Arab Spring Effects on Meanings for Islamist Web Terms and on Web Hyperlink Networks among Muslim-Majority Nations: A Naturalistic Field Experiment

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This research conducted a before/after naturalistic field experiment, with the early Arab Spring as the treatment. Compared to before the early Arab Spring, after the observation period the associations became stronger among the Web terms: 'Jihad, Sharia, innovation, democracy and civil society.' The Western concept of civil society transformed into a central Islamist ideological component. At another level, the inter-nation network based on Jihad-weighted Web hyperlinks between pairs of 46 Muslim Majority (MM) nations found Iran in one of the top two positions of flow betweenness centrality, a measure of network power, both before and after early Arab Spring. In contrast, Somalia, UAE, Egypt, Libya, and Sudan increased most in network flow betweenness centrality. The MM 'Jihad'-centric word co-occurrence network more than tripled in size, and the semantic structure more became entropic. This media "cloud" perhaps billowed as Islamist groups changed their material-level relationships and the corresponding media representations of Jihad among them changed after early Arab Spring. Future research could investigate various rival explanations for this naturalistic field experiment's findings.

Keywords: Arab Spring, Islamists, Muslim nations, Jihad, Sharia, civil society, democracy, Web mining, semantic networks, social network analysis, international networks.

Introduction

The monumental social and political significance of "Arab Spring" (Arabic: الثورات العربية; literally the Arabic Rebellions or the Arab Revolutions) is consistent with the term's media trajectory. The catchphrase rocked from relative obscurity prior to the 2011 uprisings in Tunisia and Egypt, and continued its climb as protests increased in 20 more of the Middle East and North Africa (MENA) countries. Our searches of *Lexis Nexis Academic* from December 18, 2010 to April 3, 2014 in the databases: Major World News, Broadcast Transcripts, and BBC International Monitoring identified 43,586 documents containing 'Arab,' an average of 3,632 per day.

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Observation suggests that diverse applications of the Arab Spring catchphrase continue to occur. An example is the "Cuban Spring" that the White House confirmed was the objective of USAID's covert creation of a twitter-like social medium (de Córdoba & Luhnow, 2014; Butler, Gillum, & Arce, 2014; BBC, 2014). This shows one way that a media catchphrase such as "Arab Spring" can morph into different domains, carrying some original meanings but reconstituting them with others.

Social media have s been widely described as essential in the Arab Spring uprisings. Nevertheless, the theory of revolution literature leads to the reasoning that more static Web pages containing elaborated ideological writings are important to sustain action on the ground organized through social media.

In this study, we applied a naturalistic field experiment approach to the early Arab Spring with a combination of semantic network and hyperlink analysis. We examined whether semantic associations became stronger among Web terms: 'Jihad, Sharia, innovation, democracy and civil society.' We sought to answer the following: Is the Western concept of civil society transformed into a central Islamist ideological component in cyberspace? At another level, what countries are most central in the inter-nation network based on Jihad-weighted Web hyperlinks between pairs of Muslim Majority (MM) nations both before and after early Arab Spring?

The public may have received information about "Arab Spring" in many forms, but we know little about how specific types of terms are adapted and undergo transformation. Evidence for such term adaptations comes from a study (Danowski, 2008) of the "Great Cities" catchphrase for a campaign launched by the University of Illinois at Chicago. Empirical tracking in the *Chicago Tribune* found the term frequency increasing 433% during the 16-month post-test, compared to the 16 month pre-test, and to the control media market Tribune paper, the *Los Angeles Times*, where term frequency actually dropped. Yet, only 26% of the Chicago "great cities" stories identified UIC's Great Cities Initiative, despite continuing active public relations after the campaign launch. Semantic network diversity increased as "great cities" became linked with sports, restaurants, blues music, architecture, corrupt politicians, and other contexts that had no relationship to the initiative. After UIC's launch sparked initial buzz associated with the term, its referents soon meandered and diversified well out of the UIC domain.

We point out these two cases of symbol/referent catchphrase morphing to highlight that a simulacrum (Baudrillard, 1994)the such as "Arab Spring" promulgated with such frequency in mainstream media -- may become linked to significant referents outside its initially created domain, unrecognized by observers of only mainstream media. Some of these referents precede the beginning of Arab Spring on December 18, 2010. This study analyzes semantic networks before and after the early Arab Spring observation period it that may detect such term morphing. There have been some similar attempts to understand how political terms such as "climate change" and "global warming" have diverse meanings and continue to transform (Leydesdorff & Hellsten, 2005; Shapiro & Park, 2015). However, none of the recent literature on the phrase "Arab Spring" has investigated this specific area of semantic networks, particularly with respect to websites.

Krauthammer (2005) notes that soon after the Iraq War ended, some political observers expected that replacement of Saddam Hussein's regime with a democracy would, without kinetic intervention, stimulate other democratizations in the Arab Middle Eastwhich some conceptualized as an Arab Spring. In studying the meanings for this term in published documents, we found the first such use of 'Arab Spring' was in 2002 in *World News Connection* (WNC), a source for the U.S. federal government's internal daily international news digest. They reported a Letter-to-

the-Editor in Beirut's *Al Nahrim* newspaper, written by the paper's editor from 1949-1998. It was directed to Saddam Hussein:

> Letter to Saddam Husayn: Resignation Is More Honorable… Mr. President: No anti-war demonstration attracting 500,000 Arabs took place in any "Florence" in our miserable Arab world! Did you ask yourself why? Because the 500,000 people who might dream of an ***Arab spring*** [emphasis added] are in prisons, your prisons and the prisons of the regimes that hastened to save you -- or this is what they claim -- from a war we still believe is only on hold. (Tuwayni, 2002)

In 2003, George Packer published in the *New York Times*: "The [Iraq] war, which is vastly unpopular in the Arab world, is far more likely to improve the fortunes of the Islamists, and provoke governments to tighten their grip, than to ventilate the region with an Arab spring" (Packer, 2005, Section 6; Column 1; Magazine Desk; Pg. 44). In the academic literature, we found Hofheinz (2005) made first use of the term in that domain:

> After decades of political stagnation, in early 2005 new winds of hope
> were felt in the Middle East, accompanied by a new catchword making
> the rounds in the American media, »Arab spring.«. (p. 78).

As would be expected, other authors in other literatures took credit for inventing the term. Six years later, Lynch (2012) writes: "Arab Spring—a term I may have unintentionally coined in a January 6, 2011 article (Lynch, 2011)." Giving it a different ideological twist, was Islamist parties' electoral success following protests in many Arab countries, leading to morphing of the term into the "Islamist Spring" or "Islamist Winter" (Maher, 2012; Cofman Wittes, 2012).

Furthering the meaning entropy, Massad (2012) stated on Al Jazeera that the "Arab Spring" was "part of a US strategy of controlling [the movement's] aims and goals and directing it towards American-style liberal democracy." Such an orientation is consistent with this papers' first author'sknowledge gained while offering a workshop on new methods in electoral and communication research sponsored by the former United States Information Agency (USIA) in 1998 at a think tank in Amman, Jordan. He became aware of the causal reasoning chain U.S. policy makers held, beginning more than a decade before the Arab Spring, in supporting Internet growth in the region: more Internet development in Arab countries → more development of civil society → more democracy. More recently, scholars have concluded that that Internet development has generally increased democratic processes (Bentivegna, 2006).

