

Voting Advice Applications: a successful nexus between informatics and political science

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ABSTRACT

Voting Advice Applications (VAAs) are web applications that enable voters to compare their political views with the positions of the political parties. VAAs have been used successfully in many West European countries for more than a decade, but most of the Balkan countries do not have an established VAA. The aim of this paper is to promote the use of VAAs by showing that these applications – if they are built on high academic standards – can become useful tools for all stakeholders: i) voters who become more knowledgeable about the positions of the parties and they can make better vote choices, ii) political parties that have the opportunity to make their views known to a part of the electorate that is not fully covered by traditional communications channels, and iii) VAA researchers who are able to gather a huge amount of data that can be used to study voters' electoral behavior.

Categories and Subject Descriptors

J.4 [Computer Applications] Social and Behavioral Sciences
K.4 [Computers and Society] K.4.m Miscellaneous

General Terms

Algorithms, Measurement, Documentation, Design.

Keywords

Voting advice applications, jQuery Mobile, AJAX, elections, civic education

1. INTRODUCTION

Voting Advice Applications (VAAs) are web applications that enable voters to compare their political views with the views of the political parties [7]. Voting Advice Applications are used in many countries for presidential, parliamentary, regional or municipal elections. In Greece, the Voting Advice Application HelpMeVote (<http://helpmevote.gr>) was first tested for the regional elections of 2010. In 2012, HelpMeVote was implemented for the general elections of May and June 2012. This paper uses HelpMeVote as an example to demonstrate how a VAA should be designed, who are the users of a VAA and what is the impact of a VAA on the voting behavior of the users.

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2. DESIGN OF A VAA

The theoretical background underlying Voting Advice Applications is the model of issue voting [1, 6, 13, 19]. According to the theory of issue voting, voters choose the party that is closest to their own preferences on a set of political issues. Therefore, to apply the model of issue voting, the following steps should be followed: i) selection of issues ii) selection of parties and coding of parties on the selected issues, iii) calculation of distance or similarity between parties and voters and iv) presentation of the results.

2.1 Issue/Statement selection

The selected topics should reflect the major dimensions of electoral competition, and they should have adequate discriminating power to facilitate the discrimination between the political parties. Valence issues should be avoided. Also the inclusion of issues owned by a political party should be avoided because these issues would be favorable for the political party that owns them. There are many ways to create the list of statements: some VAAs cooperate with the political parties, other research teams ask a random sample of voters to propose issues and in one of the meetings of the VAA research groups it was even suggested to use crowdsourcing. For the selection of the issues included in HelpMeVote 2012 the following procedure was applied: First, each issue that was included in the first application of HelpMeVote (2010) was re-evaluated against two criteria: i) old issues which have lost their importance on the electoral agenda have been excluded, ii) the discrimination power of each issue was re-examined against the data which have been collected by the users of HelpMeVote 2010, i.e. we checked whether voters of different parties have significantly different positions on each issue and we deleted the issues that failed to pass this test for most pairs of parties, iii) we collected items included in major international political and social surveys and in the literature related with party positions, party mapping and the dimensions of political competition [5, 11, 16]; we kept only the issues that could be relevant to the Greek parliamentary elections of 2012, and iv) we included issues which were asked in Greek public opinion polls and which are related with the views regarding the management of the debt, and attitudes towards the memoranda and the Troika, because the polls had revealed that these issues would play an important role in shaping the behavior of Greek voters for the 2012 elections. This process resulted in a total of 35 statements/issues.

2.2 Selection and coding of parties

Initially, we included the parties that were represented in the Greek or the European Parliament or one of 13 regional councils. Later, we added the parties that in pre-election public opinion polls appeared as gathering more than 1% of the valid votes. After

selecting the parties, we invited them to position themselves [28]. We have sent them invitations to participate to a web survey and to express their level of agreement with each sentence using the following five-point scale: "Strongly agree", "Agree", "Neither agree nor disagree", "Disagree" and "Strongly disagree". In addition, we invited 30 Greek political parties experts (faculty and researchers working for opinion polling companies) to code the position of each party on each of the issues. After collecting the answers given by the experts, we analyzed the variance of the positions of each party on each issue, because large variance means that the experts do not share a common opinion about the position of the party on the specific issue. From the initially selected 35 issues, we removed i) the issues for which there was a large variance for most of the parties and ii) the issues with limited party discriminating power. For the remaining issues, we used the median value of the responses given by the experts for each political party, as the position of the party. Finally, for each of the parties that had responded to the questionnaire, we compared the positions given by the party with the median position given for the same party by the experts. In most cases, the position resulting from the two procedures was common. If the two positions were different and if the distance between the two positions was small (e.g. "Agree" and "Strongly agree"), we accepted the position that was given by the party. If the distance was large and provided that the experts had put the party into another position with little variance (i.e. agreeing with each other), then the position given by the experts was chosen as the final position of the party.

