Examining political mobilization of online communities through e-petitioning behavior in WethePeople

Journal:	*Big Data & Society*
Manuscript ID:	Draft
Manuscript Type:	Original Research Article
Keywords:	Electronic petitioning, agenda setting, collective action, national policy, market basket analysis, social network analysis

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Keywords

Electronic petitioning, national policy, agenda setting, market basket analysis, social network analysis, community detection, collective action

Introduction

Over the past decade, electronic petitioning systems have become stable features of national governments in Scotland, Great Britain, Germany, and Australia. In September 2011, the Obama Administration introduced its own electronic petitioning (e-petitioning) effort with the inauguration of WtP (see https://petitions.whitehouse.gov/), a web-enabled system that gives individuals the opportunity to petition the US federal government for actions of the petitioner's choosing and to register signatures from supporters. Although popular from the outset, interest in WtP skyrocketed in November 2012 following the US

presidential election and continued into 2013, attracting thousands of petition initiators as well as millions of petition signers to the website. As of January 2013, over 5.4 million individuals had created accounts on the system, doubling the number of account holders since August 2012 (Phillips, 2013). Over 9 million signatures had been registered as of January 2013, up three-fold since August 2012, on over 140,000 petitions that have been initiated since the inception of the system. Of those, nearly 46,000 petitions appeared between August 2012 and January 2013.

Key to some of the interest in WtP is the Obama Administration's pledge to respond to any petition that attracts more than a threshold number of signatures within a 30-day period. In practice, a very small percentage of petitions achieve this goal. However, social and political advocates can focus attention on their issues by launching petitions that become popular and ultimately successful. WtP administrators encourage e-petition initiators to use the Web and social media to spread the word about their petitions and drive potential signers to the WtP website in hopes of achieving the threshold required for Administration's response. Further magnifying these efforts, popular petitions have come to be covered by the press, making it possible for an issue's audience to grow substantially.

Over the brief history of WtP, frivolous and silly e-petitions have been initiated, to the general entertainment of all. However, it is also possible to view government e-petitioning as a practice through which individuals ask government to take an action or make a decision that solves a problem or improves their lives; when petitions make such requests, they fall into the domain of public policy (Birkland, 2011). Indeed, e-petitions that make specific policy suggestions to government may be viewed as acts of

participation in problem identification, the initial phase of the policy making process. Soliciting petition signatures may be viewed as part of a further policy making phase, that of positioning a petition within the broader national policy agenda.

The data created through e-petitioning – petition texts, signatures collected over time, signers' characteristics (if available), and messages used by initiators to solicit signatures (tweets or other posts) – fall within the domain of "big data," as others have noted (Hale, Margetts, & Yasseri, 2013; Jungherr & Jurgens, 2010). This is partly because the data streams generated by petitioning behavior may be large and evolve rapidly. But beyond simple volume and velocity, e-petitioning data tracks human action of a relatively novel kind, representing digital traces or footprints that document the ideas, political and otherwise, that individuals have expressed and supported, rather than their recollections of behavior or responses to a researcher (Bail, forthcoming). Initiating and signing petitions, and related activities, are behaviors with the potential to elicit other consequential actions. For example, the Obama Administration has credited e-petitions launched in January 2012 with "crystallizing" their position on SOPA (Stop Online Piracy Act) legislation then under consideration by the US Congress (Phillips, 2012). E-petitioning research is a contribution to the new "computational social science," in which social and computer scientists partner to explore the social implications of the dissemination, patterning, structures, textual features, etc. of Internet-generated behavior (Giles, 2012; Lazer, 2009).

While not all e-petitions necessarily address policy issues, many of those created on WtP assuredly do. In this study, we conceptualize e-petitioning as collective political action within policy agenda setting processes and explore the dynamics and structures of

e-petition signature data. Agenda setting theory (Baumgartner and Jones, 1993, 2009) suggests that policy issues may lie dormant for periods of time until some "focusing event" elicits extraordinary attention from issue advocates, the media, and ultimately elected representatives. Indeed the media may play an important role in these processes by focusing attention on and making particular issues salient to the public, whether the issues are novel or have been previously ignored (Wolfe, Jones & Baumgartner, 2013). Such focusing events may further stimulate a process of mobilization that contributes to the definition and interpretation of the event, unless countered by "negative feedback" of several types, which may over time restore the system to equilibrium, without the policy change that had been sought.

This type of phenomenon appears to be evident following the deaths of 26 children and school personnel on Friday, December 14, 2012 at the Sandy Hook Elementary School in Newtown, Connecticut in the use of e-petitioning on WtP to stimulate a national conversation about gun control and e-petitioning intended to forestall such action. In the week following the shootings, numerous petitions were initiated on WtP suggesting a wide range of actions for preventing such tragedies in the future, some of which focused explicitly on strengthening gun control, while others proposed alternative policy responses. Numerous petitions were also initiated cautioning against precipitous gun control actions. By Friday, December 21, 2012, President Obama issued a formal videotaped response to a set of 33 petitions that advocated for and against gun control and that made alternative policy proposals in response to Sandy Hook; together, the set of petitions attracted 503,125 signatures. Following this response, the White House "retired" all 33 of these petitions so they were no longer able to be signed.

In the case study that follows, we explore how e-petitioning functioned as collective political action in mobilizing support for and against gun control, along with other policy options, in the aftermath of the Newtown tragedy. We begin by characterizing e-petitioning as an Internet-based tool for mobilizing collective action. Then, using agenda setting theory, we identify several concepts in the policy making process that may be mapped onto empirical events involving e-petitioning that took place during the week of December 14-21, 2012. In the case study that follows, we characterize the Newtown shootings as a "focusing event" with the potential to disrupt existing gun control policy equilibrium. The event gave rise to what turned out to be the single largest e-petition to appear on WtP up till that time, which ultimately attracted over 197,000 signatures, along with 11 other petitions also advocating gun control options.

However, we focus particularly on 21 petitions initiated during the week of December 14-21, 2012 in apparent counter-mobilization to gun control proposals as a policy response. Market basket analysis is used to explore questions about whether individuals who signed one anti-gun control petition also sign other anti-gun control petitions. We also use social network analysis to determine if there are groups of individuals who sign similar anti-gun control petitions, thus suggesting the creation of "communities" of individuals whose actions were similarly aligned in opposition to gun control or in support of policy proposals that are alternatives to gun control.

