

Article

## Bloggers' Community Characteristics and Influence within Greek Political Blogosphere

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**Abstract:** This paper investigates the properties of central or core political blogs. They can be located as clusters of blogs whose members have many incoming links. Other blogs form clouds around them in the sense that they link the core blogs. A case study records Greek political blogs and their incoming links reported through their blogrolls. The adjacency matrix from the blogs' social network is analyzed and clusters are located. Three of them, those with the larger numbers of incoming links, may be considered to be central. Next, four measures of influence are used to test the influence of the central blogs. The findings suggest that there are many kinds of central blogs, influential and non-influential, and high influence does not always involve high hyperlinking.

**Keywords:** political blogs; Greece; focal-point blogs; influence; incoming links; clusters; statistical analysis

### 1. Introduction

The blogosphere is a microworld of the Internet in the sense that it consists of a community of users that interact forming communities, sub-communities and cliques [1]. Johnson *et al.* [2], based on their research and previous studies, argue that people judge blogs as moderately credible, but as more

credible than any mainstream media or online source [2]. Blogs usually offer links to other blogs, to mass media accounts of daily political events with political commentaries by their authors and a comment forum associated with each post for visitors to contribute their own commentaries and debate with other visitors or the post's author [3]. There are millions of individual blogs, but within any community there may be some particularly prominent members who start major conversations and there may be others who are more active in gathering content from many conversations and only a few that attract a large readership [1,4].

The structure of communication that has developed in the blogosphere results from a combination of the unique technological capabilities and enhanced blogging tools for between-blog feature interactivity [5]. Thus, blog communities emerge [6] that facilitate social interactions among members and provide conversation opportunities [7,8]. There are several types of hyperlink in blogs. Blogroll links, content links, navigation links and paid links. A blogroll link is a blog sidebar hyperlink to other blogs that the author reads or otherwise recommends. A content link is a hyperlink embedded in a post or commentary. A navigation link directs visitors to internal blog features. A paid link is a hyperlink to advertisers [9]. Political blogs form political discourse through hypertext links, blogrolls, posts and opinionated commentary, calls to political action, and requests for feedback [10–12].

The paper studies incoming links between blogs through their blogrolls. A “blogroll” is a list of blogs maintained by a number of bloggers, for regular navigation and frequent visits to linked blogs. The blogroll occupies a permanent position on the blog's home page, usually located in the blog's sidebar. It is the list of blogs that the blogger frequently reads or especially admires offering links to these blogs [13,14] for recommending them or expressing personal acquaintance or friendship [15]. Blogrolls evolved early in the development of blogs and help find other blogs with similar interests [14]. In this vein, the blogroll can be regarded as indicative of the communication networks of the blogger [16]. Analyzing blogrolls as they are used by bloggers to self identify their close connections, is a good way to map the network [6].

Virtual communities are groups of people with a similar interest trying to achieve certain purposes, interested in relationship building, transaction, and fantasy under certain rules by using new information technology as their means [17]. Previous studies have investigated communities in blogs, Wei [18] used content analysis to find norms that indicate membership rules, Nardi *et al.* [19] used interviews and surveys to investigate feelings of community and Chin [20] used social network analysis to identify communities in blogs. Taking into consideration the popularity of blogs, the facts that blogs can be connected in virtual communities of similar interests [21] and the that the activities that take place in the blogosphere affect the external world [22] as well as the importance of understanding influential bloggers, the paper aims at investigating the formation of focal-point political blogs and their influence in Greece. A-list blogs are the most well known and highly linked and enjoy higher readership [23,24]. Blogroll links were used for the detection of A-list blogs [9], as blogrolls provide clues about the blogger's political agenda and affiliations [15]. It is not, however, certain that many links equate high readership.

The paper investigates how the property of formation of focal-point political blogs applies to the Greek political blogs. It proposes a methodology for locating focal point blog groups, according to the number of incoming links. Because of the method used, these blog groups are linked jointly by other blogs, and in this way it is probable that they share some common property. The paper distinguishes

those highly linked groups and investigates how influential they are with respect to several conventional influence measures.

The paper follows a quantitative approach. Qualitative aspects related to a broad content analysis of the blogs are not taken into consideration in this study. Although a qualitative approach could broaden our understanding of blogs' community characteristics, this paper only makes a first step in understanding networking and influence properties of the political blogs using cluster analysis and quantitative indexes of influence.

## 2. The Influence of Political Blogs

The number of people engaging in explicit political blogging has increased in recent years following the overall explosion of blogging activity [25].

Web 2.0 technologies can change the nature of political completion and either serve to complement or as an alternative to traditional media [26]. Political bloggers use their blogs to engage in a variety of political activities, the most popular being to provide readers with links to reports and articles found elsewhere. The majority of political bloggers provide information not found in traditional media outlets, including party platforms, dates of political rallies or events, upcoming votes, and the release of data [11]. They also inform their readers about errors or omissions in the mainstream media [27]. There are many situations in which blogs have exercised an important influence over how politics is practiced and how policy is developed and supplanted, surpassed and scooped mainstream media [28–31] and in holding public officials accountable [11,30,32–35]. However, there are studies that do not indicate that blogs have any major impact. Jackson [28] finds that blogs used by parties in the 2005 UK general election, were used as a one-way communication channels, not being effective as conversational, campaigning, or promotional tools.

Political bloggers also express their political beliefs [12], spread their ideological orientations, and amplify views from parties that reflect their own political predispositions [12]. Tibbals [36] found that a strong association exists between comment types and the blog's political perspective. According to this study comments on liberal blogs tend to treat the comment section as an open forum where they share ideas and often directly engage the blogger, while comments on conservative sites tend to be angrier especially towards opposing viewpoints.

A growing amount of political leaders and political parties manage their own blogs. They diffuse information to internal audiences, build up a volunteer base, mobilize support from their constituency, shape their political agenda and generate resources [37,38]. Blogs have been used as a campaigning instrument in the following elections: The 2004 presidential election [37,39], the 2005 U.K. general election [28,40], the 2005 Danish parliamentary election [41], the 2005 New Zealand general election [42], the 2005 German Bundestag election [43], the 2007 French election [44], the 2007 Australian Federal Election [45], the 2008 presidential elections in the USA [46].