2.3 Calculating the distance

When the application is available to voters, they express their political views by completing the same questionnaire that was used for the parties. For every voter who completes the questionnaire, the voting advice application provides an estimated coefficient of proximity with each of the parties. HelpMeVote research team used a coefficient of proximity (or similarity/dissimilarity), which is a fraction formed by the following procedure:

- If a voter, when asked about an issue, responds "Agree" or "Strongly agree" ("Disagree" or "Strongly disagree") and the position of a party is also "Agree" or "Strongly agree" ("Disagree" or "Strongly disagree") then we assume that the voter and the party have a common position on this issue and the numerator of the coefficient is increased by one.
- If the pair of answers (voter - party) towards an issue is on one hand "Agree" or "Strongly agree" ("Disagree" or "Strongly disagree") and on the other hand "Strongly disagree" ("Strongly agree"), then we assume that the positions of the voter and the party are totally opposite with regard to this issue and reduce the numerator of the coefficient by one.
- If the pair of answers (voter - party) on an issue is on one side "Agree" and on the other side "Disagree", then we assume that the voter and the party have partially opposing positions on this issue and we reduce the numerator of the coefficient by half a unit.
- If the pair of answers (voter - party) on an issue is from one side "Neither agree nor disagree", and on the other side "Agree" or "Disagree", then we assume that the positions of the voter and the party are relatively similar on this issue and we increase the numerator of the coefficient by 3/8 of a unit.

- As denominator of the coefficient we use the number of questions answered by the voter.

With the above procedure we get a coefficient of similarity/dissimilarity with values ranging from -1 (when voter and party have absolutely opposite positions on all issues) to +1 (when voters and parties agree on all issues). Of course, it should be pointed out that VAA designers can use other values for pairs of answers, e.g. they could argue that the pair of answers "Agree" and "Strongly agree" does not indicate an absolute coincidence of views between the voter and the party. As a result, they could suggest a value smaller than one for this pair.

2.4 Presentation of the results

Many voting advice applications present the results as a list of parties ranked according to their proximity with the voter, other VAAs provide both a ranked list and a diagram, and some offer only a diagram [22, 23]. Both outputs are useful: the ranked list displays the party that according to the theory of issue voting should be voter's first choice at the top of the list and the parties that promote policies that are against the political views of the voter at the bottom of the list. The diagram usually displays voter's position and the position of the parties on a political map and users are able to observe their distance from the parties on each dimension of the map.

HelpMeVote 2012 displays the results both with a ranked list of parties and with a political map. For the political map, the results are presented in a two axes X-Y plot. The horizontal axis depicts the position of parties in the conventional "Left-Right" dimension. The axis is based mainly on socio-economic issues. The second (vertical) axis captures the juxtaposition of the parties regarding the management of the debt, country's commitments to its lenders and the attitudes towards the European Union. At the top of the axis we can find voters and parties who strongly supported that Greece should stay in the EU and that we should fulfill all the promises we have given to our lenders (pro-European); at the bottom of the axis we can find the opposite view (anti-Troika), i.e. that we should default even if this means that we should get out of the EU (see Diagram 1).

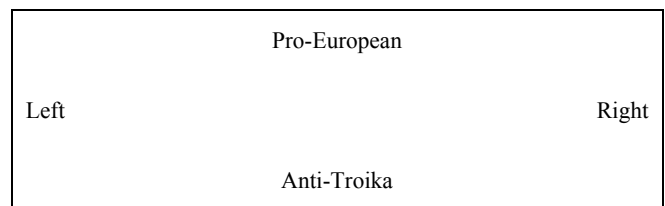


Diagram 1 The Political Map of HelpMeVote 2012

Most of the statements used in HelpMeVote have been classified according to their political orientation: if a statement expresses a left position (i.e. a position with which a left party would probably agree) is classified as left-oriented. With the same method, other statements have been classified as right-oriented. For the statements that are more related to the vertical axis we have used the labels "pro-European" (used for statements expressing ideas that would be supported by parties that appear near the top of the diagram) and "anti-Troika" for statements expressing opposite ideas.¹

¹ The statements along with their orientation can be found in the Appendix.

