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Does Social Media Influence Conflict? Evidence from the 2012 Gaza Conflict

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Abstract

How does international public support via social media influence conflict dynamics? To answer this question, I construct a unique, extremely disaggregated data set drawn from social media sources to examine the behavior of Israel and Hamas during the 2012 Gaza Conflict. The data set contains conflict actions and international audience behavior at the hourly level for the full 179 hours of the conflict. Notably, I also include popular support for each side from international audiences on social media. I employ a Bayesian structural vector autoregression to measure how Israel's and Hamas's actions respond to shifts in international public support. The main finding is that shifts in public support reduce conflict intensity, particularly for Israel. This effect is greater than the effect of the key international actors—United States, Egypt, and United Nations. The results provide an important insight into how information technology is changing the role of international audiences in conflict.

Keywords

asymmetric conflict, diplomacy, Israeli–Palestinian conflict, terrorism, use of force

> The IDF has embarked on Operation Pillar of Defense.
>
> —*@IDFSpokesperson* 15:45, November 14, 2012

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> We recommend that no Hamas operatives, whether low level or senior leaders, show their faces above ground in the days ahead.
>
> —*@IDFSpokesperson* 18:22, November 14, 2012

> @IDFSpokesperson Our blessed hands will reach your leaders and soldiers wherever they are (You Opened Hell Gates on Yourselves).
>
> —*@AlQassamBrigade* 19:04, November 14, 2012

Historically, information technology advances have altered the path of conflict by changing the way leaders communicate to their armed forces and interested audiences monitor events (van Creveld 1989). Technology increases the speed and dissemination of information, allowing new audiences to follow the conflict, and express their (the audience's) support or dissatisfaction for different actors. For example, the widespread use of telegraph and mass newspaper coverage during the American Civil War allowed ordinary citizens to follow the news and casualty reports about the war at an unprecedented speed and intimate level (Hagerman 1992; Marten 2012). In turn, this information was able to sway public opinion on the war (Coopersmith 2006).[1] Taylor (1992) argues that the First Gulf War was unique in that it allowed for the first time journalists, such as CNN, to broadcast live images to worldwide television audiences from both the coalition forces' perspective and from the Iraqi side. He argues that this second war, the so-called media war between Saddam Hussein and the coalition forces, was almost as important as the war on the ground (1992, 8).

New technology provides new information to leaders and influences their strategies and constraints that are central to the bargaining models of international conflict (Fearon 1995, 1997). Previous research on audience costs and foreign policy public opinion argues that democratic leaders may be uniquely sensitive to shifts in domestic support (Mueller 1973; Fearon 1994). Yet, this research is agnostic on how international public support constrains (or enables) conflict.[2] Other research argues that states may be responsive to international public opinion and threats to their legitimacy due to international norms (Finnemore and Sikkink 1998) or as a way to lower the costs of favorable policy implementation in foreign constituencies (Thompson 2006). Given that many conflicts have transnational dimensions (Gleditsch 2007), the lack of research on the effects of international public support on conflict dynamics represents an important gap in the current literature.[3]

Most empirical studies of conflict examine the role of third-party actors only at the state level, and are focused on outcomes (Bercovitch and Sigmund Gartner 2006), and not the actual dynamics during fighting.[4] This results in a disconnect from the majority of theoretical work which explicitly describes the dynamic process of fighting and bargaining (Wagner 2000; Kydd 2003; Beardsley 2008). The

increasing use of social media[5] by states and the general public affords state (and nonstate) actors and leaders the ability to more quickly communicate to a wider audience and elicit feedback during the conflict. For researchers, it also provides a new source of data and insights on conflict behavior. I use social media sources to construct a disaggregated data set. I then use the data set to test for the first time (to my knowledge), how states respond to changes in international public support on social media vis-à-vis international mediators during conflict. The 2012 Gaza Conflict is an excellent case to explore this research question, as it marks one of the first conflicts where both actors (Hamas and Israel) extensively used social media to attempt to sway international opinion (Borger, 2012).[6]

On November 14, 2012, in the late afternoon, the Israeli Defense Forces (IDF) launched a series of airstrikes against Hamas targets in the Gaza Strip in response to increased rocket fire from the Gaza Strip. The fighting continued until a mediated ceasefire, brokered by Egypt and the United States (US), with United Nations (UN) oversight, took effect on November 21, 2012. The escalation of conflict mirrored past hostilities between Israel and Hamas (notably the 2008–2009 Gaza Conflict) with Israel launching airstrikes and Hamas responding with inaccurate rocket fire (Borger 2012). Yet, the extensive use of social media—specifically Twitter—by both sides in the 2012 Gaza Conflict was unprecedented. Twitter is a social media platform for rapid, public, and concise messages to be shared among networked followers (see https://twitter.com/about for more information). The IDF used its *@IDFSpokesperson* Twitter account to announced its campaign on Twitter (see previous excerpt),[7] and both the IDF and Hamas, via its *@AlQassamBrigade* also engaged each other over the social media (IDF Spokesperson 2012; Al Qassam Brigades 2012).[8] Each side used social media to attempt to put their own actions in a better context and denigrate the opposition. While the use of social media during the conflict is interesting, what is of greater interest to scholars of international relations, is what social media (and the data constructed from it) reveals about how actors' strategies are constrained (or not) by different audiences.

The current study improves upon extant studies of conflict and bargaining in the presence of international audiences in three ways. (1) I measure and incorporate both fighting and communication into the empirical models. (2) The use of social media to both track the conflict, and as a communication tool for the conflict participants, represents a new and important data source. I scraped data on Hamas and Israel conflict intensity toward each other from Haaretz (2012) and Al Jazeera (2012), news organizations that closely followed the fighting on the ground diplomatic efforts. I also used the Haaretz and Al Jazeera to code the interest of the principal international actors in the conflict: the US, the UN, and Egypt. Both Hamas (*@AlQassamBrigade*) and Israel (*@IDFSpokesperson*) used social media to communicate information and advocate for their actions to international audiences. This social media data afford the construction of extremely disaggregated data to better understand how the bargaining and fighting process unfold and how international actors directly influence it. (3) The most innovative part of this article is the use of

social media to create an hourly measure of public support during the conflict. Israel and Hamas made extensive use of hashtags, specific words, or phrases prefaced with the pound (#) symbol to categorize their messages,[9] to garner support for their actions, and let other Twitter users show their support by sharing these hashtags in their Twitter feeds. Far and away, the most prominent were the #GazaUnderAttack hashtag (support for Hamas) and the #IsraelUnderFire hashtag (support for Israel; Ashkenazi 2013). I collect data on mentions of these hashtag to construct an hourly measure of support for Hamas and Israel.

I then use a Bayesian structural vector autoregression (BSVAR; Brandt and Freeman 2006; Brandt, Colaresi, and Freeman 2008) to test how conflict participants respond to shifts in international mediators and public support. Three key findings emerge. (1) Both Hamas and Israel paid close attention to changes in their own public support. Hamas's and Israel's communication on social media responded contemporaneously to changes in support. (2) Increases (shocks)[10] in support for rival actors constrain each actor's conflict intensity. This is especially true for Israel, as increases in support for Hamas decrease their conflict intensity by approximately 177 percent. Comparatively, increases in the attention of the international mediators (the US, the UN, and Egypt), slightly increase both actors' conflict intensity. (3) While increases in public support for Hamas constrain Israel militarily, it actually increases the activity of its communication on social media. The results show how much more sensitive the conflict participants were—particularly Israel—to shifts in public support on social media compared to the international mediators. The results also provide new empirical and theoretical insight into how new technology is changing the information available to conflict participants and hence the trajectory of conflict. Qualitative information presented in the discussion and builds upon the BSVAR results and points to the increasing primacy played by social media as a tool for conflict, both in the Israel–Palestinian conflict, and other conflicts.

Further information on the data sources, methods, additional results, and robustness checks are presented in the Appendix and Online Supplementary Information.

Communication, Technology, and International Audiences

As many scholars have argued, war and bargaining are inherently intertwined (Powell 2004; Wagner 2000). This is even more true in limited conflicts in which neither side expects a total victory. For actor A, the goal in a limited conflict between actors A and B, in the presence of third-party mediators, is to use a combination of battlefield success and international pressure to arrive at the most favorable settlement for actor A (Bercovitch and Sigmund Gartner 2006). Previous research suggests that third-party actors may be able to constrain the behavior of conflict participants via mediation,[11] particularly when the mediators are allies to one of the actors (i.e., biased; Calvert 1985; Kydd 2003). Crucial to the success of mediation is the ability of third-parties to credibly convey information about the costs and benefits of continued fighting to conflict participants (Kydd 2003, 2006; Beardsley

2008).[12] In the event of an asymmetric conflict, where actor A is stronger than B, international actors may place more pressure on actor A to stop the conflict to avoid civilian casualties (Arreguín-Toft 2006; Gross 2009). This may particularly be the case when actor A has more connections to the international system (Keohane and Milner 1996; Zeitzoff 2011). Dixon (1994) suggests that democratic states are more likely to peacefully negotiate an end to disputes due to shared values and norms. Others argue that democracies are more constrained in the threats they make and the conflicts they enter due to reelection-seeking incentives (Fearon 1994; McGillivray and Smith 2008).

