E-petitioning as Collective Political Action in We the People

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Abstract
In this study, we aim to reveal patterns of e-petition co-signing behavior that are indicative of political mobilization of online "communities" in the case of *We the People (WtP)*, the first web-enabled petitioning system developed by the US federal government. This Internet-based tool enables users to petition the Obama Administration and solicit support for policy suggestions. Using *WtP* petition data, we focused on 33 petitions that were initiated the week after the Sandy Hook shooting (December 14-21, 2012) involving gun control and collectively received a response from President Obama. We apply Baumgartner and Jones's (1993) work on agenda setting and punctuated equilibrium, which suggests that policy issues may lie dormant until a "focusing event" triggers the attention from political figures, interest groups, and the media. Using some techniques from market basket analysis and social network analysis we found evidence of the mobilization of online communities for and against gun control laws and alternative policy proposals to address the Sandy Hook tragedy.

Keywords: Electronic petitioning; agenda setting; collective action; market basket analysis; social network analysis
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1 Introduction

The potential of information and communication technologies (ICTs) to provide ways for the public to become more actively involved in government, particularly the policy development process, has been increasingly recognized by government leaders. One example of this is the Open Government Partnership (OGP) initiative launched in July 2011, through which the Obama Administration and leaders of seven other countries created "a global effort to encourage transparent, effective, and accountable governance" (see http://www.whitehouse.gov/blog/2013/12/06/united-states-releases-its-second-open-government-national-action-plan). Presently, the OGP has more than 60 members from nations all over the world. Obama's first National Action Plan for the OGP was released in September 2011, featuring an innovative tool for citizen engagement. In an effort to "promote public participation in government" and to give "all Americans a way to engage their government on the issue that matters to them" (https://petitions.whitehouse.gov/), the first web-enabled petitioning system for the US federal government, We the People (WtP), was launched.

WtP gives individuals the opportunity to petition the US federal government to undertake actions suggested by the petitioner and to register signatures from supporters. Figure 1 is a screenshot of the home or landing page of the WtP website that illustrates different ways users can interact with the system to find petitions to sign or to initiate one. New users must create an account with an email address, first name, last name , and zip code to sign or initiate a petition.

A petition that receives at least 100,000 signatures within 30 days becomes eligible to receive a response from the Obama Administration. Usage of WtP has become increasingly popular attracting a growing amount of petitioning activity. By 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 on over 140,000 petitions created since the

site was launched. As of August 2014, the system had attracted over 15 million total users, over 22 million signatures, and over 350,000 petitions (Mechaber, 2014).

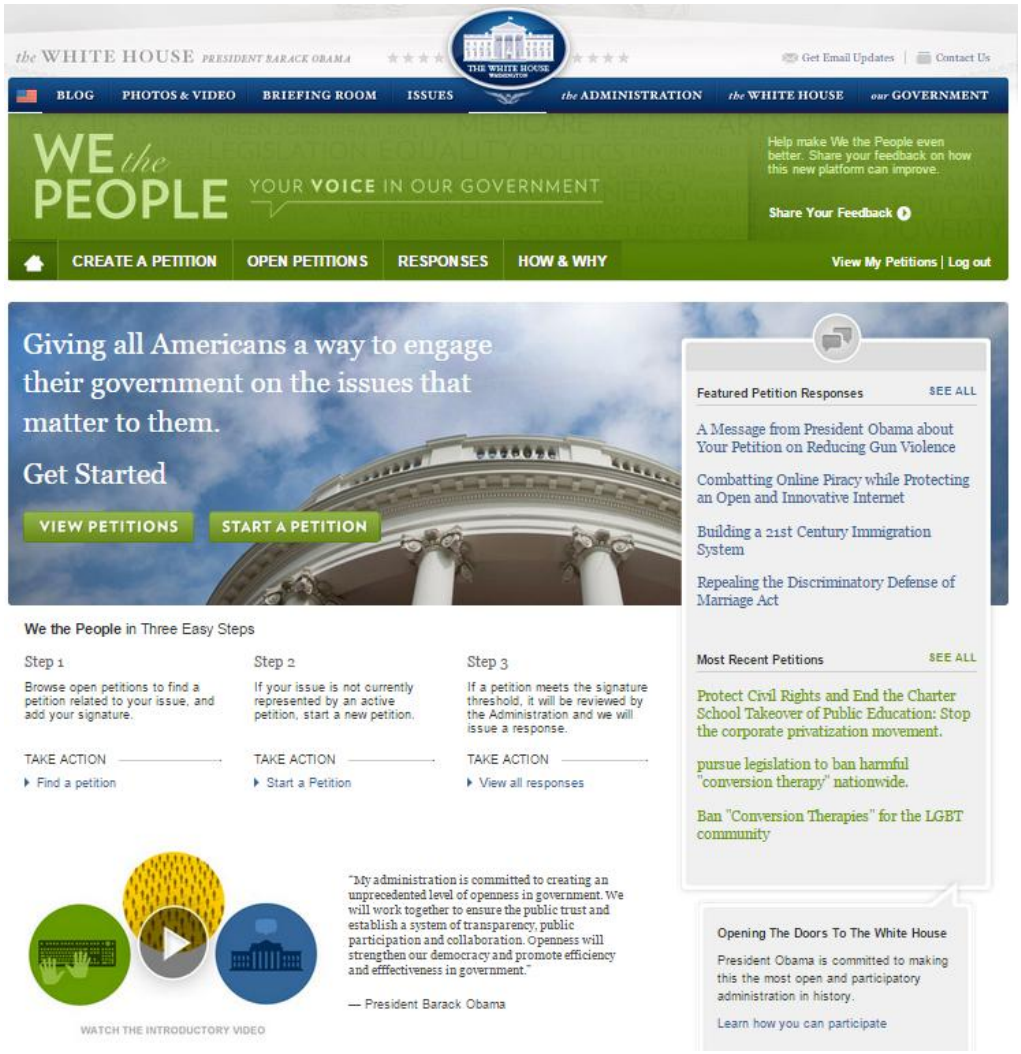

Figure 1: Screenshot of the Home Page of the WtP Website (https://petitions.whitehouse.gov/)

In this study, we conceptualize e-petitioning as collective political action in the context of policy agenda setting processes and we explore the dynamics and structures of e-petition signature data. Agenda setting theory (Baumgartner & Jones, 1993, 2009) suggests that policy issues may rest at equilibrium for periods of time until some "focusing event" triggers attention from special interest groups, the media, the public, and ultimately policy makers. Policy changes can occur during these times due to the pressures for action created by the mobilization of the aforementioned groups of actors (Baumgartner & Jones, 2009). On the other hand, such pressure for change may be countered by other political and institutional forces with substantial stakes in the status quo. Attention to the policy may stimulate a national conversation between individuals who support the policy status quo and those who call for policy change, which may include other issues that are related to the policy but offer different solutions and may have not been part of the original policy dialogue. So as a result of some focusing events, other issues may also gain access to the policy agenda.

