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EMOTION DURING ELECTION PERIODS: DECIPHERING TWITTER USERS' DISCOURSE

ABSTRACT

Within computational political science, a sentiment expressed in social media has been subject to examination about electoral behaviour, more so because of the cases of the successful use of social media by candidates (Obama) or by companies who tried to manipulate public opinion (e.g., the involvement of the Russian Internet Research Agency and Cambridge Analytica in 2016 Presidential Elections in the USA, or of Cambridge Analytica's to the UK's Referendum about Brexit). In this paper we examine a refinement of analysis, moving from sentiment (positive-negative) to emotions, combine opinion mining with social network analysis, and apply it to the tweets posted during the critical elections that took place in Greece in 2015 and 2019. We find support for the relation between some emotions and voting behaviour in other countries but also realize that the intensity of expressing such emotions is perhaps a better indicator of the need for change.

Keywords: *elections, voting behavior, sentiment analysis, computational social science*

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ΣΥΝΑΙΣΘΗΜΑΤΑ ΚΑΤΑ ΤΗ ΔΙΑΡΚΕΙΑ ΕΚΛΟΓΙΚΩΝ ΠΕΡΙΟΔΩΝ: ΑΠΟΚΡΥΠΤΟΓΡΑΦΗΣΗ ΤΟΥ ΛΟΓΟΥ ΤΩΝ ΧΡΗΣΤΩΝ ΤΟΥ TWITTER

ΠΕΡΙΛΗΨΗ

Η ανάλυση συναισθήματος όπως εκφράζεται στα μέσα κοινωνικής δικτύωσης έχει αποτελέσει αντικείμενο διερεύνησης στον χώρο της υπολογιστικής πολιτικής επιστήμης σε συνδυασμό με την εκλογική συμπεριφορά. Το ενδιαφέρον πυροδοτήθηκε και από τα παραδείγματα επιτυχημένης αξιοποίησης των μέσων κοινωνικής δικτύωσης από υποψηφίους όπως ο Obama ή από εταιρείες που επιχείρησαν να χειραγωγήσουν την κοινή γνώμη (π.χ., η εμπλοκή του ρωσικού Internet Research Agency και της Cambridge Analytica στις αμερικανικές προεδρικές εκλογές του 2016, ή της τελευταίας στο βρετανικό δημοψήφισμα για το Brexit). Σε αυτό το άρθρο παρουσιάζουμε μία πιο ενδελεχή ανάλυση, καθώς περνάμε από την πολικότητα (θετική ή αρνητική) του συναισθήματος σε συγκεκριμένα αισθήματα, συνδυάζουμε την ανάλυση συναισθήματος με την ανάλυση κοινωνικών δικτύων, και την εφαρμόζουμε στα tweets, τα οποία διακινήθηκαν την περίοδο των κρίσιμων ελληνικών εκλογών του 2015 και 2019. Διαπιστώνουμε ότι ισχύει και στη συγκεκριμένη περίπτωση (όπως και σε άλλες χώρες) η συσχέτιση μεταξύ ορισμένων αισθημάτων και της εκλογικής συμπεριφοράς, αλλά και ότι η ένταση έκφρασης των αισθημάτων αυτών ίσως να αποτελεί ένδειξη του αιτήματος για πολιτική αλλαγή.

Λέξεις κλειδιά: *εκλογές, εκλογική συμπεριφορά, ανάλυση συναισθήματος, υπολογιστικές κοινωνικές επιστήμες*

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INTRODUCTION

Sentiment and emotions have a long history in political science. Almond and Verba (1963/2015) were interested in feelings toward government and politics. They wrote about ''affect'' as a measure of national pride and its aspects, of (un) favourable disposition toward governmental authority, and of freedom to speak about politics, and go on to relate affect with partisanship. Their measurement toolset has been extensively used in quantitative research in politics, civic engagement, political alienation, and partisanship. In the decades that followed the work of Almond and Verba, the interest in sentiment and emotions and their impact on politics in general and specifically in elections has developed into more nuanced explorations.

In the late 1980s and early 1990s, researchers were looking for the impact of certain emotions upon political behavior. Ragsdale (1991, p. 45) found that hope and pride were strong positive predictors of approval for presidential candidates, while "anger and disgust substantially diminish approval," and fear was less significant than anger and disgust. Marcus and Mackuen (1993, p. 672) suggested that fear or anxiety "discourages reliance on habitual cues for voting," while enthusiasm "stimulates interest and involvement." Furthermore, they relate anxiety with "intrusive signals of novelty and threat" and enthusiasm with "monitoring the success of current behavior" (1993, p. 674). They take the Aristotelian approach to fear as an emotion with ambivalent outcomes in politics: in prosperity, people underplay fear while in hopelessness they still cling to a faint expectation of escape. Anxiety and enthusiasm are straightforward emotions: anxiety causes cautiousness against, and enthusiasm causes involvement in a candidate's campaign. Several researchers followed in the same line (Johnston, Lavine & Woodson, 2015; Song, 2017): Groenendyk and Banks (2014) suggested that "party identification stimulates participation via anger and enthusiasm. On the other hand, fear produces thought but not much action." In this line, Valentino et al. (2011) found that "anger, more than anxiety or enthusiasm" mobilizes people to expend resources in elections. Finn and Glaser (2010) found that in the 2008 presidential elections in the USA "hope, pride, and fear, predicted reported vote choice above and beyond party identification, ideology, and other predictors." Johnston, Lavine and Woodson (2015) sought to find the effects of expectancy violation, i.e., experiencing enthusiasm or anxiety towards the candidate of an opposite party. The list of emotions has grown since the

early 1990s to include contempt, disgust, shame (Roseman et al., 2020; Gadarian & van der Vort, 2019), and admiration (Wang, 2008).