Bloggers can also be described as political activists, who push their own causes, organize event candidates, publish campaign literature and raise money for candidates in elections, [11,37,46–49].

Political bloggers also encourage donations to charity causes [27]. Bloggers raised money for the victims of the 2004 Tsunami, and in the aftermath of Hurricane Katrina collected donations for relief organizations [11].

### 3. The Greek Blogosphere

According to the Greek Statistical Authority, Greece has a population of 10,787,690 and according to the Hellenic Observatory for the Information Society 2010, one in four Greeks has access to the Internet, while more than 40% of them have access to blogs.

In the light of 2009, there were 39,374 blogs written in the Greek language and today 32 blogs are being created daily. The number of Greek blogs doubles every year and the same happens with the number of posts. A total of 2.479.098 posts have been recorded in Greek blogs. The average number of posts per month in 2008 was 110.354 and 65.550 in 2007 [50].

The average Greek blogger is between 26 and 35 years old with a college education. One third is self-employed and only 15% are public servants. Three out of four bloggers are male. 74% of the bloggers live in Athens (58%) and Thessaloniki (16%). Ten percent are residents of other countries [50]. Motives for blogging are to keep a diary, to experiment, to take action while being anonymous, and to create a community. Personal interests, art and culture, and entertainment are the main subjects throughout Greek blogs. News and political blogs are less common. Thirty eight percent of the bloggers consider blogging to be a form of journalism, while 51% do not [51].

Blogs emerged in Greece after the events of 2007. People used blogs in order to express their political awareness and their feelings about major events that happened during that year. In 2007 Greek blogs revealed that foreigners had been beaten in the police department of Omonia square in the centre of Athens. Bloggers also raised concern about the environment after the deforestation caused by fires in the Peloponnese, created a protest and organized a big demonstration in the Syntagma Square in Athens.

In 2008 blogs began to exercise influence on Greek politics. A growing amount of political leaders created their own blogs and started dialogue with bloggers. Panagiotis Bryonis was the first blogger who was invited by the Hellenic Socialist Movement (PASOK) to advise them about the utilization of social media and Dora Bakoyianni, at that time minister of foreign affairs, organized a team of bloggers in order to investigate how Social Media could have a positive influence on national affairs.

### 4. Measuring Influence

Blogs are already influencing politics. A question that arises is how do we measure influence? Previous studies have taken different approaches in order to identify influential bloggers. The first approach takes into consideration incoming links.

“The vast majority of blogs are probably only read by family and friends, there are only a few elite blogs which are read by comparably large numbers” ([28], p. 295).

The authors of the most well known and read blogs manage to create a persona, making themselves a “celebrity” among the community of bloggers. These blogs are regularly the most linked by others [13,52]. The overall distribution of inbound links between blogs is highly unequal [1,23,24,53,54]. It has been argued that large numbers of incoming links indicate high readership [55]. In this vein the median blogger has almost no political influence. Drezner and Farrell [24] highlighted (pp. 16–17):

“This is because the distribution of weblinks and traffic is heavily skewed, with a few bloggers commanding most of the attention. This distribution parallels the one observed for political websites in

general. Because of this distribution, a few “elite” blogs can operate as both an information aggregator and as a “summary statistic” for the blogosphere.”

The performance of various algorithms such as PageRank, HITS and in-degree, on modeling influence of blogs was also studied [56]. Their experiments show that PageRank based heuristics can be used to select an influential set of bloggers. However, in order to identify opinion leaders in a network, other essential properties, like how novel the information each node contributes to the network is, should be taken into account in both models [57].

Karpf [58] illustrated four distinct areas of influence: Network centrality, link density, site traffic, and community activity. He used the Blogosphere Authority Index that combines data from four measures of online influence into a single ranking system. The four measures used are: (1) The Network Centrality Score. It is an applied sociometric variable that is culled from blogrolls, which are self-reports of recommended or approved blogs; (2) the Hyperlink Authority Score that it derived directly from Technorati.com’s authority tracking system; (3) the Site Traffic Score. He used Sitemeter.com that directly measures the number of unique visitors a website receives every day; (4) The Community Activity Score. Almost all blogs include a mechanism for readers to write comments in response to the author’s post. Total Comments/Week was used to serve as a site’s Community Activity Score.

## 5. Methodology

This paper addresses the issue of blogging from two perspectives: Mainly it considers the blogs’ networking connectivity patterns, and at a secondary level, it analyzes the influence they have regarding influence indicators that have been proposed in the literature. The influence of blogs is a complex concept and in the literature it has been studied mainly in relation to the location within the blog social network, the readership of blogs and the participation of readers which is measured by their comments on posts. A key feature of the study of influence is the use of incoming hyperlinks through blogrolls. It is generally accepted that the so-called A-list blogs are those that are more readable and they usually attract the largest number of incoming hyperlinks. To identify such blogs commonly used indicators are authority, number of visits by users, the number of incoming links and the number of comments.

Generally, blogs are studied individually by using the measures mentioned above. The concept of community is introduced at two levels. At the first level the user comments are identified in order to investigate the intensity of community involvement in commenting on the posts. This is a clear and straightforward process. The total number of comments can be used as an indication of community involvement and thus as a measure of the influence of blogs. At the second level, we can consider the example of political blogs in USA. In this example the community is presented usually considering the Democratic blogs on one hand and Republican blogs on the other [39]. The community can be conceptualized when representing incoming links, if there are two clouds of blogs—one Democratic and one Republican—around two centers which gather most of the incoming hyperlinks [39]. Regarding this picture we argue that the blogs’ centers have a greater influence and can be identified by the community of bloggers. It is probable that these centers are regarded by the community of bloggers to have some common characteristics (possibly ideological-political) and that is why the community of bloggers refers to them.