E-petitioning and agenda setting

It is well acknowledged that the Internet has become an effective means for organizing collective action with political consequences; considerable research attention is now

devoted to exploring how such action is organized and unfolds. Studies of how Web 2.0 applications such as Twitter and Facebook are used for public e-participation as well as for mobilizing demonstrations and protest, both online and offline, are increasingly common; they often consist of social networking analyses that illuminate the social infrastructure that is the foundation for political action (Saebo, Rose, & Nyvang, 2009).

Services such as Moveon.org and Change.org provide the technical infrastructure to simplify petitioning, as well as practical suggestions for targeting governments at all levels, corporations, and seemingly any other organization that comes under public scrutiny. Because it is a quick, simple, and accessible way to mobilize large numbers of activists to support a particular cause, e-petitioning has been referred to as "Protest 2.0" (Petray, 2011). As one tool within what has been called an "electronic repertoire of contention," e-petitioning enables individuals to express their views and has the potential to create a sense of collective identity among loosely coupled advocacy groups (Strange, 2011; Rolfe, 2005). However, empirical studies of e-petitioning and its dynamics and consequences are comparatively rare.

Change.org and Moveon.org may be viewed as informal petitioning mechanisms since they are not subject to public law (Lindner & Riehm, 2009). However, in countries such as the US, government-sponsored e-petitioning systems enable a new form of direct communication between the public and policy makers that is subject to national law, but is unmediated by corporations, mass media, or political parties. Can such a tool be used by the public to participate in policy making? Public policy theory generally ignores the public, as Muhlberger, Stromer-Galley, and Webb (2011) have concluded; however, e-petitioning offers a novel channel for the public to participate in policy making processes.

We use some of the concepts in agenda setting theory to conceptualize how e-petitioning may contribute to the policy making process, as others have also done (Hale, Margetts, & Yasseri, 2013).

Policy agenda setting

Why do some policy issues produce radical changes in legislation, while others are neglected entirely or become locked over time within stable and exclusive institutional contexts? Agenda setting theory (Baumgartner & Jones, 1993, 2009) depicts the policy making process as characterized by both stability and change. Stable policy systems are marked by allegiance to the status quo, by the difficulties of marshaling change in a political system of checks and balances, and by institutional structures that limit access to the policy process and are characterized by powerful political and ideological understandings that resist alternative interpretations (Jones & Baumgartner, 2005; Baumgartner & Jones, 2009). Such systems operate at "equilibrium" until something happens in the environment that compels the attention of the excluded or the disinterested, unleashing new interests and alternative interpretations with the potential to undermine the status quo. This sequence of triggering event and subsequent attention functions as "positive" feedback, helping an issue to gain access to the political agenda, and potentially leading to major policy changes that disrupt or "punctuate" the equilibrium. But such events do not inevitably subvert policy monopolies, since access to the agenda does not guarantee major change (True, Jones, & Baumgartner, 2006). Challenging groups may be checked and countered by powerful institutional and macropolitical forces. These counter-mobilizing moves can function as "negative"

feedback, which may ultimately maintain system equilibrium (True, Jones & Baumgartner, 2006; Baumgartner & Jones, 2009).

The policy agenda thus reflects the attention paid to particular issues, which can be increased by "focusing events" that can "cause issues to shoot high onto the agenda in a short period" (Baumgartner & Jones, 2009 p.10). A focusing event "is sudden; relatively uncommon; can be reasonably defined as harmful or revealing the possibility of potentially greater future harms; has harms that are concentrated in a particular geographical area or community of interest; and that is known to policy makers and the public simultaneously..." (Birkland, 1998). Focusing events can be characterized as indicators of policy failure by issue advocates in an attempt to broaden and mobilize their audience and move their issue to the forefront of the political agenda. On the other hand, status quo groups may well respond with counter-mobilization in an effort to preserve their interests.

Information and media

More recently, agenda setting theorists have considered how information and media affect the attention processes at the heart of the theory. Indeed, the idea of punctuated equilibrium over time has morphed into a more general theory of government information processing, since problem identification is fundamentally dependent on information flows (Jones & Baumgartner, 2012). However, policy makers are incapable of attending to all available information; their processing is "disproportionate" tending generally toward stability and under-reaction until "a scandal or crisis erupts...and they scramble to address the issue" (p. 7). Media can amplify and weight some information over others, prime audiences with certain interpretational predispositions at the expense of others, and they

can contribute to positive and negative feedback cycles. Focusing events might trigger increased news coverage, which then further stimulates the attention of both the public and decision makers (Wolfe, Jones, & Baumgartner, 2014) in a complex positive feedback cycle. Or issue advocates can take advantage of the priming function of media by selecting news frames that suggest policy problems to the public or new attributes of a problem that can change the focus of decision makers. However, extensive media attention over time can also function as negative feedback by slowing down the speed of legislative changes (Wolfe, 2012).

Agenda setting theory has yet to consider the impact of new media technologies, the effects of which may further complicate attentional processes. A traditional role of media is to create issue salience by focusing public and decision making attention; however new media technologies may set in motion "reverse" agenda setting processes. That is, some evidence is beginning to suggest that traditional media may take their cues from the online activities of the audience, such as the frequency of terms sent to search engines, and shift their news coverage to coordinate with such interests (see, e.g., Ragas, Tran & Martin, 2014).

Narrative case study: E-petitioning in the aftermath of Newtown tragedy

There has been no significant gun control legislation at the federal level since the passage of the Brady Act in 1993 and the Assault Weapons Ban in 1994. As Bennett (2013) discusses in his brief history of gun safety legislation, loopholes in existing legislation enable individuals to purchase guns without background checks. Further, the assault weapons ban passed in 1994 expired in 2004, without subsequent renewal. Assessing the gun control debate at the state level in the time period directly prior to Newtown, Cooper

(2012) wrote, “The legal and political debate over the nation's gun laws was following a familiar trajectory: toward fewer restrictions.” None of the recurring incidents of gun violence, including the most recent incident in which Representative Gabrielle Giffords was shot and nearly died, had generated sufficient momentum for legislative action.

On the morning of Friday, December 14, 2012, a masked gunman broke into Sandy Hook Elementary School in Newtown Connecticut, and, using a Bushmaster .223 caliber AR-15 assault rifle, shot and killed 26 children and school employees. In the context of the relative equilibrium of firearms policy, the Newtown school shootings galvanized the attention of the country. Indeed, the story ranked first in USA Today's poll of top new stories in 2012 (positioned ahead of the election) (USA Today, 2012). Dan Gross, the president of the Brady Campaign to Prevent Gun Violence declared shortly after the Newtown shootings, “We genuinely believe that this one is different.....because no human being can look at a tragedy like this and not be outraged by the fact that it can happen in our nation. And because this time we're really poised to harness that outrage and create a focused and sustained outcry for change” (Cooper, 2012).