The dilemma between cognitive/rational and emotional reasons behind electoral behaviour was discussed by several authors (e.g., Carter & Stamm, 1994; Goren, 1997; Wang, 2008; Cwalina, Falkowski & Newman, 2010) mostly to show that they are mutually engaged (Marcus & Mackuen, 1993) though emotions were shown to sometimes be better predictors of actual vote (Ragsdale, 1991). Contrary to such findings, Wang (2013) suggested that rationality plays a more important and consistent role in individual turnout decisions than emotion, because the effect of emotion on turnout might be built on the appearance of charismatic candidates.

Several papers relating emotions with politics and elections used data from the American National Election Studies (ANES), along with experiments, panel interviews or (later) web surveys. In all those cases people were asked about their emotions against candidates and related events and were presented with a list of emotions. Such an approach is susceptible to both explicit and implicit biases: on the one hand, people were asked to choose one among a list of predefined emotions, thus limiting the emotional complexity (i.e., feeling more than one emotion simultaneously) or mentioning emotions beyond the ones included in the list. Robert Plutchik (2001) was quick to notice that:

> [t]he internal experience of emotion is highly personal and confusing, particularly because several emotions may be experienced at the same time. (…) Most of us censor our own thoughts and feelings, and we have learned to be cautious about accepting other people's comments about their feelings (Plutchik, 2001, p. 344).

As Ragsdale (1991, p. 43) put it: "The questions ask people to recall (cognitively) whether they have experienced an emotion. Since emotions are spontaneous reactions to a situation, their intensity and duration are best monitored as they happen," and argues that "the American National Election Studies (…) do not ask enough questions" to cover the desired range of feelings. On the other hand, people had to feel some emotion, even if they were indifferent.

This paper has a methodological focus, applying its methodological tools in a certain case study: the sentiment expressed by Twitter users during the critical elections in Greece in 2015 and 2019. In the next section, we discuss the relation between emotions and politics in the age of social media, as was ignited by the successful use of social media in

Barack Obama's 2008 campaign, as well as by the infamous involvement of the Russian Internet Research Agency and Cambridge Analytica in the 2016 Presidential Elections in the USA, or the latter's involvement in manipulating popular sentiment and voting behaviour during the UK's Brexit Referendum campaign. The third section is dedicated to the case study of Greek elections during the decade of crisis: we present shortly the basic figures for the outcomes of the elections between 2009 and 2012, signalling the outset and the deepening of the crisis and leading to the elections of 2015 when a coalition government based on SYRIZA signalled the first Left-wing Government in Greece, with the support of the small Right-wing party of ''Independent Greeks''. Then we further discuss the three elections that are included in our case study: the January 2015 election, when SYRIZA won for the first time; the September 2015 election which followed a Referendum as well as a new Memorandum between Greece and the Troika; and the July 2019 election, when the Conservative party of New Democracy won. In the fourth section, we present in detail the methodology followed, explaining data-collection procedures, the tools used for measuring sentiment and emotions, and the steps followed in Social Network Analysis (SNA). We combine the SNA and sentiment/emotion analysis in the fifth section for each of the three elections and further discuss our findings in the sixth section.

EMOTIONS AND POLITICS IN THE AGE OF SOCIAL MEDIA

The development of social media and its use by candidates and parties signalled a renewed interest in sentiment and emotions and their impact on voting behaviour, coupled with the use of computational techniques to mine sentiment from enormous amounts of data. It is widely accepted that Barack Obama's use of social media in his 2008 campaign, and the attribution of his victory to a large part of this use, was pivotal to this research interest (e.g., Tumasjan et al., 2011). In this case, social media users expressed their sentiments and emotions in a kind of ongoing online dialogue with other users, irrespective of the researcher. Thus, only those involved emotionally could be studied without pushing the indifferent to select an emotion. It was also possible to mine the expression of complex emotions in a single Facebook post or Tweet. On the other hand, ethical considerations entered the scene since the subjects didn't know in advance that their utterances would become part of scientific scrutiny. So far, such ethical considerations have for the most part been answered concerning

Twitter's terms of use, both directed to ordinary users and developers, as well as under best practices and guidelines produced by research organizations, and the legal framework of General Data Protection Regulation (GDPR). Initially, research focused on mention frequency as a proxy of popularity, to find that it could be a better predictor of electoral outcome than polls (see Tumasjan et al., 2011), as well as sentiment analysis, i.e., the computational extraction of polarity (either positive or negative) in a text (Jose & Chooralil, 2016; Hu, Kodali & Padamati, 2016). Other authors combined sentiment with information-sharing behaviour (Hoang et al., 2013), homophily (i.e., the tendency to cluster with people who hold similar ideologies or attitudes) with emotional valence (Himelboim et al., 2016), or campaigning (Hosch-Dayican et al., 2016). As Twitter evolved from a text-only 140-character microblogging platform to a rich multimodal environment, allowing for posting emoticons, images and videos along with longer texts (up to 280 characters), research turned to multimodal analysis (Joo, Steinert-Threlkeld & Luo, 2018).

Modelling emotions

Sentiments are based on emotions, like the ones mentioned in the previous section, and furthermore, basic emotions are combined to form higher-level ones. Plutchik (2001), elaborating upon his work since 1958, proposed a circumplex model of emotions visualized in his emotion wheel (Figure 1). In his own words:

> I have found that the primary emotions can be conceptualized in a fashion analogous to a color wheel – placing similar emotions close together and opposites 180 degrees apart, like complementary colors. Other emotions are mixtures of the primary emotions (Plutchik, 2001, p. 349).

Thus, emotions in this model are *joy* vs *sadness*, *trust* vs *disgust*, *fear* vs *anger*, and *surprise* vs *anticipation*. The combination of neighbouring emotions produces *love, submission, awe, disapproval, remorse, contempt, aggressiveness*, and *optimism*, while the combination of emotions two or three steps away produces fifteen more secondary emotions. The combination of emotions occupying opposite positions in the wheel produces *bittersweetness* (*joy* and *sadness*), *ambivalence* (*trust* and *disgust*), *frozenness* (*fear* and *anger*) and *confusion* (*surprise* and *anticipation*).

