected that IS will carry out attacks after its leaders call for them to occur,[7] and understanding whether a connection exists will show how quickly the group's followers act on the leadership's instructions. The comparison may also reveal whether IS releases a surge of propaganda before an attack, or—as is generally understood—it intensifies propaganda output after an attack to take advantage of the renewed interest in the group among the public, potential recruits, and its existing supporters.[8]

While Islamic State no longer controls territory, it is by no means defeated, and conditions within its former “caliphate” lend themselves to the group's resurgence.[9] Should IS—or a reincarnation of the group—do so, it would be critical to understand how it used its propaganda to support its campaign of violence. We also know that terrorist groups cooperate and learn from one another.[10] The tools that IS deployed in terms of using propaganda to support and broadcast its attacks will therefore likely be used by others in the future, just as was seen with the Islamic State's predecessors.[11]

This paper will first examine the existing literature on the strategic logic of terrorism and costly signaling to develop a set of expectations for how propaganda and violence may relate to one another. It will then explain the construction of the two databases used in the study, before presenting the results of a regression analysis on how propaganda output correlates to the completed, failed, and disrupted plots in Europe in 2016. Our paper concludes with a summary of our main findings, the limitations of our approach, and recommendations for follow-up research.

In short, we find no clear correlation between the amount of propaganda Islamic State produces and the number of attacks it carries out, neither in terms of the group's leadership statements nor its overall output. This belies simple explanations of the effect of the group's propaganda, while suggesting the need for a nuanced analysis of the *content* of propaganda and the *types* of attacks. The authors therefore see this paper as the beginning of a program of further testing, rather than definitive findings, to further understand the influence of terrorist propaganda.

## **Literature**

It has long been understood that terrorist groups are rational and strategic.[12] They use terror to provoke their targets into disproportionate responses that radicalize populations and provide new potential pools of recruits.[13] They also use terrorism to signal to an enemy that they will impose considerable costs unless that enemy changes policy (e.g., withdrawing occupying forces).[14] Other strategic reasons are based on more particular circumstances, such as intimidating local populations, spoiling peace negotiations, or demonstrating greater commitment than other terrorist groups or insurgents in the same conflict.[15] As Kydd and Walter demonstrate, terrorist groups can use multiple strategies at once—the 9/11 attacks, for example, were designed to provoke a response from the United States and also force them to withdraw troops from Muslim countries. [16]

Terrorist group propaganda also has myriad uses. It promotes a culture that helps the group maintain coherence, recruit new members, justify controversial actions, and caricature the enemy.[17] There is also a large corpus of literature that describes how propaganda supports the terrorist attack itself.[18] According to Schmid and McAllister, “each act of terrorism is performed with an eye to sending a specific (set of) message(s).”[19] The attack itself can be a message to adversaries,[20] but it is also supported by propaganda that “rationalizes and contextualizes the act.”[21] Terrorist groups and leaders “have exerted considerable effort to construct and convey” that message beyond the act of violence itself.[22] This is the propaganda that our paper considers—that which occurs before or after a terrorist attack.

Kydd and Walter argue that terrorist attacks are costly signaling.[23] This means that propaganda cannot

send a credible enough signal to the adversary. In order to demonstrate their commitment, and thus cause governments and individuals to overreact in ways that might help radicalize new recruits, terrorists need to carry out attacks as well. These attacks are supported by propaganda that calls for them to attack and, afterwards, trumpets their success.

There is no single formula for post-attack propaganda. IS has a multi-step process that involves taking initial credit for the attack, followed by releasing biographical information about the attacker that is broadcast on IS's daily radio bulletin and its weekly newspaper.[24] This demonstrates Holbrook's argument that terrorist attacks are supported by an architecture of carefully crafted propaganda messages.[25] One of the innovations that distinguishes IS from other groups in the transnational jihadist movement is its communications and media infrastructure.[26] In Europe, the attack and the propaganda work together as signals: the attack constitutes the costly signal, and the propaganda amplifies it.

Our work follows the contributions of past studies on terrorist attacks as costly signals and propaganda as necessary support to these attacks in order to develop two different expectations for how propaganda and attacks might relate to each other. Our article's intended contribution is to understand the extent to which IS followed a discernable pattern in its release of propaganda and its execution of attacks.

Given the theory of costly signaling above, we should expect two outcomes from our study. First, that propaganda output increases after an attack occurs. If violence is used to radicalize moderates and draw them into supporting a terrorist group, then that violence would need to be widely publicized in order to provoke a response. Further, as demonstrated above, IS has a detailed process of releasing propaganda after an attack. As a result, we should expect to see the amount of propaganda IS releases rise after an attack occurs.

Our second expectation is that there will be no reliable connection between leadership statements and subsequent attacks. This is because leaders do not *always* need to present a credible threat in order to provoke a response by their adversaries. Furthermore, even attackers who are "inspired" by IS do not respond immediately to a leadership statement by launching an attack, even if these statements are an important part of the propaganda they consume.

Leadership statements are rare remarks made by either the leader of the group or one of its most senior members. In the case of IS, the leadership statements we consider are comments made by its leader Abu Bakr al-Baghdadi or its designated spokesman (explained more in the Methodology section). These statements are usually released as audio; very rarely are they video statements. Al-Baghdadi himself has only featured in two video statements: once in July 2014 as he ascended the pulpit of al-Nuri mosque following IS's capture of Mosul and another in April 2019 following the group's loss of the Syrian town of al-Baghuz. In 2016, four leadership statements were released by audio; none by video.

Leadership statements have an outsized impact on a terrorist group's activity.[27] In 2011, a series of authors used linguistic content analysis to help determine whether terrorist groups were planning attacks. One of their most interesting discoveries was that both Al Qaeda (AQ) and Al Qaeda in the Arabian Peninsula (AQAP) released leadership speeches whose content exhibited heightened stress levels prior to their attacks, such as a narrowing of creative and cognitive complexity in their speeches.[28] In an extensive recent review of the propaganda material consumed by attackers or would-be attackers in the UK from 2004-17, Holbrook found that speeches by prominent figures constituted the largest component of the material saved on their computers.[29]

But we do not necessarily expect attacks to regularly occur directly after leadership statements. Attacks do not need to follow leadership statements every time in order to fulfill their intention of signaling a commitment to their adversary. They only need to provoke a response, which means they only need to be followed by attacks some of the time. On the whole, however, this means we are unlikely to see any pattern of leadership statements *vis-à-vis* the carrying out of violence.

Moreover, even “lone actor” terrorists are “rarely sudden and impulsive”, with their attacks often involving months of planning.[30] Therefore, we expect that these “inspired” attacks—carried out by individuals who claim affinity to IS but are not known to be in contact with the group—will not respond immediately to high-profile calls for violence with regularity. Attackers might be inspired by the words of their group’s leader to start *planning* an attack after the statement is released, but not carry it out spontaneously.

Propaganda and violence work together to fulfill IS’s mission to provoke extreme reactions from governments in Europe. We therefore ask a simple question: do terrorist attacks and propaganda output work together? If so, in what way? And if not, why not? Due to the dearth of empirical work on this issue, our paper is only exploratory at this stage, constructing deliberately simple tests with a view to using these results to develop leads for future lines of inquiry.

## Methodology

This section will explain how we constructed the two databases used—of official IS propaganda, and of IS attacks in Europe—and how we combined and analyzed them.