Most of the previous research in international relations on bargaining and fighting in the presence of international audiences has focused on states or leaders communicating to domestic audiences or other leaders and states (Fearon 1994). The role of popular support among international audiences, or concerned foreign policy elite, remains undertheorized in international conflict (Thompson 2006). Popular international public support is hypothesized to be a key component in many conflicts, especially since many conflicts contain diaspora, or transnational communities that provide support (materially and politically) to conflict participants (Salehyan 2009). This is especially true in the Israeli–Palestinian conflict, where international institutions, popular perceptions of legitimacy, and public diaspora communities have all played a crucial role in the conflict since its inception (Tessler 1994; Morris 2011). Weaker actors, or nonstate actors may use violence, and media coverage it engenders, to gain domestic and international support for their actions (especially if the targeted government cracks down in response; Weimann 2006; Bueno de Mesquita and Dickson 2007).

The ability for states to use social media has transformed the way in which concerned elites (from abroad) and diaspora communities can follow a conflict and apply pressure to actors. States and leaders have responded. Over 75 percent of world leaders have an active presence on Twitter (Twiplomacy 2013). Moreover, a growing body of research suggests that social media is upending the traditional political uses of media by (1) democratizing access to media sources, (2) speeding the dissemination of information, which in turn (3) can facilitate and spread collective action (Lance Bennett, Breunig, and Givens 2008; Gil de Zúñiga et al. 2010; Bond et al. 2012). Leaders, cognizant of this potential for collective action, may respond by restricting access to social media (King, Pan, and Roberts 2013). Furthermore, social media allows users to self-select their information sources.[13] For example, Barberá (2015) uses the fact that Twitter networks exhibit homophily—individuals follow those who they support and feel an affinity with—to estimate ideal points for the US members of congress and voters and shows that they reflect the underlying left–right dimension. Zeitzoff, Kelly, and Lotan (2015) map Twitter follower networks on the Israel–Iran nuclear issue and show that they reflect the pro-Israel versus pro-Iran/Palestinian cleavage, further demonstrating that online follower networks map onto meaningful policy positions. Yet, none of these studies have empirically examined the strategic interaction between support on social media and conflict actors.

Public Communication during the 2012 Gaza Conflict

The 2012 Gaza Conflict began on November 14 with an Israeli air strike that assassinated Ahmed al-Jabari, the second-in-command of Hamas's military wing. Much like the 2008–2009 Gaza Conflict, the Israeli air strikes and assassination of al-Jabari were reportedly in response to increased rocket fire from the Gaza (Kershner and Akram 2012). The fighting lasted for seven and a half days, during which Israel called up reservists and threatened a full-scale ground invasion of the Gaza Strip. Hamas and other Palestinian militant groups continued to fire rockets into Israel, reaching Tel Aviv and Jerusalem for the first time.

During the conflict, mediation efforts were undertaken in Cairo, Egypt. The US Secretary of State, Hillary Clinton, visited Cairo and met with Egyptian President Mohamed Morsi. Neither the US nor Egypt were impartial in their public statements. Egypt showed much stronger support for Hamas's actions and the US did the same for Israel (Kirkpatrick and Rudoren 2012). Since Hamas and Israel had no formal diplomatic relations with each other, indirect talks took place in Cairo between Hamas and Israeli officials, with Egyptian officials serving as the interlocutors (CNN Wire Staff 2012). The UN General Secretary, Ban Ki-moon, actively participated with Egyptian and the US officials in brokering the deal. As part of any ceasefire, Hamas demanded that border crossings be opened and the naval blockade lifted. Israel demanded an end to the rocket fire and also stricter measures to prevent further weapons being smuggled into Gaza. Eventually, on November 21, 2012, the US Secretary of State, Hillary Clinton, and Egyptian Foreign Minister, Mohamed Kamel Amr, held a joint news conference in which they announced that a ceasefire would take place at 21:00 Israel (Gaza) time. The ceasefire did not address the broader issues of the Israel–Hamas conflict but did result in a cessation of rocket fire into Israel and looser regulations on the land border crossings into Gaza. Egypt served as the guarantor of the ceasefire (BBC 2012).

The 2012 Gaza Conflict was one of the first conflicts in which both sides made extensive use of social media (particularly Twitter). Hamas and Israel's interactions during the conflict via English-language Twitter feeds led some pundits to dub it the first "Twitter War" (Sutter 2012). During the 2008–2009 Gaza Conflict, the IDF maintained an official blog, disseminated press briefings, and used other, more traditional media sources to justify its offensive (Zeitzoff 2011). The perception among critics of Israeli actions in the 2008–2009 Gaza Conflict was that the IDF disproportionately targeted Palestinian civilians—with the lopsided casualty numbers cited as evidence of the IDF disregard for civilians. To attempt to counter this perception, during the 2012 Gaza Conflict, the IDF Spokesperson Unit, the military unit responsible for media relations during both peace and war, was extremely active on its Twitter feed *@IDFSpokesperson*. It attempted to both put Hamas's actions in a negative context and place a positive spin on the IDF's actions (Shachtman and Beckhusen 2012). The *@IDFSpokesperson* tweeted messages justifying Israel's military offensive such as:

> What would you do if rockets were striking your country? RT[14] if you agree that #Israel has the right to self-defense—*12:40 November 16, 2012*.

The *@IDFSpokesperson* feed also described the process of targeting Hamas militants while also denigrating Hamas for hiding among civilians. For example:

> Hamas' (sic) strategy is simple: Use civilians as human shields. Fire rockets from residential areas. Store weapons in mosques. Hide in hospitals—*10:09 November 18, 2012*.

The *@IDFSpokesperson* feed was criticized for directly threatening Hamas with its tweets such as the following: "we recommend that no Hamas operatives, whether low level or senior leaders, show their faces above ground in the days ahead (*18:22 November 14, 2012*)." Avital Leibovich, the head of the IDF's Interactive New Media Branch, explained the role of such threats:

> When rockets are falling on our (Israelis') heads, and I'm referring to 500 rockets in the last 72 hours, if you can even imagine the extent (of it). Then when you have certain time (sic) that you want to convey a message of deterrence to an audience, then that's a good tool (Twitter/social media) to do it. (Hollister 2012)

The IDF actively sought to rally supporters via social media. It encouraged the use of the hashtag #IsraelUnderFire so that Twitter users show their support for Israel and its actions (Gustin 2012). During the 2012 Gaza Conflict, Hamas and Israel faced very different political and military constraints and objectives. Israel's goal was to conduct air strikes to both weaken Hamas and other militant groups' capabilities,[15] and exact a price for continued rocket attacks. Israel's military superiority actually placed it in a conundrum. As the stronger state, it had the ability to invade and physically control Gaza via a ground invasion. This potential ground invasion, while militarily feasible, was internationally unpopular as a result of the large number of casualties suffered in the 2008–2009 Gaza Conflict and Israel refrained from doing so.[16] Furthermore, the Israeli elections in February 2013 were three months away, factoring into the Israeli decision to avoid a possible costly—both in terms of casualties and international standing—ground invasion.[17] Israel's extensive use of its *@IDFSpokesperson* Twitter feed served three purposes. (1) It was in English, so the communication was likely directed at an elite, international audience.[18] The subject of the IDF's communication emphasized the Hamas rocket attacks and Israeli victimization and were further used to justify to an international audience Israel's military campaign. (2) Another strategic goal of the *@IDFSpokesperson* Twitter feed was to combat what it perceived as Hamas misinformation. As one member of the IDF Spokesperson Unit highlighted, "we intercepted 90% of their long-range rockets into Israel (via the "Iron Dome"[19]), but if they (Hamas) can manage to say (via Twitter) that they fire rockets until the very last day of the conflict that's a victory for them. Perceptions matter."[20] Trying to shape the conflict narrative (i.e., who was winning), not only influences the mainstream

media,[21] but also the perception of mediators. Finally, (3) the tweets also served to mobilize Israeli sympathizers in other foreign constituencies to pressure relevant external actors of the "justness" of Israeli military actions. Given the fact that many of the *@IDFSpokesperson* Twitter followers were supporters of Israel and the IDF actions,[22] they could target messages to these supporters. They also had the ability to monitor feedback on how the conflict was viewed by Hamas supporters via the frequency of the two hashtags. The IDF did in fact monitor the volume of support via the changes in the #GazaUnderAttack and #IsraelUnderFire hashtags and passed this information up the chain of command.[23]

Hamas also used its own Twitter feed *@AlQassamBrigade* throughout the conflict.[24] They tweeted about the victimization of Palestinian civilians by the IDF and bragged about their ability to hit Israeli targets with their rockets. For instance,

> @IDFSpokesperson Warning to Israelis: Stay away from Israeli #IDF = #IOF[25] and bases. IDF, a terrorist army, will use you as human shields—*00:28 November 21, 2012*

Other Hamas tweets emphasized the civilian casualties of Israel strikes:

> #Palestinian children killed by #Israeli air strikes on #Gaza Strip. #GazaUnderAttack #Palestine #IDF #IsraeliTerrorism—*21:00 November 19, 2012*.

The *@AlQassamBrigade* tweets directly engaged and threatened the *@IDFSpokesperson* Twitter feed:

> @IDFSpokesperson Bunch of liars, you killing Gaza civilians deliberately, so & for our role we Promise: 'Your Crimes Will Not Go Unpunished'—*22:14 November 19, 2012*.