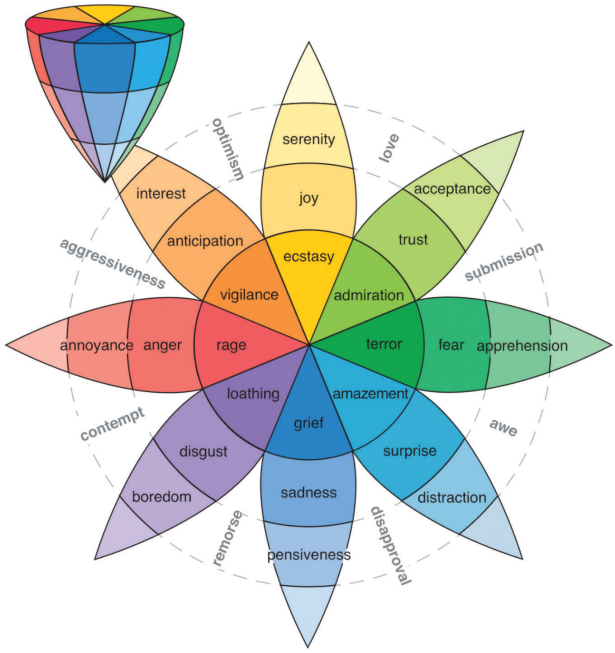

Figure 1: *Plutchik wheel of emotions*
Source: Plutchik 2001, p. 349.

TWITTER AND GREEK ELECTIONS IN A PERIOD OF CRISIS

In this paper, we examine the importance of emotions expressed by Twitter users in the electoral outcomes of a series of three critical parliamentary elections. The 2010s have been a decade when Greece went into a deep economic crisis, which was soon to become also a multilayer systemic crisis involving the political and value systems. A political system which is described as "one of the most stable party systems in Europe, with very low electoral volatility, organized around two parties" (Moschonas, 2013, p. 33) went through a realignment period which brought SYRIZA, a small left party from a mediocre 4.6% in the 2009 elections to 26.9% and the second place, less than 3% behind the centre-right New Democracy (cf. Ferra, 2020). We follow the pre-election periods of January and September 2015, when SYRIZA won the elections and established the first government of the left in Greece in coalition with the small right party of ANEL (cf. Smyrnaios & Karatzogianni, 2020), and July 2019 when New Democracy won the elections.

The initial phase of the crisis, with the memoranda and the presence of the Troika (IMF, ECB, and European Commission) signalling limited

sovereignty and austerity measures, ignited sentiments of shame and desperation, which were soon replaced by anger and indignation fueling the Greek anti-austerity movement of ''aganaktismenoi'' (or indignados). Though the movement used extensively online and social media (especially Facebook) to mobilize and organize participation in strikes and demonstrations (Ferra, 2020), little is known about the emotional expression of its members, beyond boosting internal political efficacy – i.e. '' the feeling that one is capable of understanding political facts and processes and that one feels capable of influencing politics successfully'' (Reichert, 2016, p. 222) – and diminishing external political efficacy, or the perceived political system's responsiveness to their actions (Zestanaki, 2020).

The occupation of public spaces and other mobilizations ended by the end of July 2011, following a police attack on those occupying Syntagma Square. The impact of the movement, though, was mirrored in the 2012 elections, while the use of online and social media as a means of independent information and expression became part of its legacy. Smyrnaios and Karatzogianni (2020) suggest that Twitter became a tool for SYRIZA's accession to power. It continued to play an important role in political mobilization in the period that followed, as indicated for example in an article published in *The Guardian* just after the Referendum of July 2015 (Harding, 2015). Arguably, Twitter's users multiplied in those years to create a more diversified and representative part of Greek society.[1] Therefore, it makes sense to search for emotional expressions on Twitter in the second half of the decade and examine its relation to the election outcomes.

The January 2015 election: Antonis Samaras' coalition cabinet of New Democracy (ND, centre-right) and PASOK (centre) held office for two and a half years, from 17 June 2012 to 25 January 2015. It was forced to hold advance elections, due to a constitutional requirement that a new President of Democracy had not been elected after three unsuccessful attempts. SYRIZA, who won only 4.59% in the elections of 2009 and saw its voters increasing rapidly in 2012 to 16.79%, and 26.89% two months later, achieved the apex of its electoral support in January 2015 winning 36.34%

1. According to journalistic sources, the Twitter accounts in Greece were 462,088 on 1/1/2015 and became 571,743 by 1/1/2016 (iEfimerida.gr 2016). By the end of 2019, Twitter users were estimated at 703,000 (DataReportal 2020). According to Ferra (2019, 59), in 2013 "The average user of Twitter was male (69.6%), in the age range 13-24 (40.4%) or 25-44 (37.3%), with higher education (55.7%) and living in Athens (61.4%)". She goes on to suggest that in comparison with Facebook, Twitter "indicated a more balanced usage by different age groups".

of the votes. The far-right parties also experienced a similar increase in their electoral influence. The case of the neofascist party of Golden Dawn is indicative of this increase, as it skyrocketed from a mediocre 0.29% in 2009 to 6.97% in 2012 and to 6.28% in 2015 winning third place after SYRIZA and New Democracy. After five years under economic crisis and memoranda, the electorate voted for parties at the fringes of the political spectrum, which were considered to adopt an anti-memoranda stance. Thus, voting for the Left was seen as a form of 'punishment' to traditional parties and their choices, with the hope for a better future and the implementation of measures to relieve the lower and middle classes. However, the dynamic of SYRIZA and its leader Alexis Tsipras did not prove to be enough to give him the absolute majority in the Parliament, which mobilized the populist right party ANEL (Independent Greeks) and its leader Panos Kammenos to immediately declare support to SYRIZA and form a coalition government.