Exploring whether there was scientific evidence for the efficacy of this 1990s policy reasoning in the Arab region by analyzing data from regular six-month global robotic Internet sweeps Danowski (1999) found , that from 1996 through 1999, as the number of Internet hosts in 18 Arab countries increased, there were significant increases in occurrences of 'civil society' on their Websites three years later, but rendered in English. During, 2000-2008, this three-year lag reduced to 2 years. Egypt was most successful in developing a multi-faceted policy, including a plan to create in every village a communication technology center to foster growth of civil society (Kamel, 2010).

The third phase, 2009 and 2010, showed a ten-fold growth of Internet hosts across the Arab region. Gone was the lag for increases in 'civil society.' Now its increases were simultane-

ous with Internet growth (Danowski, 2010a). Perhaps more importantly, 'civil society' was now expressed, not in English, but almost exclusively in Arabic (in Farsi in Iran).

Seeking to understand the implications of this linguistic shift was a main motivation for the current study, which began in the fall of 2010 before the emergence of the Arab Spring. We question whether the processes of symbol/referent morphing of "Arab Spring" that we highlight in the introduction may have occurred less visibly but perhaps more significantly for 'civil society,' intensively discussed for decades in scholarly and policy literature regarding possible changes in Arab socio-political systems. This research investigates whether there have been transformations in the meanings of 'civil society' as associated with the early Arab Spring. events.

Scholarly definitions of civil society are varied, but one of the more common notions in Western social science literature is that civil society is constituted by the voluntary associations of people, in formal and informal organizations, groups, and activities that bridge government organizations and individual citizens (Putnam, 2000; Center for Civil Society, 2005-2006). Noting the uncertainty in Arab countries regarding meanings of the term, Yom (2009):

> attacks the "civil society" thesis, a prevailing assumption of political analysis toward the Arab world today, which argues that vigorous civic activism can generate democratic regime change. First, analysts have reached little consensus in defining civil society in the Arab context. Second, the recent expansion of associational sector is more a function of autocratic rulers' strategy of controlled liberalization rather than its objective weakening, which means that Arab states remain robust in their will and capacity to repress. Ultimately, observers should exude caution in their endorsement of civil society as the answer to stubborn authoritarianism in the Middle East. (p.1)

Literature Review
Islamist Activism and Social Movement Theory

Social movement theory has only recently been widely applied to Islamist activism. Previously, the bridge from Western social movement theory and research to scholarship on Islamic activism was for the most part effectively blocked. Kurzman (2002) presents a detailed treatment of both sides of the chasm, noting fundamental differences as well as their parallels:

> Both fields adopted similar approaches to their subjects, emphasizing the grip that social forces had over them, although these forces were inverted in the two fields: the weight of tradition was said to bear down on Muslims, and the lack of tradition was said to make crowds susceptible to contagion. (p. 289)

Many thought Orientalism (Said, 1979) was so fundamentally different from Occidentalism that no social theory developed on that side could reach it with overarching generalizations. Nevertheless, Snow and Marshal (1984) argued against this contention, proposing theoretical justifications for Islamic activism's incorporation into social movement theory. Yet, nearly twenty years later, Wiktorowicz (2002) was still calling this linking "…a new direction for research." (p. 187)

Convergence of Communication Technologies as Causal Agents

We propose that the evolution of communication technology is the major reason why the traditional Occidental and Oriental chasm is being bridged by linkages connecting Islamic activism with social movement theory and other social science concepts developed primarily in North America and Europe. As ICTs have become increasingly distributed across the globe in access and use, commonality of concepts and perspectives result from the standardization of hardware and software of these communication technologies.

Furthermore, as the same kinds of social media are used across globally dispersed societies, use of these technologies creates effects on social behaviors and networks, sentiments and emotions, and cognitions and knowledge. While these are perhaps modified to some extent by cultural practices, ICTs are likely to produce increasing commonality across societies for the kinds of variables that are the effects of this communication technology use.

Nevertheless, while it is evident that increases in societal commonality have been preceded in time by the implementation and use of new media, thus fulfilling necessary, although not sufficient, conditions for evidence of communication technologies' causal influences, there may be rival explanations that research has yet to rule out. It appears, however, that it is difficult to isolate possible rival explanations from the so fundamentally imbedded changes in communication over the past 25 years of Internet and Web diffusion. Yet, there remains a large global digital divide such that less developed countries have less developed ICT infrastructures.

Despite this fact, societal elites, regardless of the current level of development of their communication infrastructures, are widely observed to have greater access to the global Internet and Web. At the same time, elite social strata are most likely to produce social movement leaders and activists due to the needs for communication skills that higher education systems foster. In short, communication technologies are likely agents of increased global commonality, theoretical convergence, and social movement emergence. The literature review that follows provides further support for these arguments and evidence for the proposed causal forces of the convergence of communication technologies associated with these processes.

Revolution Theory and the Web

As the Arab Spring emerged it was common for observers to refer to it as a revolution. Revolutionary movements (Goldstone, 2001) do not typically begin as if from a sort of spontaneous combustion. Although sometimes a specific incident does ignite immediate large scale protests, even with existing wide-spread dissatisfaction with authority, unplanned street actions do not as a rule evolve into an ongoing movement without the involvement of activist organizers knowledgeable about managing uprisings (Alinsky, 1971).

Goldstone (2001) points out that current revolution theory focuses on, in addition to class conflicts and high levels of population dissatisfaction: 1) leadership and conscious agency, 2) ideology and culture roles to create and justify revolutionary objectives, 3) organizing strategy and tactics, 4) communication for managing revolutionary mobilization, and 4) contingency plans as revolutionary actions progress. In the current era, Web sites and pages appear to be the main media that house documents to support revolution.

As well, master narratives are needed to effectively channel popular dissatisfaction into concrete commitment and action (Jacobs, 2000). These narratives are created based on existing ideological content that includes concepts, assumptions, axioms, and proposed remedies to social

wrongs. Given the size of these ideological texts, in the current era such content is mainly available and maintained on relatively static Web pages. Among other uses, this content provides activist organizers with the means to communicate this ideology to educate potential recruits, including the use of social media to link with and spread this ideological Web-based material.

Web-based dogma is also the basis of motivational speeches to assemble crowds, and to create snippets that form slogans chanted and placed on signage. These Web-based documents contain the extensive and enduring political statements of groups actively involved in movements (Chen, Chung, Qin, Ried, Sageman, & Weimann, 2008; Kropczynski & Nah, 2011; Ackland & O'Neil, 2011). Social media generate rapid and widespread access to these fundamental Web documents and virally diffuse them, in addition to their movement management affordances.

Web Page Content and Social Movement Theory

Garrett (2006), in reviewing the literature on the roles of ICTs in protest movements, pointedout that activists have developed ways to frame ideological content and "shaping the language in which movements are discussed" (pp. 23-24). Garret further points out that preliminary evidence suggests that activist materials posted on the Web are often granted an air of authority previously reserved mainly for more traditional media outlets.