Hamas's had two principal goals in the 2012 Gaza Conflict. (1) As the militarily weaker actor, they could not defeat Israel conventionally. Rather Hamas sought to make the costs, both militarily and in terms of international standing, of further military confrontation too high for Israel, and gain a more favorable settlement. Such a settlement would allow a greater range of goods to enter Gaza and help improve its struggling economy (Manna 2012). (2) Additionally, as the military confrontation also improved Hamas's domestic political support relative to Fatah, as Hamas was able to maintain its resistance mantra, and accuse Fatah of cooperating with the Israelis in the West Bank (McGreal 2012). The recent ascendancy of the Muslim Brotherhood in Egypt, an ideological ally, also presented Hamas with a more sympathetic neighbor than Egypt under Hosni Mubarak (Kirkpatrick and El Sheikh 2012). Hamas's extensive use of the *@AlQassamBrigade* Twitter feed during the conflict served two ends. (1) It used social media to both threaten Israel and demonstrate its resolve in the conflict. This would pressure mediators to negotiate a quick and more favorable settlement (toward Hamas) in order to avoid a lengthy protracted conflict. (2) Hamas's Twitter feed was also in English. They used the feed to emphasize Palestinian

victimization by the Israeli military. This would move international public opinion—particularly among sympathetic constituencies abroad—in favor of Hamas and also hasten a settlement to the dispute in their favor.

Hamas also promoted its own hashtag so that users could show their support by tweeting #GazaUnderAttack (Gordts 2012). Based on hashtag mentions of #IsraelUnderAttack (Israel) versus #GazaUnderAttack (Hamas), Hamas had more supporters on Twitter as compared to Israel (Ashkenazi 2013).

Data and Methods

Data

To understand how international public support and international mediators influenced the 2012 Gaza Conflict, I create nine variables that track key aspects of the conflict. Each variable is coded at the hourly level across the 179 hours of the conflict. The variables capture the attention of the mediators, actions and communication of the conflict participants, and levels of public support. The nine variables and their associated names (italicized within the parentheses) are given below.

- Hamas conflict intensity (*H2I*)
- Israel conflict intensity (*I2H*)
- *@IDFSpokesperson* aggressiveness (*IDF*)
- *@AlQassamBrigade* aggressiveness (*AQB*)
- UN attention (*UN*)
- Egyptian attention (*Egypt*)
- US attention (*US*)
- #GazaUnderAttack mentions (*#Gaza*)
- #IsraelUnderFire mentions (*#Israel*)

In order to measure and construct a data set *H2I* and *I2H*, and *UN*, *Egypt*, and *US* to the conflict, I used the Al Jazeera's *Gaza Crisis: Gaza Live Blog* (Al Jazeera 2012) and Haaretz's *Live Blog: Israel-Gaza Conflict 2012* Haaretz, which covered the conflict. Both of the live blogs extensively reported on each sides' actions during the conflict and the role of international actors. The conflict intensity variables (*H2I* and *I2H*) were constructed by looking at each relevant blog post and counting instances of Hamas's and or Israelis's verbal and material conflict toward each other. These conflict intensity scores were then aggregated for an hourly sum total conflict intensity for each actor. The mediator attention variables (*UN*, *Egypt*, and *US*) were also constructed from the live blogs (Al Jazeera 2012; Haaretz 2012). Each post that mentioned the *US*, *Egypt*, and or *UN* (or any of their leaders) was counted toward the relevant mediator attention and aggregated at the hourly level.

To measure Hamas's and Israel's communication on Twitter during the 179 hours of the conflict, I scraped the *@IDFSpokesperson* and *@AlQassamBrigade* Twitter feeds. Each tweet was then coded for whether it was hostile to other actor versus

emphasizing their own victimization status.[26] These coded tweets were then aggregated at the hourly level to create the *AQB* and *IDF* variables.

Finally, perhaps the most unique aspect of the 2012 Gaza Conflict was the use of competing hashtags by Hamas (#GazaUnderAttack) and Israel (#IsraelUnderFire) to let supporters signal their support for one of the sides (Borger 2012). I use this data to measure international support for Hamas and Israel. Previous research has used hashtag data to uncover clusters in Canadian politics (Small 2011) and polarization during the 2010 US midterm elections (Conover et al. 2011). The hashtag data were collected by searching the full Twitter firehose for mentions of #GazaUnderAttack and #IsraelUnderFire during the conflict. Individual tweet identification numbers[27] were recorded and then the Twitter application programming interface (API) was queried to put together a frequency count of mentions for each hashtag. These hashtag data were then aggregated at the hourly level to create the variables for international support for Hamas (*#Gaza*) and (*#Israel*).[28] Additional information about the coding of the data and robustness checks are presented in the Online Supplementary Information.

The coded data result in a nine-variable time series. Time series plots for each of the nine variables are shown in Figure 1.

Several of the time series variables have periods with multiple events occurring and many periods where nothing is happening (scored a 0), skewing the distribution of events across periods. This can be an issue with BSVAR models, since the time series variables are assumed to be approximately normal (Brandt and Freeman 2006). I use a log transformation on all time series (adding 0.1 to avoid taking the log of 0) to reduce the skew[29] and ease interpretation of the impulse response functions (IRFs).[30]

The time series plots also suggest that there may be daily seasonality in the data, reflecting increases in the values of the variables purely due to the time of day, and not an increase in the underlying dynamics. The daily fluctuations appear to be particularly prominent for the hashtag frequencies *#Gaza* and *#Israel* and possibly *AQB* and *H2I*. It is not surprising that hashtag volume may exhibit seasonality that reflects fluctuations in how many Twitter users are on during a given time of the day.[31] Yet, it might be an issue if the daily fluctuations in some of the variables masks the actual conflict dynamics. Given the strong theoretical and empirical evidence of regularized patterns in Twitter usage (Cheng, Evans, and Singh 2009), I model the *#Gaza* and *#Israel* hashtag variables as an additive time series with seasonal, trend, and random components (Kendall and Alan 1983). I then subtract out the daily seasonal components associated with time of day for the two Twitter hashtags time series variables (*#Gaza* and *#Israel*). For the other variables (*I2H, H2I, AQB, IDF, UN, US,* and *Egypt*), I do not remove the seasonality.[32]

The BSVAR Intuition

I use a BSVAR to model the complex dynamics between *I2H* and *H2I*, their communication on Twitter (*AQB* and *IDF*), international mediator attention (*US, Egypt,*

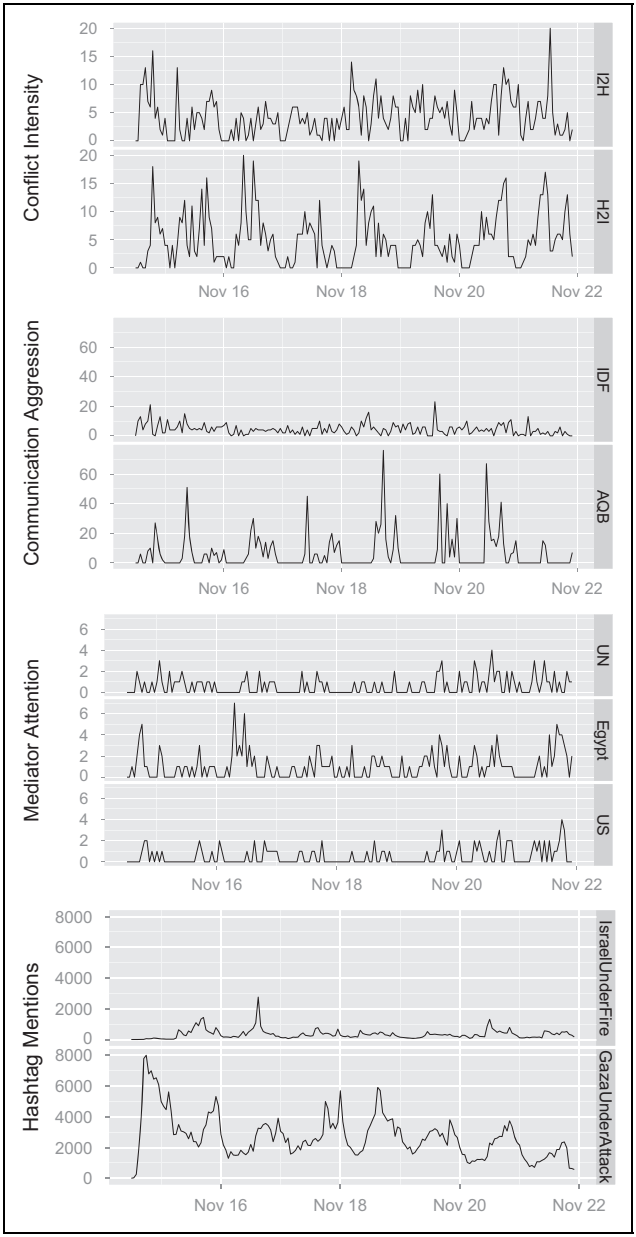

Figure 1. Hourly time series plots of variables for the 2012 Gaza Conflict.

and *UN)*, and international public support on social media (*#Gaza* and *#Israel*). For example, *I2H* depend on its own past actions and the past and present actions of the other variables. VAR models allow researchers to explicitly take into account this endogeneity and have been widely used in political science (Brandt and Williams 2007) and macroeconomic modeling (Sims 1980). Previous studies of international conflict have used VAR modeling techniques to model the dynamic and reciprocal nature of conflicts (Goldstein and Freeman 1990; Brandt, Colaresi, and Freeman 2008; Kavanagh 2011).