A focusing event appears to have taken place on Friday, December 14, 2012 when a man with a gun walked into the Sandy Hook Elementary School in Newtown, Connecticut and fatally shot 20 children

and 6 school personnel. Within a few hours a national conversation about gun control began on WtP. People started creating and signing petitions supporting gun control laws and other issues involving mental health care and putting armed guards in schools. In the six days that followed, several other petitions were created by individuals in support of maintaining the status quo of the current gun control policy. On Friday, December 21, 2012, President Obama issued a response to a total of 33 petitions that advocated for and against gun control and that made alternative policy proposals in response to the Sandy Hook shootings. There were a total of 503,125 signatures to the set of 33 petitions.

In the case study that follows, we explore how electronic petitioning (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 looking at e-petitioning systems and the influence of the public on the policy process. Using agenda setting theory, we identify several concepts in the policy making process. Then we call attention to the gap in the public policy literature concerning the role the public plays in the policy-making process. Finally, we characterize e-petitioning as an Internet-based ICT for mobilizing collective action.

2 Background

2.1. E-petitioning and Public Influence on Policy

Electronic petitioning systems have emerged as a contemporary and potentially effective way for citizens to communicate with their governments about policy issues and have facilitated making public participation in policy discussions more easily accessible. Petitioning systems such as this that enable the public to have an effect on policy development have only recently been a focus of study (Macintosh, 2002; Jungherr & Jürgens, 2010; Panagiotpoulos, 2010; Lindner & Riehm, 2011; Bochel, 2012; Hale, Margetts, & Yasseri, 2013).

However, citizens' rights to petition their governments are not new. The act of petitioning dates back to the 13th century and has long since been a way for people to communicate with local, national or parliamentary governments. With the advent of the Internet and advances in ICTs, e-petitioning has emerged as a mechanism for citizens to participate in the policy-making process in the United States as well as other countries (e.g. U.K., Germany, Scotland, Australia, Norway). Germany's Bundestag's e-petition system has demonstrated that these systems are at the "forefront of official, fully operational e-participation opportunities provided to citizens by governments and parliaments" (Lindner & Riehm, 2011, p.1). The purpose of petitioning is to change public policy, demand officials to make statements, or induce public institutions to take action (Lindner & Riehm, 2011). E-petitioning provides a safe "playing field" for citizens to take part in the policy-making process and is well-suited for a representative democratic society (Lindner & Riehm, 2009; Bochel, 2012).

E-petitioning systems are typically designed with the purpose of enabling citizens to have some influence over decision-making in the policy process. Several studies on e-petitioning systems have examined whether such influence actually takes place, with mixed results. Macintosh et al. (2002) found the Public Petitions Committee in the Scottish Parliament system "useful in influencing politicians about issues considered important" (p. 10). The Scottish Parliament was also one of the two successful e-petitioning systems in Bochel's (2012) study (the other being the Welsh Assembly). In other systems (the House of Commons and the Coalition in Scotland), there was evidence that the petitions had no effect at all on actual outcomes involving policy-making decisions (Bochel, 2012). In the case of the Royal Borough of Kingston, one of the first local authorities to implement e-petitioning in 2004, findings showed that citizen engagement had an impact on policy making decisions (Panagiotopoulos et al., 2010).

An example of e-petitioning by the public effectively influencing policy making in the US is evident in a recent case involving WtP. In January 2013, the petition "Make Unlocking Cell Phones Legal" was created on WtP by Internet activist, Sina Khanifar, asking the Obama Administration to make cell phone unlocking legal. The petition was a response to a decision by the Library of Congress in October 2012 to remove unlocking of cell phones (a process that allows cell phones to be used on any network) from the exceptions to the Digital Millennium Copyright Act (DMCA). Within the 30 days that is allotted for a petition to receive a response, over 114,000 signatures were collected crossing the 100,000 threshold.

The Obama Administration supported the petition and in early August 2014, Obama signed legislation to make it illegal to lock cell phones (Mechaber, 2014).

2.2 Policy Agenda Setting

Some policy issues rise to the forefront of the policy decision-making agenda demanding attention, while others appear to lie dormant or are ignored completely. Why does this happen? Agenda setting theory (Baumgartner & Jones, 1993; 2009) sees the policymaking process as consisting of stability and change. Policy systems that are stable are so by adherence to present circumstances, by complex political systems that are not conducive to change, and by political and ideological constraints within these systems that control access to the policy process itself (Jones & Baumgartner, 2005; Baumgartner & Jones, 2009). These systems are in a state of "equilibrium" until an event triggers the attention of political leaders, interest groups, the media, and/or the public. The stability of the policy system is "punctuated" or interrupted. The attention has the potential to place the policy into the political agenda and policy action may or may not occur (Baumgartner & Jones, 2009).

The policy agenda consists of issues that have gained attention, which can intensify quickly by "focusing events" that potentially can "cause issues to shoot high onto the agenda in a short period" (Baumgartner & Jones, 2009). 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, p.54). As a result of these events, individuals may discover new issues or focus even more on policies that were already in place, causing them to consider alternative policy suggestions to address unsuccessful policy decisions (Birkland, 1998).