Within two hours after the shootings, two e-petitions were initiated on WtP. The first proposed (at 12:42 EST), to “Start the process to enact Federal Gun control reforms.” The second (at 13:17 EST) proposed to “Immediately address the issue of gun control through the introduction of legislation in Congress.” The URL of the latter petition, which we now know was initiated by David Glynn, was disseminated using his Tumblr account, because, he commented in retrospect, “I knew if there ever were a tipping point for effective gun control, this would be it. So I wrote a petition” (Glynn, 2013).

Late on Friday, a blog on Washington Post announced that a "White House petition for gun control gaining traction" had accumulated over 15,000 signatures by 5:30 pm (Jennings, 2012). By the end of the first day, the petition had been signed over 58,000 times, surpassing the 25,000 signature threshold required at that time to elicit a response from the White House; petition signatures continued to accumulate over the next days. As Table 1 shows, over the next few days, numerous news sources reported on the growing number of signatures for Glynn's petition, mentioning it explicitly, calling attention to its focus on initiating gun control legislation, and invariably mentioning the number of signatures that it had accumulated by the time of the story.[1] These sources included major news sources such as the Washington Post, broadcast television news websites (such as ABS News), major online sources of news and commentary (such as the Huffington Post), and more specialized online services (such as NestGov).

News Source	Date	URL
Washington Post	Dec. 14, 2012	http://www.washingtonpost.com/blogs/post-politics/wp/2012/12/14/white-house-petition-for-gun-control-gaining-traction/
ABC News	Dec. 14, 2012	http://abcnews.go.com/blogs/politics/2012/12/petition-calls-for-white-house-to-address-gun-control/
Huff Post	Dec. 14, 2012	http://www.huffingtonpost.com/2012/12/14/gun-control-petitions_n_2303506.html

1 This does not reflect an exhaustive effort to find all news stories reporting on petitioning in response to the Newtown shootings.

Tech President	Dec. 14, 2012	http://techpresident.com/news/23273/after-newtown-shooting-online-outcry-today-is-the-day
Atlanta Blackstar	Dec. 15, 2012	http://atlantablackstar.com/2012/12/15/gun-control-petition-after-newtown-shooting-sparks-twitter-debate/
Forbes	Dec. 16, 2012	http://www.forbes.com/sites/tomwatson/2012/12/16/crowdsourcing-action-connecticut-massacre-spurs-largest-white-house-petition-but-is-it-a-movement/
Next Gov	Dec. 16, 2012	http://www.nextgov.com/emerging-tech/2012/12/gun-control-petition-most-popular-ever-posted-white-house-site/60197/
Syracuse.co	Dec. 17, 2012	http://www.syracuse.com/news/index.ssf/2012/12/newtown_shooting_gun_control_schumer_nra_second_amendment.html
ABC News	Dec. 17, 2012	http://abcnews.go.com/Technology/newtown-shooting-sparks-mass-social-media-discussion-gun/story?id=17998796
International Business Times	Dec. 17, 2012	http://www.ibtimes.com/connecticut-shooting-prompts-flood-white-house-petitions-944498
Washington Post	Dec. 17, 2012	http://www.washingtonpost.com/blogs/post-politics/wp/2012/12/17/gun-control-petition-is-most-popular-ever-on-white-house-site/
The Nation	Dec. 17, 2012	http://www.thenation.com/blog/171811/after-shooting-gun-control-petition-breaks-white-house-record

Salon.com	Dec. 17, 2012	http://www.salon.com/2012/12/17/gun_control_petition_breaks_record/
ABC News	Dec. 18, 2012	http://abcnews.go.com/blogs/politics/2012/12/record-breaking-petition-asks-white-house-to-tackle-gun-control/
MSNBC	Dec. 18, 2012	http://www.msnbc.com/hardball/petition-white-house-gun-control-hits-r

Table 1: News Sources Reporting on Signature Accumulation of "Immediately Address...." Petition

(all accessed July 25, 2014)

In the meantime, petitions with other proposals in response to Newtown's shootings were also initiated on WtP, including petitions to reform the mental health system, to protect schools with armed guards, and to forestall further gun control legislation. These petitions also began to collect signatures. Ultimately, the most popular of these petitions stated "We ask President Obama to support law abiding gun owners in this time of tragedy," which was initiated on December 16, 2012 and ultimately accumulated over 57,000 signatures.

Interestingly, the National Rifle Association declined to comment between the time of the shootings until December 21, 2012 (Bloomberg News, 2012); news articles noted the Association's lack of presence in social media. But there was active web activity to solicit signatures for the petitions arguing against gun control. Table 2 presents URLs for a number of such solicitations in support of the "support law abiding

gun owners" petition from organizations such as New Jersey Hunter, Smith Wesson Forum, and Northwest Firearms.[2]

Soliciting Organization	Date	URL
New Jersey Hunter	Dec. 17, 2012	http://www.newjerseyhunter.com/forums/91-hunter-angler-lounge-bar/...k-president-obama-support-law-abiding-gun-owners-time-tragedy.html
Defensive Carry.com	Dec. 17, 2012	http://www.defensivecarry.com/forum/general-firearm-discussion/15395...se-petition-ask-president-obama-support-law-abiding-gun-owners.html
Smith Wesson Forum	Dec. 17, 2012	http://smith-wessonforum.com/2nd-amendment-forum/283121-another-petition-support-law-abiding-gun-owners.html
Northeast Shooters	Dec. 17, 2012	http://www.northeastshooters.com/vbulletin/threads/181817-Petition-Ask-President-Obama-to-support-law-abiding-gun-owners-in-this-time
Sig Sauer 556 Forum	Dec. 17, 2012	Http://www.sigarms556.com/threads/white-house-gun-petition.13487/
Silicon Investor	Dec. 17, 2012	Http://www.siliconinvestor.com/readmsgs.aspx?subjectid=59030&msgnum=1959&batchtype=10&batchtype=Previous
Ohioans for Concealed Carry Discussion	Dec. 17, 2012	http:/www.ohioccwforums.org/viewtopic.ph?f=8&t=67095
Northwest Firearms	Dec. 18, 2012	http://www.northwestfirearms.com/legal-political/111270-white-house-petition-support-law-abiding-gun-owners.html
Gunalizer	Dec. 18, 2012	http://gunalizer.com/gunnews/gunrights/a-white-house-petition-to-support-law-abiding-gun-owners/
AR15.com	Dec. 19, 2012	https://www.ar15.com/archive/topic.html?b=1&f=5&t=1405132

Table 2: Organizations Soliciting Signatures for "supporting law-abiding gun owners" Petition
(accessed Feb 22 and July 16, 2014)

2 This does not reflect an exhaustive effort to find web-based solicitations for signatures for the "support law abiding gun owners" petition.