This paper is based on the idea of cloud formation by blogs around cores with great influence, cores of blogs that have a common profile. How can this approach be generalized without knowing the existence of, say, two distinct communities (Democratic and Republican, for example) but inventing a technique that will identify these cores? This work demonstrates a statistical technique that is based primarily on the use of incoming hyperlinks, and identifies the central–core blog groups. It should be noted that the proposed method identifies groups of blogs with a specific property; all the blogs within the group have almost equal numbers of incoming links. Additionally, these groups have another important property: If some blogs within a group get incoming links from some other blogs then it is likely that other blogs within the group are linked by the same blogs as well. This property is a consequence of the method followed and is explained later on. Thus, core blog groups are jointly linked and this is probably happening because the blogosphere regards them to have common affiliations, properties, interests, *etc.* These blogs can also be described as being “authority” blogs because they can serve as a meaning of navigation economy. Users who are looking for relevant information can be directed to these blogs, which are regarded favorable or important by other blogs, and economize both time and information.

This paper, using conventional influence measures, investigates the influence of these central blog groups. The analysis attempts to bridge the concept of community with the concept of influence and in this way to generalize influence, taking into account characteristics of the community.

This paper records and analyzes blogroll hyperlink interconnections. The reasoning for recording incoming links from blogrolls to other blogs is to observe and record formal interconnections between blogs. These interconnections take the form of bloggers’ suggestions to potential users. Users may benefit from navigating through incoming links and visit blogs that are considered familiar, important or relevant by other blogs. Thus suggested blogs are granted a certain degree of worth and value.

This paper records Greek political blogs discussing the five Greek parliamentary parties. Blogs that have the majority of their post discussing politics and also have tags to the Greek parliamentary parties are considered political blogs. Blogs were recorded during November 2010, using Technorati.com and Google blog search and the names of the parties as key words. Further, blogs were visited and their content analyzed to see if they actually discussed politics regarding the political parties. The five parliamentary Greek parties are: New Democracy (ND)—the Christian Democratic party, Pan-Hellenic Socialist Movement (PASOK), which is the main opposition party, the Communist Party of Greece (KKE), Coalition of the Left and Progress (SYRIZA) and People’s and the Orthodox’s Rally (LAOS) a right wing party that has newly entered the parliament and is mainly characterized by nationalist and populist practices and rhetoric.

In total 127 blogs were recorded. Incoming links between blogs through their blogrolls are studied. The paper uses the social network of the blogs and analyses the associated adjacency matrix. An adjacency matrix is a square non-symmetric binary data matrix where unity is placed in cell  $ij$  if blog  $i$  links blog  $j$  through the blogroll, otherwise zero is placed in the cell. This research adopts a method introduced for locating central blog groups in political blogging [53,54].

Multidimensional Scaling (MDS) is applied using the data of the adjacency matrix. The 127 by 127 adjacency matrix is the data matrix in our case. The 127 columns serve as the 127 variables that represent the way that each one of the 127 blogs is linked by any of the 127 blogs within the blogs’ network. MDS reduces dimensionality and quantifies the data. The method reproduces the original

data and maps them on a space with fewer dimensions. Two dimensions provide a simple solution and are suitable if goodness of fit statistics has acceptable values, while the effort is to keep intact the distances among the original data on the new reproduced data. “Stress” is a loss function in this context, which is minimized using a procedure called stress majorization. Stress is a measure of goodness of fit between distances of original data and distances of the reproduced data. It measures the squared differences between ideal (low-dimensional) distances and actual distances in high-dimensional space. Small values of Stress indicate good fit and representation of the original data to the new lower dimensional space (namely two dimensions in our study). A better fit is assumed when stress is close to zero. Two-step cluster analysis uses the quantified data from MDS to produce clusters of blogs. Some of the clusters that are produced by two-step clustering gather the largest number of incoming links. When this happens they should be considered as central or focal points. Two-step cluster analysis is useful for large data sets when there is no prior knowledge of the number of cluster. For two-step cluster analysis, the Log-likelihood distance measure and the Schwarz’s Bayesian Criterion (BIC) are used. The optimal number of clusters is found when BIC presents its greater change.

Considering the way they are formed, *i.e.*, by using incoming links and by performing cluster analysis, this means in general that if a blog links to a blog of a specific cluster, it is likely that it links to other blogs within the cluster as well. It is for this reason plausible to argue that blogs within a cluster are considered homogeneous regarding certain properties that they may share; and that is why they are linked.

Affiliation of the blogs was explored through the examination of the written content included in the blogs of the clusters. For each blog, the main title of the blog along with a summarized description was analyzed. The “about” part of each blog (when applicable) is where the scope of the blog is given, the motivation of the blogger to create it *etc.* Usually there is also information concerning the blogger, such as his/her interests, her/his aims, her/his academic background and her/his political beliefs.

The second level of the analysis includes the study of the blogs’ influence. Following the approach of Karpf [58], four measures of influence are used: The Network Centrality Score, the Hyperlink Authority Score, the Site Traffic Score and the Community Activity Score. The Network Centrality Index is calculated as the normalized betweenness of each blog regarded as a node within the blog social network. Blogs are the nodes while incoming links are the connections in the network. Loosely, betweenness equals the number of geodesic paths that pass through a node or the number of “times” that any node needs a given node to reach any node by the shortest path. Normalized betweenness divides simple betweenness by its maximum value. Normalized betweenness is calculated using UCINET for Windows. The Hyperlink Authority Index is usually measured using the Technorati.com authority index. However, since Technorati.com recently does not provide such indexes for non-English language blogs, we used Sync.gr popularity index instead. Sync.gr was founded in January 2007 and is the biggest blog aggregator in Greece. On February 3rd 2011, sync was identified through Alexa.com having an Alexa Traffic Rank 27698, Traffic Rank in Greece 180 and 656 Sites are Linking In it. “Sync.gr introduces itself as “a meeting point for anything written in Greek blogosphere”. Sync.gr users can register their blogs, upload podcasts, videos and photos, use advanced features for showing updates from other social networks and connect with friends and track their notifications. The Site Traffic Score is recorded using Alexa.com index, and finally the Community Activity Score is recorded for each blog in the analysis using content analysis. It measures the number

of comments to the posts of the blogs during a one-week frame (24 January to 30 January 2011), as suggested by Karpf [58]. The measurements of the four indexes for each blog are transformed to ranks. The Blogosphere Authority Index is the sum of the ranks of the four measures minus the worst rank of them [58]. In this study values of this final index are also ranked, in order to be easy to comprehend.

Finally, ranks of the Blogosphere Authority Index are reported for every cluster created in the first part of the analysis. Comments and conclusions are reported.