### Propaganda Database

This study’s propaganda database contains all the videos, audio statements, and magazines published by IS in 2016. It was manually built by the second author from Telegram, a social media platform favored by IS since 2015.[31] During the data collection period, two networks on Telegram were responsible for distributing all official Islamic State communications: *Nashir* (“Publisher”) and *Amaq News Agency*. Operating alongside these channels from midsummer 2016 was a disseminator network calling itself the *Nashir News Agency*. [32] Working autonomously in support of the organization, it aggregated the posts of each, publishing them all in one place.

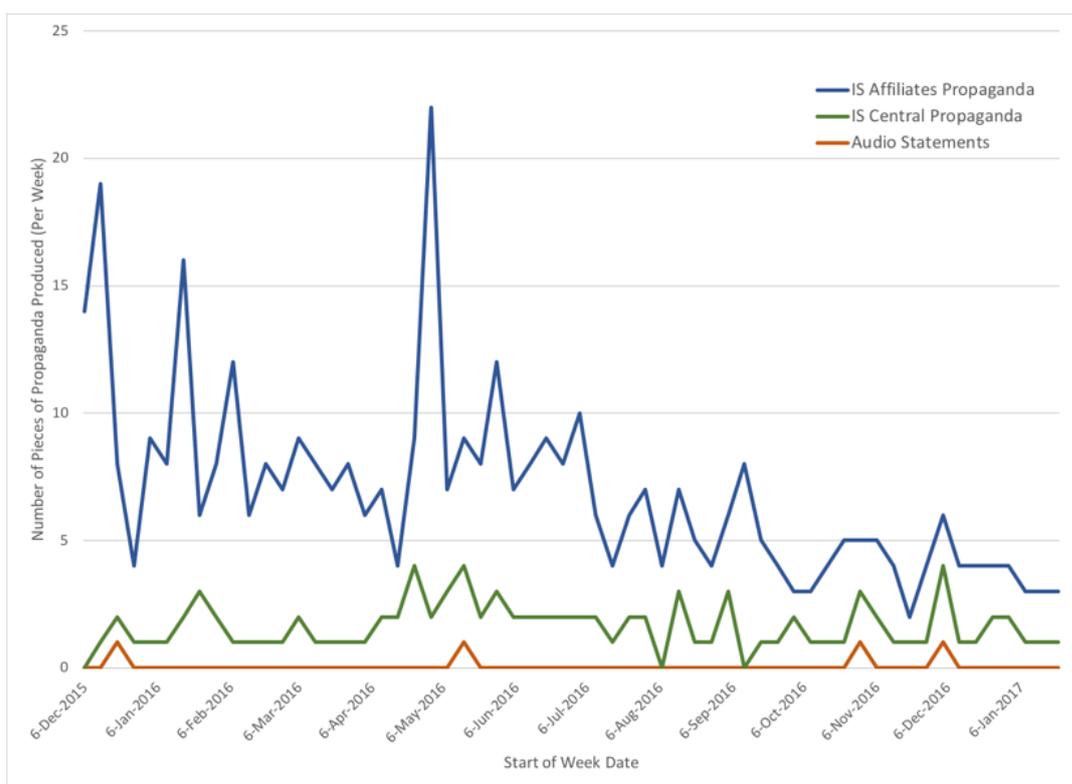
Each piece of propaganda was recorded in a single spreadsheet, and each input was reviewed to remove any duplicate publications. What results is an archive of 412 pieces of Islamic State propaganda in 2016, which were then coded by their origin within Islamic State’s “Caliphate” (see *Figure 1* and *Table 1* below). This was possible due to the watermarks used: the “Central Media Office” was branded with an official IS watermark, whereas the regional affiliate media centers, including those in Syria and Iraq, watermarked their propaganda with their regional name (e.g., “Wilayat Halab”—Aleppo Province, Syria).

**Table 1: Total Propaganda Produced by Islamic State (2016)**

Origin	Amount Published	Percent of Total	Average Output Per Week
Central Media Office	94	23%	1.6
Affiliate/Regional Media Offices	317	77%	5.3
<b>Total IS Propaganda</b>	<b>412</b>	<b>100%</b>	<b>6.9</b>

Note: Table includes propaganda produced in the last four weeks of 2015 and the first four weeks of 2017. One recorded piece of propaganda was “unknown” – not labeled with the regional IS propaganda office or with the central media office.

Figure 1: Propaganda Releases by Islamic State and Its Affiliates (2016)



The database of propaganda used in this paper deliberately excludes all news bulletins, operational claims and photograph reports, which, while important, are not (and, indeed, cannot be) used for direct attack incitement or attack instruction. For that purpose, we deem them to be beyond the scope of this initial study. Future investigations could opt to factor these materials in. We include examples of the propaganda materials considered and not included for reference in Annex I.

*Leadership Statements*

In particular, IS’s Central Media Office released four leadership statements in audio form between the end of 2015 and the beginning of 2017 (see Table 2). They include two speeches by Abu Bakr al-Baghdadi, one speech by the former spokesman of the group Abu Mohamed al-Adnani (who was killed in August 2016), and another by his replacement Abu Hassan al-Muhajir.

Table 2: Audio Statements by Islamic State Leadership (2016)

Date Released	Type	IS Media Outlet	Title of Propaganda Release	Title of Speech
12/26/15	Audio Statement	Central	“Words from the voice of the Emir of the Believers, Sheikh Abu Bakr al-Baghdadi al-Qureishi, May God Keep Him”	“We Too, Will Wait With You”
05/21/16	Audio Statement	Central	“Words from the voice of the Sheikh of the Mujahid, Abu Mohamed al-Adnani the Syrian, May God Keep Him”	“That They Live By Proof”
11/02/16	Audio Statement	Central	“Presenting the words of our master, Emir of the Believers, Abu Bakr al-Husseini al-Qureishi al-Baghdadi, May God Keep Him”	“This is What Allah and His Messenger Promised Us”
12/05/16	Audio Statement	Central	“A Word from the Voice of the Official Spokesman of the Islamic State”	“You Will Remember What I Say To You”

Note: As per the time frame of the study, this table includes propaganda produced in the last four weeks of 2015.

The four speeches are long and contain a variety of messages pertaining to IS activities and possible targets for future operations. Two specifically incite violence in Europe, and the other two call for attacks more generally. One example of general incitement was Abu Bakr al-Baghdadi's December 2015 speech, where he explains that IS faces a "battle of the disbelievers altogether against the Muslims altogether, and indeed every Muslim is intended by this war." He exhorts IS supporters to "prepare yourselves for your war"; his remarks are general. [33] A more direct incitement to violence was Abu Mohamed al-Adnani's May 2016 speech, which called for IS supporters "make it...a month of suffering for the disbelievers everywhere; and we specifically direct this to soldiers and supports [sic] of the Caliphate in Europe and America." [34]

### *Attacks in Europe*

This study uses an original database of all completed, failed, and disrupted plots carried out by IS militants or supporters in Europe in 2016, compiled by the third author. [35] Potential plots were identified using keyword searches on the international news database ProQuest Factiva, as well as searches on other platforms such as Google. Each individual news item was reviewed to see if it met the threefold inclusion criteria. First, plots must have been executed or disrupted (i.e., the plotters arrested) in Europe in 2016. Second, in order to constitute a "plot," entries required evidence of a developed plan (e.g., selection of a target) or tangible preparations (e.g., purchase of a weapon) made towards executing a terrorist attack. This threshold was important to distinguish legitimate plots from the empty threats routinely seen amidst online discussion groups. Third, plots must have had a demonstrable connection with either IS or the group's ideology. Given that each plot was associated with specific individuals or a certain location, it was possible to guarantee that plots were not double-coded. The resulting database includes 34 plots (see *Annex II*).