Ideological frames are theorized and empirically validated as crucial in movements, including religious movements (Snow, Rochford, Worden, & Benford, 1986; Snow & Benford, 1988). For movement members to become activated, alignment is required between the ideological frames articulated at the pinnacle of the movement network, and presented in formal content made available through the movement's media vehicles, and the psychological frames of individual members (Benford, & Snow, 2000). Communication media are essential to radical movements (Downing, 2001). The greater the extent to which such movements operate outside mainstream civil society, the more important are non-mass media. In the current era such media are primarily internet-based (Kahn, & Kellner, 2004).

Van Aelst & Walgrave (2002), in studying the anti-globalization movement, assert that websites may contribute to: movement formation, collective identity, actual mobilization, and enabling of a network of organizations. They posit that websites provide important information about social movement organizations': 1) organizational structure, 2) ideological positions, 3) specific issue focal points, and 4) shared frames of reference. Their study of seventeen hyperlinked Web pages finds that the Web sites appear to motivate actions, provide detailed information about actions, and reveal the network functioning of associated organizations. Web pages are a key way in which the ideological framing for a social movement are set forth in the era of new communication technologies.

New Media and the Social Movements of the Arab Spring

Research on 'social media' used during the Arab Spring uprisings (Lotan, Graeff, Ananny, Gaffney, & Pearce, 2011) surged following the Tunisia and Egypt uprisings. In the *Lexis Nexis* search results described earlier, non-scholarly communication observers used the term 'social media' more than any other communication term. Nevertheless, this catchphrase appears to have been based more on convex diffusion processes associated with fast-action herd behavior characteristic of new media environments (Danowski, Riopelle, & Gluesing, 2011), rather than on deliberative processes essential to classical diffusion (Rogers, 2010). It is not always clear how ob-

servers, particularly outside the scholarly communication research community, define 'social media.'

Within the scholarly community conceptual distinctions are made about various new media, but a review is beyond our scope. Consistent with that larger literature, however, some researchers investigating Arab Spring focus on concepts broader than "social media" (Tufekci & Wilson, 2012), such as on "new media" (Khondker, 2011), while others on "digital media" (Howard & Hussain, 2011), or the term ICTs (Allagui & Kuebler, 2011). As generally defined, "new media," "digital media," and "ICTs' would include both Web sites and pages. "Social media," distinguished by core performed on users' lists of friends, followers, or contacts, are typically labeled as "Web 2.0" (O'Reilly, 2009) to distinguish them from the non-social new media that include Web sites and pages, blogs, chatrooms, and discussion forums. These were fundamental to the Internet and Web before the emergence of social media. We expect that Web sites and pages in Arab and Muslim nations' domains contain content also important in the Arab Spring, particularly considering the revolution and social movement literature reviewed.

Research Questions

Several research questions follow from the theoretical literature reviewed, coupled with two other other elements. One is the causal reasoning chain U.S. policy makers appeared to hold, beginning more than a decade before the Arab Spring: more Internet development in Arab countries → more development of civil society → more democracy. The second is based on the findings of earlier research (Danowski, 1999; 2010a) that found a shift from 1996 through 2010 in how the concept "civil society" was expressed on Arab countries' Web pages. In 2009 and 2010 a tenfold increase in Internet growth across the Arab region occurred at the same time as a change in how 'civil society' was expressed. It was no longer in English, but almost exclusively in Arabic (in Farsi in Iran).

Accordingly, this research investigates whether there have been transformations in the meanings of the term 'civil society' on the Web associated with the Arab Spring that may be accounted for by social movement and revolution theory and research.   The research questions addressed are the following:

RQ1: After the early Arab Spring uprisings in the Middle East & North Africa (MENA) were there changes in Web page semantic associations among 'Jihad, Sharia, innovation, democracy, and civil society,' in MENA nations?

RQ2: After the early Arab Spring uprisings were there changes in the larger set of Muslim-Majority (MM) nations in their Web page associations among:'Jihad, Sharia, innovation, democracy, and civil society'?

RQ3: After the early Arab Spring uprisings were there changes in the network structure of Web domain-based hyperlinks among MENA and MM nations?

RQ4: After the early Arab Spring uprisings were there changes in Web-based semantic networks for 'Jihad' and associated concepts in the MENA and MM nations?

Definitions

1) Sharia: Islamic canonical law based on the teachings of the Koran and the traditions of the Prophet (Hadith and Sunna), prescribing both religious and secular duties and sometimes retributive penalties for law-breaking. It has generally been supplemented by legis-

lation adapted to the conditions of the day, though the manner in which it should be applied in modern states is a subject of dispute between Islamic fundamentalists and modernists. Origin from Arabic šarīʿa ; the variant shariat from Urdu and Persian.

2) Jihad: (among Muslims) a war or struggle against unbelievers. Origin from Arabic jihād, literally 'effort,' expressing, in Muslim thought, struggle on behalf of God and Islam.

Methods
Network Analysis

Social networks in relation to MENA uprisings have been of interest for more than twenty years (Denoeux, 1993). Most social network analysis (SNA) studies examine links among individuals as nodes. Nevertheless, network analysis using MENA nations as nodes has also been useful for studying their network of telephone call traffic (Danowski, 2000) and Internet development in relation to civil society development (Danowski, 2011). The current research includes network analysis of MENA and MM nations based on the number of hyperlinks (Park & Thelwall, 2003; Park, 2010; Barnett, Chung, & Park 2011) on Web pages in one nation's domain that are pointing to pages in another nation's domain. In addition, we analyze words as nodes for semantic network analysis using the same analytical framework to investigate changes in the semantic associations of the ideological catchword of "Jihad."

Research Design

Our design quantifies possible changes in the network structure and positions of MM nations pre- and post-early Arab Spring uprisings. This is a naturalistic pre-/post- treatment field experiment with no control group. We constructed our before and after measures from Web and *Lexis Nexis* data, with the early Arab Spring uprisings as our 'treatment' condition. We analyzed these data for changes in MENA and MN nations (n = 46) from a pre-early Arab Spring time of December 2010 and a post period of April 2011 to reveal possible changes in: 1) Web page associations among concepts of: 'Jihad, Sharia, civil society, innovation, and democracy,' 2) network indices of nations' centrality, indegree, and outdegree based on their inter-domain hyperlinks, 3) associations among these inter-MN nation network variables and their religious/political ideological terms associations, and 4) aggregate semantic networks across MM nations for 'Jihad'-centric two-step links gathered from all documents in containing both the term 'Jihad' and the name of each MM nation in *Lexis Nexis* databases: a) Major World Publications, b) Broadcast Transcripts, and c) BBC International Monitoring for the before period of September through December 2010 and the after period of January through April 2011.

This provides evidence of the possible effects of the early Arab Spring uprisings, most intense in Tunisia and Egypt, on these dependent variables. Because there is no control group, however, there may be other causes besides the experimental treatment in explaining observed changes over time in the pre- and post-treatment measures. Nevertheless, to rule out explanations that differences in Internet development across the nations was a factor, we do create additional statistical controls for nations' Internet development: 1) number of hosts, 2) number of Web pages, and 3) number of Internet users. Nevertheless, this design cannot rule out other rival explanations.