## 6. Findings

MDS (stress = 0.045 considered as very good goodness of fit) and two step cluster analysis results in the formation of four blog clusters. They are characterized by the property of skewness, which means that more populous clusters have smaller average incoming links values. One cluster, Cluster 0 in our analysis, contains 71 out of the 127 blogs and has an average of incoming links 1.67 which is equivalent to 1.31% of the maximum number of incoming links that it may get (max = 127). Clusters 1, 2, and 3 contain 22, 16 and 18 blogs, respectively, and they have the biggest numbers of average incoming links. In particular Cluster 3 is placed at the top of the ranking since it gets incoming links from nearly 10% in average from all the blogs (Table 1).

**Table 1.** Incoming links of the clusters.

	Mean (Std. Deviation) of Incoming links	Mean (Std. Deviation) of percentage % of incoming links
Cluster 0 (N = 71)	1.67 (1.44)	1.31 (1.13)
Cluster 1 (N = 22)	5.68 (2.25)	4.47 (1.77)
Cluster 2 (N = 16)	7.37 (2.84)	5.80 (2.24)
Cluster 3 (N = 18)	11.33 (5.40)	8.92 (4.25)
Total	4.45 (4.40)	3.50 (3.46)

Table 2 presents the affiliation of blogs. Regarding their affiliation Cluster 0 is a collection of blogs of heterogeneous content. Cluster 1 contains blogs with Left affiliation, while cluster 2 contains blogs with a Left or PASOK affiliation, and blogs that discuss and argue about society and democracy, digital liberties, information provision. Cluster 3 contains mainly mainstream media blogs (Table 2). In our analysis Cluster 0 is not considered as a core although it might contain influential blogs, yet it is not a set of homogeneous content blogs as regarded by bloggers in the blogosphere. Clusters 1, 2, and 3 are the cores that we were originally searching for. Since blogs within each core are linked (this is a default property of the techniques used, *i.e.*, Cluster analysis on the adjacency matrix), they may be considered as sharing common properties. In this way they are distinguished by bloggers, recommended by them and hence they may be considered as highly influential groups, with distinct a content that is worth reading.

**Table 2.** Affiliation and properties of the clusters.

Cluster	Affiliation
Cluster 0	A collection of heterogeneous content blogs
Cluster 1	Mainly Left, KKE and SYRIZA
Cluster 2	PASOK and Left, broader speculation about society and democracy, digital liberties, information provision, discussion and argumentation
Cluster 3	Mainly mainstream media blogs

Table 3 presents the correlations among the four measures of influence used in the paper and number of incoming links. It serves as a preliminary test to examine whether influence measures are characterized by internal consistency. Centrality, as expressed by the normalized betweenness, is not correlated with community characteristics, such as number of comments, or with traffic. On the contrary, incoming links are correlated with centrality (for obvious reasons) and with community activity (comments) as well, while they are also correlated to a certain degree with traffic (Alexa traffic rank). Two implications arise from this table: Not all indexes of influence are correlated with each other, that is, influence is not a uniform property across all indexes, or indexes do not result in similar findings. Secondly, the number of incoming links seems to be a good indicator of influence indexes and characteristics.

**Table 3.** Correlation coefficients among blog influence indexes and number of incoming links.

	Incoming links	Normalized betweenness	Alexa traffic rank	Sync rank
Normalized betweenness	0.531 **			
Alexa traffic rank	-0.287 **	-0.109		
Sync rank	-0.176	-0.003	0.624 **	
Comments	0.508 **	0.081	-0.146	-0.206 *

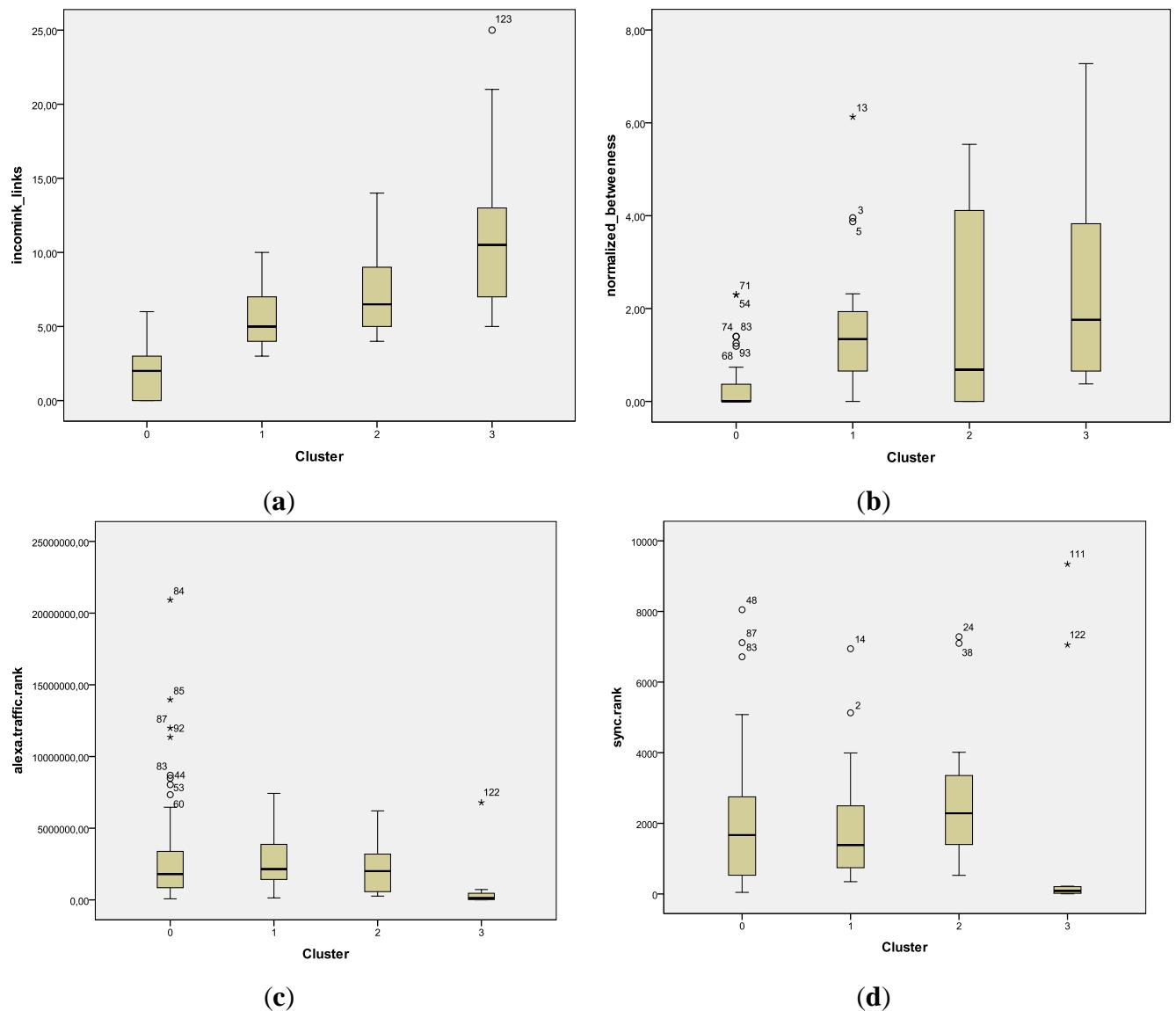
\*\*  $p < 0.01$ , \*  $p < 0.05$ .