While this database relies on open sources, it is possible that other plots from 2016—not yet publicly disclosed—may exist. Authorities could have observed a jihadist planning an attack, for example, only to arrest and charge them for another offense (e.g. for disseminating terrorist propaganda, or for an entirely non-jihadist related offense), without ever publicly disclosing details of the plot. Such scenarios are possible as prosecutors may have decided there was insufficient evidence to secure a successful conviction for attack planning, which in turn is influenced by the strength of a country's counterterrorism legislation or the authorities' risk threshold. A low-risk threshold, for instance, may mean police intervene in the early stages of a plot, even if that would forgo the evidence collection needed for an attack planning conviction, and thus what is publicly revealed during any trial.

We attempted to mitigate against missed examples of IS attack plots in Europe by cross-referencing our data with Europol's 2017 Terrorism Situation and Trend Report, which covers the year 2016 and includes plots disclosed by member states. [36] We also cross-referenced our results with two other open source databases: Petter Nesser's archive of jihadist plots and the Global Terrorism Database (GTD). [37]

Plots were disaggregated according to whether they were 1) *centrally directed*, involving attackers dispatched from IS territory, 2) *assisted*, with perpetrators receiving operational guidance from IS jihadists based abroad, or 3) *inspired*, carried out by individuals ideologically motivated by their support for IS or the group's ideology, but without an operational link to the group. The most important distinction for this study was between centrally directed and *non-centrally directed* plots, as IS would certainly know of the former ahead of time, and so could potentially adjust its propaganda output in anticipation of the plot materializing, whereas assisted or inspired plots would not be able to influence propaganda in this way.

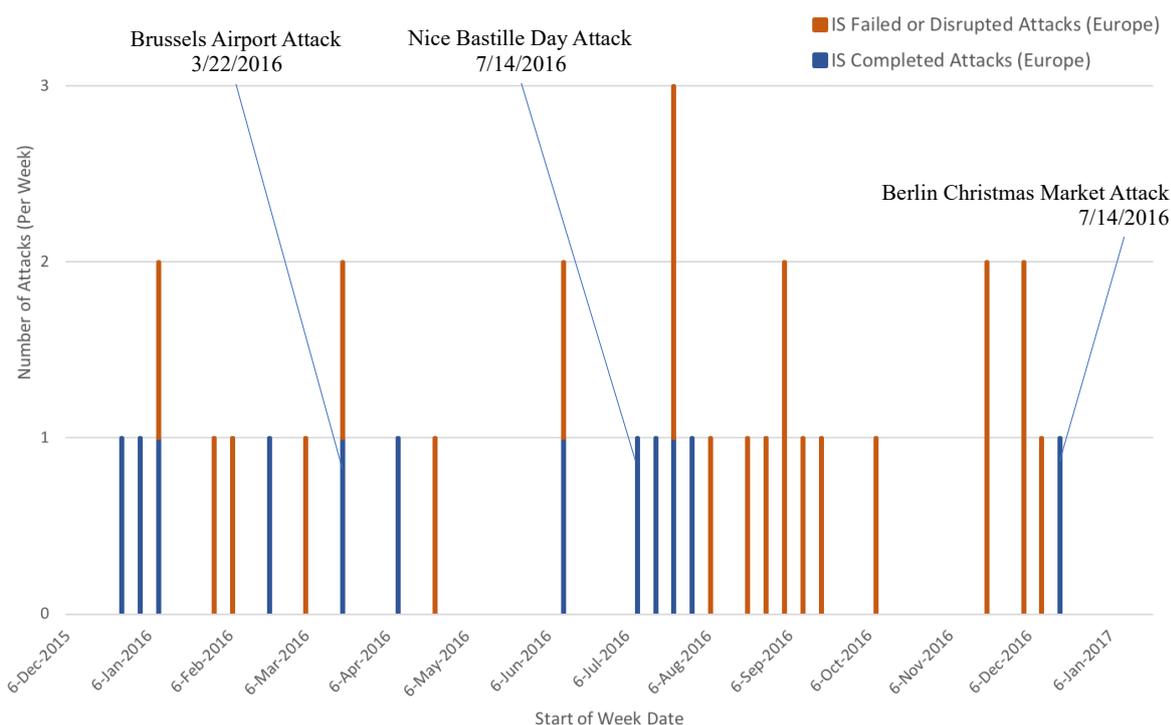
More than half of all attacks were "inspired," that is, perpetrated or attempted in Europe in 2016 with no known direct assistance from IS (see *Table 3*). Inspired attacks constituted the majority of IS attacks in Europe attacks from 2011-2015 as well. [38] The link between "inspired" and "assisted" is very fine, as several attacks involved perpetrators being in contact with IS jihadists based abroad, though the exact content of their messages is often unspecified. Where there is only evidence of contact involving incitement (e.g., "carry out an attack"), it was coded as "inspired," while if there was evidence of individualized and specific operational instructions (e.g., "attack the target from this entrance"), it would be classified as "assisted."

**Table 3: Islamic State Plots in Europe (2016)**

Outcome of Plots	Total Number	Percent of Total	Average Per Week
Completed	12	35%	0.20
Failed	5	15%	0.08
Disrupted	17	50%	0.28
Category of Plots	Total Number	Percent of Total	Average Per Week
Centrally Planned	3	9%	0.05
Assisted	9	26%	0.15
Inspired	19	56%	0.32
Unknown	3	9%	0.05
<b>Total IS Plots in Europe</b>	<b>34</b>	<b>100%</b>	<b>0.57</b>

Note: All 3 plots whose planners had unknown relationships to Islamic State’s central command were disrupted.

**Figure 2: Islamic State Plots in Europe by Outcome (2016)**



Only one-third of the 34 attacks in Europe in 2016 were completed. This shows how critical it is when assessing the breadth of a terrorist group’s efforts to not just include completed attacks but their myriad attempts as well. 17 of the attack plots were disrupted, meaning that law enforcement stopped the plotters before they could carry out the attack. Five attacks “failed,” meaning the attack stopped for some reason as it was being carried out (e.g., due to the mechanical failure of the bomb). On average there were between two and three attacks per month (see *Figure 2*).

