Published Jan 17, 2017 as: Laaksonen, S-M.; Nelimarkka, M; Tuokko, M. & Marttila, M.; Kekkonen, A. & Villi, M. (2017). Working the fields of big data: Using big-data-augmented online ethnography to study candidate–candidate interaction at election time. *Journal of Information Technology & Politics*, DOI: 10.1080/19331681.2016.1266981

Working the fields of big data: Using big-data-augmented online ethnography to study candidate–candidate interaction at election time

Salla-Maaria Laaksonen*

Communication Research Centre, Department of Social Research, University of Helsinki

Matti Nelimarkka

Helsinki Institute for Information Technology (HIIT) and Department of Computer Science, Aalto University; Department of Computer Science, University of Helsinki

Mari Tuokko

University of Jyväskylä

Mari Marttila

Department of Political Research, University of Helsinki

Arto Kekkonen

Department of Social Research, University of Helsinki

Mikko Villi

Department of Communication, University of Jyväskylä

Author Note

Salla-Maaria Laaksonen is a PhD Candidate at the Communication Research Centre, Department of Social Research, University of Helsinki. Her research interests are related to new communication technologies, organizations and organizing in new media, and online research methods.

Matti Nelimarkka is a PhD Candidate at the Department of Computer Science, University of Helsinki and Researcher at Helsinki Institute for Information Technology (HIIT) and Department of Computer Science, Aalto University and University of Helsinki. His research interest include computational social science, social computing, and technology-enabled politicians.

Mari Tuokko is a graduate from University of Jyväskylä with a MA in Speech Communication. Her research interests are in technology-mediated interaction and political communication.

Mari Marttila is a PhD Candidate at the Department of Political and Economic Studies, University of Helsinki. Her research interests include politics in social media, political representation and digital inequalities.

Arto Kekkonen is a graduate from the University of Helsinki with an M. Soc. Sci. in Media and Communication Studies, and an undergraduate student in computer science. His research interests include online advocacy and political participation, and computational social science.

Mikko Villi, PhD, is Professor of Journalism in the Department of Communication at the University of Jyväskylä, Finland. His research is focused on media management and media work, concentrating on mobile, visual and social media.

*Corresponding author: Salla-Maaria Laaksonen, Media and Communication Studies, Department of Social Research, University of Helsinki, Finland P.O. Box 54 FIN-00014 University of Helsinki phone +358 50 415 6576 email salla.laaksonen@helsinki.fi

Acknowledgments: This research was supported by the Helsingin Sanomat Foundation (project Digivaalit 2015). Nelimarkka and Marttila also thank the Kone Foundation for funding their work (project Digital Humanities of Public Policy-making). We are grateful to research assistants Netta Karttunen, Paula Hyssy, and Sanna Luomanperä for assisting in the online ethnography. Finally, the authors wish to thank the three anonymous reviewers for their extremely useful comments, commenters in The Empiricist's Challenge: Asking Meaningful Questions in Political Science conference, University of Mannheim and SOMERI Social Media Research Symposium, University of Jyväskylä, and Asko Lehmuskallio and Salli Hakala for their feedback on earlier versions of the manuscript.

Abstract

The paper proposes big-data-augmented ethnography as a novel mixed-methods approach to study political discussions in a hybrid media system. Using such empirical setup, the authors examined candidate–candidate online interaction during election campaigning. Candidate–candidate interaction crossing party boundaries is scarce and occurs in the form of negative campaigning via social media, with the shaming of rival candidates and engaging in battles with them. The authors posit that ethnographic observations can be used to contextualize the computational analysis of large data sets, while computational analysis can be applied to validate and generalize the findings made through ethnography.

Keywords: big data, ethnography, computational social sciences, political discussion, interaction, negative campaigning, elections, social media, data science

Working the fields of big data: Using big-data-augmented online ethnography to study candidate–candidate interaction at election time

Introduction

Social-media services support peer interaction through commenting and responding to others' posts (among others, Walther, 1996; Walther & Jang, 2012). Political scientists and communication researchers have explored how this type of interaction takes place in an electoral context. Researchers have typically been examining candidate–citizen (e.g., Gerodimos & Justinussen, 2014; Graham, Broersma, Hazelhoff, & van 't Haar, 2013; Stromer-Galley, 2000) and citizen–citizen interactions (e.g., Hawthorne, Houston, & McKinney, 2013; Penney, 2016). These interactions are a good example of "digital traces" (Jungherr, Schoen, & Jürgens, 2016; Welser, Smith, Fisher, & Gleave, 2008), data points of the social actions of the media-users.