2.3 Role of the Public in the Policy Process

Most of the public policy literature fails to include an explicit discussion of how the public is involved in the policy-making process and if the public is mentioned at all, "theorists present a highly unfavorable view of them enacting their role" (Muhlberger, Stromer-Galley & Webb, 2011, p. 208). Instead scholarship views the central actors influencing policy as primarily political figures, interest groups and the media. Muhlberger et al. (2011) point out that Baumgartner and Jones's edited book "Policy Dynamics" (2002) contained numerous scholars of punctuated equilibrium theory who were aligned with the assumption that "the chief causal factors influencing policy are Congress and other institutional actors, interest groups, and historical events. The public is mentioned primarily in passing" (p.207).

However, e-petitioning systems have the potential to position the public as active participants in the policy making process by allowing them to initiate policy proposals on issues of interest to them. Further, using links to Twitter and Facebook, these systems provide users with the technical capabilities to mobilize support from their social networks, or from the public at large, for or against particular policy proposals. Thus, e-petitioning pulls together two forms of political action that are becoming increasingly feasible for members of the public: the public expression of policy proposals and the ability to mobilize collective action in sufficient numbers required to command attention from the elites and elected representatives that make policy decisions.

2.4 E-petitioning and Collective Action

For Bimber et al. (2005) "collective action" takes place when "individuals' transition from a private domain of interest to a public one" (p.377). As private citizens, they have interests and actions that are kept to themselves and by going public with these interests, they move from the private to the public sphere (Bimber et al., 2005). Once this boundary is crossed by at least two people "in conjunction with a public good, a collective action has occurred" and that "boundary-crossing phenomena lie at the heart of the new forms of technology-based collective action…" (Bimber et al., 2005, p.377). E-petitioning is one of these new forms of technology-based collective action tools.

Individuals with access turn to the Internet as the "first port of call for information on almost any subject" (Margetts, 2009, p.3) creating the foundation for informed and directed political action. The Internet has become a locus for collective action fostering "widespread spontaneous political activity"

(Saebo et al., 2009, p.47) as well as more systematic and long-term mobilizations. Social media sites like Facebook and Twitter, blogs, and online discussion forums are just a few of the Web 2.0 applications that are currently being studied to understand how people mobilize around political issues. Increasingly there is evidence that a majority of political mobilizations include an online element of some sort (Hale et al., 2013). The Internet's role in collective action within social media is apparent in enabling massive amounts of people, strangers in some cases, to come together to mobilize or participate online through petitioning or calling attention to issues via retweeting or hitting the "Like" button on Facebook (Margetts et al., 2013).

Petitioning services like Moveon.org and Change.org provide platforms that make petitioning easy for initiators as well as potential signers. These systems also offer suggestions for users to target local and federal governments, corporations, and pretty much any organization that warrants a call for action. Because it is a quick, easy, and accessible way to mobilize large numbers of people to engage in collective action, e-petitioning has been referred to as "Protest 2.0" (Petray, 2011). E-petitioning enables people to express their views and has the potential to create a sense of collective identity among loosely coupled advocacy groups (Strange, 2011; Rolfe, 2005). Citizens in industrialized and developing countries, most likely without enforced censorship, equipped with the technology affordance of e-petitioning systems are embracing the ability to be heard (Neuman, 2014). Individuals can participate in political action online without having to be a part of larger organized effort, interest groups, or "well-defined membership boundaries" (Bimber et al, 2009, p.75).

WtP was created by the Obama Administration to be an innovative tool for online citizen engagement. The system was designed to make it easy for people to bring issues to the forefront of the policy making agenda and potentially have an effect on the policy making process. Similar to Moveon.org and Change.org, users are encouraged to garner support for their petitions through social media via the "Promote this Petition" buttons for Twitter and Facebook on the petition pages. In December 2013, the Obama Administration issued its Second National Action Plan that called for the expansion and simplification of use for WtP. The plan for 2014 was to "make petitioning the Government easier and more effective." (see http://www.whitehouse.gov/sites/default/files/docs/us_national_action_plan_6p.pdf). Improvements include a "more streamlined process for signing petitions and a new Application Programming Interface (API) that will allow third parties to collect and submit signatures to *We the People* petitions from their own websites".

3 Case Study: Sandy Hook Shootings, Newtown, CT.

In the case study that follows, we characterize the Newtown shootings as a "focusing event" with the potential to disrupt the 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 to that time, which ultimately attracted over 197,000 signatures, along with 11 other petitions also advocating gun control options. At the time of the focusing event at Sandy Hook in December 2012, gun control policy at the federal level had lay dormant for four years. One week after the shootings, and bolstered by substantial public support for petitions that advocated renewed policy attention to gun control, Obama vowed to take action.

We focus particularly on 12 petitions initiated during the week of December 14-21, 2012 in apparent mobilization for pro gun control proposals as a policy response. Techniques from market basket analysis are used to explore questions about whether individuals who signed one pro gun control petition also sign other pro gun control petitions. We also use some methods from social network analysis to determine if there are groups of individuals who signed similar pro gun control petitions, thus suggesting the creation of "communities" of individuals whose actions were similarly aligned in support of pro gun control policy proposals.

The remainder of the analysis that follows considers 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 Can we find evidence of collective action by identifying similar thematic policy preferences using techniques from a market basket analysis of e-petitioning signing data?

2. Can we find evidence of e-petitioners mobilizing and forming core groups or "communities" in support of pro gun control law policy issues following the Sandy Hook shootings using techniques from social network analysis of e-petitioning signing data?

4 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 1 and 2 in the Appendix for a listing of these petitions). We used petition titles and petition 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, some of whom appear to have signed more than one petition since the total number of signatures is 503,125[1]. Tables 1 and 2 in the Appendix 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.

We divided the petitions into two groups differentiating between those that expressed a clear preference for "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 12 "pro gun control" petitions were sorted further into three thematic clusters: a group in support of gun control laws which we label "establish gun laws"; a group advocating banning the sale and use of assault weapons which we label "assault weapons"; and a final group consisting of only one petition calling for Congress to repeal the second amendment, labeled "repeal the 2nd amendment". We also sorted the remaining group of 21 petitions 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"). Tables 1 and 2 in the Appendix 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 2. It is apparent from the figure that signatures on the "pro gun control" petitions accumulated largely during the first hours following the shootings while signatures of petitions expressing other preferences accumulated largely over subsequent days.

[1] 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.