The position of a voter (as well as the position of the parties) on the diagram is determined by the following procedure: First, since voters have the option of not answering some questions and because the position in the diagram is meaningful only if they have answered most of the questions, the number of questions that have been answered by the voter is checked and the chart is displayed only if the user has given more than 25 answers. The answers are coded as follows: -1: Strongly disagree, -0.5: Disagree, 0: Neither agree nor disagree, 0.5: Agree and 1: Strongly agree. Then, to determine the position of the voter on the Left - Right axis, we sum the codes of all the answers to questions that are right-oriented and subtract the codes of all responses to questions that are left oriented. Then the result is divided by the number of responses given to all left or right oriented questions. The result is a number with values ranging from -1 (extreme left) to +1 (extreme right) and used as the abscissa of the voter. In a similar way (using the questions related to the management of debt) we find the ordinate of the voter.

3. JQUERY MOBILE PROGRAMMING

HelpMeVote was designed from the beginning as a web application that would be able to run both on PCs and on mobile devices. The main reason for this decision was the idea that if HelpMeVote could run on mobile devices, then users would be able to run the application not only in their houses or offices, but also when they go out to meet their friends. Sharing their voting advice would motivate their friends to try HelpMeVote themselves and find out their own profile.

In order to create a web application able to run on mobile devices, one of the significant factors that should be taken into account is the limited screen size of most mobile devices in comparison with the largest screen size of most PCs. But for a successful mobile web application, size screen is one but not the only important factor. The designer of the mobile web application should take into account additional factors that would make the application useful and pleasant for the user of the mobile device. The mobile programming literature includes papers on the debate between mobile web applications and native applications [8]. According to the literature, the major advantage of mobile web applications is the lower development cost, and the major advantage of native applications is the improved user experience. But, if the mobile web application offers a user experience that is similar to a native application then there is no debate.

The solution I have selected for the creation of HelpMeVote is jQuery Mobile². According to its official website, JQuery mobile is:

"A unified, HTML5-based user interface system for all popular mobile device platforms, built on the rock-solid jQuery and jQuery UI foundation. Its lightweight code is built with progressive enhancement, and has a flexible, easily themeable design."

Thus, jQuery Mobile was built on top of jQuery³, which is an open source, lightweight, CSS3 compliant, cross-browser JavaScript library that was created to facilitate the writing of complex client-side applications for HTML pages [9].

jQuery Mobile is compatible with all major mobile platforms and all major desktop browsers. This means that that an application created with jQuery mobile can be accessed from a web browser and will run on almost every device that is able to access the World Wide Web.

Applications created with jQuery Mobile will automatically scale to any screen size. This means that the same application will run on the small screen of a smartphone, on a larger screen of a tablet and on an even larger screen of a PC monitor without any changes.

jQuery Mobile web applications support both touch events and mouse events. This means that the same application will run equally well on a PC with users giving their input with their mouse and on mobile devices equipped with touch screens, because jQuery Mobile provides touch-optimized controls that are easy to use on any mobile device.

With all the aforementioned features it is obvious that with jQuery mobile it is feasible to support multiple web enabled devices using the same code and keeping the costs low, but at the same time a jQuery Mobile web application is built using the web technologies but it offers the user experience and feel of a native mobile application [12].

Of course, the world of jQuery mobile is not perfect. For instance, if you check a jQuery Mobile application with the W3C MobileOK checker,⁴ you will probably get many errors. The most severe of them will be related to i) the size of the page and ii) the Cascading Style Sheets [17].

Under the current (March 2013) settings of MobileOK checker, the error regarding the size of the page appears if the total size of the page exceeds 20 kilobytes. This page size limit will make all jQuery Mobile applications fail because JQuery Mobile alone (Minified and Gzipped, i.e. with the minimum possible size) is 24 kilobytes. Thus, no matter the size of the web application, even if it has only one line of code, it will not pass this test. MobileOK checker uses this test because in many mobile networks big pages require high costs and long waiting times. In addition, some mobile devices may have memory limitations and as a result these devices may be unable to load the web application.