Data Set One

Data Set One focused only on MENA countries and gathered Web data from their top-level Internet domains (tlds) in December 2010 and again in April 2011. Two kinds of data were collected: 1) inter-nation top-level domain hyperlinks, and 2) associations among the relative frequencies of the terms: 'civil society, innovation, democracy, Jihad, and Sharia.' Pilot research earlier in 2010 (Danowski, 2010b) found 'Jihad' and 'Sharia' were strong consistent correlates of 'civil society' and 'innovation' in Arabic and Farsi. So we included the term 'innovation' in this study. We measured only at the post-period: 'infidels,' 'martyrs and a combination of the following terms on an individual Web page: 'civil society,' 'democracy,' 'Jihad,' 'infidels,' 'Sharia.' We used this additional search term where these five terms all occurred on the same Web page because it indicates higher validity for the indication of possible ideological connections about among the terms written by the Web page creators. It serves as a validity check on the measures of change, were we replicated the same search term approach for the post-period as we did in the pre-period. This was important because we intended to perform a statistical analysis of the terms to see if they loaded on a single dimension in factor analysis and which term might be the highest loading one for subsequent use as the indicator of the underlying dimension.

Each nation of the world has a unique top-level domain name, such as .eg for Egypt or .dz for Algeria, and most Web pages and other Internet information is coded for that domain name. Table 1 shows the TLDs for each MENA and MM country (for Data Set Two) along with the total number of 'Jihad' Web pages, logged counts values (used in Data Set Two), and number of Google Web pages.

Inter-MENA Web domain networks. To measure possible changes in the centrality of various nations in the inter-MENA network, we extracted counts of the total number of Web pages in one country TLD that linked to Web pages in another TLD. These are the Webometric hyperlinks referred to earlier. For the MENA nations the number of these directed pairs of TLDs was 126 (pairs = n (n-1) or 18*17). We used the Yahoo Applications Programming Interface (API) to provide our hyperlink data among TLDs. From these data we ran social network analysis (SNA) software to index each nation's s total Web link indegree (number of incoming links), outdegree (number of outgoing links), and a measure of centrality, flow betweenness. The LexiURL tool (http://lexiurlsearcher.blogspot.com/) converted the Yahoo API results to a matrix format for SNA. Unfortunately, this Yahoo service was discontinued shortly after our data collection was finished in April 2011.

Network Analysis of Inter-Domain Hyperlinks. The SNA program Ucinet version 6.328 (Borgatti, Everett, & Freeman, 2002) enabled importation of these hyperlink matrices and computation of statistics for indegree, outdegree, flow betweenness centrality, and network graphics in the companion program, NetDraw (Borgatti, 2002). For the 2010 MENA network the median was 56 directional links and for the 2011 network was 88 directional links, showing a significant increase in linkage associated with the early uprising period (Chi^2 = 7.11, d.f. = 1, two-tailed p < 0.008). We dropped links below the median so the reader can better see structural differences in Figures 3 and 4. Nevertheless, when we computed the quantitative indices of structural differences using Ucinet we used the full ranges of data, not just those above the median. For graphs, NetDraw creates a layout of nodes based on the standard "spring embedded" algorithm.

Web term searches. Google Translate provided the country-specific search terms, which were checked for accuracy through back translation. This enabled searches for Web terms con-

ducted in Arabic, Farsi, and in the dominant languages of each MENA nation (and later in Data Set Two for MM nations). The words and phrases were encoded in UTF-8 format so that the characters were exactly as represented as in the standard encoding of the languages. Here is a search term example in Arabic:

site:.tld طسوألا قرشلا صنلا تنب

The 'tld' stands for the "top-level domain" of each. If the search term was a phrase, such as 'civil society,' we entered it into Google Translate with quotes around it so that the resulting translation contained quotes in the proper locations. This enabled finding when the two terms co-occurred directly next to one another in the text, rather than appearing anywhere on the page. After each search, Google displays an estimate of the total number of Web pages in the TLD that contain the search term(s). We entered these totals into an Excel spreadsheet for eventual reading into SPSS version 19 for statistical analysis.

Reliability. The authors previously conducted reliability testing on the Google results at different times of the day and night and on different days. There is consistently a correlation at r =.97 or higher in number of pages returned over different test searches. Some of the residual variance is probably not error but due to the fact that the actual number of pages had changed based on intervening Google Web crawling.

Normalization of Web term counts. Each of the Web term(s) counts is non-normal, as is characteristic of frequency counts of communication data. We performed the natural log (ln) conversion on each count variable to rescale it to be more normal, because parametric statistical techniques we used have the assumption that the variables have normal distributions. Nevertheless, correlations have been shown robust with non-normality.

Internet development control variables. Indicators of Internet development in each MENA nation were the: 1) number of users, 2) number of Web pages, and 3) number of Internet hosts. We used the logs of these three as statistical controls in partial correlations in examining the main relationships under study. This removed differences in the Internet development of nations from the computed partial correlation coefficients.

Internet Systems Consortium (http://www.isc.org/solutions/survey) robotically collects host data every six months and indexes the host counts for TLDs. Google provides the total number of Web pages in a TLD when the search term: 'site:.tld' is entered. The International Telecommunications Union (ITU) (http://www.itu.int/ITU-D/ict/statistics) provides the number of Internet users per TLD and the number of Internet hosts per TLD.

Cronbach's Alpha reliability coefficient was.61, not sufficient to form a reliable scale. We therefore used each of the three variables together as controls in partial biserial Pearson correlations.

Data Set Two

While the first data set focused on the 18 MENA countries that have Internet hosts, the second data set included all countries in the world that have majority Muslim (MM) population (CIA World Factbook, 2010). There are 47 such countries, but Kosovo has no top-level Web domain, which leaves 46 MMs nations for analysis.

Internet-MM networks. In December 2010 and again in April 2011 we extracted directed Web hyperlinks among each of the 2,070 pairs of countries' TLDs (pairs = n*n-1, or 46*45). For this data set we weighted these indegree and outdegree links by the log-normalized relative ratios of total pages containing 'Jihad' to the total number of Web pages in the MM na-

tion TLD. This 'Jihad' weighting gave us a more ideologically-specific inter-MM nation network analysis.

Flow betweenness centrality. We used the flow betweenness metric (Freeman & Borgatti, 1991) to index how central each nation was in the network. Borgatti (2005) has pointed out that for communication data this metric is more fitting to the assumptions than is the commonly but incorrectly used Freeman's (1979) original betweenness centrality measure.

MM 'Jihad' Web Pages. Using the same method as in Data Set One, searches were performed in April 2011 for each MM nation. Although there may have been changes in the number of 'Jihad' pages from pre- to post-periods, we developed this method only for the post-period measures. Nevertheless, our base network indegree and outdegree were measured at the two different points in time. Because the 'Jihad' ratio weights were applied to both time periods, this makes it more difficult for any differences in the network structures to be identified from pre- to post-periods. This reduces the likelihood of finding significant changes in the weighted network structures from pre- to post-periods, in other words, it stacks the cards against us to any changes found in the weighted networks are even more substantial..

In Google searches, we entered the translated linguistic term for 'Jihad' and the top-level country domain TLD code to obtain the number of Web pages, discussion forum posts, and other Web content that contains the term. For example, the following is the search input to Google for finding the total number of 'Jihad' Web items in Kazakhstan where Russian is an official language, and state language of Kazakh is less used. Russian is used 95% of the time for everyday interethnic communication:

Джихад site:.kz

This search term revealed that the total number of Web items containing 'Jihad' in Kazakhstan in Russian was 79,800 (in early May 2011) out of a total number of Web pages of 278,000,000.