One further indication of the amount of online activity related to e-petitioning following Newtown may be found in a number of referencing one or more of these petitions. We found at least 9,187 tweets sent between December 14 and 21, 2012 mentioning one or more of the Newtown-related WtP petitions initiated during this period.

On December 21, 2012, the White House issued a response to 33 petitions initiated on WtP in response to Newtown (see https://petitions.whitehouse.gov/response/message-president-obama-about-your-petition-reducing-gun-violence) which contained a videotaped message from President Obama explicitly addressing petition signers. Further, the same day, the NRA conducted a press conference in which Wayne LaPierre, executive vice-president of the NRA called on Congress immediately to appropriate "whatever is necessary to put armed police officers in every single school in this nation" http://www.washingtonpost.com/politics/remarks-from-the-nra-press-conference-on-sandy-hook-school-shooting-delivered-on-dec-21-2012-transcript/2012/12/21/bd1841fe-4b88-11e2-a6a6-aabac85e8036_story.html).

The remainder of the analysis that follows focuses on the set of 33 petitions addressed by the White House, which includes petitions that call for gun control legislation, as well as petitions that argue against gun control, that advocate improvements in mental health care, and that propose arming protectors within the school system. We were explicitly interested in exploring answers to the following research questions:

1. How is collective action evident in the petitioning activities that transpired following the Sandy Hook shootings? Can we see evidence of collective action through market basket analysis and social network analysis of petitioning behavior?

2. Can we find patterns of e-petitioners mobilizing and forming core groups or "communities" that bring alternative (to anti-gun control laws) policy issues to the forefront as a result of a focusing event like the Sandy Hook shootings?

Data mining analyses: E-petitioning in the aftermath of Newtown tragedy

Data mining methods

Data mining refers to the process of discovering hidden patterns in data. It is widely used in many domains including business analytics, sociology, medicine, and weather forecasting. Under the umbrella of data mining, many different techniques have been developed for analyzing data and identifying patterns/trends that cannot be readily detected using standard statistical methods. In this paper, we use two of these techniques, namely market basket analysis and social network analysis, on the data collected from the White House petitioning site. Brief overviews of these two techniques appear below; additional details can be found in many references (e.g. Easley & Kleinberg 2010; Newman 2010; Tan et al. 2006).

Data description

The data used for this study were obtained from a publicly available White House database containing information about all petitions and signatures (coded to ensure anonymity) appearing on the *WtP* website between Sept 22, 2011 and April 30, 2013 (see https://petitions.whitehouse.gov/developers). We focused on the collection of 33

petitions, initiated between December 14 and 21, 2012 that received a response from President Obama on December 21 (see Tables 3 and 4). We used petition titles and signatures in the analyses that follow. Within this dataset, a distinct signature ID consisted of unique first and last initials followed by a five-digit zip code. We eliminated from the analysis any ID that did not include a valid five-digit zip code. This resulted in 316,311 distinct signers.[3] Tables 3 and 4 show the petition ID number (assigned according to sequence of initiation), title of the petition, creation date, and signature count for each of the 33 petitions.

Petition ID	Pro-gun Control Petitions/Title	Creation Date and Time	Signature Count
970	Start the process to enact Federal Gun control reforms.	Dec. 14, 2012 12:42	10034
971	Immediately address the issue of gun control through the introduction of legislation in Congress.	Dec. 14, 2012 13:17	165088
972	Begin a national conversation on sensible gun control.	Dec. 14, 2012 13:37	5528
973	Set a date and time to have a conversation about gun policy in the United States.	Dec. 14, 2012 13:43	22188
974	Stronger Gun Control	Dec. 14, 2012 13:48	23524
976	Create a national commission to review our gun laws and recommend legislation to address the epidemic of gun violence.	Dec. 14, 2012 13:54	5290
977	Seriously, respectfully and quickly work to end the violence committed by assault weapons.	Dec. 14, 2012 14:27	10165
978	Today IS the day: Sponsor strict gun control laws in the wake of the CT school massacre	Dec. 14, 2012 14:39	33538
993	Petition the Congress and the States to REPEAL THE SECOND AMENDMENT.	Dec. 15, 2012 18:26	3355
997	Urge Congress to advance federal legislation banning the sale of assault rifles & high capacity magazines.	Dec. 15, 2012 21:20	24294

3 We acknowledge the possibility that a distinct ID consisting of two initials and a zip code may reference more than one individual. We assume that, since the dataset is taken from one week of petitioning activity, these possibilities are minimized.

1014	Establish federal gun control laws	Dec. 17, 2012 12:57	6477
1021	Immediately sign Executive Order banning sale of assault weapons and high-capacity magazines until Congress acts on this	Dec. 17, 2012 17:33	3684

Table 3: 12 Pro-Gun Control Petitions

Petition ID	**Anti Gun-Control Petitions (Support Law Abiding Gun Owners)/Title**	**Creation Date and Time**	**Signature Count**
982	Place Security Guards in Schools Nationwide: The Safe & Sound Schools Initiative	Dec. 14, 2012 23:35:59	2943
987	No more gun control.	Dec. 15, 2012 2:36:09	3406
990	Not punish the tens of millions of law-abiding gun owners with ineffective and unconstitutional assault weapons/bans	Dec. 15, 2012 11:41:58	8227
996	Ensure the 2nd Amendment cant be infringed in anyway limiting citizens ability to defend against tyrannical governemnts	Dec. 16, 2012 1:55:43	9063
1006	We ask President Obama to support law abiding gun owners in this time of tragedy.	Dec. 16, 2012 20:27:15	53677
1009	Dissolve any petitions on an Assault Weapons Ban as unconstitutional under amendment II of the Constitution	Dec. 17, 2012 5:48:55	9070
Petition ID	**Invest in Mental Health Care Petitions/Title**	**Creation Date and Time**	**Signature Count**
975	Make Mental Health a National Emergency	Dec. 14, 2012 18:52:03	10235
981	Address the shortcomings of the current mental health system to prevent at-risk people from becoming violent offenders.	Dec. 14, 2012 21:55:40	9896
983	Stop crime before it starts by funding mental health facilities instead of prisons.	Dec. 14, 2012 0:19:45	6046
984	Launch a federal investigation in to the relationship between school shootings and psychiatric drugs	Dec. 15, 2012 1:16:55	6334
1003	Build a federally-funded mental healthcare system in the United States that offers treatment, education, and advocacy.	Dec. 16, 2012 14:39:13	11747
Petition ID	**Guard Our Schools Petitions/Title**	**Creation Date and Time**	**Signature Count**
980	A gun in every classroom. Arm every teacher and principal to defend themselves and their students during an attack.	Dec. 14, 2012 21:14:38	8955