The advantage of the (BS)VAR approach is that it makes relatively few assumptions. For instance, other "time series methods such as ARIMA, error correction model (ECM), structural equation (SEQ) methods are special cases" of the VAR model (Brandt and Williams 2007, 12). These other models make strong assumptions about which way causality flows in highly dynamic, multiple time series such as the 2012 Gaza Conflict (Brandt and Freeman 2006). Rather than assuming, for instance, that shifts in public support only influence the conflict behavior of Israel and Hamas and not the reverse, a BSVAR allows for causality to flow both ways (e.g., from Israel and Hamas to public support and vice versa). The BSVAR model simply assumes that variables in a conflict system are in an equilibrium, or a steady state, and respond to their own past values, and the past values of other variables in the system (the autoregressive nature). The "structure" or "S" in BSVAR results from restricting which variables respond contemporaneously to each other. Substantively, which of the nine variables from the 2012 Gaza Conflict respond within the hour to each other? These restrictions on the structure (known as the A_0 matrix) influence not only the immediate responses (which actors respond with the current time period), but also the long-term strategies available to the actors, and subsequent dynamics of the conflict (Brandt, Colaresi, and Freeman 2008).

The BSVAR assumes that conflict systems (like the 2012 Gaza Conflict) follow an equilibrium pattern of interrelated response and escalation. In order to measure conflict dynamics, the BSVAR uses IRFs to see how exogenous, or "surprise," shocks in one variable move through the system affecting the other variables (Brandt and Williams 2007). This provides a way for measuring the effect of changes in one variable on the others, given the dynamic nature of conflict. For instance, how does a shock in Egyptian attention (*Egypt*) influence *H2I*? Historically, modeling the uncertainty in error bands around the IRF estimates has been difficult given the nonlinearities and high dimensionality of its derivation (Brandt and Willams 2007, 42). Recent advances in Bayesian methods allow a more precise way to characterize uncertainty in IRF estimates (Sims and Zha 1999; Brandt and Freeman 2006). The Bayesian VAR framework provides more coherent and precise shape bands (Brandt and Freeman 2006). Especially relevant to the current article, the Bayesian VAR framework was explicitly created by macroeconomists to account for the difficulty in estimating shorter time series with multiple endogenous variables (like the current paper). By putting a lower probability on the higher order lags (via a prior), the Bayesian VAR framework provides a more coherent and accurate way to estimate

the system (Sims and Zha 1998). It also uses a Bayesian framework to compare the fit of different possible contemporaneous relations, or structures, among the variables (Brandt and Freeman 2009).

BSVAR Method

More formally, following the notation in Brandt and Freeman (2009), the nine-variable 2012 Gaza Conflict VAR can be written as a dynamic simultaneous equation model:

$$\underset{1\times m}{y_t}\ \underset{m\times m}{A_0} + \sum_{l=1}^{p} \underset{1\times m}{y_{t-l}}\ \ \underset{m\times m}{A_l} = \underset{1\times m}{d} + \underset{1\times m}{\epsilon_t}, \quad t = 1, 2, \ldots T. \tag{1}$$

Equation (1) shows "each vectors and matrix's dimensions noted below the given matrix. This is an m-dimensional VAR for a sample size of T (179 hours), with y_t a vector of observations for m (9) variables at time t, A_l the coefficient matrix for the lth lag, $l = 1\ 1, \ldots, p$, p the maximum number of lags (assumed known), d a vector of constants, and ϵ_t a vector of i.i.d. normal structural shocks" (Brandt and Freeman 2009, 8-9). The key structural aspect of equation (1) is the contemporaneous relationships in A_0 or how the nine variables of the 2012 Gaza Conflict respond within the hour to each other. The structural model can be transformed from equation (1) into the reduced form model by postmultiplying equation (1) by A_0^{-1} and expressing the contemporaneous (exogenous) variables in terms of their lagged valuables (Brandt and Freeman 2009, 12):

$$y_t = c + y_{t-1}B_1 + + y_{t-p}B_p + u_t, \quad t = 1, 2 \ldots, T, \tag{2}$$

where

$$c = dA_0^{-1}, \quad B_l = A_l A_0^{-1}, \quad l = 1, 2, \ldots, p, \quad u_t = \epsilon_t A_0^{-1}. \tag{3}$$

As equations (2) and (3) show, the structural identification of A_0 in the BSVAR influences both the contemporaneous relationship and also the longer-term dynamics as they move through the system (Brandt and Freeman 2009, 12).

Given the large number of parameters for each equation ($\approx m \times p = 9 \times 5 = 45$) to be estimated and complex dynamics, a BSVAR uses hyperparameters to specify beliefs about the dynamics within the BSVAR system (Brandt and Freeman 2006, 2009). Following Brandt and Freeman (2009, 120): "the hyperparameters influence or control the estimation of the BSVAR in the following way: error covariance matrix scale (λ_0), standard deviation of AR(1) (persistence) (λ_1), decay of lag variances (λ_3), standard deviation of intercept (λ_4), standard deviation of exogenous variables (λ_5), sum of autoregressive coefficients component (μ_5), and correlation of coefficients/initial condition component (μ_6)." I use a relatively informed prior:

$$\lambda_0 = 0.8,\ \lambda_1 = 0.25,\ \lambda_3 = 2,\ \lambda_4 = 0.5,\ \lambda_5 = 0.25,\ \mu_5 = 0,\ \mu_6 = 0,$$

which shrinks the higher order lags toward 0 and allows beliefs about the structure of the contemporaneous relationships to be explicitly modeled (Brandt, Colaresi, and Freeman 2008, 357-58).[33]

I explore the effect of international audiences—public support and mediators—on Hamas and Israeli actions during the conflict using the BSVAR in two ways. (1) In order to estimate a BSVAR, I impose structure (on the A_0 matrix) by testing different restrictions on which variables respond contemporaneously to each other.[34] For instance, does allowing Israel's communication on Twitter (*IDF*) to respond contemporaneously to *UN* improve the model fit? Comparing various structure in the BSVAR framework—which contemporaneous relationships between the variables best models the data—allows for the rigorous testing of competing theories of conflict (Brandt, Colaresi, and Freeman 2008). (2) I also use the BSVAR to estimate IRFs and explore how shocks in one variable influence other the variables. In the next section, I first empirically test for the lag length specification. I then use information about the conflict and previous research to derive and test different structural restrictions. Finally, I estimate IRFs and interpret the results.

Results and Interpretation

Lag Length Specification

Crucial to the BSVAR modeling approach is the selection of the appropriate lag length. Enough lags must be included to avoid issues of serial correlation.[35] However, since each lag increases the number of coefficients per equation by the number of included variables (nine variables in the present study) more parsimonious models are preferred. In Table 1, I test different lag length specifications. Both the AIC and BIC, point to a one-lag model (the lowest values). However, this likely is not enough time to incorporate strategic interaction (such as diplomacy and response from Twitter) that take longer than an hour to develop (i.e., the time difference between Jerusalem and Washington, DC, is seven hours). I choose to use a five-lag model to allow richer dynamics and avoid serial correlation.[36] Furthermore, previous research using a VAR on hourly conflict data on the 2008–2009 Gaza Conflict employs a five-lag model (Zeitzoff 2011). In the next subsection, I test different structural identifications and assess their model fit using BSVAR posterior statistics.

Structural Identification

Structural identification delineates the contemporaneous relationships—which variables respond contemporaneously and which are restricted from doing so—in order to estimate the BSVAR model. Besides being a necessary step for estimation, structural identification also serves a theoretical purposes. One of the advantages of the BSVAR approach is that, unlike a standard VAR, it uses theory to explicitly models the contemporaneous relationship between the included variables in the

Table 1. Lag Length Specification Test.

Lags	AIC	BIC
1	−0.39	1.29
2	−0.04	3.15
3	0.33	5.04
4	0.55	6.77
5	0.62	8.35
6	0.93	10.17
7	1.22	11.98
8	1.24	13.51
9	1.20	14.98
10	1.12	16.41
11	0.80	17.60
12	0.16	18.48

system. Different models of contemporaneous relationships assume different speeds of response to certain variables in the system (Brandt, Colaresi, and Freeman 2008).[37] These different models provides a means of testing whether or not the *IDF* and/or *AQB* Twitter feeds contemporaneously (within the hour) respond to international mediators (*UN*, *Egypt*, and *US*) or public support (*#Gaza* and *#Israel*). The speed at which Hamas and Israel respond to each other via their communication and their conflict intensity, and how quickly, underlines the strategic constraints placed on actors by logistics, the international mediators, and international public support.

Theory should be used to guide the selection of the structural identification. For instance, given the speed of diplomacy in the 2012 Gaza Conflict[38], it is unlikely that the UN, Egypt, or the US would be able to react to conflict developments within the hour. Conversely, given the expressed point of Hamas's (*AQB*) and Israel's (*IDF*) Twitter feeds, to broadcast their own success and denigrate the other side, they are likely to react contemporaneously to the conflict. Theoretical and empirical testing[39] point to the *Hashtag Biased* model shown in Table 2 as the best model of the contemporaneous relationships.[40] The contemporaneous relationships of the *Hashtag Biased model* are composed of nine rows and nine columns (one row and one column for each variable). In Table 2, the columns are equations and the rows are variables designated (or not designated) to have a contemporaneous relationship with the column variable. In each model, an X represents a "free" parameter to be estimated. The estimated free parameters correspond to the row variable having a contemporaneous relationship with the column equation. Empty cells assume that the row variable does not contemporaneously influence the column equation.

The *Hashtag Biased* model allows *I2H* to react contemporaneously to changes in *H2I* and to its communication on Twitter (but not vice versa). This echoes previous findings that the stronger actor (Israel) would be more reactive to the weaker actor (Hamas) than vice versa (Zeitzoff 2011). Both the mediators and Israel and Hamas

Table 2. Contemporaneous Relationships.