A solution to the problem of the large page size is the customization of jQuery Mobile by downloading only the modules that are required for the specific application. This can be done with the use of tool called jQuery Mobile Download Builder, but it is still in alpha version, and it should be used carefully. Another solution is to wait: as time passes, mobile Internet connections will provide larger bandwidths and they will cost less. In addition, all new mobile devices have much larger memory than their predecessors.

The error regarding the Cascading Style Sheets appears because jQuery Mobile supports CCS Level 3. MobileOK checks style sheets against CSS Level 2.1, because there are still a lot of browsers that do not support CSS3. Of course, most mobile devices should render the page but the error is classified as severe because if the browser does not support CCS3, the page will appear very different. Again, a solution to this problem is waiting: as the time passes more and more mobile devices will come with browsers supporting CCS3.

² jQuery mobile: <http://jquerymobile.com/>

³ jQuery: <http://jquery.com/>

⁴ W3C MobileOK Checker: <http://validator.w3.org/mobile/>

Another important feature of jQuery Mobile is the support of AJAX-powered navigation system. The name AJAX is derived from the terms "Asynchronous JavaScript and XML" and it is the modern way for developing web applications. The main advantage of using AJAX is that users are able to interact with a webpage, and a part of the contents of the page can change according to the user input with the use of JavaScript and without requiring the browser to reload the entire page [10, 32].

Although similar technologies were used for many years before 2005, the name AJAX was given to this approach of building web applications by Jesse James Garrett, who published an article that year describing AJAX [15]. Garrett used as examples two very popular web applications provided by Google: Suggest and Maps. Google Suggest or Autocomplete⁵ is part of Google Search and it suggests similar searches when a user types within the search box. The Autocomplete suggested terms update almost instantly as the user types additional characters. A similar instant reaction to user input can be observed with Google Maps⁶. As the user scrolls the maps, zooms in or zooms out the map updates almost instantly. This instant reaction improves user experience. As a result, when people use AJAX applications, they do not need to wait for the server to respond and the page to reload. The user experience (regarding lag time) is very similar to the experience of a desktop application running locally on the users' device.

HelpMeVote was built as an AJAX application; all 30 statements are downloaded from the beginning to the users' browser. This means that there is no lag time between answering one question and viewing the next one. The time between clicks can be counted accurately. The response times are recorded in hidden input fields. Communication with the server is done in the end, when all questions have been answered and the user clicks the "Submit" button. When the respondent submits the web page, the content of the hidden fields (i.e. response times) are transmitted to the server and are stored to a database.

Finally, there is another important design feature of HelpMeVote 2012 worth mentioning. HelpMeVote 2012 allows users to submit only one questionnaire during a session, i.e. after submitting, the user cannot go back, change one or more answers and submit again (the system keeps only the initial set of answers). The only way a user can repeat the test is to start from the beginning. This way HelpMeVote accepts only complete sets of answers and the resulting dataset is already cleaner from the beginning in comparison with other VAAs which allow users to have different sets of answers within the same session.

4. POPULARITY OF HELPMEVOTE

HelpMeVote was completed about 480000 times in the period from its official beginning (18/04/2012) until the Election Day (06/05/2012). The number of citizens who have participated in the Greek Parliamentary Elections of May 2012 is 6476818. Thus, if we suppose that all HelpMeVote users have used it only once and that all of them have participated in the elections, then we can estimate that HelpMeVote users are circa 7.4% of those who participated in the elections.

⁵ Google Search Autocomplete:
<http://support.google.com/websearch/bin/answer.py?hl=en&answer=106230>

⁶ Google maps: <https://maps.google.com/>

HelpMeVote promotion was based on two pillars: social networking services and political websites. With regard to social networking services, we have asked the members of our social networks to promote HelpMeVote to their social networks, e.g. we have asked our Facebook friends to "Like" and "Share" HelpMeVote. With regard to political websites (news portals, political blogs, etc.) we have sent them a press release and asked them to display it on their site with a link to our application. When HelpMeVote became an Internet buzz for the Greek Internet users, it attracted the attention of more traditional media channels (TV, radio and press). Finally, HelpMeVote, occupied some space on the webpages of international news sites⁷.