Viewing these interactions as digital traces has motivated scholars to collect larger data sets and to apply various methods in their analysis. When exploring interaction in an electoral context, researchers have studied the form and content of interaction, along with social patterns and frequency of interactions. This field of research has a quantitative focus, as is common among studies of political communication (Karpf, Kreiss, Nielsen, & Powers, 2015). In general, researchers have recently been calling for a new era of qualitative research and mixed-methods studies (Karpf et al., 2015).

In its focus on computational methods, the recent research interest in digital trace data and big-data studies primarily follows the quantitative tradition of political studies. The main reasons for the increasing application of computational analysis of digital traces lie in access to the data (Lazer et al., 2009) and the development of methods for analysis of said data (Cioffi-Revilla, 2010). The main benefit of computational methods is the opportunity they offer to conduct analyses on the scale necessitated when the quantity of data exceeds those in traditional qualitative or quantitative research, in what is often referred to as "big data." Furthermore, tools such as machine learning have been demonstrated to provide insightful assistance in such processes as classification of data (see, e.g., Levy & Franklin,

2013).

These developments notwithstanding, collecting and computationally analyzing the digital traces is not unproblematic. First, there are concerns related to the validity of the methods employed. Both Boyd and Crawford (2012) and van Dijck (2014) argue that computationally based data collection and analysis require contextual framing, which is easily lost in projects entailing purely collecting and analyzing big data.

Without good knowledge of the context, posing relevant questions in light of the data can be difficult. Highlighting another caveat, social scientists have emphasized the need for human interpretation in the data-analysis process, to validate the findings (Grimmer & Stewart, 2013). The research process, even when taking "big data" as its material, involves selections and choices, which often are not discussed in writings in the relevant field (Ekbia et al., 2015). Furthermore, the data-collection tools themselves usually depend on third parties, such as suppliers of social-media services, and on their willingness to provide access to the data. A final issue, subject to constant discussion in this field, is the quality of the data (e.g., Joseph, Landwehr, & Carley, 2014; Lorentzen & Nolin, 2015; Villi & Matikainen, 2016). These are legitimate concerns, and scholars must address them if they are to ensure both mainstreaming of the approach and building of trust in research that takes trace data from systems and databases as material.

Striving to address these challenges, we applied a *mixed-methods* (Jick, 1979; Tashakkori & Teddlie, 1998; Teddlie & Tashakkori, 2010) setup to study interaction via social media in an electoral context. We combined online ethnography and data science in both the data-collection stage and the analysis phase. The rationale for combining qualitative and quantitative methods–i.e., employing the mixed-methods strategy–is that one can, when properly done, harness the strengths of each while offsetting their respective weaknesses (Tashakkori & Teddlie, 1998). Combining methods can thus increase the validity of research, since using a variety of methods means that one method can serve as a check on another (Read & Marsh, 2002). We argue that by means of our proposed combination, it is possible to address the challenges of context, validity, and reliability presented above.

We will demonstrate the applicability of a mixed-method setup that combines online

ethnography and data science by discussing a less studied form of interaction: candidate–candidate interaction during the pre-election part of the parliamentary election season. Our demonstration examines the case of Finland in spring 2015. We ask, "*How do candidates interact with other candidates via social media?*" Because the study was conducted in a milieu with a multi-party system, the competition-related elements not only between parties but also within parties are emphasized. This provided especially fruitful ground for analysis. In addition to the latter work, we discuss how various previous frameworks, such as that of negative campaigning, can be used as a lens for analysis of this sort. Hence, the paper serves a twofold purpose, in response to our aim to make both empirical and methodological contributions.

We will first review existing research on political interaction via social media, personalization of campaigning, and negative campaigning. After this, we describe both online ethnography and data science as research methods, then present our particular empirical case and the mixed-methods approach we adopted. With that groundwork laid, we can present the results of our mixed-methods analysis of candidate–candidate interaction during campaigning, after which we reflect on the challenges and possibilities related to the methods selected, taking our experiences as a jumping-off point. Finally, having explored the limits and challenges of this setup, we present the process of *big-data-augmented ethnography* and lay out three propositions that summarize the advantages of such a methodological approach.