Model name	Variables	H2I	I2H	IDF	AQB	UN	Egypt	US	#Gaza	#Israel
Hashtag Biased	*H2I*	X	X	X	X					X
	I2H		X	X	X				X	
	IDF		X	X	X					X
	AQB	X	X	X	X				X	
	UN					X				
	Egypt						X			
	US							X		
	#Gaza				X				X	X
	#Israel			X					X	X

Note: H2I = Hamas conflict intensity; I2H = Israel conflict intensity; IDF = *@IDFSpokesperson* aggressiveness; AQB = *@AlQassamBrigade* aggressiveness; UN = UN attention; Egypt = Egyptian attention; US = US attention; #Gaza = #GazaUnderAttack mentions; #Israel = #IsraelUnderFire mentions.

are restricted from responding within the hour to each other.[41] The model also allows both Israel (*IDF*) and Hamas (*AQB*) to contemporaneously respond on Twitter to shifts in international public support via changes in their respected hashtags (*#Gaza* for Hamas and *#Israel* for Israel). The structural identification shows that conflict participants are sensitive to shifts in public support international audiences.

In the next section, I use the *Hashtag Biased* model to explore the IRF and measure how shocks in one variable influence innovations in the other variables.

Impulse Response Functions and Interpretation

I use IRFs to examine the dynamic effects of the five-lag *Hashtag Biased* BSVAR model using the vector moving average (VMA) representation. The IRF analysis uses the VMA representation to trace the dynamics of the endogenous variables to "surprise" innovations, or shock increases in the other variables,[42] using the A_0 matrix specified in the *Hashtag Biased* model in Table 2 (Brandt and Williams 2007, 68). Since all the variables are in logarithms, responses to shocks[43] are in percentage change in the variable of interest (Brandt and Williams 2007, 50). Given the dynamic nature of conflict, IRFs allow researchers to trace the effect of an increase in one variable on the other conflict variables in the conflict. For example, from a substantive perspective, IRFs can measure how increases in support for Hamas (*#Gaza*) and Israel (*#Israel*) influence the conflict actions of Hamas or Israel.

In Figure 2, I report cumulative IRFs over the twelve-hour period following a shock to key variables. In other words, how do these shocks accumulate and affect the response variable after twelve hours? Each plot shows the cumulative effect of the shock (*shock in* variable) variable on the response variable (labeled on the x-axis) after a twelve-hour period. Sixty-eight percent (darker colored lines) and 90 percent (light gray lines) error bands are calculated using 50,000 Markov Chain Monte Carlo draws with 10,000 burn-in draws[44] estimated via the MSBVAR package (version

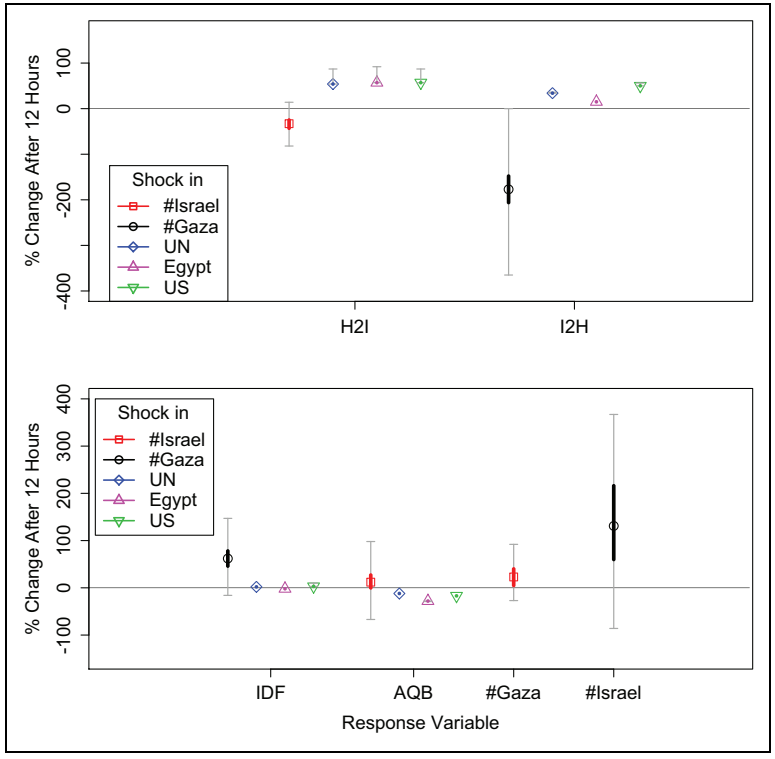

Figure 2. Cumulative impulse response function plots.

0.7-2-1) in R using the eigendecomposition method described in Brandt and Freeman (2006). Given that there are nine-variables leading to 81 possible IRF estimates, I omit presenting the IRF results for all variables.[45] Sims and Zha (1999) and Brandt and Freeman (2006) suggest focusing on the 68 percent error bands, as they provide a better measure of the central tendency. It should also be noted that the IRF error bands calculated using the eigendecomposition method explicitly account for the asymmetry present in IRF, and are more accurate than Gaussian, or other symmetric approximations (Brandt and Freeman 2006, 19). This method leads the asymmetry in the confidence bands for some of the estimates in Figure 2, and for some estimates having very tight error bands, with little to no variation.[46] The asymmetry in the bands provides substantive information about likely direction of uncertainty in the respond dynamics (Brandt and Freeman 2006).

Several key findings emerge from Figure 2. The top plot in Figure 2 compares how shocks in the international mediators (*US*, *UN*, and *Egypt*) and public support (*#Gaza* and *#Israel*) influence *I2H* and *H2I*. Two key results emerge. (1) Shocks in the international mediators slightly increase the conflict intensity of

Hamas and Israel. Rather than constraining the actors, traditional mediators have a null to slightly positive effect on increasing the conflict of the actors. (2) Conversely, increases in public support for the other side, constrain the conflict intensity of the actors, especially Israel. A shock to public support for Hamas (*#Gaza*), decreases Israel's response intensity by approximately 177 percent. This is a large and significant effect. These two results taken together show that international public support constrains conflict participants much more than traditional mediators.

The bottom plot in Figure 2 explores how shocks in international mediators and public support influence Israel's and Hamas's communication (*IDF* and *AQB*). They also examine how public support for Hamas and Israel respond to shocks in each other. As in the results in the top plot, the international mediators have a negligible effect on Israel's and Hamas's communication. However, Israel's aggressiveness and activity on Twitter (*IDF*) increases by approximately 62 percent following a shock in support for Hamas (*#Gaza*). This represents a novel substitution effect—shocks in support for Hamas decrease what Israel is doing militarily but increase the activity of its communication. Comparatively, shocks in support for Israel (*#Israel*) have little to no effect on Hamas's communication (*AQB*). Additionally, public support for Israel is much more responsive to shocks in public support for Hamas than vice versa. The results in the top and bottom plots in Figure 2 suggest that international public support shaped the conflict dynamics of the conflict participants, particularly Israel, much more than the public attention of international mediators.

Both *I2H* and *H2I* scores are composed of both material and verbal conflict. Yet it might be that material (rockets, air strikes, etc.) and verbal conflict (threats and posturing) respond differentially to shocks in international public support (*#Gaza* and *#Israel*). In order to test this, I rerun the five-lag *Hashtag Biased* model disaggregating the *H2I* and *I2H* into separate verbal and material conflict. This new multiple time series contains eleven variables. All the same variables are included as in the previous analysis, but the conflict intensity variables are now separated out into Hamas material conflict (*H_material*), Hamas verbal conflict (*H_verbal*), Israel material conflict (*I_material*), Israel verbal conflict (*I_verbal*; Table A2). In Figure 3, I plot the cumulative IRF for shocks in public support and how that influences Hamas's and Israel's material and verbal conflict.

The results in Figure 3 confirm and provide nuance for the results from Figure 2: *I2H* is much more responsive than Hamas's to shifts in public support for the other side.[47] Neither Hamas's material conflict (*H_material*) nor Hamas's verbal conflict (*H_Verbal*) respond to shocks in public support for Israel (*#Israel*) with both point estimates are close to 0. Conversely, Israel's material conflict (*I_material*) and Israel's verbal conflict (*I_verbal*) do respond to shocks in support for Hamas (*#Gaza*). A shock in support for Hamas decreases Israel's material conflict by $\approx$ 57 percent, while increasing its verbal

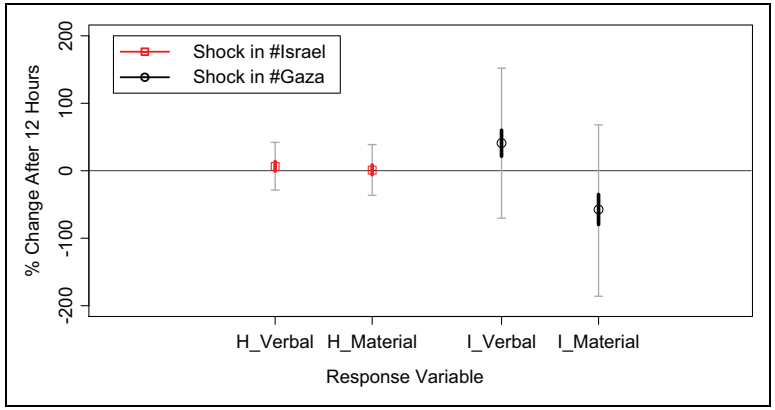

Figure 3. Cumulative impulse response function plots (separating out material and verbal conflict).

conflict by 41 percent. These findings show that increases in public support for Hamas, actually constrained Israel's military behavior, and not simply its posturing, or threats (verbal conflict). In fact, it conforms to the substitution effect from Figure 2, with increases in support for Hamas constraining Israel militarily, but increasing the activity and aggressiveness of its communication. The finding that increases in public support for Hamas increase the activity of Israel's Twitter feed (and Israel's verbal conflict) demonstrate that Israel's use of Twitter during the conflict was not divorced from its larger strategy. Rather, it was an integral part of it.