As shown in Table 1, more than one out of three HelpMeVote users were informed about HelpMeVote during a conversation with a relative, friend or colleague. Of course, social networking sites played a very important role for the dissemination of HelpMeVote (29.8% of HelpMeVote users). The Facebook page of HelpMeVote was liked by more than 3800 different Facebook users in less than 20 days. During the same period more than 500 different Twitter users have promoted HelpMeVote to their followers. Traffic from links in other websites was also very large (26.5% of HelpMeVote users). Traditional media (TV - Radio-the press) were less important sources of HelpMeVote traffic.

Table 1. How people find about HelpMeVote

How have you found about HelpMeVote?	%
I heard from a relative, friend or colleague	35.3%
I learned about it from social networking services (Facebook, Twitter, etc.)	29.8%
I followed a link on another site (such as news websites, blogs, etc.)	26.5%
I saw it on TV	4.6%
I read about it on the press (eg newspapers, magazines, etc.)	2.3%
I heard this on the radio	1.5%

5. PROFILES OF HELPMEVOTE USERS

Before the presentation of the result, HelpMeVote users are asked to fill-in a form with their personal information: Gender, Age group, Education Level, Vote Choice, and Confidence of Vote choice. Almost all users fill-in this form, i.e. we have the profile of almost all users. This section compares the gender, age and education level distribution between the group of HelpMeVote users and the entire electorate. The group of HelpMeVote users is not representative of the entire electorate. There are significant differences regarding the gender, age and educational level. This finding is compatible with similar results found in the literature [18, 29].

In the group of HelpMeVote users, 60.3% are male and 39.7% are female. According to the most recent Greek census which was conducted in 2011 the distribution of the population is as follows: male: 49.2%, female: 50.8%. It is evident that the ratio of male/female in the sample is much larger than the corresponding ratio in the total population.

⁷ HelpMeVote aimed at Greek elections and undecided voters
<http://www.neurope.eu/article/helpmevote-aimed-greek-elections-and-undecided-voters> (New Europe: 30/4 2012)

Table 2 shows that the educational level of HelpMeVote users is significantly higher than the education level of the electorate (estimates using census data of 2001). The majority of HelpMeVote users was formed by voters of higher education levels. The categories tertiary education (47.9%) and postgraduate studies (20.9%) combined give a cumulative percentage that is greater than 68% of the sample while the same education levels correspond to a sum of percentages that is less than 15% in the electorate. On the other hand, voters of lower education levels are underrepresented in the sample: primary education: 1.5% and lower secondary education: 3% while the same two categories in the electorate correspond to a cumulative percent larger than 50%. From the aforementioned figures, it becomes obvious that the education distribution of HelpMeVote users is very different from the education distribution of the population of voting age.

Table 2. Educational level of HelpMeVote users

Education level	HelpMeVote users	Electorate
Primary	1.5%	43.2%
Lower Secondary	3.0%	9.5%
Higher Secondary	26.8%	32.8%
Tertiary	47.9%	13.6%
Postgraduate studies	20.9%	1.0%

Age distribution of HelpMeVote users is different than the age distribution of the electorate. The age group 65+ is seriously underrepresented (2.7% of the sample, 21% of the electorate). The age group 50-64 is also underrepresented (14% of the sample, 21.7% of the electorate). On the other hand, younger voters are overrepresented in the sample. (see Table 3)

Table 3. Age distribution of HelpMeVote users

Age group	HelpMeVote users	Electorate
18-24	15.4%	11.3%
25-34	31.9%	19.8%
35-49	36.0%	26.2%
50-64	14.0%	21.7%
>64	2.7%	21.0%

6. VAA AND CIVIC EDUCATION

The objectives of the research team that created HelpMeVote were to help voters to: i) become familiar with the important issues of the electoral competition, ii) learn the positions of the parties on these issues, and iii) understand the differences between the political parties. In this regard, VAAs can be considered as tools for civic education and citizen mobilization [14, 20, 21, 24].