*Attacks Worldwide*

To test whether this study’s findings were unique to Europe, we compared our database on propaganda output with all IS attacks worldwide as recorded by the Global Terrorism Database (GTD). The GTD attributed 2,121 attacks to IS and its affiliates worldwide in 2016.[39]

**Table 4: Islamic State Attacks Worldwide in 2016 (GTD)**

IS Group Responsible	Amount of Attacks	Percent of Total	Average per Week
Islamic State in Egypt/Sinai	175	8%	3.1
Islamic State of Iraq and the Levant (ISIL)	1578	74%	28.2
Khorasan Chapter of the Islamic State	117	6%	2.1
Tripoli Province of the Islamic State	193	9%	3.4
IS “Inspired” attacks	28	1%	0.5
Other IS Affiliates	30	1%	0.5
<b>Total IS Attacks Worldwide</b>	<b>2121</b>	<b>100%</b>	<b>35.4</b>

*Note: “IS Inspired” attacks were coded and attributed to IS from a wider set of attacks coded in the GTD as “Jihadi-Inspired Elements.” “Other IS Affiliates” included: Islamic State in Bangladesh; Islamic State in the Greater Sahara (ISGS); Lahij Province of the Islamic State; and the Najd Province of the Islamic State.*

As shown in Table 4, 74% of all attacks were attributed to the Islamic State of Iraq and the Levant (the core IS group). Meanwhile, 25% of all IS attacks were attributed to IS affiliates in other regions, and 1% of attacks recorded in the GTD were “Inspired.”[40] We should note that it is critical to include attacks carried out by IS affiliates and not only measure those carried out by IS central. This is because all attacks carried out by either IS or its affiliates are considered IS attacks for propaganda purposes.[41]

*Combining Databases for Analysis*

We combined the datasets above for analysis by transforming the date column for each attack or unit of recorded propaganda into a week number. Because we wanted to fully capture the effects for all activity during the year of 2016, we extended our counting for propaganda activities to start four weeks before 2016 and four weeks after. This generated 60 weeks of data.

In order to model whether propaganda shifted before an attack, we lagged each variable by four weeks. The reason for testing a four-week timeframe before and after an attack is that, in Europe, IS averaged two to three attacks per month (34 attacks in 12 months). Testing more than four weeks risks capturing propaganda shifts related to other attacks. But testing fewer than four weeks risks missing potentially key trends. Consider the example we introduced at the beginning of this paper: IS spokesman Mohamed al-Adnani called for attacks to occur during Ramadan on May 21, 2016. The attacks in Orlando and Magnanville would have been coded as occurring in the fourth week after the announcement took place (they took place 22 and 23 days after the message was released).

We lagged explanatory variables by four weeks by creating four new columns for each recorded instance (i.e., total IS propaganda) and taking  $X_{t-1}$  for that figure. This method allows us to test each week of the data

individually, rather than cumulatively (i.e., week two tests only results from week two, not the results of weeks one and two cumulatively).

Table 5 below shows how we structured the data to test lagged independent variables. Let’s consider, for example, that we wanted to measure the relationship between changes in propaganda *before* an attack. In the example below,  $Y_5$  would measure the number of IS attacks in the fifth week of our data. That fifth week of our data is the first full week of 2016 (January 3, 2016), because we lagged our data by four weeks in order to measure the full effects before the beginning of 2016. In this example, where we measure changes in propaganda before an attack, Columns B through F show IS propaganda output in the same week as the number of attacks in the first week of January 2016 (Column B), the week before (Column C), two weeks before (Column D), three weeks before (Column E), and four weeks before (Column F). This method does not group attacks or propaganda by month, but rather tests each week independently in succession

**Table 5: Modeling Lagged Independent Variables in Our Study**[42]

	Column A	Column B	Column C	Column D	Column E	Column F
	Y	X	X lagged 1 period	X lagged 2 periods	X lagged 3 periods	X lagged 4 periods
Row 1	$Y_5$	$X_5$	$X_4$	$X_3$	$X_2$	$X_1$
Row 2	$Y_6$	$X_6$	$X_5$	$X_4$	$X_3$	$X_2$
Row 3	$Y_7$	$X_7$	$X_6$	$X_5$	$X_4$	$X_3$
Row 4	$Y_8$	$X_8$	$X_7$	$X_6$	$X_5$	$X_4$
Row 5	$Y_9$	$X_9$	$X_8$	$X_7$	$X_6$	$X_5$
Row 6	$Y_{10}$	$X_{10}$	$X_9$	$X_8$	$X_7$	$X_6$

Using the data as in Table 5, our regression calculations are derived from the following equation.

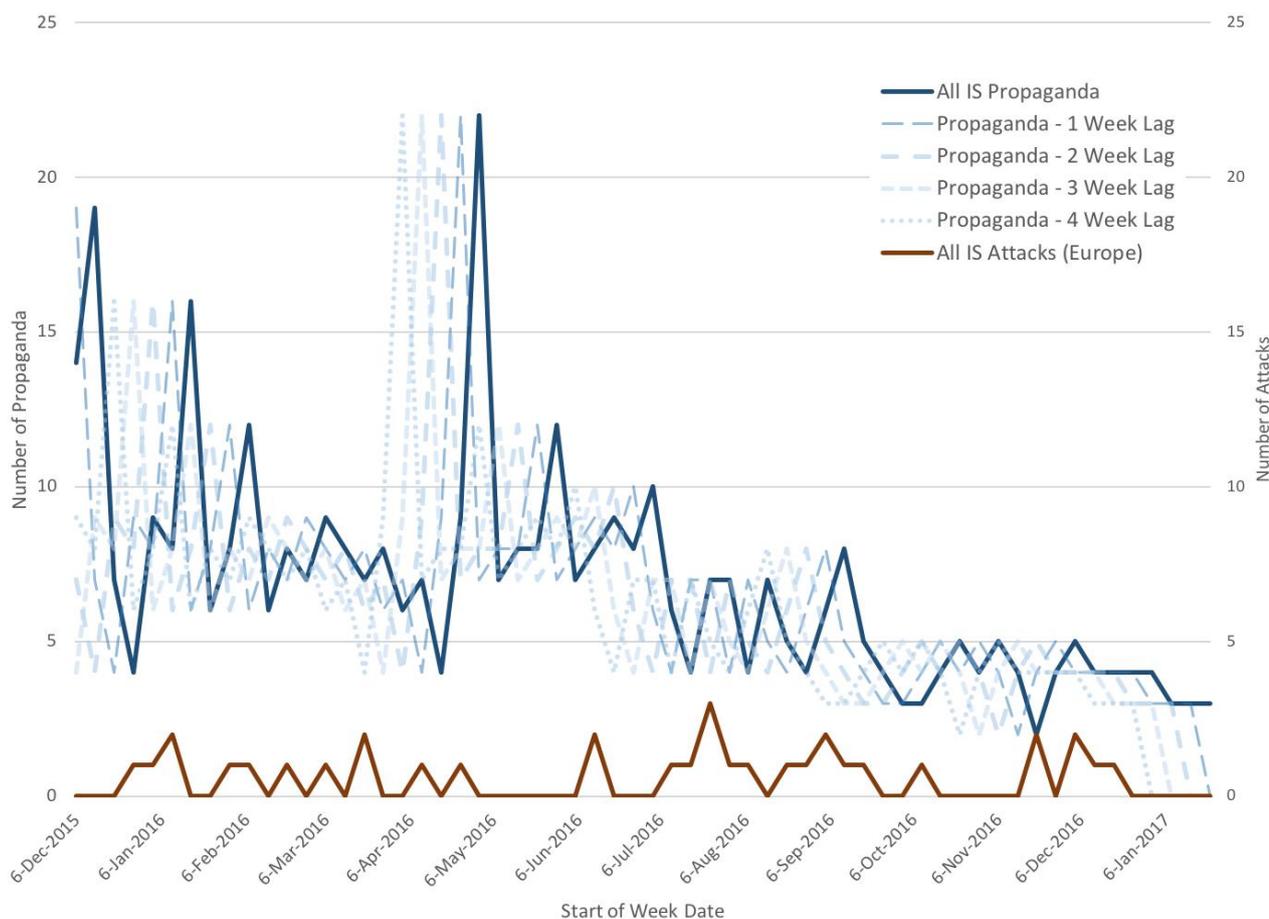
$$Y_t = \alpha + \beta_0 X_t + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \beta_3 X_{t-3} + \beta_4 X_{t-4} + \epsilon_t$$

In order to measure propaganda shifts preceding an attack, we ran regressions where the *propaganda* results are the independent variables and they are lagged back up to four weeks ( $X_1 \dots X_{t-4}$ ) preceding an attack ( $Y$ ).