The 'Jihad' counts for each MM TLD were log transformed, as were the total number of Google pages, and a ratio was computed to yield the normalized proportion of 'Jihad' Web items. The 'Jihad' ratios and the three network measures were used to create three scales: 1) multiplying the 'Jihad' ratio times indegree, which reveals the nations with the highest amount of Web Capital (Danowski, 2006); 2) multiplying the inverse of the 'Jihad' ratio times outdegree, which shows the nations more likely to be seeking Web content from other nations while having the least amount of their own internal 'Jihad' content; and, 3) multiplying the 'Jihad' ratio times flow betweenness centrality to reveal those nations with the most network power combined with most 'Jihad' Web items.

Table 1 shows that Iran has the largest number of 'Jihad' Web pages, 28 times more such pages than the next highest country, Turkey. The Jihad orientation of Iran is consistent not only with its Islamist State ideology but with its support of Islamic Jihadist terror groups in various parts of the world (Byman, 2013). Given its total Web pages is somewhat lower than a few other MM countries -- Kazakhstan, Azerbaijan, Indonesia, Malaysia, Uzbekistan, and Turkey -- Iran still has the highest ratio of log-normalized 'Jihad' to total Web pages. Turkey, Indonesia, Syria, and Kuwait round out the top five MMs nations with the highest 'Jihad' ratios. Having no 'Jihad' Web page hits are Uzbekistan, Turkmenistan, Burkina Faso, Somalia, Niger, and Guinea, the last three of which also have relative few total Web pages.

Table 1. Key to Top-Level Domains (TLDs), 'Jihad' Pages, Google Pages, and Logged Values

TLD	jihad pgs	Google pgs	ln(jihad)	ln(pgs)	Ratio
Ir	8609000	77200000	15.97	18.16	0.88
tr	309000	112000000	12.64	18.53	0.68
id	227000	175000000	12.33	18.98	0.65
sy	173000	4780000	12.06	15.38	0.78
kw	169000	18500000	12.04	16.73	0.72
my	81900	142000000	11.31	18.77	0.60
kz	79800	278000000	11.29	19.44	0.58
az	77800	197000000	11.26	19.10	0.59
ma	69900	37000000	11.15	17.43	0.64
sa	47500	7470000	10.77	15.83	0.68
qa	46200	5300000	10.74	15.48	0.69
ae	37400	28200000	10.53	17.15	0.61
eg	20600	4111000	9.93	15.23	0.65
kg	17800	41400000	9.79	17.54	0.56
bd	15200	9580000	9.63	16.08	0.60
pk	14400	32600000	9.57	17.30	0.55
lb	9150	8430000	9.12	15.95	0.57
mv	7520	6270000	8.93	15.65	0.57
af	6600	1110000	8.79	13.92	0.63
jo	5950	9310000	8.69	16.05	0.54
ng	4860	21300000	8.49	16.87	0.50
om	4290	3700000	8.36	15.12	0.55
dz	3630	12900000	8.20	16.37	0.50
sd	2320	2050000	7.75	14.53	0.53
ly	2030	12300000	7.62	16.33	0.47
sn	1690	3490000	7.43	15.07	0.49
bn	1320	2500000	7.19	14.73	0.49
bh	1080	4820000	6.98	15.39	0.45
iq	1070	1290000	6.98	14.07	0.50
tj	972	9160000	6.88	16.03	0.43
al	932	11600000	6.84	16.27	0.42
tn	753	10900000	6.62	16.20	0.41
ye	435	465000	6.08	13.05	0.47
mr	416	616000	6.03	13.33	0.45
gm	180	1400000	5.19	14.15	0.37
dj	136	1230000	4.91	14.02	0.35
ml	8	182000	2.08	12.11	0.17
td	7	4680000	1.95	15.36	0.13
sl	7	550000	1.95	13.22	0.15
km	2	10600	0.69	9.27	0.07
uz	0	119000000		18.59	
tm	0	3140000		14.96	
bf	0	1470000		14.20	
so	0	832000		13.63	
ne	0	244000		12.40	
gn	0	2980		8.00	

Considering the MM nation index values for: 1) high indegree coupled with high 'Jihad' page ratios, and 2) high flow betweenness centrality coupled with high 'Jihad' Web page ratios. Lebanon has the highest indegree weighted value, in part because of the strong link from Kuwait. Kuwait itself has the next highest rating, followed by United Arab Emirates, Oman, Bahrain, Turkey, and Libya. Scoring highest on the flow betweenness centrality index weighted for 'Jihad' page ratios is United Arab Emirates, followed by Saudi Arabia, Egypt, and Iran. MMs with high outdegree, linking a lot outward to other MMs but with internal 'Jihad' ratios to total Web pages are Comoros, Sierra Leone, Djibouti, Chad, Tunisia, Mali, and Tajikistan. Figure 1 shows the network graphic representing indegree multiplied by the 'Jihad' content ratio. The size of the nodes reflects this metric. Iran has the highest Jihad centrality.
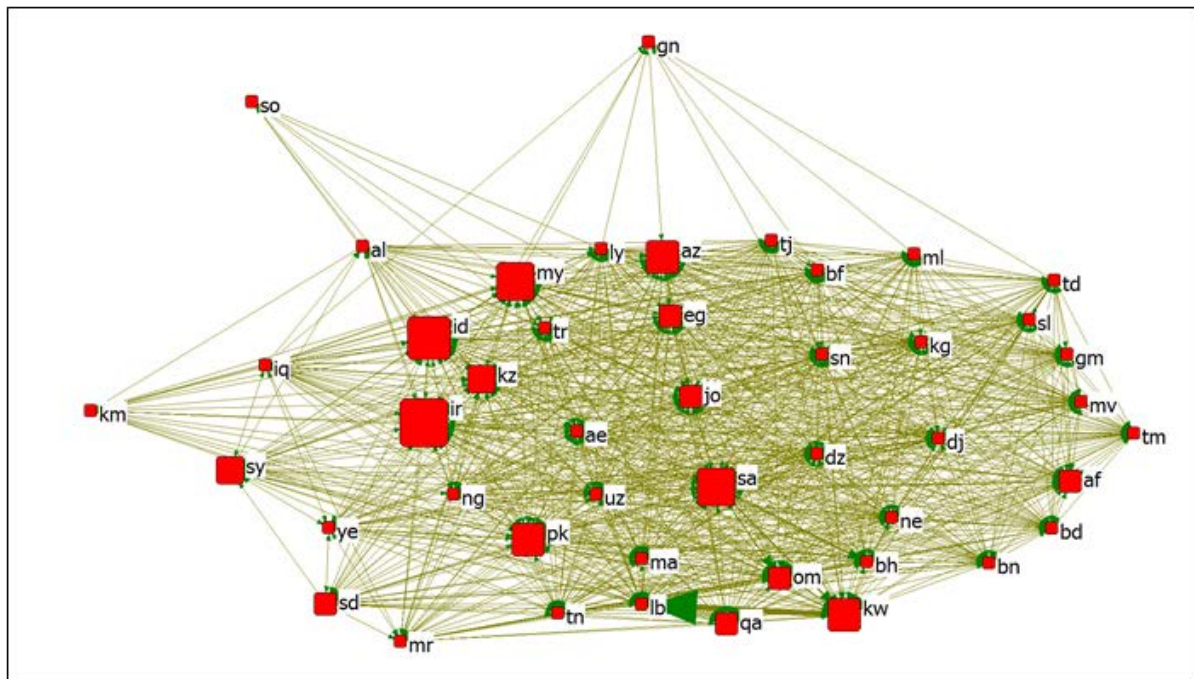