Of course, a simple web application such as a voting advice application can not provide citizens with all the information that would enable them understand all the political issues, motivate them to participate actively in the democratic process and enable them play a more active role in political life. The main objective of the research team was to provide some basic knowledge about the political parties through a pleasant environment, in order to motivate voters to acquire more information about the political parties. HelpMeVote users are able to follow the links (displayed

on the results page) to the websites of political parties, or they can use other sources of information.

On the results page of HelpMeVote there is a link that asks HelpMeVote users to help our research project by participating in a web survey that will help us evaluate the application [3]. Questionnaires are attached to outcomes, i.e. each outcome can have only one completed web questionnaire (linked with the same id number). One of the questions of the web survey is about our civic education goals. The question is displayed as a multiple choice (i.e. "click as many as apply").

Table 4. HelpMeVote goals regarding citizenship education

Civic Education Objectives	%
Familiarize with the issues of electoral competition	11.90%
Understand the differences between the parties	18.30%
Motivate to learn more about political parties	23.10%
Learn the position of the parties	27.80%

The results are displayed in Table 4. More than one out of four HelpMeVote users (27.8%) have answered that HelpMeVote helped them learn the positions of the parties; 23.1% answered that HelpMeVote motivated them to search for more information. Those who argue that HelpMeVote helped them understand the differences between the parties appear with a smaller percentage (18.3%) and the percentage is even smaller for those who responded that HelpMeVote helped them become familiar with the issues of electoral competition (11.9%). The latter percentage was expected to be low, because VAAs include the most important issues of political competition; therefore most of the VAA issues are known to the majority of citizens before they use the VAA. There are many HelpMeVote users who have not clicked on any of the options, probably because they think that they already knew all the information before visiting HelpMeVote.

At this point, it should be mentioned that our target was civic education in a pleasant environment. This means that we had to keep a balance: the information included in HelpMeVote should not be very hard to absorb because this would make the experience less pleasant and the users would be less likely to recommend HelpMeVote to their peers. We had great success on the latter tasks: the majority of HelpMeVote users claim that their experience was pleasant (72.8%), they answer they would recommend it to others (58.1%) and that they will discuss the results with family and friends (45.4%).

7. IMPACT ON VOTE CHOICE

The impact of VAAs electoral behavior is an important issue, and this importance is evidenced by the extensive work that exists in the literature - indicatively for Greece see [4] and for other countries see [25, 26, 27, 30]

Following the concept initially stated by Ruusuvirta and Rosema [27] and continued by Andreadis and Chadjiapadelis [4] I argue that the impact of VAAs on vote choice depends on whether the VAA user had chosen a party before using the application.

7.1 If the voter is undecided

If voters have not chosen a party, then the VAA can help them learn the positions of the parties on the issues of the electoral competition and choose the most suitable one to represent them.

Among HelpMeVote users the percentage of undecided voters was about 40% and this percentage remained constant from the beginning of HelpMeVote up to Election Day. Of those who indicated that they were undecided before using HelpMeVote, 35.2% said that HelpMeVote helped them choose the party they would vote in the election. In absolute values, this percentage corresponds to circa 70,000 voters, i.e. more than 1% of the valid votes for the election of May 2012.

7.2 If the voter has chosen a party

If a citizen has chosen a political party before using the application, then there are the following possibilities: i) The pre-selected party appears first in the list of HelpMeVote results (absolute matching), ii) HelpMeVote shows that the voter is close to his/her pre-selected party, but there is another party that appears first in the list (partial matching) and iii) HelpMeVote advice differs significantly from the pre-selected voting behavior (significant deviation).

In the first case, the potential impact of using HelpMeVote is to enhance the user's intention to vote for the pre-selected party. In the third case, the possible effect of VAA will be in the opposite direction, i.e. instead of strengthening, the VAA recommendation would undermine user's initial selection, and if the influence is strong enough, it can lead to a change of voter's position. In the second case, the possible impact could be towards both directions because it depends on how the voter interprets the output.

Table 5. Impact on Initial Vote Choice

Matching	No impact	Enhance initial choice	Undermine initial choice	Change initial choice
Absolute (27%)	56.7%	43.3%		
Partial (48%)	57.0%	35.2%	5.9%	1.9%
No (25%)	82.1%		15.5%	2.5%

Table 5 shows the impact on the initial vote choice for each group. Among the users in the "absolute matching" group, 43.3% answer that HelpMeVote has enhanced their intention to vote for their pre-selected party. Of those who belong to the second group (partial matching) 35.2% report that HelpMeVote reinforced their intention to vote for the pre-selected party but 5.9% of the partial matching group indicate that HelpMeVote has undermined their faith in their original selection, and 1.9% report that will probably change their initial choice, following the advice of HelpMeVote. In the latter group (significant deviation) 83.2% indicate that HelpMeVote had no effect on their voting behavior, 15.5% say that their faith to their initial selection was undermined, and 2.5% claim that they will rather follow the proposal of HelpMeVote.