In the Online Supplementary Information, I also address concerns that the main results may be sensitive to the lag length or that the relationships between variables (other than *#Gaza* and *#Israel*, which are already seasonally adjusted) are confounded by seasonality or that the results are sensitive to a particular formation of the prior. The three key findings of Israel's greater responsiveness to the shifts in public support (especially compared to international mediators) remains unchanged. (1) Shocks in public support on social media for Hamas (*#Gaza*) decrease *I2H* more than the international mediators, and much more than shocks in public support on social media for Israel (*#Israel*) influence *H2I*. (2) Israel's communication on Twitter (*IDF*) increases its aggressiveness and activity following increases in public support for Hamas, while the mediators have little effect on either actor's communication. (3) Finally, public support on social media for Israel reacts strongly and positively to shocks in public support on social media for Hamas but not vice versa.

In the next section, I discuss the results in terms of their broader significance for understanding how international audiences and communication influence conflict and how social media is changing this relationship.

Discussion and Conclusion

The findings point to actors (particularly Israel) being more responsive to public support on social media compared to the international mediators.[48] The novel data give a unique, microlevel test of how international audiences influence different actors in conflict. It also shows how states engaged in conflict are harnessing social media to sway perceptions and communicate to international audiences. Particularly for Israel, public support via social media affected its use of Twitter and its decisions to escalate its conflict intensity. Further shifts in popular support affected Israel to a greater degree than Hamas—*I2H* significantly decreases following an increase in support for Hamas. Conversely, there is no such variation in *H2I* following shocks in support for Israel. This finding provides a potential mechanism (international public support on social media) through which democratic states are more constrained in conflict (Fearon 1994; Guisenger and Smith 2002). The fact that neither side's conflict intensity is constrained by international mediators, highlights the primacy of international public support—particularly in limited conflict (like the 2012 Gaza Conflict).[49] Additionally, the finding that Israel's communication increases its activity following shocks in support for Hamas suggests an interesting substitution effect. Shifts in public support may constrain a state's (Israel's) ability to fight, so it increases the activity and aggression of its communication on social media.

One concern may be that the use of Twitter and other social media was simply epiphenomenal with respect to the actual conflict, rather than an integral part of it. For instance, international support on social media may simply proxy for international public opinion, so social media support in and of itself did not influence the conflict directly.[50] It is not possible to distinguish this argument using the BSVAR from the one put forth in this article. Furthermore, public opinion likely paid some role in decision-making of the actors (particularly Israel; see The Economist 2014). Yet, qualitative information suggests international support on social media was not simply proxy for public opinion but had a direct impact on the conflict. Both Israel and Hamas continued to keep their Twitter feed extremely active following the conflict (Al Qassam Brigades 2012; IDF Spokesperson 2012) and again in the 2014 Gaza War[51] using the same hashtags (#GazaUnderAttack and #IsraelUnderFire; see Mackey 2014). The IDF further launched in the wake of the 2012 conflict a new censor system that monitors Facebook, Twitter, and blogs to censor sensitive information (see Krupsky 2012). Moreover, the creation and increasing role of the IDF's new Interactive Media Unit dedicated to using social media to sway foreign audiences, including paying Israeli university students studying abroad to post–pro-Israel messages on social media,[52] further emphasizes the primacy Israel places on social media and its role in future military strategy.[53] Finally, social media has also been implicated in the increased violence starting in September 2015, which include Palestinian stabbings and car-ramming attacks against Israelis, and claims of Israeli security services use of excessive force (see Michaelson 2015). Many of the Palestinian perpetrator are not

members of formal militant organizations. Instead, many of them point to being driven to violence by images of Israeli security services shooting Palestinians engaged in attacks as well as "how-to" videos describing how to attack Jewish Israelis on social media as "inspiration" (see Rudoren 2015). Thus social media is not limited to influencing international audiences, but is also increasingly influencing domestic opinion and conflict behavior as well.

What is perhaps most unique and important about social media and its role for future conflicts, is the speed at which it is able to disseminate information to audiences, and for those audiences to provide feedback. Social media allowed Israel and Hamas to tailor their message to their international supporters, and monitor their feedback extremely quickly.[54] The 2014 Gaza War further saw both sides intensifying their social media strategy and increasing use of "citizen journalists" to share images and video from the front line (Hirschauge, Casey, and Fleisher 2014; Carr 2014). The ability for social media to quickly engage supporters abroad, who in turn can pressure other international actors, changes the strategy of conflict participants, and the dynamics of the conflict itself. The quantitative and qualitative evidence points to social media not simply being a tool for propaganda, but rather as a strategic tool that changes the way conflict participant's fight.

The diffusion of social media into other conflicts provides further evidence of its status as a new tool for conflict. Jones and Mattiaci (2014) provide convincing evidence that Libyan rebels in the 2011 Libyan Civil War were able to increase the US assistance through an effective Twitter campaign. Thus, social media provides conflict participants an avenue to both attract political and material support and improve their odds of success. For instance, the Taliban and the International Security Assistance Force in Afghanistan actively engaged each other on Twitter (Farmer 2011). More recently, social media has played a prominent role in the Syrian Civil War. Competing factions in Syria have their own YouTube and Twitter accounts which they use to publicize their battlefield successes and tout their territorial control (Zambelis 2012). Even more concretely, Syrian rebel groups have used their Facebook pages to "brand themselves" and to facilitate fundraising (Topol 2012). The Islamic State in the Levant (ISIL) has proven remarkably adept at using social media to increase their exposure. They have a dedicated social media and Twitter team that informs followers of ISIL campaigns and use organized hashtag campaigns to garner real and virtual support (Siegel 2014). In addition to broadcasting beheadings and acts of violence, it uses social media to show its governance activities in the areas it controls. Finally, ISIL also uses social media to engage and seek support from Western audiences in Europe and North America, both to bolster its presence in the West, and recruit supporters and fighters (Berger 2014).

As the number of social media users increases[55], the role of social media in conflict will likely grew. The key innovation of social media, shown through the lens of the 2012 Gaza Conflict, is how it influences audience participation in international conflict, and how this has both a direct and indirect effect on the

strategic decisions of participants. By reducing the costs, and increasing the speed of communication, social media affords conflict actors new opportunities to engage with international audiences (direct effect). These audiences are then able to communicate their own opinions and thoughts back to the actors and the wider community, subsequently influencing the conflict actors (indirect effect). It is also important to point out that social media allows weaker actors such as Hamas and ISIL to more cheaply reach international audiences, and be on equal footing with stronger actors (i.e., Israel and other Western powers). By democratizing media and access to international audiences, it further change the strategic calculus of actors engaged in the conflict.

I used extremely disaggregated (hourly) data from the 2012 Gaza Conflict to explore how international audiences influence different actors during the course of a conflict. Using novel data on public support on social media for Hamas and Israel, I show that Israel was much more constrained by increases in international public support for Hamas than vice versa. Additionally, I show that neither actor was particularly constrained militarily by public attention of the international mediators. The results also provide micro-level support for previous research that suggests that international audiences influence democracies (Israel compared to Hamas) to a greater degree than nondemocracies (Maoz and Russett 1993; Tomz 2007; Brandt, Colaresi, and Freeman 2008). Finally, the increasing use of social media by state and nonstate actors to influence perceptions about the conflict, represents a new and fertile data source for researchers to study extant theories of conflict behavior and develop new ones. The present study provides a template for doing so.

Appendix

Table A1. Cumulative Impulse Response Functions from Bayesian Structural Vector Autoregression Hashtag Biased (Five-lag Model).

Shock in	Response by	Cumulative median response after twelve hours	68% Regions	90% Regions
H2I	I2H	0.25	(0.14, 0.36)	(−1.42, 2.07)
I2H	H2I	0.04	(−0.08, 0.18)	(−0.71, 0.86)
IDF	H2I	−0.13	(−0.17, −0.09)	(−0.50, 0.20)
IDF	AQB	0.22	(0.16, 0.27)	(−0.38, 0.88)
AQB	I2H	1.27	(0.94, 1.87)	(−1.68, 5.02)
AQB	IDF	−0.04	(−0.46, 0.39)	(−2.18, 2.11)
#Gaza	H2I	−0.56	(−0.66, −0.46)	(−1.12, −0.08)
#Gaza	I2H	−1.77	(−2.06, −1.48)	(−3.65, 0.00)
#Israel	H2I	−0.33	(−0.43, −0.25)	(−0.82, 0.14)

(continued)

Table A1. (continued)