Figure 1. Web Interlink Network Showing Degree of Jihad Web Capital

Web page word associations. As is the case for Data Set One, we also measured for Data Set Two at both the pre- and post- time points the frequencies of the following terms in each MM nation's Web domain: 'civil society, Jihad, Sharia and innovation, and democracy.' We added to the post period for separate analysis the terms 'infidels, martyrs,' and the combination of the following terms on an individual Web page: 'civil society, democracy, Jihad, martyrs, infidels, and Sharia.' Factor analyzing these various term variables, we found that they loaded on a single factor. This indicates that they were all measuring a single concept, in this case, Islamist ideology. Because we observed that the single term 'Jihad' was the highest loading term on this single dimension, and therefore a valid and reliable indicator of it, we used it for the MM portion of the analysis to represent all of the other terms.

Data Set Three

We gathered the third data set to provide a basis for examining the word-centric networks surround the concept of 'Jihad' among all the MMs, and searches of Lexis Nexis Major World Documents and BBC International Monitoring databases captured the full text of each item containing 'Jihad' for each of the MMs in the pre- and post-periods for the beginning of April Spring as seen in the revolutions in Tunisia and Egypt. Figure 1 shows the distribution of documents source types. In both of the pre- and post-period measurements there were 46 Boolean searches for documents containing both 'Jihad' and the name of each MM nation. This enabled a semantic network analysis for each period.
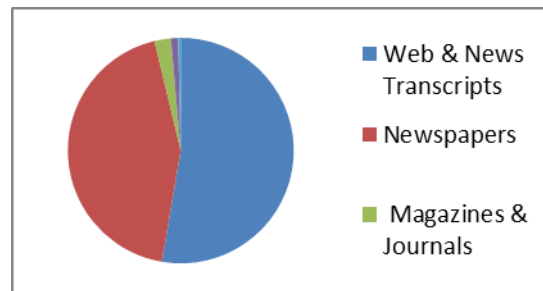

Figure 2. Distribution of Lexis Nexis Sources Used

Semantic Network Analysis. WORDij (Danowski, 1993; 2010c; 2011) performed proximity-based extraction of word pairs for semantic network analysis. We also retain the word pair order, in other words, the directionality of their link. The sliding proximity window stops at each word in the document, and the software pairs the words within three words on either side of each word, stopping at the end of each sentence and restarting the window counts for the next sentence. It keeps a running tabulation of directed word pair counts.

Such a directional proximity approach is most useful for representing social meanings of terms because it retain information on the sequences of all word pairs throughout the full texts. Syntax is imbedded in the semantic relations because these rules determine acceptable word order in the language. If, for example, one desires to create optimal messages for an information campaign within the linguistic domain from which the text corpus is collected and analyzed, by finding the shortest network path strings linking a seed word to a target, the software automatically produces strings that typically sound almost like a grammatically correct sentence (Danowski, 1993; 2010c).

In contrast, the alternative "bag of words" approach has been found useful for quite different applications than mapping aggregate meaning, most frequently in the field of library and information science -- information retrieval (IR) -- to find documents in a database that match a set of search terms. That goal is not mapping semantic domains but strategically extracting documents with the minimal required search terms and minimal representation of text word representations. Typically a Euclidian vector-distance model based on coding each document with a single vector containing word counts, i.e. "a bag of words" not based on proximity or directionality makes for efficient coding and retrieval, rather than a linkage-based network model.

In this research, because we did directed proximity-based semantic network analysis, we were able to do word-centric network analysis for directed two-step word links around 'Jihad,'

first in the benchmark period, then during the initial period of Muslim Middle East uprisings through April 30.

Results

Change in Centralization of Inter-MENA Nation Networks

For 2010, the MENA top-level national domain interlink network for directed links above the median of 56 in the pre-period appears in Figure 3. The 2011 network, having a higher median of 88 directional links, is shown in Figure 4. The result is that in 2010 a slightly denser network appears than in 2011, which was borne out by the numerical computations of network centralization using Ucinet. The actual change, although small, increasing from 18% to 21% was statistically significant at $p < .05.$. This suggests that the uprisings were associated with increasing centralization of the network.
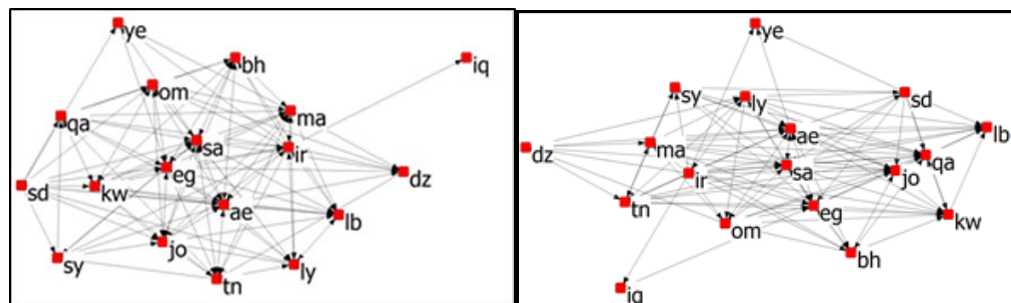

Figure 3. MENA Web Interlink
Network for June 2010

Figure 4. MENA Web Interlink
Network for April 2011

Changes in Web Terms Associated with Inter-MN Nation Networks

In the 46 Muslim majority nations, an increase in 'innovation' from 2010 to 2011 was significantly negatively associated with increase in indegree ($r=-.53$, $p <.02$). In contrast, increase in 'innovation' from 2010 to 2011 was positively associated with an outdegree increase from 2010 to 2011 ($r=.45$, $p <.05$). This finding means that if Web authors in a MENA nation's domain are increasing their focus on innovation, they are also increasingly linking their Web pages to those in other MENA nations. At the same time, as increases in innovation focus occur in a nation, fewer other MENA nations are increasing their links back to them. Innovation increases, therefore, create an outward- directed orientation in linking to Web pages of other MENA nations.

Changes in Web Meanings in MENA Nations

The Arab Spring uprisings through April 2011 are coincident with some noteworthy statistically significant findings. Not surprisingly, an increase in 'Jihad' from 2010 to 2011 is positively associated with an increase in 'Sharia.' 'Jihad' increases are positively associated with an increase in 'civil society' from 2010 to 2011. At the same time, an increase in 'civil society' is positively associated with an increase in 'Sharia' from 2010 to 2011. These change associations among the variables further substantiate that the concept of civil society in Arabic (and Farsi) has become increasingly linked with Islamist political/religious in Arab Spring. In the introduction section of

this article we explained why ideological frames for revolutionary activities are likely to be encoded on Web pages. The meanings for civil society are different than those in the Western social science and public policy literature.