The September 2015 election: The elections held on September 20, 2015, were extremely important after a compromise between the leftist government of SYRIZA/ANEL and the Troika led to a new memorandum despite the massive negative vote (61.3%) in the referendum of July 5th. Tsipras popularity fell, while a number of its party parliamentarians left the Party, but SYRIZA maintained its momentum, winning by 35.46%.

The July 2019 election: The 2019 election took place on 7 July, after the defeat of the governing SYRIZA party in the elections for the European Parliament and the first round of municipal elections (26 May 2019). The 10% distance between SYRIZA and ND in European Parliament elections led to the decision to hold elections before the end of the four-year term, and ND won with 39.85%.

METHODOLOGY

Data collection

We collected tweets from Twitter API ver. 2 using Python's twarc2 library with an Academic Developer Account, which offers access to the platform's complete archive. The query used contained the Twitter account names of the political leaders of all the parliamentary parties. In case the leader did not have an account (like the leader of the far-right Golden Dawn) or didn't use it (like the leader of the incumbent New Democracy), we used the account names of their deputy or a very active party official. We also included the accounts of political parties and the relevant hashtags (e.g.,

#elections_2015, #elections_2019 etc.). Data collection ran from the day of the official announcement of the elections with a Presidential Decree until the day the elections took place: 25 January 2015, 20 September 2015, and 7 July 2019. The corpus after data cleaning (duplicate removal) is presented in Table 1. A rise in the number of tweets during the September 2015 pre-election period signifies the importance of Twitter in public discourse after the Referendum and the third Memorandum, which was received either as a (honest) compromise or as a betrayal of promises and expectations.

Table 1: *The tweets and retweets of the three elections*

Type	29/12/2014-25/1/2015	28/8-20/9/2015	11/6-7/7/2019	Total
Tweets	35,234	128,072	66,152	229,458
Retweets	27,222	141,206	110,867	279,295
Total	62,456	269,278	177,019	508,753

Measuring emotions

To mine sentiment and emotions from the tweets, we used the NRC Word-Emotion Association Lexicon (EmoLex) (Mohammad & Turner, 2010; 2013). The Lexicon provides a list of 14,182 English words associated with the relevant sentiment (positive or negative) and eight emotions which correspond to those described in Plutchik's model. It has been used extensively in diverse contexts from media discourse analysis to politics, to social media, while spanning through disciplines from linguistics to computer science to social sciences to medicine and life sciences. Despite its wide use, the Lexicon is not free of bias: Zad, Jimenez & Finlayson (2021, p. 103) have found that it includes "a large number of incorrect, non-sensical, pejorative, or otherwise troubling entries", providing emotional labels for generic nouns, verbs, colours, places etc. They proceeded to apply a semi-automatic procedure to complement such biases, which included a final phase of manual checks for the correctness of the automatic outcome. The Lexicon is available in several languages, based on Google Translate. In any case, Greek grammar and syntax pose certain obstacles to the use of EmoLex or any other translated lexicon, since it does not cover all instances of the same word (e.g., singular, and plural forms). Similar worries were expressed by Ljubešić et al. (2020), who examined the Croatian, Dutch

Table 2: *Secondary emotions (dyads) and Opposites in Plutchik's model*

Dyads (Combinations)			
Secondary Emotions	**Emotions**	**Opposite secondary Emotions**	**Emotions**
Optimism	Anticipation + Joy	Disappointment	Surprise + Sadness
Hope	Anticipation + Trust	Outrage	Surprise + Anger
Anxiety	Anticipation + Fear	Remorse	Sadness + Disgust
Love	Joy + Trust	Envy	Sadness + Anger
Guilt	Joy + Fear	Pessimism	Sadness + Anticipation
Delight	Joy + Surprise	Contempt	Disgust + Anger
Submission	Trust + Fear	Cynism	Disgust + Anticipation
Curiosity	Trust + Surprise	Morbidness	Disgust + Joy
Sentimentality	Trust + Sadness	Aggressiveness	Anger + Anticipation
Alarm	Fear + Surprise	Pride	Anger + Joy
Despair	Fear + Sadness	Dominance	Anger + Trust
Shame	Fear + Disgust		
Opposites			
Opposite	**Emotions**	**Opposite**	**Emotions**
Bittersweetness	Joy + Sadness	Frozenness	Fear + Anger
Ambivalence	Trust + Disgust	Confusion	Surprise + Anticipation

and Slovene versions of the Lexicon. They found that manually correcting the translations significantly improved the outcome. Several authors went further than improving term translation, towards enrichment by including more terms (cf. Mohsen, Hassan & Idrees, 2016; Briciu & Lupea, 2017; Wijayanti & Arisal, 2021).

Another obstacle is that such a lexicon is suitable for general use, leaving aside context-specific or corpus-specific uses. We decided to enrich the Greek version of EmoLex by adding corpus-specific words (and hashtags) tagged for the relevant emotions. To achieve this task we extracted all the

words in our corpus that appear more than 10 times (excluding stopwords), and presented them to two independent judges. In case of disagreement, they discussed and decided upon a mutually accepted tagging. We also checked for bias in the original NRC Greek Lexicon and corrected the relevant entries.[2]

For this paper, we used Python code to parse all tweets and find the corresponding emotions, based on Term Frequency, and calculated secondary emotions (or dyads) adding the relevant basic emotions, as shown in Table 2.

Social Networks

To achieve a closer look at the emotions expressed by certain groups probably driving their vote choice, we use Social Network Theory and its applications. The Internet, according to Barabasi (2016, p. 8), "is built by the collective actions of millions of individuals and organizations". Social media like Twitter are woven upon such actions which, when considered collectively, seem to follow certain rules while the actors themselves consider that they follow their tastes, incentives, or impulses. In Network Theory actors, for example, the users of Twitter, are called 'nodes,' and each act that connects two such nodes is called an ''edge''. Consider a Twitter user (a ''node'') retweeting, liking, quoting, or mentioning another user: this is an ''edge''. Our data include not only the text of the tweets collected, but also information about interactions of this kind, as well as information about the nodes' overall characteristics (e.g. when they joined Twitter, how many times they tweeted, or how many followers they have). Such characteristics may be further used to understand their status as humans, bots (software pretending to be human), or hybrid (accounts sometimes used by humans and sometimes by software).