Shock in	Response by	Cumulative median response after twelve hours	68% Regions	90% Regions
#Israel	I2H	−0.98	(−1.12, −0.84)	(−2.20, −0.03)
#Gaza	IDF	0.62	(0.46, 0.78)	(−0.16, 1.47)
#Gaza	AQB	−0.39	(−0.57, −0.20)	(−1.42, 0.63)
#Israel	IDF	0.69	(0.48, 0.95)	(−0.24, 1.88)
#Israel	AQB	0.12	(−0.00, 0.27)	(−0.67, 0.98)
#Gaza	#Israel	1.31	(0.60, 2.16)	(−0.86, 3.67)
#Israel	#Gaza	0.23	(0.05, 0.40)	(−0.27, 0.92)
UN	H2I	0.54	(0.54, 0.54)	(0.54, 0.87)
UN	I2H	0.34	(0.34, 0.34)	(0.34, 0.36)
UN	IDF	0.02	(0.02, 0.02)	(0.02, 0.02)
UN	AQB	−0.12	(−0.12, −0.12)	(−0.12, −0.12)
Egypt	H2I	0.57	(0.57, 0.57)	(0.57, 0.92)
Egypt	I2H	0.15	(0.15, 0.15)	(0.15, 0.15)
Egypt	IDF	−0.02	(−0.02, −0.02)	(−0.02, −0.02)
Egypt	AQB	−0.28	(−0.28, −0.28)	(−0.29, −0.28)
US	H2I	0.57	(0.57, 0.57)	(0.57, 0.87)
US	I2H	0.50	(0.50, 0.50)	(0.50, 0.56)
US	IDF	0.03	(0.03, 0.03)	(0.03, 0.10)
US	AQB	−0.17	(−0.17, −0.17)	(−0.17, −0.17)

Note: H2I = Hamas conflict intensity; I2H = Israel conflict intensity; IDF = *@IDFSpokesperson* aggressiveness; AQB = *@AlQassamBrigade* aggressiveness; UN = UN attention; Egypt = Egyptian attention; US = US attention; #Gaza = #GazaUnderAttack mentions; #Israel = #IsraelUnderFire mentions.

Table A2. Cumulative Impulse Response Functions from Bayesian Structural Vector Autoregression Hashtag Biased (Five-lag, Eleven-variables Model Separating out Material and Verbal Conflict).

Shock in	Response by	Cumulative median response after twelve hours	68% Regions	90% Regions
#Gaza	H_material	−0.03	(−0.10, 0.03)	(−0.41, 0.32)
#Gaza	H_verbal	0.01	(−0.06, 0.07)	(−0.34, 0.33)
#Gaza	I_material	−0.57	(−0.80, −0.35)	(−1.86, 0.68)
#Gaza	I_verbal	0.41	(0.22, 0.60)	(−0.70, 1.52)
#Israel	H_material	0.01	(−0.06, −0.08)	(−0.36, 0.39)
#Israel	H_verbal	0.06	(−0.00, 0.13)	(−0.29, 0.42)
#Israel	I_material	−0.11	(−0.23, 0.02)	(−0.91, 0.72)
#Israel	I_verbal	0.18	(0.08, 0.28)	(−0.51, 0.90)
UN	H_material	0.17	(0.17, 0.17)	(0.17, 0.18)
UN	H_verbal	0.08	(0.08, 0.08)	(0.08, 0.08)

(continued)

Table A2. (continued)

Shock in	Response by	Cumulative median response after twelve hours	68% Regions	90% Regions
UN	I_material	0.21	(0.21, 0.21)	(0.21, 0.24)
UN	I_verbal	0.03	(0.03, 0.03)	(0.03, 0.03)
Egypt	H_material	0.28	(0.28, 0.28)	(0.28, 0.36)
Egypt	H_verbal	0.11	(0.11, 0.11)	(0.11, 0.11)
Egypt	I_material	0.23	(0.23, 0.23)	(0.23, 0.25)
Egypt	I_verbal	0.04	(0.04, 0.04)	(0.04, 0.04)
US	H_material	0.17	(0.17, 0.17)	(0.17, 0.17)
US	H_verbal	0.08	(0.08, 0.08)	(0.08, 0.08)
US	I_material	0.25	(0.25, 0.25)	(0.25, 0.30)
US	I_verbal	0.10	(0.10, 0.10)	(0.10, 0.12)

Note: UN = UN attention; Egypt = Egyptian attention; US = US attention; #Gaza = #GazaUnderAttack mentions; #Israel = #IsraelUnderFire mentions.

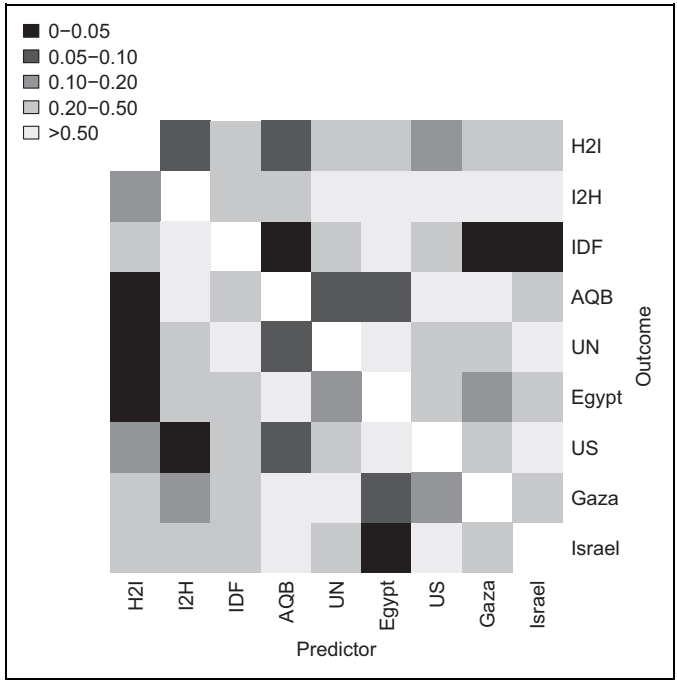

Figure A1. Granger heat map plot (five hour lag).

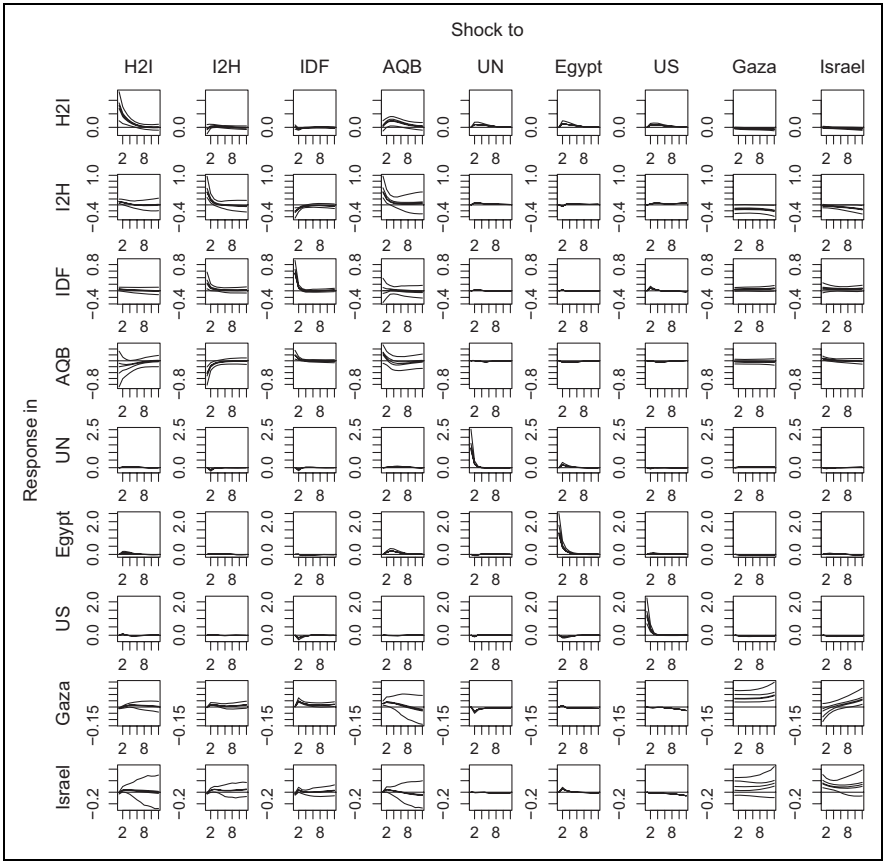

Figure A2. Impulse response function plots for all responses for Bayesian structural vector autoregression *Hashtag Biased* (five-lag model).

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Supplemental Material

The online [appendices/data supplements/etc.] are available at http://jcr.sagepub.com/supplemental.

Notes

1. Indeed, similar to Hamas's and Israel's strategies during the 2012 Gaza Conflict, much of the reporting was designed to influence opinion.
2. Many states have actually tried to do the reverse—engender support among targeted foreign constituencies for support or involvement in a conflict. For instance, the British during the World War II (pre-Pearl Harbor) actively attempted to sway the American public to join the war via a sophisticated public relations campaign. See Cull (1995).
3. For instance, many rebel groups receive political and material support from patron actors or diaspora communities abroad (Salehyan 2009).
4. A notable exception is Schrodt and Gerner (2004).
5. Following the Oxford dictionary definition, I define social media as ''websites and applications that enable users to create and share content or to participate in social networking,'' http://oxforddictionaries.com/us/definition/american_english/social-media.
6. The Israeli Defense Forces (IDF) and Israeli sources called the conflict Operation Pillar of Cloud and Hamas called it shale stones. To avoid using normative names for the conflict, I refer to it as the 2012 Gaza Conflict.
7. They also announced it on YouTube.
8. They each tweeted approximately 300 times. The Israel Ministry of Foreign Affairs also had engaged over Twitter during the conflict (*@IsraelMFA*), but it was much less active.
9. From the Twitter website, ''the # symbol, called a hashtag, is used to mark keywords or topics in a Tweet. It was created organically by Twitter users as a way to categorize messages.''
10. As Brandt and Freeman (2006) describe, the Bayesian structural vector autoregression (BS)VAR framework explicitly assumes an equilibrium for the data generating process. A key question, is how do different variables respond to ''surprise'' shocks, via impulse response function (IRF) analysis, in other variables.
11. Like Beardsley (2008), I adopt the definition of Bercovitch and Houston (1996, 724) which states that mediation is ''a reactive process of conflict management whereby parties seek the assistance of, or accept an offer of help from, an individual, group, or organization, to change their behavior, settle their conflict, or resolve their problem without resorting to physical force or invoking the authority of law.''