To measure shifts in propaganda output *following* an attack, we ran regressions where the *attack* results were the independent variables and they were lagged back up to four weeks preceding a specified week of propaganda output. In effect, this models propaganda shifts after an attack: when we shift the attack each week, it appears as though the propaganda is being released a week later. An example of propaganda lagged behind an attack to measure shifts in propaganda before an attack is modeled visually below (see *Figure 3*).

We analyzed these data using a negative binomial model or a traditional logistic regression in instances where our dependent variable was binary. We used a negative binomial regression in the analysis of the GTD data and when propaganda is the dependent variable. This is because 1) the results of the dependent variable were more than 1 or 0, and both variables (the propaganda and GTD attacks data) violated the requirement in Poisson models that the variance should equal the expected value. The variance for both variables exhibits considerable over-dispersion, meaning that it exceeds the expected number of occurrences. We used a traditional logistic regression to model instances where our dependent variable included attacks in Europe, because these dependent variables were mostly binomial. We transformed the number of attacks in Europe (34) into a binomial variable for the 60 weeks analyzed.

Figure 3: Islamic State Attacks in Europe Compared to IS Propaganda Releases (2016)



The regressions shown in the “Results” section combine the time lags for each independent variable into the same regression (i.e., all propaganda output at  $t_0$ ,  $t_{-1}$ ,  $t_{-2}$ ,  $t_{-3}$ , and  $t_{-4}$ ). Each variable’s time lag was also calculated independently of other time periods, although this is not shown.

**Results**

This section reviews the results of our regression analysis in two parts: the first covers whether there were discernible shifts in propaganda output *before* an attack in Europe, or if there was a regular increase in violence following a leadership statement. The second part covers whether there were discernible shifts in IS propaganda output *after* an attack in Europe.

*Islamic State Propaganda Patterns Before Attacks in Europe*

This section examines whether the amount of IS propaganda rises or declines in a systematic way *before* an attack took place in Europe (see Table 6). It shows the relationship between propaganda and three different breakdowns of attacks in Europe: 1) all attacks in Europe (combining completed, failed and disrupted); 2) only completed attacks; and 3) only failed or disrupted attacks. We test how four different types of IS propaganda behaved before those three attack types: 1) all IS propaganda (combining central and regional media offices); 2) the Central Media Office of IS; 3) the regional “affiliates” propaganda; and 4) leadership statements.

**Table 6: Does Islamic State Propaganda Precede Attacks in Europe (2016)?**

Ind. Variable	Dep. Variable	<i>Propaganda released...</i>				
		Same week	1 week before	2 weeks before	3 weeks before	4 weeks before
All IS Propaganda	All attacks	-0.119 (0.09)	-0.188 (0.09)*	-0.018 (0.09)	0.018 (0.08)	0.072 (0.08)
Central IS Propaganda	All attacks	-0.057 (0.15)	-0.089 (0.15)	0.091 (0.14)	-0.096 (0.15)	-0.122 (0.15)
IS Affiliates Propaganda	All attacks	-0.158 (0.11)	-0.218 (0.11)	-0.055 (0.11)	0.049 (0.11)	-0.126 (0.10)
Leadership Statements	All attacks	0.010 (0.78)	-0.420 (0.83)	-0.144 (0.81)	0.714 (0.66)	-0.230 (0.79)
All IS Propaganda	Completed attacks	-0.033 (0.16)	-0.161 (0.16)	0.225 (0.15)	0.163 (0.15)	0.225 (0.15)
Central IS Propaganda	Completed attacks	-0.105 (0.71)	-0.217 (0.29)	0.158 (0.27)	-0.203 (0.29)	0.078 (0.28)
IS Affiliates Propaganda	Completed attacks	-0.020 (0.20)	-0.151 (0.20)	0.245 (0.19)	0.252 (0.19)	0.258 (0.19)
Leadership Statements	Completed attacks	-17.67 (2909)	0.640 (1.33)	1.704 (1.19)	-0.720 (1.68)	0.274 (1.50)
All IS Propaganda	Failed/disrupted attacks	-0.138 (0.11)	-0.230 (0.11)*	-0.138 (0.11)	-0.089 (0.10)	0.030 (0.010)
Central IS Propaganda	Failed/disrupted attacks	0.001 (0.17)	-0.028 (0.18)	0.096 (0.18)	-0.084 (0.18)	-0.176 (0.19)
IS Affiliates Propaganda	Failed/disrupted attacks	-0.210 (0.13)	-0.293 (0.14)*	-0.216 (0.13)	-0.085 (0.13)	0.086 (0.12)
Leadership Statements	Failed/disrupted attacks	1.143 (1.04)	-0.574 (1.04)	-17.93 (3275)	1.18 (0.83)	-0.112 (1.16)

Note: Robust standard errors in parenthesis. \*  $p < .05$  (two-tailed). \*\*  $p < .01$  (two-tailed). \*\*\*  $p < .001$  (two-tailed). Intercepts not shown.

Two key conclusions emerge: the first, following our expectations, is that IS leadership statements have no regular and consistent impact on whether or not attacks occur in Europe within a month before they are released. The second conclusion is that, in general, there are no patterns to the volume of propaganda output before an attack. This means a rise in the volume of IS propaganda of any kind did not signal an increased likelihood in an IS attack in Europe. This suggests that, in general, measuring propaganda simply by its volume will not help us anticipate whether a terrorist attack is more likely.

#### *Islamic State Propaganda Patterns After Attacks in Europe*

This section examines whether the amount of IS propaganda rises or declines in a systematic way *after* an attack occurs or is disrupted in Europe (see *Table 7*).