Several properties and statistics can be computed about both nodes and edges. In our research presented here, we rely on the property of ''homophily'', which means that "people's networks are homogeneous concerning many sociodemographic, behavioural, and intrapersonal characteristics" (McPherson, Smith-Lovin & Cook, 2001, p. 415). People interact more with others who hold similar ideology, status, work etc. Thus, in a politics-oriented network, as is the network of communicative

2. When we began enriching the NRC Lexicon, version 0.92 was available. A newer version (version 1.0) was made available in August 2022, after the completion of our enrichment project.

acts referring to politics and elections, people with similar ideologies tend to interact within their community, and less with opponents. Of course, sometimes they exit their community and address people from other communities, but this is rather infrequent. The algorithms behind social media timelines support homophily, showing to individual users content that was created by users they know or interact with more often, or even with their friends' friends (e.g., the followers of their followers). Therefore, "homophily limits people's social worlds in a way that has powerful implications for the information they receive, the attitudes they form, and the interactions they experience" (McPherson, Smith-Lovin & Cook, 2001, p. 415), leading to divides within the corpus public. Such divides may reproduce social or political polarization as expressed in public discourse or the outcome of elections.

In Network Theory jargon, "a community is a locally dense connected subgraph in a network" (Barabasi, 2016, p. 10). Other terms are also used to denote such communities: they are called ''subgraphs'', ''clusters'', or ''cohesive subgroups'' (Borgatti et al., 2022, p. 214). While in theory it is possible to have communities – called 'cliques' – where each node is connected to all other nodes, in real social networks such communities are rare. To locate groups, we will use an algorithm developed by Blondel et al (2008), available at the software Gephi v. 0.10.1, which recognizes ''modularity classes''.

A second characteristic we use is the number of incoming edges to a node, called in-degree. Such a measure is related to the core-periphery structure of networks. As explained by Borgatti et al. (2022, p. 206), "a network has a core-periphery structure to the extent that there is a set of core nodes that have ties to each other and the periphery and there is a set of periphery nodes that are only connected to the core and not each other". In our case, most users tend to retweet content from socially important nodes (e.g., politicians or media), mention them to applaud or criticize them, like their tweets etc. These edges are directed towards the important nodes (incoming edges), and the number of such edges within a community indicates whom they deem important. Looking at the nodes with the higher in-degree we can sometimes characterize the community.

Based on these characteristics (''modularity class'' and ''indegree''), we will compute the emotions recorded for the most prominent communicative communities within the network of all those who were involved in the Twitter discussion about the elections. But which communities are pertinent? A network-based analysis would initially suggest, the bigger

ones: those consisting of more nodes than the rest. For example, the user network of Twitter interactions in January 2015 is shown in Figure 2. The bigger communities, with thousands of nodes, were the Spanish, the Italian and the two French since there was high interest from their side on the outcome of the ‘‘Greek experiment’’. Despite their magnitude, those communities were formed by the interactions around a rather small number of tweets. On the other hand, less populated Greek communities were prolific in Tweets.

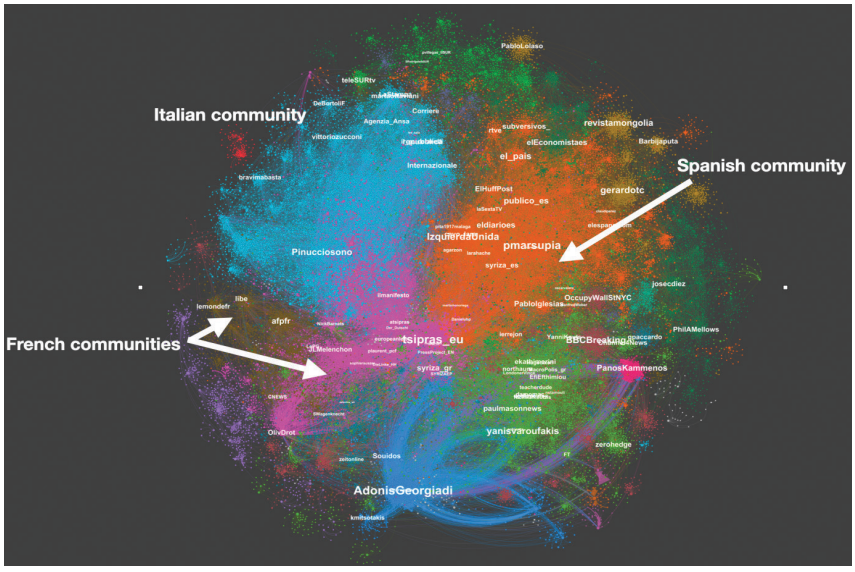

Figure 2: *The network of Twitter users’ interactions during the January 2015 election. The Spanish, Italian, and French communities were prominent in this network*

FINDINGS

Communities

The corpus collected for the January 2015 elections revealed the interactions between 10,232 users. The algorithm used recognized 1,280 communities, of which only 20 had more than 50 members. Some of those 20 ‘‘big’’ communities had several hundreds or even thousands of members interacting about a very small number of tweets. They were mostly composed of foreign users retweeting, liking, or otherwise interacting with

those few tweets (Figure 2). An extreme example is a group of accounts from Turkey: it includes 684 users interacting with only 2 tweets.

Among the predominantly Greek communities, several ones were adopting a positive stance towards SYRIZA, as well as ANEL (who collaborated to form a government after the elections), and small parts of the far Right. On the other hand, we were unable to locate a community supporting the Centre-Right Party of New Democracy. Nonetheless, users are opposing SYRIZA and reproducing the program and ideology of New Democracy. In any case, the dominant presence of SYRIZA supporters and their enthusiasm may be conceived as an effect of the widespread certainty that a political change was just around the corner, or as a prediction of the election outcome.