Changes in Inter-MN Nation Network Variables and Web Terms

An increase in 'Jihad' from 2010 to 2011 is positively associated with an increase in outdegree from 2010 to 2011 ($r=.66$, p <.004). As an MN nation increases its focus on 'Jihad' on the Web from before to after the early Arab Spring uprisings, its outbound linkages to other MM nations increase. The absolute amount of 'Jihad' focus in 2010, however, is negatively associated with an increase in outdegree from 2010 to 2011 ($r=-.57$, p <.01). In other words, those MN nations in 2010 that were already higher in 'Jihad' focus did not increase in outdegree, while MN nations in 2010 with a lower level that moved higher in 2011 did increase in outdegree. This change is associated with their establishing Web links to more MN nations during and immediately after the early uprising period.

As well, an increase in civil society from 2010 to 2011 is positively associated with an increase in outdegree from 2010 to 2011 ($r=.49$, p <.03). The combination search term of: 'Jihad, infidels, Sharia, civil society, democracy' all in the same MN Web pages is positively correlated with 2011 flow betweenness centrality as well as an increase in flow betweenness centrality from 2010 to 2011. ($r=.48$, p <.04; $r=.44$, p <.05). Because network centrality is associated with power in the SNA literature (Wasserman & Faust, 1994) this reflects increasing agentic Web capital (Danowski, 2006) and power for MN nations with this combination of Jihad-related concepts.

An increase in indegree from 2010 to 2011 is negatively associated with an increase in outdegree from 2010 to 2011 ($r= -.52$, p <.03). This pattern when coupled with findings discussed earlier indicates that MN nations with a higher degree of democracy focus are being linked to less frequently by other MN nations. Taken together with the previous finding, this suggests that most MN nations have not taken action during the early uprising period to link more to other MN nations. Rather, it is a subset of MENA nations with the greatest increase in outdegree that are the most active agents. The MENA with the largest increase in outdegree is Oman with an increase of 248% over its 2010 level, followed by Iran with a 151% increase. The country with the highest increase in indegree was Iraq. In contrast, fewer MENA nations were directing links into the Iranian domain after the uprisings. The countries showing the largest increase in flow betweenness centrality were UAE, Egypt, Libya, and Sudan. These were the new network power agents at the time of the study.

Changes in Semantic Networks for 'Jihad'

The next type of SNA focused on the words in the documents. The word-centric analysis examined the directed proximate two-step links of words to 'Jihad' for 2010 and 2011 periods. The WORDij program was set to default parameters, including the three-word window and maintaining order of words within pairs. A standard drop list of stop words were removed, words such as articles, prepositions, and other function words that carry little semantic meaning. Word pairs occurring less than 50 times were dropped to enable clear views of the dominant structure of the networks. These networks are shown in Figures 5 and 6. Note that there are significantly more words after the early uprising period, 1613 compared to 520 in the pre-period ($Chi^2 = 560.079$, d.f. = 1, two-tailed p < .0001). The 310% increase for the Jihad network after the initial Arab

Spring events is evidence for a substantial boost in 'Jihad' linked to the 46 MN nations in Web, broadcast transcripts, and news stories, whose distribution is shown in Figure 1.

Figure 4. Jihad-Centric Network in Late 2010 Period

Figure 5. Jihad-Centric Network in Early 2011 Uprising Period

In terms of structure among the words, in 2010 the mean indegree for word nodes is 55.0 links and the network centralization is.68%. By the 2011 observation period, mean indegree increased to a mean of 105.5, nearly doubling, with centralization dropping to more than a third of the value at.20 in half to.12%. These results indicate that the early uprising period had network results consistent with crisis effects, an increase in communication but less structured (Greenberg, 1964; Danowski & Edison-Swift, 1985). The crisis effect continued with the post-bin Laden period with a further major decline in structure in the network. Because the time period for the latter measurement was shorter than for the other two measurement periods, this network is not presented and analyzed here.

The words paired with 'Jihad' that significantly increased based on z-tests for proportions (the relative frequencies of words) were all larger than p < .0001 from the pre-period to the early uprising period. These were: 'Website, voice, economic, Taleban, Pashto, year, leader, supreme, and alkhazin.' Accounting for most of these references were numerous documents from the Website: Voice of the Taleban, and from a publication, 'Jihad' Al-Khazin. As well, Iran declared an "Economic Jihad Year."

Those words paired with Jihad that significantly decreased from the pre-April Spring to the post-period were: 'group, movements, groups, Islamic, monotheism, Alqaidah, organization, Afghanistan'. A reason for this is that there is considerable material from London-based newspaper *Al-Quds al-Arabi* in a report on Jihadist Salafism which made numerous references to the Egyptian Islamic Jihad Group led by Ayman al-Zawahiri, and various other Egyptian Jihadist movements. This, however, was a significantly reduced relative frequency. There is also a long *Pan-Arab* daily serialization: "other face" of Al-Qa'idah that made frequent reference to links between Al-Qa'idah and al-Zarqawi's organization, the Group of Monotheism and Jihad, which Al-Qa'idah eventually absorbed. These references, however, were in significant decline from the benchmark period.

From the early-uprising in 2011 to the immediate the post-Bin Laden period the words paired with 'Jihad' that had the top 10 largest significant increases were: 'Jews, crusaders, front, Egyptian, group, Bin, Laden, international, world, al.' There are many historical references to the group Bin Laden formed: "The International Islamic Front for Jihad Against Jews and Crusaders," an umbrella group that called for the killing of Americans including civilians. The many references to 'Egyptian' and 'group' were primarily in the context of stating that Dr. Zawahiri joined his group Egyptian 'Jihad' with Bin Laden's Al Qa'idah organization.

The 10 most significantly most decreasing words were: 'voice, Website, economic, year, Afghan, Palestinian, fight, resistance, and country.' There were fewer reports from the Voice of 'Jihad' Website of the Afghan Taleban. The 'economic Jihad' references were connected with Iran's President's conflict with the Majlis, forming tensions that were not considered in the spirit of the "Economic 'Jihad' Year." After the Cairo Accord meetings on Palestine on May 10, there was less reference to Palestinian and Hamas 'Jihad' against Israel. There were fewer references to statements of Prof. Borhanoddin Rabbani, the leader of 'Jihad' and resistance of the people of Afghanistan and chairman of the High Peace Council, who had talked about a lasting peace in Afghanistan in the previous few months.

Discussion
Summary of Key Findings and Interpretation

Noteworthy findings included evidence that in the MENA nations the early uprisings were associated with increases in radical Islamist concepts in their Web domains. Our conceptual basis for this research highlighted the notion that ideological content is important for developing narratives for recruitment and mobilization of protests.