**Table 7: Does Islamic State Propaganda Follow Attacks in Europe (2016)?**

Ind. Variable	Dep. Variable	<i>Propaganda released</i>				
		Same week	1 week after	2 weeks after	3 weeks after	4 weeks after
All IS Propaganda	<i>All attacks</i>	-0.077 (0.08)	0.108 (0.05)*	-0.041 (0.08)	0.071 (0.05)	-0.214 (0.11)
Central IS Propaganda	<i>All attacks</i>	-0.023 (0.21)	-0.484 (0.24)*	0.082 (0.21)	0.115 (0.22)	-0.021 (0.21)
IS Affiliates Propaganda	<i>All attacks</i>	-0.070 (0.075)	0.100 (0.043)*	-0.049 (0.075)	0.049 (0.048)	-0.173 (0.11)
Leadership Statements	<i>All attacks</i>	-0.388 (0.73)	-18.99 (4713)	-0.388 (0.73)	-0.100 (0.73)	-18.99 (5442)
All IS Propaganda	Completed attacks	-0.121 (0.14)	0.071 (0.11)	0.074 (0.11)	0.281 (0.14)*	-0.221 (0.20)
Central IS Propaganda	Completed attacks	-0.532 (0.46)	-0.598 (0.52)	0.886 (0.44)*	0.403 (0.43)	0.099 (0.43)
IS Affiliates Propaganda	Completed attacks	-0.086 (0.13)	0.086 (0.10)	0.041 (0.11)	0.257 (0.13)	-0.172 (0.19)
Leadership Statements	Completed attacks	-18.79 (5377)	-18.79 (5377)	-18.79 (5377)	-18.79 (6209)	-18.79 (6209)
All IS Propaganda	Failed/disrupted attacks	-0.104 (0.14)	0.289 (0.13)*	-0.212 (0.18)	0.030 (0.12)	-0.337 (0.22)
Central IS Propaganda	Failed/disrupted attacks	-0.090 (0.37)	-0.512 (0.40)	-0.215 (0.38)	-0.043 (0.38)	-0.156 (0.38)
IS Affiliates Propaganda	Failed/disrupted attacks	-0.093 (0.14)	0.289 (0.13)*	-0.178 (0.16)	-0.021 (0.12)	-0.302 (.20)
Leadership Statements	Failed/disrupted attacks	-0.539 (0.34)	-17.03 (1978)	-0.056 (1.20)	1.232 (1.27)	-17.03 (2284)

Note: Robust standard errors in parenthesis. \*  $p < .05$  (two-tailed). \*\*  $p < .01$  (two-tailed). \*\*\*  $p < .001$  (two-tailed). Intercepts not shown.

There are few patterns to the output of propaganda following an attack. However, it is clear there is a difference between IS’s central and regional media offices. IS’s Central Media Office, for example, reduces propaganda output one week after all attacks in Europe, but increases it two weeks after a completed attack. Meanwhile, its affiliates *increased* their propaganda output in the week after all attacks and, in particular, after failed or disrupted attacks. Yet for attacks that were completed in Europe, IS’s regional media did not have a clear, statistically significant response. IS’s Central Media Office produced an increase in its propaganda two weeks later.

The most likely explanation for these differences is that it is coincidental. IS central and regional media outlets generally focus only on reporting what happens in their specific region. Moreover, the difference between IS’s central and regional propaganda output after all attacks in Europe appears at least partially driven by the fact that regional media increases in the week following a failed or disrupted attack in Europe. It could be that regional media increases its output immediately after failed attacks in order to shift attention away from a perceived failure in Europe. Yet it is unclear why the Central Media Office would not do so as well.

*Comparing Islamic State Propaganda with Islamic State Attacks Worldwide*

As a check on the generalizability of our results, we compare our findings relating IS propaganda and attacks in Europe with a test of how IS propaganda shifts related to IS attacks worldwide as measured by the Global Terrorism Database.[43] We tested propaganda released before and after IS attacks that were attributed to the central group, coded in the GTD database as the “Islamic State of Iraq and the Levant” (ISIL). We also tested propaganda released before and after all attacks the GTD attributes not just to “ISIL” but also its affiliates.

These results did not contradict the evidence presented above; there were few statistically significant relationships. IS propaganda does not exhibit any considerable shifts before or after increases or declines in

the rate of IS attacks globally. For reference, regression tables showing these results can be found in Annex III.

## **Discussion**

This section will offer two main conclusions and discuss the possible mechanisms involved. The second half of this section will review the limitations of this study and make recommendations for future research.

Before reviewing the two main conclusions, it is important to emphasize two points: first, that our study is seeking patterns in behavior that might be identified by a quantitative analysis of IS attacks and propaganda. Holbrook, for example, examined propaganda consumed by UK attackers to determine what types of propaganda were most influential among those arrested for planning or carrying out an attack in the UK.[44] Our study is not looking at the *influence* of propaganda as much as it is asking whether there are regular, identifiable shifts in the *patterns* of propaganda IS releases before or after an attack. That means, for example, that our findings are not predicated on the idea that if propaganda rises three weeks after an attack, it must somehow relate to that attack. IS could release seemingly unrelated propaganda after a major attack, for example, in order to take advantage of increased attention on the group (i.e., they could release material on what life is like in the Caliphate to attract potential recruits).

Second, our analysis of the relationship between propaganda and attacks is deliberately simple to demonstrate that the relationship between the propaganda terrorist groups release and the attacks they carry out is extremely complex. These preliminary results, therefore, might be more accurately thought of as leads for future research rather than conclusions. The authors plan to publish follow-up research that asks more specific questions about the relationship between propaganda and attacks. This is described in the future research portion of the end of this section. We also hope that others will be inspired (or irritated) by our work to either confirm its findings or disprove them. Either way, we hope to initiate a more informed, evidence-based discussion of how attacks and propaganda output relate to each other.

*Result 1: There is no predictable pattern in how much propaganda is released by IS before it carries out terror attacks.*

Our results yielded no statistically significant patterns between IS releasing propaganda before an attack. In particular, IS attacks are not more likely to occur after their leaders release rare public statements. With a slight exception explored in Result 2, our findings are set against a broader result: the general lack of statistically significant relationships between attack occurrences and propaganda releases.

One explanation for this apparent lack of significance is that we needed to more carefully disaggregate the data. The data are extremely heterogeneous, even when we disaggregate propaganda sources and attack types. Even a statistically significant trend could therefore lack a real relationship. Moreover, there could be a relationship between propaganda and attacks that we miss due to a lack of statistical significance. More exploration of how to better disaggregate attack and propaganda data might be required.

A second explanation could be that there may not be clear patterns to discover even if we more carefully refine and disaggregate our variables in future research. The general lack of statistically significant relationships may be because there are too many intervening factors that make it hard to uncover a clear and consistent pattern of behavior. Some of the myriad reasons impeding propaganda and attack patterns include a disruption in the medium for propaganda distribution, the death of someone in the media office, loss of records, unexpectedly failed attacks, or shifts in leadership.

A third possible explanation is that IS may be deliberately avoiding propaganda patterns before and after its attacks. For example, in January 2016, IS published a video in which each of the November 2015 Paris attackers were shown executing prisoners while they were still inside Syria—at least six months before they carried out the attack in France.[45] The video was proof of a connection between IS's central media office and those responsible for attack planning (something that has since been further evidenced in recent research by

the second author), yet it was not released until months after the attack.[46] If IS's central media office had foreknowledge of the 2015 Paris attack, then it is conceivable that it had foreknowledge of other such attacks such as the Brussels bombing of March 2016.[47] Thus, it could have prepared pre- and post-attack propaganda campaigns in advance rather than reacting to them.

Fourth and finally, these results might simply demonstrate that larger sample sizes are more likely to yield statistically significant relationships than smaller ones. Therefore, there may be no substantive difference between our general relationships and our more specific ones, and the former may be a case of false positives or statistically significant results without a significant relationship.

*Result 2: There may be a difference in how Islamic State's central and regional media offices respond to attacks after they occur.*

One surprising result from our paper is the extent to which IS's Central Media Office differs from the behaviors of IS's regional affiliate media offices. This difference manifested itself in slightly divergent responses to IS's attacks carried out in Europe: IS's central media produced more propaganda two weeks after a successful attack in Europe, but its propaganda declined in the week following news of any attack, whether IS carried it out or whether it was disrupted by law enforcement. Meanwhile, IS's regional media offices produced more propaganda one week after a failed or disrupted attack in Europe but did not have a clear response after a completed attack.