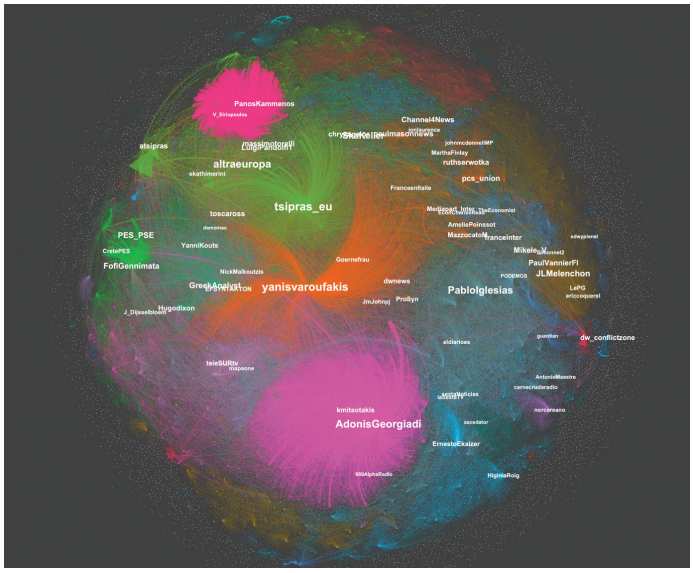

Figure 3: *The network of users during the September 2015 elections. The usernames included in the graph are those of the users with the higher in-degree (i.e., receiving most mentions)*

Nine months later, the 55,842 users interacting on Twitter were placed in 1,821 communities. Only 19 communities consisted of more than 50 members, and some among them were mostly composed of foreign users and sometimes accounts of EU officers or politicians mentioning the election winner Alexis Tsipras or other political leaders. The supporters of the major Opposition New Democracy party not only composed a considerably

populated community but also posted the most tweets during the pre-election period. Most users were placed in similar-minded communities centred around a political party, while some other communities were shaped around online media commenting on their content (Figure 3).

Our dataset for the July 2019 elections consists of 37,115 users, almost half of those of the previous election (Figure 4). They were placed in 987 communities. Nineteen communities had more than 50 members. There were still some communities composed mostly of users from foreign countries or officials of the EU. Despite their number, they were focused on a small number of tweets. Two communities were related to the winning New Democracy: one around the populist vice-president of the party Adonis Georgiadis, a populist politician very active in social media promoting provocative neoliberal policies, and the other (the smaller) around the president and candidate prime minister. All the parties that managed to pass the 3% threshold and enter the Parliament had a considerable presence in Twitter's social network.

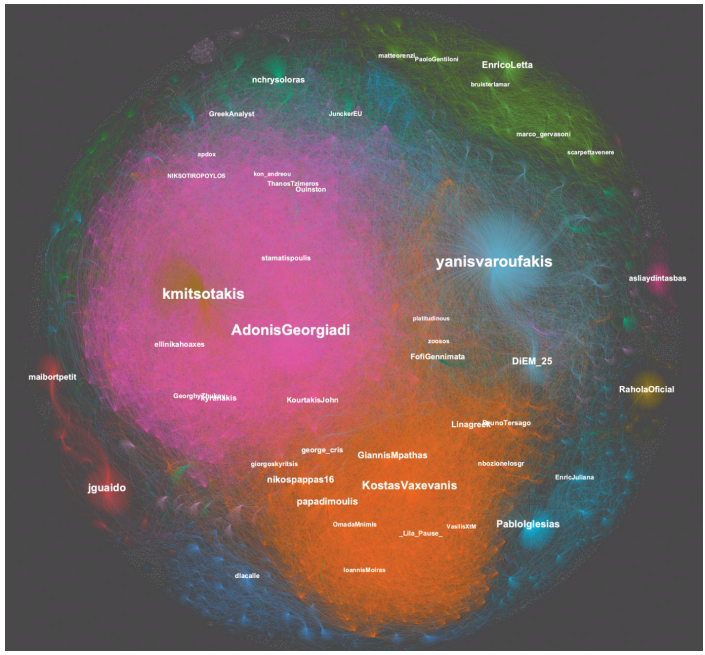

Figure 4: *The network of users during the June 2019 elections. The usernames included in the graph are those of the users with the higher in-degree (i.e., receiving most mentions)*

Emotions

Amid a deep crisis, it would be expected that positive emotions might eclipse, while negative ones might prevail. More so, during pre-election periods, when polarization of public discourse and partisanship peak.

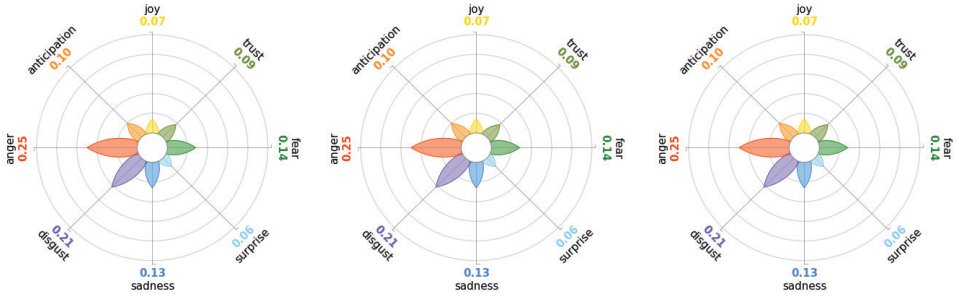

Figure 5: *The basic emotions in the tweets during elections of (a) January 2015, (b) September 2015, and (c) July 2019*

The eight basic emotions present a more or less similar structure throughout the three elections (Figure 5). In January 2015 Anger and Disgust were the dominant emotions. Fear and Sadness followed far behind. Anger was dominant throughout the pre-election period leading, and Disgust was the indisputable second. It is worth mentioning though, that Anger became less pronounced as the day of the elections was approaching. Fear and Sadness were exchanging places in the third and fourth positions, with the latter taking the lead during the last few days before the election (Figure 6).