982	Place Security Guards in Schools Nationwide: The Safe & Sound Schools Initiative	Dec. 14, 2012 23:35:59	2943
985	Have armed security at all schools across the nation who are ex military from combat MOSs or combat	Dec. 15, 2012 1:34:49	4256
1008	Hire military veterans as armed resource officers in all public schools throughout America.	Dec. 17, 2012 3:50:12	2219
1013	Allow individual School Districts and/or schools the ability to train staff to be School Marshalls.	Dec. 17, 2012 17:17:56	1964
1025	Employ competent veterans as armed security guards for America's schools	Dec. 17, 2012 19:18:28	2518
1043	Place police officers and metal detectors in all of our schools.	Dec. 17, 2012 14:17:16	667

Table 4: 21 Anti-gun Control Law and "Other" or Alternative Policy Petitions

The total number of signatures for the 33 gun control petitions is 503,125, since individuals often signed more than one petition.

We divided the petitions into two groups differentiating between those that expressed a clear preference "pro" gun control and those that expressed other preferences; this produced a cluster of 12 "pro-gun control" petitions, and a remaining group of 21. The group of 21 was sorted further into three thematic clusters: a group in support of law-abiding gun owners ("support law abiding gun owners"); a group advocating investment in the improvement of mental health care ("invest in mental health care"); and a final group advocating using firearms to guard our schools ("guard our schools") principally by not using Newtown as a justification for further gun control legislation. Tables 3 and 4 reflect this categorization.

To get a temporal sense of when these two groups ("pro" gun control and those that expressed other preferences) signed the 33 petitions see Figure 1. It is apparent from the figure that signatures on the "pro-gun control" petitions accumulated largely in the first hours following the shootings while signatures of petitions expressing other preferences accumulated largely over subsequent days.

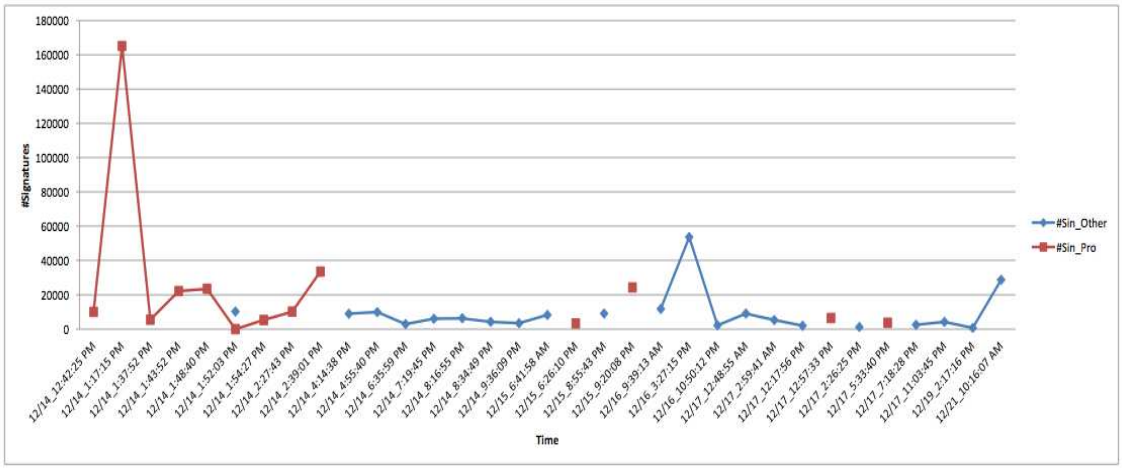

Figure 1: Signature Count Over Time for 33 Gun Control Petitions

We began by asking whether individuals who signed "pro-gun control" petitions also signed petitions in any of the three other groups. Of the 316,311 distinct signers, there is a subset of 24,156 people who signed one or more gun control petitions and one or more petitions in other groups. Of these 73% (17,754) signed at least one petition in the group we categorized as "invest in mental health care" (i.e., 975, 981, 983, 984, and 1003). The remaining 6,402 signed petitions in one of the two remaining groups. [4] The remaining analyses focus further on the 21 petitions appearing in these 3 groups ("support law abiding gun owners"; "invest in mental health care"; and "guard our schools"), which were signed by a total of 190,720.

4 This intersection may reflect IDs that reference more than one unique individual.

Market basket analysis: A brief overview

The primary goal of **market basket analysis** is to identify patterns concerning *co-occurrences* of objects. The basic idea can be readily understood through a simple example. Consider a supermarket where each **transaction** (or **market basket**) consists of a set of items bought by a customer. By collecting and analyzing transactions that occur over a period of time, managers can identify sets of items that are frequently bought together by customers. Such sets of items can be placed in adjacent shelves to make it more convenient for customers to shop at the store.

A few definitions are needed to precisely describe the notion of frequent co-occurrence of objects in the context of supermarket data. Any set of items is called an **itemset**. As mentioned above, each transaction consists of a set of items bought by a customer. The **support** of an itemset S is the fraction of transactions which include all the items in S; that is, the support for S is the ratio of the number of transactions that include all the items in S to the total number of transactions. Any itemset S whose support exceeds a chosen support level is called a **frequent itemset.** Thus, frequent itemsets represent sets of items that are bought together often by customers.

In addition to frequent itemsets, analysis of market basket data can also reveal other patterns related to co-occurrences. For example, for some items x, y and z, a large fraction of customers who buy items x and y may also buy z. Such patterns are captured through an **association rule** which is usually shown as $\{x,y\} \rightarrow \{z\}$. The importance of an association rule is specified using a measure called **confidence**. The confidence of the association rule $\{x,y\} \rightarrow \{z\}$ is the ratio of the number of transactions that contain all the

items *x, y* and *z* to the number of transactions that contain the two items *x* and *y*. (Formally, confidence gives the conditional probability that customer's basket contains item *z* given that it contains both *x* and *y*.) Thus, association rules with large confidence values also provide insights regarding co-occurrences.