That regional and central media offices have different reactions to attacks IS carried out in Europe in 2016 would be a surprising finding. It could be because regional offices produce more content and have less of an obligation for regular reporting (i.e., radio bulletins) than the central media office does. This would allow them to react to news faster, possibly explaining why they had a statistically significant positive response to all attacks (successful or not) carried out in Europe the week after they occurred. Meanwhile, IS Central Media's output declined the week after news of an attack (completed or not) in Europe yet increased two weeks after (completed) attacks in Europe.

But the difference in propaganda output by IS's central and regional media offices as they relate to attacks in Europe is more likely to be coincidental. Each office focuses on its own regional activities. Moreover, IS's central office decides when to publish regional propaganda. The regional media offices (e.g., those in Libya) produce the propaganda material and send it to those operating the IS telegram channel, who then release it. Moreover, by 2016, there was more centralized control over propaganda dissemination, and this has only grown over time.[48] Yet the results show that the publication of IS central media propaganda is not at all related to when IS regional affiliate material gets published, suggesting these materials are for different audiences and focus on different priorities.

One caveat to these results is that the model may be, overall, more conservative in estimating the positive effects of events on propaganda output. There were more attacks in the second half of 2016: 59%, or 20 out of the 34 attacks, occurred in the final 6 months of 2016. But there were fewer pieces of propaganda released in the second half of 2016: on average, IS released 9 pieces of propaganda per week in the first half of 2016, while releasing only 5 per week in the second half of 2016. These changes would matter because the residuals associated with the *beta* estimate would be related to the average dataset as a whole, which would be higher than average in the first half of 2016 and lower than average in the second half. This would 1) increase the variance, potentially resulting in fewer statistically significant results in the regressions. It also might 2) bias the estimates against showing that, for example, increases in propaganda were positively correlated to increases in attacks. Therefore, we would caution that there may exist false negatives or that there may be an effect in the data that is not noticed due to the model. But that these effects are modest in size.

#### *Recommendations for Future Research*

This paper underscores the complex relationship between propaganda activity and attack incidence. It is not simply a case of identifying a linear relationship between propaganda and action, as is often expected of

terrorism analysts, particularly those in the media spotlight.

That said, there are three general limitations to this exploratory study. Since this paper should be seen as part of a program of research attempting to uncover patterns between IS propaganda releases and attack occurrences, these limitations are presented as future research opportunities—and not necessarily flaws—that we either plan to explore or encourage others to pursue in our stead.

First, this paper's propaganda and attack variables could be improved through further disaggregation. Variables on propaganda could be divided into certain categories: educational videos are likely to be produced outside of the scope of planned attacks, while explicit calls to arms might be more likely to pre-date attacks. A future study would focus solely on videos, magazines and audio statements that expressly called for terrorist attacks outside the caliphate and determine if they specifically had an impact on the rate of attacks. For attacks, it is critical to separate the different types, their targets, the level of their impact (i.e., number of people killed, level of symbolism, amount of media attention), and compare these results to whether they are inspired, planned, or partially directed by IS. Furthermore, coding the start date of a plot would also be a useful variable, allowing us to reduce our dependence on the disruption date of a plot, which is influenced by myriad other factors such as authorities' risk-threshold or law enforcement competence. The third author intends to expand the database on attacks in Europe to cover adjacent years (i.e., 2015, 2017), thus expanding the sample size. We believe this will be particularly important for leadership statements.

Second, in addition to variable specification, our paper could make a better account of time. Our paper was somewhat time-inflexible: it only measured responses to attacks or propaganda releases no more than three weeks after they had occurred. But, as we have seen with the case of the November 2015 Paris attacks, related propaganda can be released many months after the attack occurs. One way to design a future study to address this would be to review how different types of attacks or propaganda releases relate to each other with regards to their timing. A time series analysis, for example, would help us determine (and control for) whether the occasion of a certain incident makes future incidents more or less likely. Does a stabbing attack, for example, increase the likelihood that future attacks involve stabbings? And, if so, to what degree is that likelihood increased? Such analysis may allow a nuanced examination of what appear to be “copy-cat” attack plots, which mimic the modus operandi of earlier attacks.

Third and finally, we must acknowledge that measuring the *amount* of output (attacks or propaganda) is a poor or at least incomplete proxy for understanding terrorist attacks or the impact of terrorist group messages. The fact that researchers have found that views of a video called the “Black Flags of Khorasan” spike before an attack occurs shows that not all pieces of propaganda are made equal.[49] However, our study, which counts the *number* of attacks or pieces of propaganda, assumes they are equal. To be fair, this is not an uncommon problem: most research on protests, for example, measures them by counting their number rather than their size.[50] Nevertheless, our study would benefit from a more nuanced analysis of the outputs we consider. A follow-up paper might measure not only the output of propaganda but also its reach and popularity. Then, our analysis of the relationship between attacks and propaganda would give greater weight to larger attacks or more popular propaganda material, rather than treating each piece equally.

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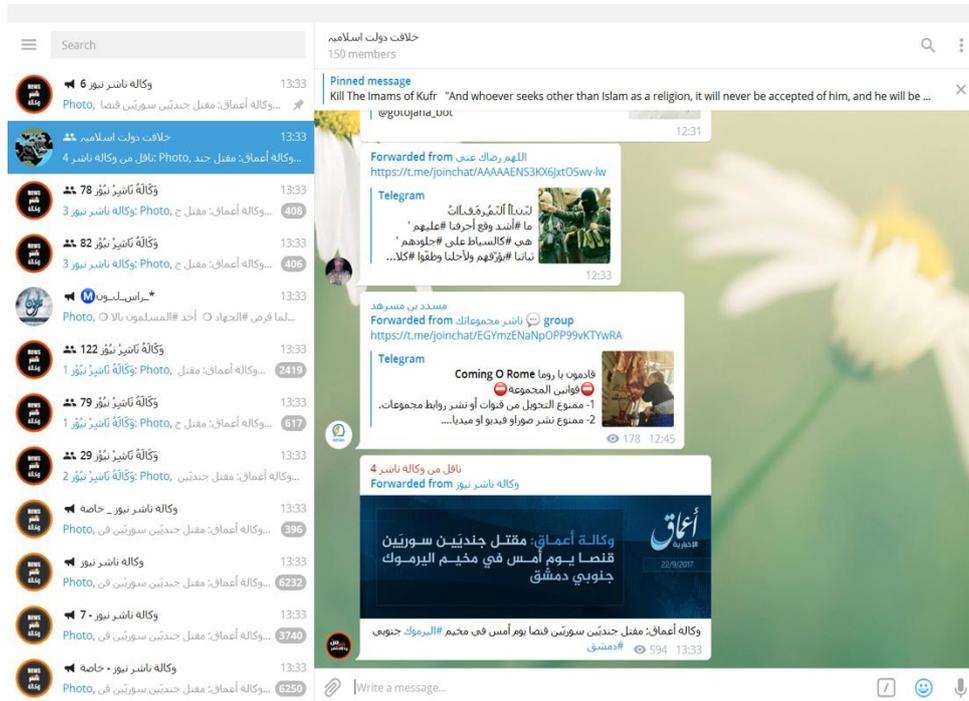
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**Annex I: Images of IS Propaganda Included and Not Included**