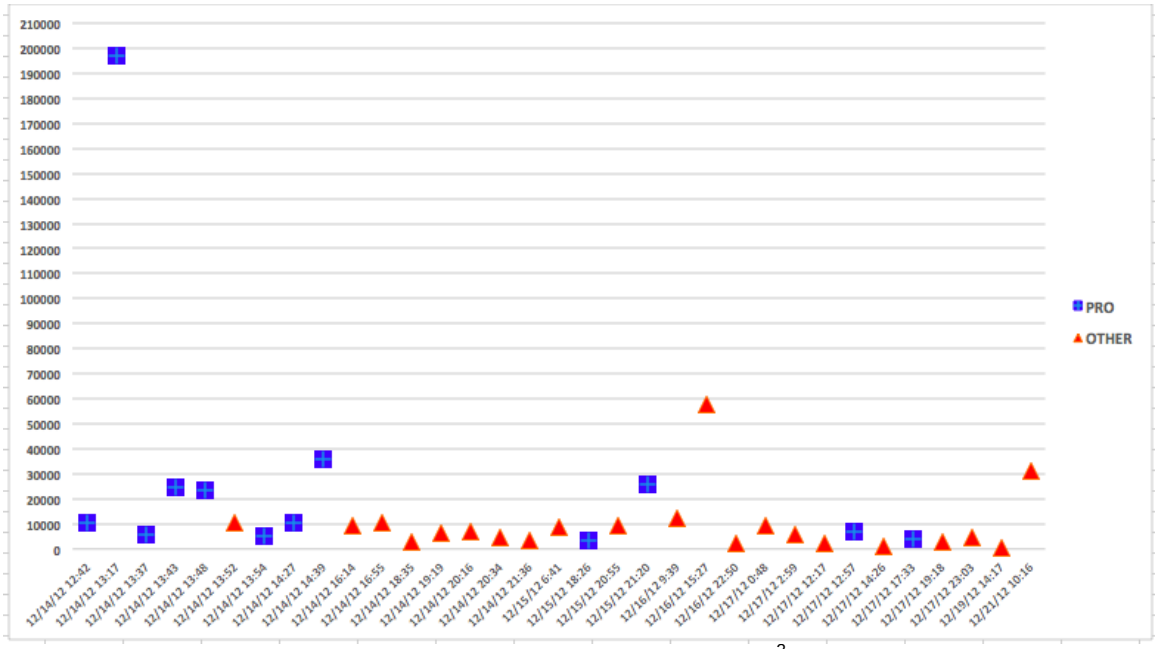

Figure 2: Signature Count Over Time for 33 Gun Control Petitions[2]

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.[3] The remaining analyses focus further on the 12 petitions appearing in these three groups (namely, "establish gun laws", "assault weapons", and "repeal the 2nd amendment"), which were signed by a total of 218,121.

5. Methodology: Data Mining Methods

Data mining (sometimes called data or knowledge discovery) is the process of extracting information analyzing data from a data set and transforming it into a structure that can be analyzed to see if there is any useful information. Many different methods have been developed to analyze data looking for patterns or trends that cannot be observed through traditional statistical methods. For this study, we use techniques from market basket analysis and social network analysis on the 12 gun control petitions that are the focus of this study. These techniques will be explained briefly below; for additional information see Easley and Kleinberg (2010); Newman (2010); and Tan et al. (2006).

5.1 Market Basket Analysis

Market basket analysis is used to identify patterns of co-occurrences of objects. In the case of e-petitioning, e-petition transactions (or market baskets) contain the set of petitions each user signs. This data collected over time can be analyzed to see which petitions users frequently signed together.

Some definitions that will be useful to help understand the concept of frequent co-occurrence of objects in the context of petition data:

- Itemset: any set of items; each transaction is an itemset (subset of petitions signed by user)
- Supportof an itemset *S*:This 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.

[2] This figure is also used in another paper by Dumas et. al that is under review for the Big Data and Society Journal.
[3] This intersection may reflect IDs that reference more than one unique individual.

- Frequent itemset: Any itemset *S* whose support exceeds a chosen support level. Thus, frequent itemsets represent subsets of petitions that are signed together often by users of the petitioning system.

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 users who sign petitions *x* and *y* may also sign *z.* These 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.

5.1.1 Applying Market Basket Analysis to Pro gun Control Petition Data

We used some techniques from market basket analysis on the data collected for 12 petitions that reflect "pro gun control" preferences. In our case, each person who signed at least one of the 12 petitions represents a market basket and the subset of the 12 petitions signed by the person represents the items in that basket. Since a total of 218,021 people signed one or more of these petitions, our data set for market basket analysis consisted of 218,021 baskets, with each basket containing at most 12 items (or petitions). 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. We know of one other study that used market basket analysis techniques on petition data; Jungherr & Jurgens (2010) explored e-petitioning behavior in the German e-petition systemand found core groups of e-petitioners actively signing similar thematic petitions. Their association rules revealed stable patterns of co-signing behavior particularly among a group of Internet activists (Jungherr & Jurgens, 2010).

5.1.2 Results

We computed the confidence values of various association rules of the form $\{x\} \rightarrow \{y\}$, where both x and y represent the IDs of one of the 12 petitions. For visualization purposes, we considered three different confidence values, namely 65%, 50%, and 30%. For each confidence value c, we constructed the following graph with 12 nodes: each node of the graph represents a petition ID and each edge (x,y) implies that the association rule $\{x\} \rightarrow \{y\}$ has a confidence value of at least c. The three graphs constructed in this manner depict the association between the petitions and are shown in Figures 3a through 3c.

Each node contain a petition ID that represents each one of the 12 pro gun control petitions. The nodes are colored according to our three thematic clusters with green, red and blue representing "establish gun laws", "assault weapons", and "repeal 2nd amendment".