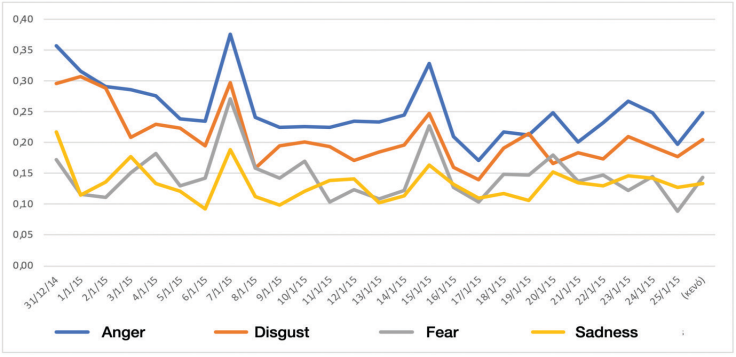

Figure 6: *Timeline with the evolution of the four prominent emotions (31/12/2014-25/1/2015)*

The most active community consisted of users of the governing and opposition parties, who were attacking each other. This community was expressing the most negative sentiments, with Anger, Disgust, Fear and Sadness scoring higher than average. The community supporting the minor (far) right party ANEL, which was anticipated to support SYRIZA in forming a coalition government, expressed highly positive sentiments, namely Anticipation, Joy, and Trust. The rest communities supporting the far right expressed mostly Fear and Sadness. Due to the interest shown by the EU public in the Greek experiment and the rise of SYRIZA to power, especially from left-wing politicians and citizens alike, some of the most populated communities came from Italy, Spain (who were both parts of the same PIIGS crisis), France and the United Kingdom. They expressed Anticipation, Joy, Trust, and sometimes Surprise.

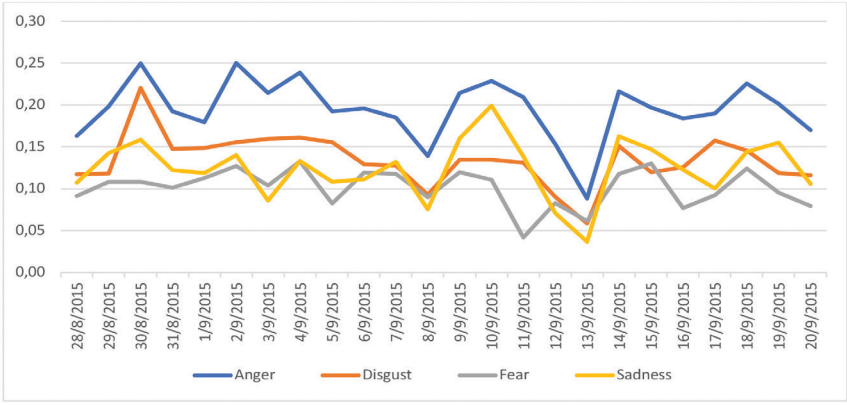

Figure 7: *Timeline with the evolution of the four prominent emotions (28/8/2015-20/9/2015)*

In the period leading to the elections of September 2015, Anger was the most eminent emotion, though not as pronounced as in the elections of January. Disgust became milder and was recorded close to Fear and Sadness. Disgust and Sadness were taking turns in the second place (Figure 5, Figure 7). Anger scores were high for the communities supporting parties of the Opposition, as well as the ex-minister Yanis Varoufakis, while they were mild among the communities supporting the two parties of the government coalition. Disgust scores were high between the supporters of the memoranda and the GRemain[3] during the Referendum, as well as

3. During the July 2015 Referendum, the supporters of NO found favorable the idea of

between the nationalists who supported GRexit, but their expectation was not fulfilled. Fear was high among users discussing systemic media content. Media were pivotal in propagating the possibility of chaos if SYRIZA was re-elected as government. Sadness scores were higher among the supporters of Varoufakis and the parties to the Left of SYRIZA.

Anger and Disgust were again dominant emotions during the pre-election period of July 2019. A newcomer to the top was Anticipation, ranking as high as Sadness and Fear. In Plutchik's theory, Anticipation refers to the expectations we have about ourselves, based on current experience and information. Those scoring high on Anticipation were mostly proponents of ND envisaging a better future for themselves as being on the part of the winners. Thus, the rise of Disgust and Anticipation during the ten days before the elections, in parallel with the diminishing scores of Fear, signalled that the outcome had been somehow predicted.

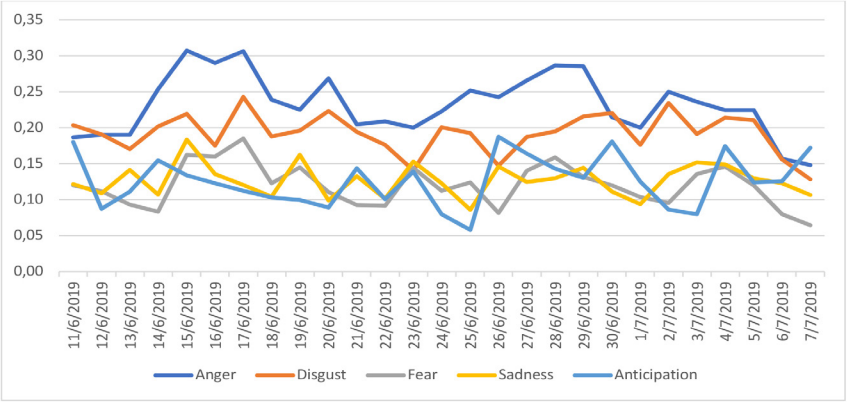

Figure 8: *Timeline with the evolution of the four prominent emotions (11/6/2019-7/7/2019)*

Among the communities with the most tweets in our dataset, two supported the winning party of New Democracy, and both scored high on positivity. While the populist community expressed Joy, Surprise and Trust slightly higher than the average, the other (more mainstream) scored top of Anticipation, and Trust. There were also two communities supporting

a possible exit of Greece (GRexit) from the Eurozone, while the supporters of YES were supporting that Greece should remain (GRemain) in Eurozone. The former voted for anti-austerity parties, both left and right wing, while the latter voted mostly for the conservative New Democracy and the centrist PASOK/KINAL.