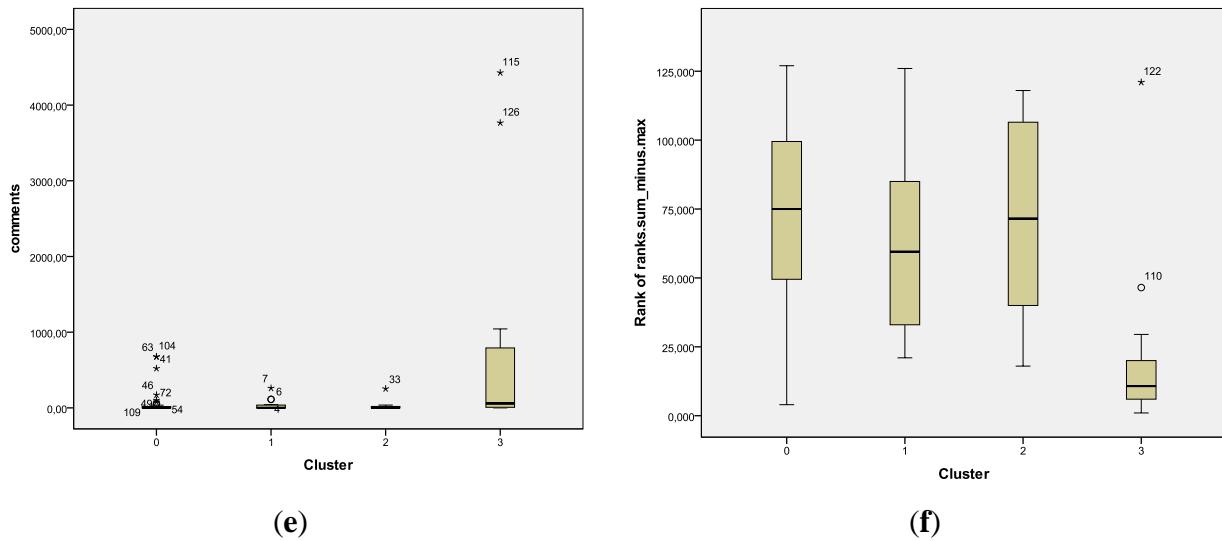
Applying the four measures of influence to the four clusters produces Table 4 and Figure 1. Figure 1 presents the box-plots of influence measures by clusters. It is clear that incoming links (used to construct the clusters) and normalized betweenness scale from low values in cluster 0 to the highest values of cluster 3. However there are no overall differences of the two traffic indexes among clusters 0, 1, and 2. Only Cluster 3 (Media blogs) differentiates, presenting the “best” values. Quite the same finding holds for the number of comments and the overall Blogosphere Authority Index. In this case the media blogs cluster presents even larger differences from the main pattern of the other clusters, because the blogs in the media blogs cluster reach a thousand comments or more for the period of the study. It is interesting to notice, however, that some blogs in Cluster 0 (Heterogeneous blogs cluster), may have very large number of comments. This implies that even if Cluster 0 may not be central within the blog network, it contains however, popular blogs with high users’ community participation.

**Table 4.** Centrality and Authority Scores of the clusters.

Clusters	Incoming links score (average rank)	Network Centrality Score (average rank)	Hyperlink Authority Score (average rank)	Site Traffic Score (average rank)	Community Activity Score (average rank)	Blogosphere Authority Index (average rank)
Cluster 0: Heterogeneous content blogs (N = 71)	91	82	67	58	65	74
Clyuster 1: Left (N = 22)	42	43	79	61	66	62
Clyuster 2: PASOK–Left, information, discussion (N = 16)	30	51	67	70	73	72
Cluster 3: Mainstream media blogs (N = 18)	16	30	22	22	27	20

**Figure 1.** Boxplots of influence measures by clusters: (a) Incoming links by cluster; (b) normalized betweenness by cluster; (c) Alexa traffic rank by cluster; (d) Sync rank by cluster; (e) number of comments by cluster; (f) overall blogosphere authority score by cluster.



**Figure 1. Cont.**

(e)

(f)

It is obvious from Table 4 that the heterogeneous blogs cluster is the most popular, i.e. the cluster with, in average, the least linked and the least central blogs. However blogs in this heterogeneous blogs cluster in average are no different from those of Clusters 1 and 2 (Left and PASOK-Left clusters, respectively) regarding the Hyperlink Authority Score, Site Traffic Score and Community Activity Score. In total they are no different, in average, from blogs of the Left and PASOK-Left clusters regarding the Blogosphere Authority Index. In fact they may be ranked in better orders than those of Left and PASOK-Left in some scores, yet this difference is not significant. Thus, the heterogeneous blogs cluster contains those blogs that are equally influential than those of the Left and PASOK-Left clusters but have only few incoming links (average number of incoming links is 1.67). For example, parapolitiki.com and anti-ntp.blogspot.com are two blogs from the heterogeneous blogs clusters, which are of interest. Parapolitiki.com is a blog about political discussions that claims to be independent and with no specific political affiliation. This blog is seventh within the overall ranking of our analysis and is indeed ranked among the top-10 of the Greek blogs ([http://www.parapolitiki.com/2009/11/blog-post\\_9455.html](http://www.parapolitiki.com/2009/11/blog-post_9455.html)). However, in our analysis it gathers only six incoming links from the other political blogs. Although it is not recommended by the political bloggers community, it enjoys high readership. Anti-ntp.blogspot.com is a political and information provision blog against the new order. It gathers four incoming links from the other political blogs but it is placed ninth in our influence ranking system and twelfth regarding the Alexa traffic rank, within the political blogs of our study. It is therefore straightforward that there exist influential blogs such as the two mentioned before, which enjoy high readership but are not considered members of specific blog communities.