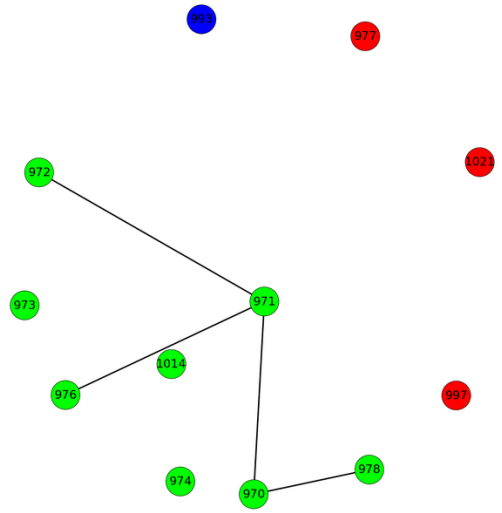

Figure 3a: 65% Confidence Level

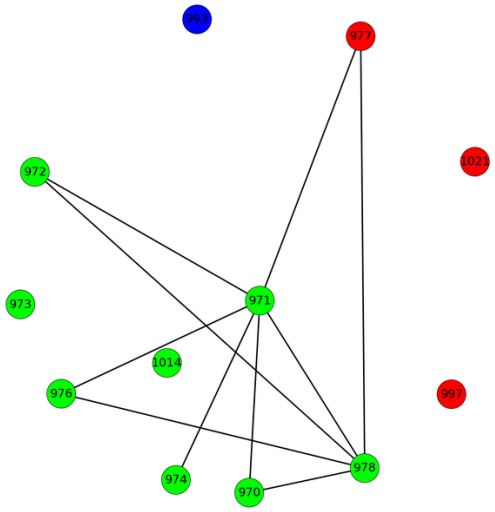

Figure 3b: 50% Confidence Level

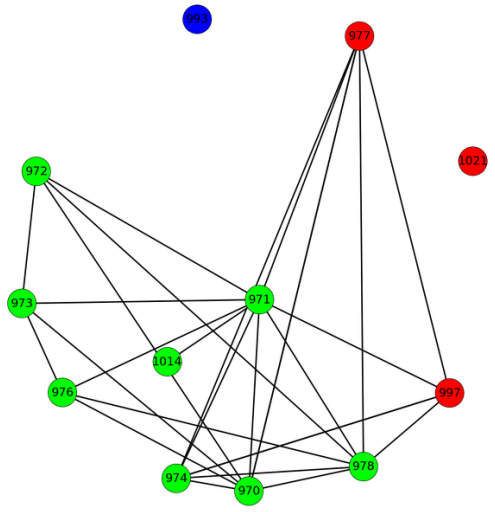

Figure 3c: 30% Confidence Level

From the structure of these graphs, the following conclusions can be drawn.

At the largest confidence value of 65%[4] there is a strong core of five petitions which are characterized by the common theme “establish gun laws” with petition 971 playing a central role. That is, three of the other four petitions are connected to petition 971. Petition 971 ("Immediately address the issue of gun control through the introduction of legislation in Congress") has the largest number of signatures among the group of 33 petitions in this study with 197,073. It was also the second petition created in response to the Sandy Hook shootings; creation day/time December 14, 2012 at 1:17pm. EST. The Sandy Hook shooting took place on December 14, 2012 ~9:30-9:40 am. The other four petitions in this core, 970 (“Start the process to enact Federal Gun control reforms”); 972 (“begin a national conversation on sensible gun control”); 976 (“ Create a national commission to review our gun laws and recommend legislation to address the epidemic of gun violence”); and 978 (“Today is the day: Sponsor strict gun control laws in the wake of the CT school massacre”) were all created within five hours of the Sandy Hook shooting. These petitions are highly connected on the basis of common signers and constituted a frequent itemset; petitions in the other two categories are not connected. That is, individuals signing a petition in this itemset were more likely to sign others in this set, but not petitions in the other two categories. These results indicate that there was an initial online mobilization for pro gun control that was a reaction to the "focusing event" of the Sandy Hook shooting.

When we lower the confidence value to 50%, two more petitions join the core: 974 (“Stronger Gun Control”) and 977 ("Seriously, respectfully and quickly work to end violence committed by assault weapons"). Petition 974 is in the “establish gun laws” category (the same category that makes up the core) but petition 977 is from the “assault weapons” thematic cluster. Both petitions were created within five hours of the shooting.

Petition 977 is different from the other two petitions in the category of "assault weapons". 997 ("Urge Congress to advance federal legislation banning the sale of assault rifles & high capacity magazines") and 1021 ("Immediately sign Executive Order banning sale of assault weapons and high-capacity magazines until Congress acts on this") both are inciting a call to action. With petition 977, this is not the case. It is interesting to see how the petitions are worded and how it affects the signature response.

As the confidence level is decreased to 30%, the “establish gun laws” core continues to become more cohesive. Petition 973 ("Set a date and time to have a national conversation about gun policy in the United States") from the "establish gun laws" theme and petition 997 ("Urge Congress to advance federal legislation banning the sale of assault rifles & high capacity magazines") from the "assault weapons" category join the core cluster. The single petition 993 (“petition Congress and the States to REPEAL THE SECOND AMENDMENT.”) in the “repeal 2nd amendment” category and petition 1021 (“Immediately sign Executive Order banning sale of assault weapons and high-capacity magazines until Congress acts on this”) in the “assault weapons” category are isolates. That is, they have no connections in the network. They have the least number of signatures with 3434 and 3755 respectively.

Petitions 993 and 1021 remain isolates even in the lowest confidence level of 10% (We have not shown the figure for this confidence value since it is very similar to Figure 3c). A possible explanation for these two petitions remaining isolates may be that they are seeking “extreme” measures (“petition Congress and the States to REPEAL THE SECOND AMENDMENT”) and (“Immediately sign Executive Order banning sale of assault weapons and high-capacity magazines until Congress acts on this”) which may not appeal to many people. It appears that the people who mobilized the support for 971 ("Immediately address the issue of gun control through the introduction of legislation in Congress") showed a preference for a more moderate action and perhaps were not inclined to support 993 or 1021. Additionally, they were not created on the day of the Sandy Hook shooting.

5.1.3 More Complex Association Rules and their Significance

[4] Since the largest confidence value is less than 70%, we have included the graph for 65% confidence level.

In the previous section, we considered association rules of the form x → y, where x and y are single petition ids. Here, we comment on the significance of more complex association rules of the form p → y, where p is a set of petition ids.