Applying market basket analysis to petition data

We used market basket analysis on the data collected for 21 petitions that do not reflect "pro-gun control" preferences. In our case, each person who signed at least one of the 21 petitions represents a market basket and the subset of the 21 petitions signed by the person represents the items in that basket. Since a total of 190,720 people signed one or more of these petitions, our data set for market basket analysis consisted of more than 190,720 baskets, with each basket containing at most 21 items. A number of algorithms are known for identifying frequent itemsets and association rules (Tan et al. 2006). We used the algorithm discussed in (Han et al. 2000) for identifying frequent itemsets since a public domain software tool based on this algorithm is available. We generated association rules and their confidence values using a software tool available at orange.biolab.si.

Results

We computed the confidence values of various association rules of the form {x} → {y}, where both x and y represent the IDs of one of the 21 petitions. For visualization purposes, we considered five different confidence values, namely 50%, 40%, 30%, 20% and 10%. For each confidence value c, we constructed the following undirected graph with 21 nodes: each node of the graph represents a petition ID and each undirected edge x

→ y implies that the association rule {x} → {y} has a confidence value of at least c. The five graphs constructed in this manner are shown in Figures 2a through 2e.

The nodes contain a petition ID and are colored according to our three thematic clusters: red = "support law-abiding gun owners"; blue = "invest in mental health care"; and green = "guard our schools".

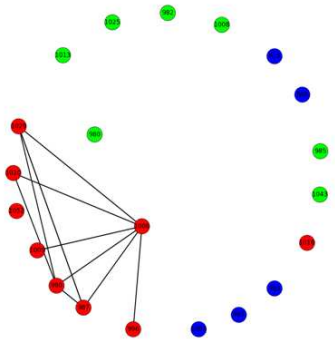

Figure 2a: 50% Confidence Level

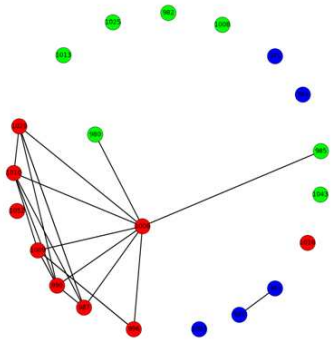

Figure 2b: 40% Confidence Level

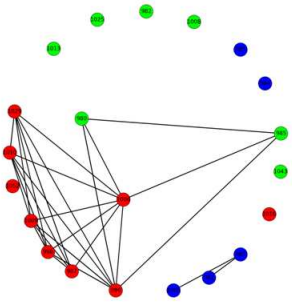

Figure 2c: 30% Confidence Level

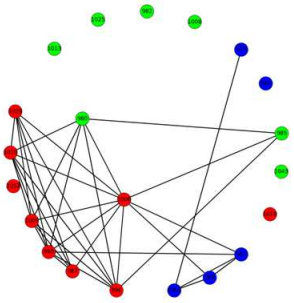

Figure 2d: 20% Confidence Level

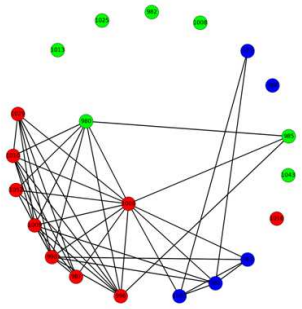

Figure 2e: 10% Confidence Level

The following conclusions can be drawn by observing the structure of these graphs.

At the largest confidence value (50%), there is a core group of seven petitions (which can be characterized by the common theme "support law-abiding gun owners"), with petition 1006 playing a central role. (Petition 1006 has the largest number of signatures among the group of petitions considered in this study.) These petitions were highly connected on the basis of common signers and constituted a "frequent itemset"; petitions in the other two categories are not highly connected. That is, individuals signing a petition in this itemset were more likely to sign others in the set, but not petitions in the other two clusters.

When the confidence value is decreased to 40% additional associations appear among the core group and a few associations begin to appear between the core group and a couple of petitions that we characterize as "guard our schools". (These petitions deal with arming teachers in school.)

As we decrease confidence level again to 30%, we see a group of three "invest in mental health care" petitions forming a cluster not connected to the main core. The two

"guard our schools" petitions become more cohesive to the main core by connecting with more of the "support law-abiding gun owners" petitions.

At the 20% confidence level, the "invest in mental health care" cluster gets larger and connects to the main core. Even at a low confidence value of10%, many of the petitions color coded as green squares do not appear in association rules. These petitions fall into the category of "guard our schools".

Our market basket analysis showed that three association rules involving petitions in the "support law abiding gun owners" had the largest confidence value, namely 73%. The three association rules themselves are 990 → 1006, 1009 → 1006 and 1010 → 1006. We recall that petition 990 has the title "Not punish tens of millions of law-abiding gun owners with ineffective and unconstitutional assault weapons bans"; petition 1009 has the title "Dissolve any petitions on assault weapons ban as unconstitutional under Amendment II of the Constitution"; petition 1010 has the title "End gun free zones and we the people demand a vote on the Citizens Protection Act H.R. 2613"; and petition 1006 has the title "We ask President Obama to support law abiding gun owners in this time of tragedy". The confidence value shows that 73% of the people who signed any of the petitions 990, 1009 and 1010 also signed 1006. We also note that the support for the itemsets {990, 1006}, {1009, 1006} and {1010, 1006} derived from the association rules varied from 3 to 5%. Since the 21 petitions collected a total of 190,720 signatures, it follows that these three groups of petitions (each consisting of two petitions) were signed by 5700 to 9500 people.

These three rules provide evidence of a core group of people who are actively mobilizing in the "support law-abiding gun owners" category of policy issues, which

would appear to be a reaction to the first two pro gun control petitions 970 (“Start the process to enact Federal Gun control reforms”) and 971 (“Immediately address the issue of gun control through the introduction of legislation in Congress”). The latter which has the most signatures of all 33 petitions, garnished 197,073 signatures, and, as discussed earlier in our analysis, was the topic of repeated news coverage in online media.

Among the "Invest in mental healthcare" petitions, the association rule with the highest confidence value is 983 → 981. We recall that petition 983 has the title ("Stop crime before it starts by funding mental health facilities instead of prisons") and 981 has the title ("Address the shortcomings of the current mental health system to prevent at-risk people from becoming violent"). This rule has a confidence value of 48%. The itemset {981, 983} has a support of 2.4%, indicating that these two petitions were co-signed by more than 4575 people. The rule with the second highest confidence value is 983 → 1003, where petition 1003 has the title ("Build a federally-funded mental healthcare system in the United States that offers treatment, education and advocacy"). This rule had a confidence value of 32% and the itemset {983, 1003} had a support of 1.6%, indicating that these two petitions were co-signed by about 3050 people.