An index construction stage of our research yielded the result from factor analysis that term 'Jihad' was the highest loading term on a single ideological dimension. This finding of a unitary ideological construct linking 'civil society, democracy, innovation, Jihad, Sharia, infidels, and martyrs' in nation's web pages is theoretically significant in light of the nearly two decade push of the West to develop the Internet of the MENA region under the assumption that this would lead to development of the civil society and, in turn, democracy. We observed that the once English-language rendering of terms including 'civil society and democracy,' were translated by MENA Web content creators into indigenous languages during the 10-fold spike n internet development in 2009 to 2010 just prior to the Arab Spring, meanings for the terms in the indigenous languages were very different than anticipated in Western scholarly literature and political policy. Our statistical index construction procedures found that the terms had been transformed into meanings strongly associated with the Islamist ideology terms Jihad, Sharia, and others. This brings back into focus our discussion at the beginning of this article about the morphing of media catchphrases such that they often develop unexpected referential links outside the domain of the original concept's referents.

This finding reveals an unintended consequence of the U.S. and other Western nations' policies regarding civil society. Internet development in the MENA region did indeed appear to lead to greater recognition of the importance of the concept of civil society in these Arab nations but in very different terms than understood within the Western conceptualizations. A corresponding new development in moves toward democracy were that these were driven not by Western liberal secular notions but by radical Islamist ideology. 'Democracy' in Arabic Islamist discourse, for example, appeared to take on the meaning of overturning existing non-religious regimes to convert them to Islamist states operating under Sharia law and waging Jihad against infidels.

Our findings that MN nations with a higher degree of democracy focus were linked to less frequently by other MN nations after the early Arab Spring merits discussion. Most MN nations had not taken action to link more to other MN nations during the early uprising period. Rather, it is a subset of MENA nations with the greatest increase in Jihad-weighted outdegree that became the most active agents emerging after the early Arab Spring in their Web-related linking behaviors. At a conceptual level, this suggests support for the proposition that geographic proximity makes a difference in the spread of social movements. The logic is that proximity increases the likelihood of face-to-face interaction. Contagion of communication message content is most effective through face-to-face contacts, compared to mediated interactions, particular when the participants are geographically dispersed.

Two MENA nations had the largest increase in Jihad-weighted outdegree: 1) Oman with an increase of 248% over its 2010 level, followed by 2) Iran with a 151% increase. The tripling of entropy in the Jihad semantic network domain we found may help in understanding this pattern, which may possibly be seen as paradoxical. On the one hand, Oman had citizens join in Arab Spring protests against their government. On the other hand, Iran struggled to suppress their own 'reverse' Arab Spring in 2010, when large scale and long running protests threatened its Is-

lamist state. We call this a reverse Arab Spring because for the most part the other Arab Spring activities resulted in the further ascendance of Islamists. At the same time, Iran was said to be interested in supporting Arab Spring against non-Islamist regimes. The implications of being caught in this high level contradiction may explain why Iran became more centrally positioned in the Jihad-weighted outdegree hyperlink Web page network. It both wanted to become more supportive of Arab Spring uprisings against what it perceived as Western-backed regimes, yet be strong in suppressing any renewed insurgency in Iran. Greater Jihad outdegree may explain both if the repositioning was used to serve dual purposes. Whatever the actual purposes, higher outdegree generates more Web capital, in this case about Jihad.

The fact that other MENA nations reduced their linkage into Iran's Web page domain may be because Iran had lost credibility because of its contradictory Jihad-Arab Spring association. The country with the highest increase in Jihad-weighted indegree was Iraq. Future research may find good explanations for this phenomena. We hypothesize that because Iraq had continuing internal violent clashes between Shia and Sunni Islamist radicals for control of the state apparatus it may have been a credible and convenient source of information about how other activists might develop more effective strategies under conditions of continuing conflict if uprisings were not fully successful.

Among MENA nations, Iran is consistently in the top 2 positions in flow betweenness centrality, a measure of power in the network. Showing the largest increase after the early Arab Spring were the UAE, Egypt, Libya, and Sudan. Among MN nations, Somalia made an extremely large move upward across the three periods. All of these other countries had intensive uprisings except for the UAE. Nevertheless, protests against the UAE government began in early 2011 and continue. The UAE could be a site for a future Arab Spring uprising of consequence (Davidson, 2012).

Overall, the MN nation network increased in link strength and indegree but became less structured (more entropic network) after the early uprising period. These results are consistent with crisis effects (Danowski & Edison-Swift, 1985). The MM nations with the highest 'Jihad' Web capital were Lebanon, with nearly four times the index value of the next nation, Kuwait, followed by the United Arab Emirates, Oman, Bahrain, Turkey, and Libya. Countries with increasing flow betweenness centrality became more powerful in the network relative to other countries. To the extent these countries share the Islamist political ideology that this research found to increase in strength after the early uprisings, we can expect this network agency to promote these concepts more to other MN nations. Because of the network positions of power that comes from their centrality, their actions are predicted to be more effective than those of other MN nations.

The semantic network analysis of 'Jihad' provided a rich picture of the dominant meanings for this single strong predictor of Islamist ideology, and how the meanings changed from before to after the early Arab Spring. These results suggest that meanings became more diverse. The number of words linked with 'Jihad' within two-step links more than tripled. In semantic network complexity terms, this means more semantic discrimination in the domain. The Islamist ideology meaning domain expanded. It encompassed a larger portion of the global network of t Muslim majority nations and 'Jihad. The overall network also became less structured – more entropic and disorganized. This means that the differentiation of the semantic network into groups of terms and the integration among groups decreased.

Although there can be a variety of different meanings held by individuals and groups within and across societies about Jihad, this kind of research focuses on the dominant central

tendencies across the MM nations, taking into account the distributions surrounding them, which includes variation and outliers across these nations. Nevertheless, there is no information about the variability in meanings inside particular countries, which some observers would consider a limitation of this approach.

The changes we observed in the semantic network for 'Jihad' during this time may be due to at least two major categories of causes. One is how Islamist organizations communicated about 'Jihad' on their Web sites, their broadcasts, press conferences and releases, and print outlets. The other possible cause may be how journalists reported events and developments and included the term 'Jihad.' Some of this coverage would be reporting on Islamist organizations with respect to 'Jihad.' Other reporting may reflect changes in journalistic framing of stories for reasons other than direct reports of Islamist actions and statements. Changes in framing would reflect changes in narratives about Jihad-related news that have become normative within the journalistic community. Government sources have been shown to have strong influence on media framing (Manheim, & Albritton, 1984).

The increased entropy may afford more semantic and rhetorical flexibility to those who create documents about Jihad, as they can write new things about it. As global media representations of 'Jihad' have become less clear, with a tripling of associated words, and increased entropy, this may make it easier for Jihadists to maneuver in the semantic domain in ways that make it more difficult for observers to quickly comprehend. At the same time, the increased entropy expands the potential for reorganization of the structure into innovative forms at later points in time. Future scientific observation of the semantics of Jihad in Muslim majority nations would reveal changes that may have occurred. Research that attempts to sort out media framing contributions versus Jihadist messages about their actions and ideology would be valuable in its contribution to communication theory and for its potential policy implications.

In conclusion, this study has opened wider a window to an area of theoretically-based linkage between ideology, Web media content, social media, traditional media, and the material-level conduct of the Arab Spring. Future research could examine whether the explanatory principles emerging from this study can generalize outside the network of Muslim majority nations and Islamist ideology. Research on a greater variety of social movements could test the heuristic power, parsimony, and generalizability to other contexts of the theoretical nexus of political disruption and new media literature from which we drew our research questions and interpretations of the results.

Acknowledgement

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