Our market basket analysis showed that there were 27 association rules containing four petitions that fall between the confidence value range of 61%-91% which consist almost entirely of petitions from the "establish gun laws" category, with the exception of 977 ("assault weapons"). Within these 27 rules, 41% contain only petitions from the "establish gun laws" category and 60% contain the petition 977 from the "assault weapons" category in addition to three other "establish gun laws" petitions.

Additionally, within these items sets containing four petitions, two association rules involving petitions in "establish gun laws" had the largest confidence values. Association rule {978, 973, 970} → 971 had a 91% confidence value. Rule {978, 974, 973} → 971 had a 90% confidence value. These rules contain frequent itemsets {978, 973, 970} and {978, 974, 973}. Both of these frequent itemsets imply petition 971 ("Immediately address the issue of gun control through the introduction of legislation in Congress") which, again, as previously noted, has the largest number of signatures (197,073) among the 33 gun control petitions. In other words, signers who sign the set of petitions in the 2 frequent itemsets {978, 974, 973} and {978, 973, 970} are very likely to sign petition 971. Both of these itemsets have 1% support. Since there are total of 218,021 signatures in this data set, it follows that for each of these two itemsets, at least 2100 people co-signed all four petitions in that itemset.

Also within the itemsets containing 4 petitions, there are two association rules that had an 88% confidence value. These rules are {977, 971, 970} → 978 and {977, 974, 970} → 978. Both of these frequent itemsets {977, 971, 970} and {977, 974, 970}, which have a support value of 1%, imply petition 978 ("Today IS the day: Sponsor strict gun control laws in the wake of the CT school massacre"). Petition 977 ("Seriously, respectively and quickly work to end the violence committed by assault weapons") is a new addition to these itemsets and belongs to the category "assault weapons". We recall in the previous analysis of the structure of the graph, that 977 was a part of the main core at the confidence of 50%.

Within the itemsets containing three petitions, there are two association rules that have the highest confidence value of 88%. These rules are {977, 973} → 971 and {976, 970} → 971. At 87% confidence level there are two more rules, {976, 970} → 978 and {973, 970} → 971. All of the petitions in these groups are in the "establish gun laws" category except petition 977 which, again, is in the "assault weapons" category. The support for these itemsets is 1%.

When we look at the top three association rules for itemsets containing 2 petitions (x →y), at 69% we have 976 → 971, at 68% we have 970 → 971 and at 66% we have 972 → 971. Petition 976 ("Create a national commission to review our gun laws and recommend legislation to address the epidemic of gun violence"), petition 970 ("Start the process to enact Federal Gun control reforms") and petition 972 ("Begin a national conversation on sensible gun control"). Again, these petitions are all in the category of "establish gun control laws". The support for these itemsets range from 2 to 3%, so these three groups of petitions were signed by 4300 to 6500 people.

As a result of this analysis we found many stable patterns of petition co-signing behavior. These rules provide evidence of a core group of people who are actively mobilizing in the "establish gun laws" category. All of the petitions in these aforementioned itemsets were created on the day of the Sandy Hook Elementary School shooting, December 14, 2012, except for petition 997 which was created at 1:20am on December 15, 2012. Eight out of all twelve (66%) pro gun control petitions were created on the day of the shooting. All eight of these are included in the previous association rules analysis: 970, 971, 972, 973, 974, 976, 977, and 978. Clearly, there is evidence of an initial online mobilization for pro gun control law policy started by eight people, the petition creators, within hours of the tragedy in Newtown. This resulted in the formation of a strong community engaging in collective action by signing these petitions calling for the attention of policy decision makers, the White House.

In summary, we found techniques from market basket analysis of e-petition data to be effective in finding meaningful correlations in signer behavior by identifying strong relationships among the petitions. The market basket analysis shows how different petitions were related to each other through patterns of co-signing.

6.2 Social Network Analysis

Social networks are pervasive in today's society. The Internet, online social media networks (such as Facebook, Twitter, Pinterest), and professional networks (such as LinkedIn) are just a few examples. Social network analysis (SNA) helps us to explore the roles of actors or entities and relationships between these actors or entities in these networks. SNA methods are used to try to understand these relationships. SNA is used to study a variety of networks: communication networks, biological networks, economic networks, and terrorist networks (Newmann, 2010).

Centrality was introduced by Freeman (1979), and is commonly used to measure the level of importance or influence of an actor or entity in a social network. Along with Freeman's seminal paper, numerous other papers have acknowledged a variety of centrality measures for social networks (Newmann, 2010). Some of these include degree centrality, closeness centrality, betweenness centrality and eigenvector centrality. (Definitions for these can be found in Easley & Kleinberg 2010; Freeman 1979; Newmann, 2010). In the context of this study, the concept of actors or entities having large centrality measure values signifies a more central or important role in determining certain behavior in a given network.

A community (or cluster) is used to identify a group of actors or entities with similar behavior in a social network. Similarity in behavior can be defined in many ways and algorithms are available for partitioning the nodes of a social network into communities according to those definitions (Newmann, 2010).

6.2.1 Applying Social Network Analysis to Pro Gun Control Petition Data

From the petition data, we constructed a social network (an undirected graph) that allowed us to identify highly central petition signers and groups of similar petition signers. 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 12 petitions that reflected "pro gun control" policy preferences. 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 2213 nodes and 1,084,710 edges[5].

The graph consists of one large component containing all 2213 nodes. Thus, the component (called the giant component) of the network consisted 100% of all the nodes. The large number of edges indicates that it is very densely connected (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 petition signing activity from 1 to 12. (In the table, we use G_i to denote the graph where each node represents a person who signed at least *i* petitions.)

Graph	#Nodes	Graph	#Nodes	Graph	#Nodes
G_1	218,021	G_5	6811	G_9	583
G_2	25,065	G_6	3967	G_{10}	277
G_3	21,120	G_7	2213	G_{11}	143
G_4	11,774	G_8	1257	G_{12}	54

Table 3: Number of Nodes for Different Number (1-12) of Common Petitions Signed

[5] When we reduced the value from seven to six, the resulting network consisted of 3967 nodes and nearly 3.06 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.