Annex I: Figure 1. Telegram feed including official IS propaganda



Annex I: Figure 2. Example of IS Propaganda Included in Coding



Announcement regarding the church attack in Normandy, France on July 25, 2016

Annex I: Figure 3. Example of IS Propaganda Not Included in Coding



Announcement about an attack on Diffa airport in Nigeria (March 15, 2019)

**Annex II: Attack Plots Recorded in Europe (2016)**

#	Date of attack or disruption	Plot Name	Country	Outcome	Category
1	01/01/16	Valence vehicle ramming	France	Completed	Inspired
2	01/07/16	Paris police station stabbing	France	Completed	Inspired
3	01/11/16	Franco-Hebraic Institute machete attack	France	Completed	Inspired
4	01/13/16	Kundby plot	Denmark	Disrupted	Inspired
5	02/05/16	Hanover attack	Germany	Failed	Inspired
6	02/08/16	Aydin Sevigin arrested	Sweden	Disrupted	Inspired
7	02/26/16	Hanover stabbing	Germany	Completed	Assisted
8	03/09/16	Unnamed 22-year-old arrested	Italy	Disrupted	Inspired
9	03/22/16	Brussels bombings	Belgium	Completed	Centrally Planned
10	03/25/16	Reda Kriket arrested	France	Disrupted	Centrally Planned
11	04/16/16	Essen Gurdwara bombing	Germany	Completed	Inspired
12	04/28/16	Vatican plot	Italy	Disrupted	Assisted
13	06/13/16	Carcassonne plot	France	Disrupted	Inspired
14	06/13/16	Magnanville stabbings	France	Completed	Inspired
15	07/14/16	Nice Bastille Day vehicle ramming	France	Completed	Inspired
16	07/18/16	Würzburg train attack	Germany	Completed	Inspired
17	07/24/16	Ansbach bombing	Germany	Failed	Inspired
18	07/26/16	Normandy church attack	France	Completed	Inspired
19	07/29/16	Casteau plot	Belgium	Disrupted	Assisted
20	08/06/16	Charleroi police stabbings	Belgium	Completed	Inspired
21	08/09/16	Gare du Lyon plot	France	Disrupted	Assisted
22	08/26/16	“Three musketeers” plot	United Kingdom	Disrupted	Inspired
23	09/03/16	Notre-Dame explosives attack	France	Failed	Assisted
24	09/08/16	Haroon Ali Syed plot	United Kingdom	Disrupted	Unknown
25	09/10/16	15-year-old boy arrested	France	Disrupted	Assisted
26	09/13/16	Schleswig-Holstein sleeper cell plot	Germany	Disrupted	Centrally Planned
27	09/22/16	16-year-old Mohamed J. plot	Germany	Disrupted	Assisted
28	10/10/16	Chemnitz plot	Germany	Disrupted	Unknown
29	11/20/16	Copenhagen plot	Denmark	Disrupted	Assisted
30	11/26/16	Ludwigshafen bombing (first attempt)	Germany	Failed	Inspired
31	12/05/16	Ludwigshafen bombing (second attempt)	Germany	Failed	Inspired
32	12/07/16	Jaoud A. arrested	Netherlands	Disrupted	Unknown
33	12/12/16	Munir Mohammed and Rowaida El-Hassan arrested	United Kingdom	Disrupted	Assisted
34	12/19/16	Berlin Christmas market attack	Germany	Completed	Inspired

**Annex III: Regression Results for Islamic State Propaganda and Worldwide Attacks (Attacks Recorded by the Global Terrorism Database).**

**Does Islamic State Propaganda Precede Islamic State Attacks Worldwide (2016)?**

Variable	Propaganda released...				
	Same week	1 week before	2 weeks before	3 weeks before	4 weeks before
<i>For all IS attacks and IS affiliates</i>					
All IS Propaganda	0.002 (0.01)	0.010 (0.01)	-0.005 (0.01)	0.003 (0.01)	-0.001 (0.01)
Central IS Propaganda	0.010 (0.01)	-0.006 (0.01)	0.011 (0.01)	-0.005 (0.01)	0.004 (0.01)
IS Affiliates Propaganda	-0.004 (0.01)	0.014 (0.01)	-0.009 (0.01)	-0.006 (0.01)	-0.002 (0.01)
Leadership Statements	0.007 (0.06)	-0.0402 (0.07)	0.028 (0.06)	0.033 (0.05)	-0.013 (0.05)
<i>For IS attacks only (coded in GTD as "ISIL")</i>					
All IS Propaganda	0.004 (0.01)	0.005 (0.01)	-0.005 (0.01)	-0.001 (0.01)	-0.003 (0.01)
Central IS Propaganda	0.009 (0.01)	-0.002 (0.01)	0.006 (0.01)	-0.001 (0.01)	0.003 (0.01)
IS Affiliates Propaganda	0.002 (0.01)	0.007 (0.01)	-0.007 (0.01)	0.000 (0.01)	-0.005 (0.01)
Leadership Statements	0.009 (0.07)	0.000 (0.07)	0.036 (0.07)	0.072 (0.07)	-0.048 (0.07)

Note: Robust standard errors in parenthesis. \*  $p < .05$  (two-tailed). \*\*  $p < .01$  (two-tailed). \*\*\*  $p < .001$  (two-tailed). Intercepts not shown.

**Does Islamic State Propaganda Follow Islamic State Attacks Worldwide (2016)?**

Variable	Propaganda released...				
	Same week	1 week after	2 weeks after	3 weeks after	4 weeks after
<i>For all IS attacks and IS affiliates</i>					
All IS Propaganda	0.003 (0.01)	0.007 (0.01)	0.006 (0.01)	0.017 (0.01)	0.008 (0.01)
Central IS Propaganda	0.028 (0.05)	0.043 (0.05)	0.097 (0.05)*	0.072 (0.05)	-0.027 (0.05)
IS Affiliates Propaganda	0.000 (0.01)	0.014 (0.01)	-0.009 (0.01)	0.006 (0.01)	-0.002 (0.01)
Leadership Statements	0.005 (0.16)	0.245 (0.16)	0.122 (0.16)	-0.005 (0.18)	-0.088 (0.19)
<i>For IS attacks only (coded in GTD as "ISIL")</i>					
All IS Propaganda	-0.001 (0.01)	0.006 (0.01)	-0.002 (0.01)	0.018 (0.01)	0.007 (0.02)
Central IS Propaganda	0.013 (0.05)	0.052 (0.05)	0.104 (0.05)*	0.101 (0.05)	-0.051 (0.05)
IS Affiliates Propaganda	0.002 (0.01)	0.007 (0.01)	-0.007 (0.01)	-0.001 (0.01)	-0.005 (0.01)
Leadership Statements	0.058 (0.17)	0.217 (0.17)	0.192 (0.17)	0.036 (0.20)	-0.074 (0.20)

Note: Robust standard errors in parenthesis. \*  $p < .05$  (two-tailed). \*\*  $p < .01$  (two-tailed). \*\*\*  $p < .001$  (two-tailed). Intercepts not shown.

## Notes

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- regional affiliates: “To the soldiers of the Khilafa in Khorasan [Afghanistan-Pakistan], Bengal, Indonesia, Qawqaz [Caucasus, Russia], the Philippines, Yemen, the Arabian Peninsula, Sinai, Egypt, Algeria, Tunisia, Libya, Somalia, and West Africa [Nigeria, i.e. Boko Haram]: Know that today, you are the supports of Islam and the pegs of the Khilafa in the earth.”
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