From the above discussion, we see the coming together of a core group or community of people mobilizing for alternatives to gun control laws.

In summary, we note that market basket analysis of e-petition data is helpful in identifying strong relationships among the petitions and therefore meaningful correlations in signer behavior.

Social network analysis: A brief overview

Large-scale networks are ubiquitous in modern society; examples include the Internet, friendship networks (such as Facebook), professional networks (such as LinkedIn), and social media networks such as Twitter. Social network analysis provides methods to understand the roles of participants and the nature of interactions among the participants in such networks. These methods have been applied to study behaviors in various networked systems such as computer communication networks, biological networks, economic networks, and terrorist networks (Newmann, 2010).

The notion of centrality, introduced by Freeman (1979), is commonly used to characterize the level of importance of a participant in a social network. Freeman's seminal paper and a number of subsequent papers have identified a variety of centrality measures for social networks (Newmann, 2010). Examples include degree centrality, closeness centrality, betweenness centrality and eigenvector centrality. (Precise definitions of these and other measures can be found in Easley & Kleinberg 2010; Freeman 1979; Newmann, 2010). For our purposes, it suffices to know that a larger value of centrality measure indicates that the corresponding participant plays a more important role in determining the behavior of the network.

The notion of community (or cluster) is used to identify a group of nodes with similar behavior in a social network. There are several ways to define similarity in behavior and algorithms are available for partitioning the nodes of a social network into communities according to those definitions (Newmann, 2010).

Applying social network analysis to petition data

From the petition data, we constructed an appropriate social network (an undirected graph) that enabled us to identify highly central participants and groups of similar participants. To ensure that our conclusions were not affected by users who exhibited low levels of petitioning activity, we restricted the network to users who signed at least seven of the 21 petitions that did not reflect "pro-gun control" preferences. Thus, in the constructed network, each node represents a person who signed at least seven petitions. An edge was added between two nodes if the corresponding pair of users co-signed at least seven petitions. The resulting graph had 2285 nodes and 487,336 edges[5].

The graph consists of two connected components containing 2267 and 18 nodes respectively. Thus, the larger component (called the giant component) of the network consisted of a very large fraction (99.21%) of all the nodes. This behavior is exhibited by most social networks considered in the literature (Easley & Kleinberg 2010).

In the above discussion, we considered a social network in which each node represents a person who signed at least seven petitions. The following table shows how the number of nodes in the graph drops rapidly as we increase the level of petitioning activity from 1 to 15. (In the table, we use G_i to denote the graph where each node represents a person who signed at least i petitions.

G_i	**#Nodes**
G_1	190720

5 When we reduced the value from seven to six, the resulting network consisted of 3834 nodes and nearly 1.2 million edges. With the computational capabilities available to us, we could not compute centrality measures for a graph with such a large number of edges.

G_2	26895
G_3	14107
G_4	8790
G_5	5687
G_6	3834
G_7	2285
G_8	1463
G_9	994
G_{10}	640
G_{11}	424
G_{12}	278
G_{13}	178
G_{14}	127
G_{15}	80

Table 5: Number of Nodes for *i* number (1-15) of common petitions signed

After constructing the network, we computed three centrality values (namely, closeness, betweenness and eigenvector) for each node. These computations were carried out using CINET, an interactive software tool for network analysis, developed by the Network Dynamics and Simulation Science Laboratory (NDSSL) of Virginia Tech. For each centrality measure, we computed the set of 500 nodes with the highest values. We found that 416 of the 500 nodes (i.e., 83.2%) appeared in all three sets, indicating the group of nodes playing an important role in determining the behavior of the network are

roughly the same, no matter which of the three centrality measures is used to find such nodes.

Community detection

We used a software tool (available from http://perso.uclouvain.be/vincent.blondel/research/louvain.html) for identifying the communities in the network. This tool implements a well-known algorithm, called the Louvain Algorithm (Blondel et al. 2008), for finding communities. The algorithm found four communities, denoted by C_0, C_1, C_2 and C_3, with sizes presented in Table 6.

Community	Size by Signature
C_0	844
C_1	531
C_2	461
C_3	449

Table 6: The Four Communities of Signers

For each community, we computed the **three most favored** petitions (i.e., the petitions which had the three *highest* signature counts among the people in the community) and the **three least favored** petitions (i.e., the petitions which had the three *lowest* signature counts among the people in the community). The following table shows the results of this computation.

Community	Most Favored Petitions	Least Favored Petitions
C_0	{1006, 1009, 990}	{1043, 1016, 1008}

C_1	{1006, 1029, 990}	{1043, 975, 1003}
C_2	{1006, 990, 1029}	{975, 1043, 984}
C_3	{1006, 990, 1029}	{1043, 1003, 975}

Table 7: Three Highest and Lowest Signed Petitions in the Four Communities

There are two petitions that were most favored by all four communities: 990 ("Not punish the tens of millions of law-abiding gun owners with ineffective and unconstitutional "assault weapons/ bans") and 1006 ("We ask President Obama to support law abiding gun owners in this time of tragedy"). Petition1029 ("Keep guns in America! No weapons ban!") appears among the most favored petitions in C_1, C_2, and C_3 but not in C_0. All three of these petitions fall within the category of "support law-abiding gun owners" and suggest a strong mobilization of opposition to gun control laws across all four communities.

Two petitions stand out as being least favored. Petition 1043 ("Place police officers and metal detectors in all of our schools") appears among the least favored petitions in all four communities. Petition 975 ("Make Mental Health a National Emergency") appears among the least favored petitions in three of the four communities, C_1, C_2, and C_3. These petitions fall into the other two categories which are alternative policy proposals within the counter mobilization to gun control: "guard our schools" and "invest in mental healthcare" respectively. These results are not surprising since they are the alternative policy proposals; in other words, the main focus is to prevent the pursuit of gun control laws. However, there is evidence of a core group of people in C_0 that are mobilizing to support the "invest in mental healthcare" policy issue. This is demonstrated

by the fact that it was signed by 33% of the people in C_0. Two other petitions that fall into "invest in mental healthcare": 1003 ("Build a federally-funded mental health system in the United States that offers treatment, education, and advocacy") and 984 ("Launch a federal investigation in to the relationship between school shootings and psychiatric drugs") are supported by 42.8% and 34% respectively of the people in C_0.

Petition 1008 ("Hire military veterans as armed resource officers in all public schools throughout America") ("guard our schools") appears among the least favored petitions in C_0. (It was signed by only by 9.9% of the people in C_0.) It is the fourth least favorite petition (signed by only 7.12% of the people) in C_3. However, it has a significant signature count in C_1 (48.9%) and C_2 (58.8%).