Left and PASOK-Left clusters are highly recommended by bloggers in terms of number of incoming links but not very influential regarding three of the four influence scores.

The media blogs cluster is ranked first by far, according to all of the scores used, including the total Blogosphere Authority Index. It contains the most linked and in addition the most influential blogs. The media blogs cluster encompasses all the influence characteristics plus it is the most central or core cluster. One of its significant properties is that it not only is a central cluster but it presents a high degree of community involvement regarding the number of comments. The common characteristic of

these blogs is that they are mainly mainstream media blogs. The reason that they rank highly among all the scores used in the analysis might be obvious or commonplace. Blogs in this cluster may be treated as a homogeneous group because they are mainstream media blogs having high readership rates, so bloggers decide to include them in their blogrolls. It has been argued that providing links to mainstream news sources and blogs is clearly an important function of blogs [11]. Left and PASOK-Left clusters have a very distinct profile and although they present medium scores they are highly linked and constitute clusters with distinct profiles. For this reason they probably deserve to be studied since they may represent a distinct part of the activated public opinion expressed through blogs.

Blogs of Media blogs cluster serve as the ultimate focal points. This minority of blogs may be regarded as influential by all means.

## 7. Conclusions

Although the findings are indicative of the Greek blogosphere, they may be diversified within other contexts, and some interesting conclusions can be drawn.

This paper provides a new and wider perspective when regarding influential blogs. It introduces a framework to cluster blogs according to their incoming links and studies them regarding influence indicators. The number of incoming links is a fair index of a blog's influence and a very good indicator of a blog's centrality. Influential blogs can be spotted using the clustering procedure introduced. However there exist influential blogs that do not have many incoming links. Some clusters, Left and PASOK-Left clusters in our analysis, are not better regarding influence but they are central and constitute cores of blogs having common properties and profiles. Researchers should take notice that influence as measured by conventional measures might not be enough to distinguish and study the blogosphere, but instead a mixture of hyperlinks analysis and influence measures could provide more suitable results. Left and PASOK-Left clusters, although being moderately influential, are central and represent certain bloggers' affiliations and groupings. They should not be neglected from any content analyses because, although not being very influential, they represent and exhibit certain points of views of bloggers, which can provide complementary information when studying activated public opinion expressed in the blogosphere. On the other hand, remote blogs can have substantial influence and should be examined even if they are not central within the blogosphere.

This paper provides a methodology for describing, mapping, and better understanding the blogosphere and blog communication patterns. There is a certain way that bloggers act within in a community. They present community characteristics and they appreciate certain blog clusters regarding their content or affiliation. On the other hand, the public visits blogs at different rates and the readership presents a large degree of differentiation. The way people see blogs is not necessarily the same as the way bloggers regard other bloggers within the community context. Clusters with highly recommended blogs (through blogrolls) enjoy high readership, while there are fairly recommended blog clusters that do not. There are also exist blogs with high readership but without being appreciated or recommended by the bloggers' community. A research hypothesis to be further investigated is whether this recorded diversity regarding incoming links popularity and influence, can be attributed to the bloggers' activism. Bloggers involved in activism may form clusters of central ideological blogs,

which may not necessarily attract users' traffic or reflect public choices and opinions. However they may attract incoming links from other bloggers of the same affiliation.

The question still holds. What are the most influential blogs within the blogosphere? Each index tells a different story, or reveals different aspects of this issue. If one is interested in identifying and reading blogs of certain characteristics or ideology then probably blog clusters of high incoming links rates are those of interest. However since blogging provides an opportunity for the individuals to post ideas and discuss according to their own opinion and ideology, then individual blogs (like the ones in Cluster 0) could be of interest.

This hypothesis is to be investigated by the authors within another project, using content analysis and profile analysis of the blogs and bloggers. Also, since this paper only explores the formation of central clusters of blogs and the measures that influence them, further analysis is scheduled to explore whether central and/or influential blogs have an impact on the wider political arena.

There are some managerial implications that can be drawn from this study. Firms, political campaigns and users can benefit by visiting blogs of the central clusters as well as the most influential blogs of the heterogeneous blogs cluster (Cluster 0). Users, researchers and campaigners can benefit from reading what is discussed in clusters of certain affiliations and in clusters of high influence. These are the blogs in Left, PASOK-Left, Media clusters and the most influential blogs of the heterogeneous cluster. In total they are half the number of the total recorded political blogs of the study. Campaigners not only can benefit from following the essential political discussions and information provision, but can also reach influential and central blogs to promote political opinions and views.

The limitations of the study are associated to the specific methodology followed and to country specific issues, such as cultural differences. Limitations regarding the methodology include the use of the statistical analysis, the sampling procedure, and the use of incoming links through blogrolls. Other sampling procedures, or recording incoming links though blog posts and not only blogrolls, or some other approach, for example a purely Social Networking Analysis approach, could reveal aspects and properties of focal-point blogs, or enhance the findings of this paper. Country specific limitations are associated with the way that politics are discussed in Greece and the way bloggers are connected with each other. Most blogs that form communities are indeed blogs with a Left affiliation while blogs of Right are less involved in networking through hyperlinking. Many bloggers from clusters of the Left and PASOK do know each other personally and many of them organize summits to discuss technology and political issues. On the other hand, due to the fact that the Greek political system is not a strictly bipolar system, like the one in USA for example, it allows for people of different political affiliations to discuss with each other and, consequently, form communities, and blog communities as well, where the social actors have somewhat close but different political affiliations. Replications of the proposed approach could enhance or shed light on this interesting issue of cluster formation.