Table 3 also shows that out of the 12 pro gun control petitions garnering a total of 218,021 signatures, 25,065 people (11.5%) signed more than one petition in the set. Over 6000 individuals signed five petitions and 2213 signed seven petitions, while far fewer individuals signed substantially more petitions. We see that 54 people signed all 12 petitions, 143 people signed at least 11 petitions, 277 people signed at least 10 petitions and 583 people signed at least nine petitions. Conversely, we see that most people (192,956, = 218,021 - 25,065) or 88%, signed only one petition. Individuals with such radically different signing behaviors would seem to have differential investments in the petitioning process during this event.

6.2.2 Centrality Measures

After constructing the network, we computed three centrality values (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 400 of the 500 nodes (i.e., 80%) appeared in all three sets, indicating that 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.

6.2.3 Community Detection

We used software (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), which partitions the nodes of the graph into subsets, with each subset representing one community. The algorithm found three communities, denoted by C_0, C_1, and C_2 with sizes presented in Table 4.

Community	Size by Signature
C_0	974
C_1	753
C_2	486

Table 4: The Sizes of the Three 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	{978, 971, 974}	{1021, 993, 972}
C_1	{978, 971, 977}	{1021, 993, 1014}
C_2	{971, 978, 970}	{1021, 1014, 993}

Table 5: Three Highest and Lowest Signed Petitions in the Three Communities

There are two petitions that were most favored by all three communities: 978 ("Today is the day: Sponsor strict gun control laws in the wake of the CT school massacre") and 971 ("Immediately address the issue of gun control through the introduction of legislation in Congress."). Both of these petitions fall within the "establish gun laws" category. Petition 971 was the second petition created within two hours of the Sandy Hook shooting and garnered 197,073 signatures. As previously noted it is also the petition that has accumulated the highest number of signatures in the 33 gun control petitions . All three communities had a different third petition that is most favored. Petition 974 (" Stronger Gun Control") was favored C_1 and Petition 970 ("Start the process to enact Federal Gun control reforms") was favored in C_3. Both of these petitions also fall within the "establish gun laws" category and suggest a strong mobilization of support for gun control laws across all three communities. The third most favored petition in C_2 is 977 (" Seriously, respectfully and quickly work to end the violence committed by assault weapons") which falls in the "assault weapons" category.

Two petitions are clearly the least favored. Petition 1021 ("Immediately sign Executive Order banning sale of assault weapons and high-capacity magazines until Congress acts on this") and 993 ("petition the Congress and the States to REPEAL THE SECOND AMENDMENT."). These petitions fall into the categories of "assault weapons" and "repeal 2nd amendment" which collectively make up 1/3 or only 33% of the pro gun control petitions. As we saw in the graph structure of the association rules in all three confidence levels (65%, 50%, 30%) these two petitions were not connected to the main core and remained isolates. Petition 1014 (“Establish federal gun control laws”) is part of the “establish gun laws” category but it is the only petition in this group that was not created on December 14, 2012, the day of the Sandy Hook Elementary School shootings. It was created three days later. What we are seeing here is a trend that then the majority of the mobilization to support gun control laws occurred within 24 hours of the shootings.

7. Discussion and Conclusion

In this paper we sought and found evidence for policy agenda setting activity by the public in the case of the Sandy Hook Elementary School shootings. The tragedy served as a “focusing event” that galvanized the online mobilization of people on WtP in support for renewed attention to gun control legislation, helping to propel the gun control issue back into the policy agenda arena. Prior to Sandy Hook, gun control legislation at the federal level had lay dormant for years in an ongoing state of equilibrium. Directly following Sandy Hook, although discussions about gun control certainly took place in the media, WtP enabled individual members of public to take part in a national conversation about gun control by initiating their own proposals for action and by mobilizing support for them in the form of signatures. It is apparent that President Obama recognized these actions in his press conference on Friday, December 21, 2012, where he publicly acknowledged the contributions of individuals who had proposed and signed petitions during the week that had transpired since the day of the shootings.

Using techniques from market basket analysis, we found a core group of five petitions in the "establish gun laws" theme that were highly connected at the largest confidence level of 65%. At the 50% confidence level this core group increased to six. Individuals who signed one of these petitions in this core group were more likely to sign other petitions in this group. We also found two association rules with at least 90% confidence value that contained four petitions within the "establish gun laws" category. Here we see evidence of the mobilization of e-petitioners engaging in collective action in support of pro gun control laws. Initially, these signers have a private interest in the issue of gun control and are taking action by actively seeking other petitions on WtP where they can engage publicly with others to sign additional petitions that are related to their policy agenda. These acts of private citizens bringing their policy interests into the public sphere and joining others with similar interests "in conjunction with a public good", constitutes collective action (Bimber et al., p.377).

Both the market basket and the social network analyses were feasible because a sizable number of individuals signed more than one of the pro gun control petitions. As we show in Table 3, of the 218,021 individuals who signed one petition, 25,062 (11.5%) signed two petitions and 21,120 (9.7%) signed three petitions. The market basket analysis shows how different petitions were related to each other through patterns of co-signing, while social network analyses show how individuals formed into groups based upon their support for the same petitions.

In the market basket analysis, we find a core group of petitions that were highly connected with each other through common signers. This would imply that some individuals came to WtP presumably to sign one petition and then found and read other petitions that were available to be signed, chosing to sign some of these as well. This would suggest that signing a petition was more than a one-shot effort and that individuals took the time to register their support for other petitions that reflected their opinions. This pattern is interesting from the standpoint of assessing the "slacktivist" argument, in which critics have questioned whether the lowered transaction costs of e-petitioning (among other web 2.0 mechanisms) and satisfaction of having contributed support to a cause might diminish the impact of online activism and decrease offline activism as well (Shulman, 2009; Morozov, 2009; Karpf, 2010).

However, timing also played a crucial role in the mobilization of support for and against the gun control laws (see Figure 2 for a breakdown of signatures over time for all 33 petitions). In our market

basket analysis, we found the core group of petitions for the pro gun control laws was created within five hours of the Sandy Hook event. The second petition created, namely 971 (“Immediately address…”) acquired 15,000 signatures by 5:30pm and over 58,000 by the end of the day, ultimately garnering 165,088 signatures over the next few days. However, two petitions that were created three days after this never connected with the core group of petitions that were created on the day of the shooting, and thus did not attract many signatures. This indicates a strong initial mobilization effort that was highly focused on a compelling petition, which then attracted media attention and perhaps stimulated signatures on additional petitions already created. However, it is not apparent that supporters came back to WtP to continue their efforts. We note that this pattern differs from the signature patterns of those who signed anti gun control petitions, which we analyze in a different study (Dumas et. al, 2014). In that study, we found that anti gun control petition signers, mobilizing to prevent potential gun control legislation, seem to have come back to WtP multiple times to sign petitions reflecting their opinions that appeared on the site subsequently.