SYRIZA. While they both scored high in Anger and Sadness, one scored high on Disgust and the other on Fear. Finally, two communities were expressing the far Right. One of them, being content with the defeat of the Left, but expecting a better result for the far-right party of Elliniki Lysi, scored low on all emotions. The other, close to the leader of Elliniki Lysi, scored high on Anger, Disgust, and Fear.

Secondary Emotions and opposites

Secondary emotions provide a more nuanced understanding of the emotional drives behind voting behaviour. While emotions are shared between humans and other animals, secondary emotions are properly human.

During the January 2015 elections *contempt*, *sullenness* (or *envy*), *aggressiveness*, *shame*, *remorse*, and *cynicism* scored high, implying the upcoming change in voting behaviour. The same is true about two positive secondary emotions, *dominance*, and *pride*, a mix of *anger* with *trust* or *joy* in the expectance of political change. *Frozenness*, a combination of *anger* and *fear*, was the most intense between the opposite emotions, followed by *ambivalence* (*trust* and *disgust*).

Contempt was dominant during the period preceding the September 2015 elections, followed by remorse for what was understood as a U-turn that frustrated the expectations of the supporters of the government. Understandably, *optimism* was cut to almost half, indicating that the citizens lost their hope for a positive change. *Frozenness* and *ambivalence* were once again the high scoring among the opposite emotions, though not as pronounced as in the previous elections.

Sulleness (or *envy*) was dominant during the July 2019 elections. It was expressed mostly by the followers of SYRIZA, as well as of the far right, each for different reasons. Mixing *anger* and *sadness*, *sullenness* is an expression of disappointment. The former group was disappointed for being displaced from government despite what they perceived as a fruitful term, while the latter for not achieving a harsher verdict against the Left as well as not becoming necessary in forming a coalition government of the Right. In their opinion, New Democracy was not Conservative enough, not Right enough. *Sulleness* was a result of the prevailing *anger* and *sadness* for the insufficiency detected in policy for years. *Frozenness* and *ambivalence* were still the dominant among the opposite emotions, this time with intensity like that of the January 2015 elections.

Overview

Anger and *Disgust* were the dominant emotions in all three elections. Most emotions were more pronounced in January 2015, except for the positive emotions of *Joy*, *Confidence* and *Anticipation* which scored higher in the July 2019 election. This probably explains the "punishment" vote, based upon accumulated *Anger* and *Disgust* from past policies and initial expectations that were not fulfilled. *Fear, Sadness*, and *Anticipation* were felt by citizens to a moderate degree. The positive emotions, namely *Trust, Joy* and *Surprise* scored low. They were expressed by party supporters defending their party. Among them, of course, were the party leaders who used Twitter to promote their campaign.

A similar structure is evident as far as the secondary emotions are concerned. *Contempt, aggressiveness* and *remorse, sullenness* (or *envy*), *pride* and *cynism*, *dominance* and *shame*, all being negative emotions, gave the tone. In any case, they scored higher in January 2015 and July 2019 and lower in September 2015. Positive secondary emotions, though scoring far lower, followed the same trend: they were higher in January 2015 and July 2019 to almost similar levels and dropped in September 2015. Thus, we may suggest that when sentiments intensify a political change is around the corner.

DISCUSSION

The idea that the absolute number of mentions of a party or a political leader, as a measure of the share of attention received, may be an indication of electoral success, was abandoned rather quickly. Since this idea was expressed quite early in the history of Twitter (e.g., Tumasjan et al. 2010; 2011), the development of the medium itself and the demographics of its users were far from being a somewhat representative sample of the electorate. Thus, the fact that in German elections of 2009 "the relative volume of tweets mirrors the results of the federal election closely" (Tumasjan et al., 2010, p. 182) and not lagging far behind traditional election polls, it was challenged on pragmatic grounds (as "tweets collected one week before an election negatively correlates with the result" [Jugherr et al. in Rita, António & Afonso, 2023, p. 45]) as well as on the lack of interest on the content of the tweets. It was also challenged on epistemological grounds. Anstead & O'Loughlin suggested that social media analysis leans towards a new conceptualization of public opinion "as an ongoing product of conversation, embedded in social relationships" (2015, p. 215) rather than

as a sum of discrete preferences. Thus, tweets are better suited to gauge the less settled, restless, and volatile change of preferences in a postmodern society. Upon such a conceptualization, research focused on the polarity between positive and negative sentiment.

While polarization is expected "during heightened political conflicts" (Rita, António & Afonso, 2023), the Greek political system is more fragmented than the one of the USA or UK, therefore polarization is producing multiple groups, indicated by network analysis. Thus, fine-tuning is necessary to gauge the content of sentiment as expressed in emotions. Plutchic's approach to emotions, and the further finetuning in secondary emotions and opposites, provide an organized framework, operationalized for use in computational analysis.

Of the emotions analyzed we found that Anger is a better indicator of voting disposition than Fear, while a strong presence of positive emotions among the supporters of either party might indicate the possibility of electoral success. We also found that the intensity of emotions might be an indicator of stability or change of government. The overall strong expression of negative emotions might indicate governmental change, while mild emotional expression might be indicative of stability. A deeper understanding is needed in computationally recognizing the direction of such emotions, since they may be directed either to the person or party mentioned or to its opponents. Thus, while the case study presented in this paper proved that there seems to be a relation between some findings of the analysis of tweets, this is still far from being recognized as a correlation.

While the two elections of 2015 marked the height of a period of electoral de-regulation initiated some 4 years earlier, the 2019 elections seemed to mark the beginning of a period of re-regulation with a new stable bi-party system changing roles in government and major opposition, and a few other parties in minor opposition.

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