## References

1. McGlohon, M.; Leskovec, J.; Faloutsos, C.; Hurst, M.; Glance, N. *Finding Patterns in Blog Shapes and Blog Evolution*. Carnegie Mellon University: Pittsburgh, PA, USA, 2007.
2. Johnson, T.J.; Kaye, B.K.; Bichard, S.L.; Wong, W.J. Every blog has its day: Politically-interested internet users' perceptions of blog credibility. *J. Comput.-Mediat. Commun.* **2007**, 13, 100–122.

3. Lawrence, C.; Dion, M. Blogging in the political science classroom. *The Teacher* **2010**, *43*, 151–156.
4. Wagner, C.; Bolloju, N. Supporting knowledge management in organizations with conversational technologies: discussion forums, weblogs, and wikis. *J. Database Manag.* **2005**, *16*, i–viii.
5. Woody, D. New competencies in democratic communication? Blogs, agenda setting and political participation. *Public Choice* **2008**, *134*, 109–123.
6. Efimova, L.; Hendrick, S.; Anjewierden, A. Finding “the life between buildings”: An approach for defining a weblog community. In *Proceedings of AOIR Internet Research 6.0: Internet Generations*, Chicago, IL, USA, 5–9 October 2005.
7. Nardi, B.; Schiano, D.; Gumbrecht, M. Blogging as Social Activity, or, would You Let 900 Million People Read Your Diary? In *Proceedings of the 2004 ACM Conference on Computer Supported Cooperative Work*, New York, NY, USA, 6–10 November 2004; pp. 222–231.
8. Herring, S.C.; Kouper, I.; Paolillo, J.; Scheidt, L.-A.; Tyworth, M.; Welsch, P.; Wright, E.; Yu, N. Conversations in the Blogosphere: An Analysis “From the Bottom Up”. In *Proceedings of the Thirty-Eighth Hawai’i International Conference on System Sciences (HICSS-38)*, Los Alamitos, CA, USA, 3–6 January 2005.
9. Park, H.W.; Thelwall, M. Developing network indicators for ideological landscapes from the political blogosphere in South Korea. *J. Comput.-Mediat. Commun.* **2008**, *13*, 856–879.
10. McKenna, L.; Pole, A. Do Blogs Matter? Weblogs in American Politics. In *Proceedings of Annual Meeting of the American Political Science Association*, Chicago, IL, USA, 2–5 September 2004.
11. McKenna, L.; Pole, A. What do bloggers do: An average day on an average political blog. *Public Choice* **2008**, *134*, 97–108.
12. Wallsten, K. Political Blogs: Transmission belts, soapboxes, mobilizers, or conversation starters? *J. Inf. Technol. Polit.* **2008**, *4*, 19–40.
13. Ali-Hasan, N.; Adamic, L. Expressing Social Relationships on the Blog through Links and Comments. In *Proceedings of International Conference Weblogs and Social Media*, Boulder, CO, USA, 27–28 March 2007.
14. Marlow, C. Audience, Structure and Authority in the Weblog Community. In *Proceedings of the 54th Annual Conference of the International Communication Association*, New Orleans, LA, USA, 27–31 May 2004.
15. Schmidt, J. Blogging practices: An analytical framework. *J. Comput.-Mediat. Commun.* **2007**, *12*, doi:10.1111/j.1083-6101.2007.00379.x.
16. Park, H.-W.; Jankowski, N. A hyperlink network analysis of citizen blogs in South Korean Politics. *Javnost-The Public* **2008**, *15*, 57–74.
17. Kim, W.G.; Lee, C.; Hiemstra, S.J. Effects of an online virtual community on customer loyalty and travel product purchases. *Tourism Manag.* **2004**, *25*, 343–355.
18. Wei, C. Formation of Norms in a Blog Community. In *the Blogosphere: Rhetoric, Community and Culture of Weblogs*; University of Minnesota, Minneapolis, MN, USA, 2004.
19. Nardi, B.A.; Schianom, D.J.; Gumbrecht, M.; Swartz, L. Why we blog. *Commun. ACM* **2004**, *47*, 41–46.
20. Chin, A. Identifying communities in blogs: Roles for social network analysis and survey instruments. *Int. J. Web Based Communities* **2007**, *3*, 345–363.