Petition 1016 "Stop Demonizing Guns" also appears among the least favored petitions in C_0. (It was signed by just 5.9% of the people in C_0.) In C_1, C_2, and C_3, this petition was signed by 23.9%, 16.27% and 34% of the people, respectively.

For each support level p (expressed as a percentage of the size of a community), the following table shows the set of petitions that were signed by at least p percent of the people in the community

Support	**Petitions for C_0**	**Petitions for C_1**	**Petitions for C_2**	**Petitions for C_3**
90%	None	None	None	{990,1006,1029}
80%	{1006}	{990, 1006, 1029}	{990, 1006, 1029}	{987, 990, 996, 1006, 1009, 1010, 1029}
70%	{990, 996, 1006,	{987, 990, 1006,	{990, 1006, 1010,	{987, 990, 996,

	1009}	1029}	1029}	1006, 1009, 1010, 1029}
60%	{980, 981, 990, 996, 1006, 1009}	{987, 990, 1006, 1009, 1029}	{990, 1006, 1009, 1010, 1025, 1029}	{987, 990, 996, 1006, 1009, 1010, 1029}
50%	{980, 981, 983, 990, 996, 1006, 1009, 1010}	{987, 990, 996, 1006, 1009, 1010, 1025, 1029}	{982, 987, 990, 996, 1006, 1008, 1009, 1010, 1013, 1025, 1029}	{908, 987, 990, 996, 1006, 1009, 1010, 1016, 1029, 1052}

Table 7: Percentage of Petitions Signed by the Four Communities

We now observe that the above table provides additional evidence of mobilization against the pursuit of gun control laws. For example, "support law-abiding gun owners" petitions 1006 (“We ask President Obama to support law abiding gun owners in this time of tragedy”); 990 (“Not punish the tens of millions of law-abiding gun owners with ineffective and unconstitutional\assault weapons\” bans”); and 1029 (“Keep guns in America! No weapons ban!”) have a strong mobilization of signers with at least 80% support in three of the four communities, $C_{1,}$ $C_{2,}$ and C_3. All three of these petitions (1006, 990 and 1029) have the highest support recorded of 90% in only one community, namely C_3.

C_0 is the only community that shows support for any of the “Invest in mental healthcare” category. At the 60% level one petition, 981 “(Address the shortcomings of the current mental health systems to prevent at-risk people from becoming violent offenders”) is supported. Petition 983 (“Stop crime before it starts by funding mental

health facilities instead of prisons") characterizes the community at the 50% support level.

At the 50% level petitions 982 ("Place Security Guards in Schools Nationwide: the Safe & Sound Schools Initiative"); 1008 ("Hire military veterans as armed resource officers in all public schools throughout America."); and 1025 ("Employ competent veterans as armed security guards for America's schools") characterize community, C_2.

In summary, our results from social network analysis also provide evidence of mobilization for alternatives to gun control laws and that e-petitioning functions as collective political action.

Conclusions

The case of Newtown appears to conform to the generalized depiction of policy action described by agenda setting theorists. We see that in the ongoing equilibrium of the gun control issue, the Newtown shootings functioned as a "focusing event" that re-opened the controversy and triggered the creation of policy proposals of several different kinds from a variety of activists. In this case, We the People served as a site for making policy proposals that the public could view as well as for registering support in favor of them. The news media (at least online news media) called continuing attention to the most active of these proposals, which was to "immediately address" gun control as a legislative issue, alerting others to the growing support in favor of gun control action. Given the twitter traffic mentioning petitions (which we have not yet analyzed) we can only surmise that considerable discussion of these petitions took place. However, the signature data in Figure 1 provides evidence of counter-mobilization, interestingly not from the NRA (if press reports are to be believed), but from gun activists seeking to maintain their

ownership rights. The case illuminates at least two other policy proposals that were offered to address the Newtown tragedy, each of which would make legislative steps to curtail gun ownership unnecessary.

The signature data available from WtP provides additional insight into the effort to curtail the seeming surge of support for gun control legislation. The market basket analysis and the social network analysis broadly support our a priori categorization of the petitions into the 3 groups; "support law -abiding gun owners", "invest in mental health care", and "guard the schools". There are numerous connections between the petitions in each of these groups, and fewer bridges across the groups. From the standpoint of policy analysis, it is useful to see how these linkages among policy proposals are structured into communities of support. The co-signing of petitions in each of these categories indicates that signers are recognizing similarities in the policy positions expressed here, and endorsing petitions with thematic similarities.

Some individuals within each of the communities can be rightfully labeled "activists" since they sign many similar petitions, presumably in an effort to promote their policy preferences. It is not possible to tell from this particular analysis, but we would expect that these same individuals are generating tweets and soliciting of signatures on topically related web discussion boards. This is something we plan to investigate further as we extend this analysis.

It would seem that "invest in mental health care" petitions presents a non-gun related policy proposal with somewhat surprising traction in this event. Proponents of mental health care sign petitions that are pro-gun control and also appear in communities that connected through their support of "support law abiding gun owner" petitions. This

may present a policy proposal that bridges the concerns of gun control advocates and detractors.

As the number of people signing more than one petition indicates, most of the signing activity is produced by relatively small numbers of individuals. This is consistent with the Jungerr & Jurgens, 2010 study which illustrates a common finding in web-related research that most web-related activities are contributed by small numbers of individuals resulting in a power law dynamics.

Lastly, it is interesting to note that the NRA's official proposal, announced on December 21, to put armed policy officers into every single school does not receive substantial support in terms of signatures for the cluster of petitions in the "guard the schools" group. The frequency of signatures for these petitions is low. Further, petitions related to this cluster are relevant for only community C2 at the 50% level. This raises the question of whether NRA issued their policy position and mobilized too late, or if gun owners are principally more concerned with safeguarding support for the right to keep arms.

As e-petitioning becomes more common and becomes more of an object of focus for understanding policy preferences, we should have a better understanding of the digital traces or footprints that document the ideas, political and otherwise, that individual express and support. Big data as it relates to the study of e-petitioning behavior is a novel and timely example of the type of research that can be rightfully placed within the field of computational social science. As this study has shown, the application of data mining techniques and social network analysis coupled with the social science framework of policy theory (agenda setting, punctuated equilibrium, and collective action) have

produced insight into the social implications of the patterns of e-petitioning behavior. The partnership of the social and computer scientist is an effective solution to undertaking the daunting task of tackling "Big Data" and making sense of it.

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