At this point, the most that can be said definitively is that many signers took the opportunity and time to register support for more than one petition, which seems somewhat counter to "slacktivism" concerns, although not dispelling them entirely. Clearly, more empirical studies of e-petitioning, its dynamics, and its consequences are needed to assess how individuals are using e-petitioning to express opinions about policy.

Through social network analysis, we found groups of individuals ("communities") that had signed some of the same petitions and that had similarly refrained from signing others. These analyses support the thematic clusters made evident by the market basket analysis. Most of the same individuals turned up in the top-500 lists of three different centrality measures, which would suggest that regardless of how centrality is measured, these particular individuals are core or integral to connecting others in the graph. Perhaps individuals within each of the groups can be labeled "activists" since they sign many similar petitions presumably in an effort to promote their policy preferences. However, although social network analysis locates “communities” of individuals based upon their structural connections, genuine activism would depend on the presence of communicative ties between these central individuals and those they are connected to with respect to e-petitioning. To explore this further, we plan to investigate the relationship between tweeting and the use of other social media to promote selected e-petitions, and subsequent signature accumulation. This kind of analysis would provide a more fine-grained and interactional understanding of how activist communities are formed in the course of e-petitioning mobilization.

So far, our analyses have been descriptive and have focused on an effort to show that patterns of data related to e-petitioning can be successfully mapped onto social science theory related to policy agenda setting. In so doing, one of the contributions of this study is to highlight the importance of e-petitioning itself as a powerful tool for the expression of public opinion. The current popularity of e-petitioning suggests that it may become an increasingly important mechanism for citizens to use to participate in policy decision making. This would underscore the importance of understanding the dynamics of e-petitioning activism, which may provide a useful foundation for theory generation in the future.

Finally, we call attention to some limitations to our study based upon some of the choices we made using petition data. In sorting the petitions into their thematic clusters, we used only the titles of the petitions, and not the supporting text that each petitioner also supplies when the petition is initiated, which may contain reasons for the petition. It may be possible to obtain a more accurate grouping of each petition by a careful analysis of this type of text of the petition. We also noticed that the wording of the petitions may have an effect on the signature response. We briefly mentioned this in the analysis and plan to look into it further. Also, in this study, we did not use the time stamps of the petitions, which indicate the moment when each petition appeared on the WtP website, in a significant manner. For future work, it may be possible to use these time stamps to construct social networks that evolve over time and try to understand the emergence of central players and communities. Finally, as indicated earlier, we are interested in the role that social media (Twitter, Facebook, etc.) plays in the political mobilization of online communities of e-petitioners.

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11 Appendix

Petition ID	**Pro Gun Control "Establish Gun Laws" 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
978	Today IS the day: Sponsor strict gun control laws in the wake of the CT school massacre	Dec. 14, 2012 14:39	33538

1014	Establish federal gun control laws	Dec. 17, 2012 12:57	6477
Petition ID	**"Assault Weapons" Petitions/Title**	**Creation Date and Time**	**Signature Count**
977	Seriously, respectfully and quickly work to end the violence committed by assault weapons.	Dec. 14, 2012 14:27	10165
997	Urge Congress to advance federal legislation banning the sale of assault rifles & high capacity magazines.	Dec. 15, 2012 21:20	24294
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
Petition ID	**"Repeal 2nd Amendment" Petitions/Title**	**Creation Date and Time**	**Signature Count**
993	petition the Congress and the States to REPEAL THE SECOND AMENDMENT.	Dec. 15, 2012 18:26	3355

Table 1: 12 Pro Gun Control Law Petitions

Petition ID	**Anti Gun Control "Support Law Abiding Gun Owners" Petitions/Title**	**Creation Date and Time**	**Signature Count**
987	No more gun control.	Dec. 15, 2012 2:36	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	8227
996	Ensure the 2nd Amendment cant be infringed in anyway limiting citizens ability to defend against tyrannical governemnts	Dec. 16, 2012 1:55	9063
1006	We ask President Obama to support law abiding gun owners in this time of tragedy.	Dec. 16, 2012 20:27	53677
1009	Dissolve any petitions on an Assault Weapons Ban as unconstitutional under amendment II of the Constitution	Dec. 17, 2012 5:48	9070
1010	End the gun free zones and we the people demand a vote on the Citizens Protection Act H.R. 2613	Dec 17, 2012 2:59	5499
1016	Stop Demonizing Guns	Dec. 17, 2012 14:26	1270
1029	Keep guns in America! No weapons ban!	Dec 17, 2012 23:03	4334
1052	Stop any legislation that will ban assault weapons, semi-automatic rifles or handguns and high capacity magazines	Dec. 21, 2012 10:16	31094
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	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	9896
983	Stop crime before it starts by funding mental health facilities instead of prisons.	Dec. 14, 2012 0:19	6046
984	Launch a federal investigation in to the relationship between school shootings and psychiatric drugs	Dec. 15, 2012 1:16	6334

1003	Build a federally-funded mental healthcare system in the United States that offers treatment, education, and advocacy.	Dec. 16, 2012 14:39	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	8955
982	Place Security Guards in Schools Nationwide: The Safe & Sound Schools Initiative	Dec. 14, 2012 23:35	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	4256
1008	Hire military veterans as armed resource officers in all public schools throughout America.	Dec. 17, 2012 3:50	2219
1013	Allow individual School Districts and/or schools the ability to train staff to be School Marshalls.	Dec. 17, 2012 17:17	1964
1025	Employ competent veterans as armed security guards for America's schools	Dec. 17, 2012 19:18	2518
1043	Place police officers and metal detectors in all of our schools.	Dec. 17, 2012 14:17	667

Table 2: 21 Anti Gun Control Law and “Other” or Alternative Policy Petitions