21. Agarwal, N.; Huan, L. Blogosphere: Research issues, tools, and applications. *KDD Explor.* **2008**, *10*, 19–29.
22. Agarwal, N.; Huan, L.; Tang, L.; Yu, P. Identifying the Influential Bloggers in a Community. In *Proceedings of WSDM'08*, Palo Alto, CA, USA, 11–12 February 2008.
23. Drezner, D.; Farrell, H. The Power and Politics of Blogs. Paper presented at the *2004 Annual Meeting of the American Political Science Association*, Washington, DC, 28–31 August 2004. Available online: <http://www.utsc.utoronto.ca/~farrell/blogpaperfinal.pdf> (accessed on 17 April 2012).
24. Drezner, D.; Farrell, H. The power and politics of blogs. *Public Choice* **2008**, *134*, 15–30.
25. Wallsten, K. Political Blogs and the Bloggers Who Blog Them: Is the Political Blogosphere and Echo Chamber? Paper Presented at the American Political Science Association Annual Meeting Washington, DC, USA, 1–4 September 2005.
26. Wattal, S.; Schuff, D.; Madviwalla, D.; Williams, C.B. Web 2.0 and politics: The 2008 U.S. Presidential election and an e-politics research agenda. *MIS Q.* **2010**, *34*, 669–688.
27. Pole, A. Black bloggers and the blogosphere. *Int. J. Technol. Knowl. Soc.* **2006**, *2*, 9–16.
28. Jackson, N. Dipping their big toe into the blogosphere. The use of weblogs by the political parties in the 2005 general election. *Aslib Proc.* **2006**, *58*, 292–303.
29. Lankshear, C.; Knobel, M. Do-It-Yourself Broadcasting: Writing Weblogs in a Knowledge Society Paper presented to the American Education Research Association Annual Meeting, Chicago, IL, USA, 21 April 2003.
30. Scott, T. Tempests of the Blogosphere: Presidential Campaign Stories that Failed to Ignite Mainstream Media. 2005. Available online: <http://homepage.mac.com/dtraversscott/academics/blogflops/tempestsfulltext.html> (accessed on 1 November 2010).
31. Sroca, N. Understanding the Political Influence of Blogs. *Institute for Politics, Democracy, & the Internet*: Washington, DC, USA, 2007. Available online: <http://www.ipdi.org/UploadedFiles/PoliticalInfluenceofBlogs.pdf> (accessed on 1 May 2008).
32. Meraz, S. Is there an elite hold? Traditional media to social media agenda setting influence in blog networks. *J. Comput.-Mediat. Commun.* **2009**, *14*, 682–707.
33. Bloom, J. The Blogosphere: How a Once-Humble Medium Came to Drive Elite Media Discourse and Influence Public Policy and Elections. In *Proceedings of the American Political Science Association Annual Conference*, Philadelphia, PA, USA, 27–31 August 2003.
34. Su, N.-M.; Wang, Y.; Mark, G. Politics as Usual in the Blogosphere. In *Proceedings of the 4th International Workshop on Social Intelligence Design*, Stanford, CA, USA, 24–26 March 2005. Available online: <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.136.388> (accessed on 17 April 2012).
35. Farhi, P. Blogger takes aim at news media and makes a direct hit. *Washington Post*, 9 August 2006, p. C1.
36. Tibbals, T.L. The Relationship between Political Blog Readers and the Blogs They Read an Analysis of Blog Comments. In *Proceedings of the American Political Science Association Annual Meeting*, Toronto, ON, Canada, 3–9 September 2009. Available online: <http://userwww.sfsu.edu/~ttibbals/Papers/finalresearchpaper.pdf> (accessed on 17 April 2012).

37. Bloom, J.; Kerbel, M. The Blogosphere and the 2004 Elections. In *Proceedings of The American Political Science Association Annual Conference*, Washington, DC, USA, 1–4 September 2005.
38. Trammell, K.; Williams, A.; Postelnicu, M.; Landreville, K. Evolution of online campaigning: increasing interactivity in candidate web sites and blogs through text and technical features. *Mass Commun. Soc.* **2006**, *9*, 21–44.
39. Adamic, L.; Glance, N. The Political Blogosphere and the 2004 U.S. Election: Divided They Blog. In *Proceedings of the 3rd International Workshop on Link Discovery*, Chicago, IL, USA, 21–24 August 2005.
40. Coleman, S., Ward, S., Eds. *Spinning the Web. Online campaigning in the 2005 General Election*; Hansard Society: London, UK, 2005.
41. Klastrup, L.; Pedersen, P.S. Blogging for Election. The Use and Function of Blogs as Communication Tool in a Danish Parliament Election Campaign. In *Internet Research Annual 2005*; Consalvo, M., Haythornthwaite, C., Eds.; Peter Lang: New York, NY, USA, 2007; pp. 27–40.
42. Hopkins, K.; Matheson, D. Blogging the New Zealand election: The impact of new media practices on the old game. *Polit. Sci.* **2005**, *57*, 93–105.
43. AlbrechT, S.; Lübcke, M.; Hartig-Perschke, R. Weblog campaigning in the German bundestag election 2005. *Soc. Sci. Comput. Rev.* **2007**, *25*, 504–520.
44. Arnold, M. Contenders go online with diverse strategies. *Financial Times*, April 2005, p. 7.
45. Macnamara, J. E-Electioneering: Use of New Media in the 2007 Australian Federal Election. In *Proceedings of the ANZCA08 Conference Power and Place*, Wellington, New Zealand, 9–11 July 2008.
46. *The Barack Obama's Social Media Toolkit*. Available online: <http://www.edelman.com/image/insights/content/social%20pulpit%20%20barack%20obamas%20social%20media%20toolkit%201.09.pdf> (accessed on 17 April 2012).
47. Glover, D. The Rise of Blogs. *National Journal*, January 21, 2006.
48. Justice, G. Kerry Kept Money Coming with the Internet as His ATM. *New York Times*, 6 November 2004, p. 12.
49. Park, H.W.; Kluver, R. Trends in online networking among South Korean politicians. *Gov. Inf. Q.* **2009**, *26*, 505–515.
50. Sync.gr. The Map of the Greek blogosphere, 2008. Available online: <http://www.sync.gr> (accessed on 17 April 2012).
51. Karampasis, Z. Greek-speaking bloggers (In Greek), 2007. Available online: <http://ereuna.wordpress.com/> (accessed on 27 April 2008).
52. Trammell, K.; Keshelashvili, A. Examining the new influencers: A self-presentation study of A-list Blogs. *J. Mass Commun.* **2005**, *82*, 968–982.
53. Zafiropoulos, K.; Vrana, V. Representation and Study of Political Blogs Conversational Patterns. In *Proceedings of the 4th Mediterranean Conference on Information Systems*, Athens, Greece, 25–27 September 2009.
54. Zafiropoulos, K.; Vrana, V. *Hyperlink Analysis of Political Blogs Communication Patterns*; NOVA Publishers: Hauppauge, NY, USA, 2011.

55. Tan, L.K.-W.; Na, J.-C.; Theng, J.-L. Influence detection between blog posts through blog features, content analysis, and community identity. *Online Inf. Rev.* **2011**, *35*, 425–442.
56. Java, A.; Kolari, P.; Finnin, T.; Oates, T. Modeling the Spread of Influence on the Blogosphere. In *Proceedings of WWW 2006 Workshop on Weblogging Ecosystem: Aggregation, Analysis and Dynamics*, Edinburgh, UK, 22–26 May 2006.
57. Song, X.; Chi, Y.; Hino, K.; Tseng, B. Identifying Opinion Leaders in the Blogosphere. In *Proceedings of CIKM'07*, Lisboa, Portugal, 6–8 November 2007.
58. Karpf, D. Who is Winning and How Can We Tell? George Washington University's Institute for Politics, *Democracy and the Internet*, 2008. Available online: <http://www.the4dgroup.com/BAI/articles/PoliTechArticle.pdf> (accessed on 17 April 2012).

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