12. Fey and Ramsay (2010) are notably skeptical of the added benefits of mediation, arguing that any information revealed via mediation would be available in its absence.
13. For an excellent overview on the properties of Twitter networks, see Kwak et al. (2010).
14. RT means Retweet and is akin to forwarding in e-mail.
15. While Hamas ostensibly has political control of Gaza, other militant groups do operate out of Gaza with varying degrees of support from Hamas. See http://www.nytimes.com/2012/10/20/world/middleeast/hamas-works-to-suppress-militant-groups-in-gaza.html
16. The US President Barack Obama voiced serious misgivings over the ground invasion. For instance, see http://www.reuters.com/article/2012/11/18/us-asia-obama-mideast-idUSBRE8AH07Z20121118.
17. It is unclear how much electoral considerations affected the Israeli military goals during the conflict, as security has historically been the main axis of competition in Israel elections (Schofield and Sened 2005).
18. Some have argued that placating the international audience serves a domestic purpose as well. It shows that Netanyahu/Likud-led government cares about international public opinion and that this translates into votes, http://politicalviolenceataglance.org/2013/03/01/friday-puzzler-why-support-the-taliban/. This simply echoes Fearon (1995); McGillivray and Smith (2008)—democratic leaders are held responsible for foreign policy, so they care about foreign relations (more than nondemocratic leaders).
19. The name given for Israel's missile defense system. See http://www.wired.com/dangerroom/2012/11/iron-dome-next/ for an overview.
20. Author interview with Eytan Buchman, former head IDF spokesperson for North America, May 1, 2013.
21. Many of the news organizations covering the conflict also extensively retweeted news stories from the Hamas and Israeli Twitter feeds.
22. A qualitative survey of the Twitter followers of both *@IDFSpokesperson* and *@AlQassamBrigade* (*AQB*) reveals key differences between the followers. Supporters of Israel (as measured by location and information in the profile) tend to follow the former, while supporters of the Palestinian cause tend to follow the latter. See Figure 1 in the Online Supplementary Information for a comparison of location of the Twitter followers. This is consistent with findings from Zeitzoff, Kelly, and Lotan (2015); Barberá (2015) who find that who people follow on Twitter is a good proxy for whom they support and also extracting policy position.
23. Author interview with Eytan Buchman, May 1, 2013.
24. *AQB* has been active since December 2011.
25. IOF stands for the Israeli Occupation Force in reference to those who view Israel as an occupying force both in the West Bank and inside the 1967 borders in Israel.
26. The main findings—Israel is more sensitive to shifts in international support—are robust to a more agnostic coding of *IDF* and *AQB*. In the Online Supplementary Information, as a robustness check, I just look at the raw tweet counts of both the *IDF* and *AQB* rather than actually coding each tweet. The results largely match the main results presented in Figure 2.

27. A unique identification number for each tweet was sent. See https://dev.twitter.com/ for more information on the Twitter application programming interface.
28. For clarity sake, I differentiate when I discuss the hashtags (#GazaUnderAttack and #IsraelUnderFire) from the time series transformed variables (*#Gaza*) and (*#Israel*).
29. Some might be worried that this addition of 0.1 to the time series biases the coefficients. I also use an alternative transformation—the fourth root—that avoids having to add 0.1 to the time series. The results are nearly identical.
30. Log transformations mean that the IRFs are in percentage terms.
31. See Cheng, Evans, and Singh (2009), who show that Twitter usage spikes between 11 a.m. eastern standard time (EST) and 3 p.m. EST.
32. In the Online Supplementary Information, I show that removing the seasonality for the remaining variables does not change the fundamental results.
33. Allowing a relatively uninformed prior (see Table 7 in Online Supplementary Information) or "looser" prior does not fundamentally change the result.
34. Nonstructural models, or Bayesian vector autoregression (BVAR), use the Cholesky decomposition method to identify the system. In a BVAR, the order of the variables imposes the structure.
35. This is important because Granger causality forms the basis of the BSVAR framework. How does one variable's *past* innovations predict another's *future* innovations? In the Appendix, I present a plot of Granger causality for the five-lag specification. Each cell corresponds to the p value for the horizontal axis variables and how well they predict innovations in the vertical axis variables. Darker shades represent lower and more significant p values. A key result is the changes in *#Gaza* and *#Israel* strongly Granger causes *IDF* but not *AQB*. The results highlight that Israel (via its Twitter feed) was much sensitive to popular sentiment on Twitter compared to Hamas. In the Appendix (Figure A1), I present a plot of Granger causality for the five-lag specification.
36. The chief concern within the (BS)VAR framework is not enough lags to avoid serial correlation brandt_multiple_2006. The AIC statistics point to possibly a longer lag length. I test a nine-lag model in the Online Supplementary Information, and the IRF results largely match those of the five-lag model.
37. For instance, Brandt, Colaresi, and Freeman (2008) use a BSVAR approach to explore how Jewish Israeli public opinion influences Palestinian and Israeli cooperation.
38. See http://www.cnn.com/2012/11/19/world/meast/gaza-israel-strike/
39. Comparison of log marginal data densities is given in Table 6 of the Online Supplementary Information.
40. Alternative specifications, and the robustness of the IRF results to alternative models are shown in the Online Supplementary Information. They show two main things. (1) That the *Hashtag Biased* model best fits the data by a wide comparison of Bayes factors and (2) the results are not dependent on the model specification (see section A3 in the online Supplementary Information). For instance, allowing Hamas conflict intensity to respond contemporaneously to each other. Table 11 of the Online Supplementary Information do not change the main findings.

41. This is strongly supported by empirical testing (see Online Supplementary Information) and theory—diplomacy takes more than an hour to develop.
42. All shocks are "positive" in nature—that is, an increase in conflict intensity, mediator attention, communication aggressiveness, or public support.
43. All shocks are 1 standard deviation of the shock variable by default (Brandt and Appleby 2012). In this case, these are log-transformed variables. Note that this means the shocks are related to the variation in percentages. For example, the standard deviations for the log-transformed seasonally adjusted hashtag data are $\approx .77$ for *#Gaza* and ≈ 1.37 for *#Israel*. Formally, the relationship between a 1 standard deviation increase in the transformed variables to the untransformed variable is $e(SD(ln(Y))) - 1$. So for *#Gaza*, this yields $e(0.77) - 1 = 1.16$ or a 116 percent increase and for *#Israel* is $e(1.37) - 1 = 2.94$ or a 294 percent increase.
44. A concern with the procedure is if the number of burn-in draws and subsequent samples are not enough to get convergence. In Table 12 of the Online Supplementary Information, I double the number of burn-ins and subsequent draws (20,000 burn-in draws and 100,000 Markov Chain Monte Carlo) and show the results are almost identical to Figure 2 and Table A1, suggesting convergence.
45. A list of the main and ancillary IRF results is shown in the Appendix. In the Appendix, I also present the full IRF plots for all variables (Figure A2). Additional results and robustness checks are shown in the Online Supplementary Information.
46. I also tried using the "Sims-Zha3" (Brandt and Appleby 2012), which construct error bands using the eigendecomposition of the full stacked impulse responses (Sims and Zha 1999). The error bands are even tighter than those presented here with the "Sims-Zha2" method.
47. The increasing uncertainty compared to the analysis is likely do the larger number of variables (eleven instead of nine) and the fact that there a greater number of time periods where Hamas's and Israel's verbal or material conflict are scored a 0 (compared to the combined conflict scores in Figure 2).
48. In the Online Supplementary Information, the results from testing various permutations of the structural identification also point to Israel being more responsive to public support.
49. It should be noted that this does not mean that mediators have no effect at all on conflict. All three mediators played a documented role in negotiating the ceasefire. Rather, the actors, particularly Israel, are more constrained militarily by international public support relative to *public* mediator attention—a variable used in other studies (Brandt, Colaresi, and Freeman 2008). It may be interesting to compare public versus private mediator statements, but alas the full details of the diplomacy behind closed doors is not publicly available.
50. I am grateful to a reviewer for pointing this out.
51. Since the end of the 2012 conflict through July 24, 2013 both had Tweeted well over 1,000 times. More recently, Hamas's Twitter account was suspended by Twitter for violating its terms of service "The Lede: Twitter Suspends Hamas Accounts" in "*The New York Times*" on January 17, 2014.

52. See "How Israel and Hamas weaponized social media" on *CNET* on January 13, 2014 and "Israel: Government pays students to fight internet battles" on the *BBC* on August 14, 2013.
53. See announcement at http://www.idf.il/1283-18383-en/Dover.aspx
54. Further suggesting the ability of social media's importance in communicating to diaspora supporters, the IDF regularly held, and continues to hold meetings with right-leaning, pro-Israel bloggers, http://www.fastcompany.com/3003305/inside-israeli-militarys-social-media-squad.
55. See http://www.mediabistro.com/alltwitter/social-media-middle-east_b44959 and this survey by the International Telecommunications Union, http://www.itu.int/ITU-D/ict/wtim11/documents/cont/029-E.pdf

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