8. CONCLUSIONS

The acceptance and support of HelpMeVote by a large part of the electorate in conjunction with the significant impact on the vote choice proves that voting advice applications are very important tools that should be supported by independent organizations following high scientific and academic standards.

From the profile of HelpMeVote 2012 users it becomes obvious that there are specific subgroups of the electorate which are under-represented and other subgroups which are over-represented. This uneven representation is associated with the digital gap between younger and well educated on the one side and older people with lower education levels on the other side.

But this gap constantly decreases. As the digital gap gets smaller, the part of the electorate that can benefit from the use of voting advice applications gets larger.

VAA's can be used by electoral behavior researchers as data collecting tools. Researchers can benefit from the popularity of these tools and they can collect low cost electoral behavior data from a very large number of voters. Of course, VAA data usually include some invalid responses (noise), but the quality of the dataset can be improved with data cleaning methods [2].

In conclusion, VAA's, when built with academic standards, can be positive tools for all stakeholders: i) voters, who become more knowledgeable about the positions of the parties and they can make better informed electoral choices, ii) the political parties which have the opportunity to make their views known to an audience that is not covered by traditional communications channels, and iii) the researchers who are able to gather a huge amount of data that can be used to study electoral behavior.

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10. APPENDIX

Statements used for HelpMeVote 2012

Order	Statement	Orientation
1	The sentences of prisoners should be reduced.	Left
2	The police should use more stringent measures for the protection of the property of citizens.	Right
3	Citizens must accept measures such as video surveillance, in the context of countering terrorism and crime.	Right
4	We have every right to default on our debt without any negotiations with anyone.	Anti-Troika
5	We should have more flexible forms of work in order to combat unemployment.	Right
6	There should be legislation to limit protests.	Right
7	Defense spending should not be reduced to avoid becoming a vulnerable country.	Right

Order	Statement	Orientation	Order	Statement	Orientation
8	The reduction of corporate taxes would have a positive impact on the economy.	Right	20	It is better for Greece to be in the European Union rather than outside.	Pro-European
9	The legislation for the protection of the environment should be made less stringent to facilitate investments.		21	The economy of Greece would have been better if we had our own currency instead of Euro.	Anti-Troika
10	Citizens' initiatives for disobedience and resistance like the movement 'I do not pay' are positive actions.	Anti-Troika	22	The decision power of the European Parliament should be increased on all matters of internal and foreign policy.	Pro-European
11	It is not possible for first-generation immigrants to fully integrate into the Greek society.	Right	23	I agree with the events of popular anger and resentment observed during the parades on national days.	Anti-Troika
12	More attention should be paid to the rights of Greeks born in Greece by Greek parents.	Right	24	The two major parties that have been governing the country the last decades have completed their cycle and they should be set aside.	
13	The requirements for asylum and citizenship must be tightened.	Right	25	The renewal of the political system can only come from new political parties.	
14	The existence of multiculturalism in Greece is a positive phenomenon.	Left	26	It is essential to involve technocrats in government to streamline the consolidation of the economy.	Pro-European
15	It must be possible to operate non-governmental, non-profit institutions of higher education.	Right	27	The Memoranda of Understanding with the Troika can and should be renegotiated.	
16	The national health system can become more efficient through partial privatization.	Right	28	Memoranda of Understanding with the Troika were necessary to avoid the bankruptcy of Greece.	Pro-European
17	Existing social services and programs (e.g. 'help at home' day schools, kindergartens) should be reinforced by increasing municipal taxes.	Left	29	We ought to have done many of the changes provisioned in the Memoranda on our own long ago.	Pro-European
18	An estate tax should be imposed for the reduction of the deficit.	Left	30	With the Memoranda we accumulate debts without any visible benefits.	Anti-Troika
19	The church and the state should be completely separated.	Left			