Political interaction online

Since the advent of the Web, researchers have discussed how the Internet can enhance interaction between content creators and those reading the content (e.g., Adams & McCorkindale, 2013; Gerodimos & Justinussen, 2014; Nielsen & Vaccari, 2013; Stromer-Galley, 2000, 2004; Walther, 1996; Walther & Jang, 2012). In general, computer-mediated communication was expected to democratize political communication (e.g., Stromer-Galley, 2000) and to bring into being a new public arena for political discussions and digital deliberation (e.g., Dahlgren, 2005; Papacharissi, 2002; Semaan, Robertson, Douglas, & Maruyama, 2014). In this connection, previous research within the political realm has focused

mostly on candidate–citizen (e.g., Gerodimos & Justinussen, 2014; Graham et al., 2013; Stromer-Galley, 2000) and citizen–citizen interaction (e.g., Hawthorne et al., 2013; Penney, 2016).

Candidate–citizen interaction has been well studied. The research indicates that candidates use social media mainly as a tool for top-down self-promotion, information-sharing, and mobilizing rather than a medium enabling two-way communication with the citizens or their bottom-up empowerment (e.g., Gerodimos & Justinussen, 2014; Graham et al., 2013). Researchers have explained this finding in various ways, Stromer-Galley (2000) suggests that candidates avoid online interaction because it is burdensome and leads to both a lack of control of the campaign message and the overall ambiguity of that message in online media. In fact, Lilleker and Malagon (2010) and Vergeer, Hermans, and Cunha (2013) found that some politicians tend to withdraw almost completely from online interaction in fear of losing message control. However, Nielsen and Vaccari (2013) suggest that the low levels of engagement in politician–citizen interaction might be due just as much to low interest in engagement on the citizens' part.

Research into citizen–citizen interaction has been less active, so findings as clear as those above cannot be reported. Penney (2016) observed how citizens share political messages to inform their followers about politics and to persuade and engage others. Some researchers have concentrated on the term "citizen" and pointed out that it actually refers to a very heterogeneous group. Hawthorne et al. (2013) examined the difference between non-elite and elite users, where the latter category consists of users who are involved with traditional media, such as reporters. They observed that non-elite users tweeted much more than did elite users, but elite users' tweets were retweeted more. Ausserhofer and Maireder (2013) considered citizens, experts and activists, and journalists separately and examined how these participants interact with each other and the candidates. The primary finding was that everyone aims to interact with citizens, and citizens interact mostly among themselves. Of the researchers whose work is cited above, only Hawthorne et al. (2013) reported the occurrence of candidate–candidate interaction. Little is known about this type of interaction.

Indeed, studies seem to overlook the fact that social media also function as an arena

of public interaction *between* the candidates. In light of the public nature of online conversations, it can be assumed that politicians will take advantage of the possibility of both expressing their views and doing so by challenging their rivals (cf. Gainous & Wagner, 2014). Motivated by this gap in the research literature (and that in our ethnographic observations, described later in this paper), we focused on studying how candidates interact with other candidates via social media. Before discussing our methods and results, we will delve into two particular aspects of the theory relevant to examining candidate–candidate interaction: examination of personalization of campaigning and negative campaigns. Both of these areas of research are linked with how candidates interact with other candidates, either directly (attacking or endorsing) or indirectly (focusing on oneself as a person). Furthermore, they provide additional insights that can inform field observations and be used to elaborate on them.

Personalization and scandalization of politics

The concept of personalization of politics and campaigning refers to a focus on the candidate – instead of the party – in political communication, as well as focus on the private instead of the party platform. This may be manifested in an emphasis on the political leaders and a focus on non-political aspects of candidates' character (Van Aelst, Sheafer, & Stanyer, 2012). The phenomenon of personalization has several recognized key drivers, from media developments to the modernization of society (cf. Holtz-Bacha, Langer, & Merkle, 2014) In a compelling account of "new visibility," Thompson (2005) suggests two possible reasons for scandals as mediated events having become a pervasive feature of our public life. The first of these is the gradual decline of ideological politics in tandem with the growing importance of the politics of trust, and the second is media technologies that support a new kind of non-reciprocal intimacy and manners of mediated self-disclosure (see also Vergeer & Hermans, 2013). These developments promote a world wherein the audience is increasingly interested in political actors as individuals, and this can be expected to influence the campaigning styles they pursue. Further, Thompson (2005) claims that the gradual decline of ideology in politics has led to political leaders' credibility and trustworthiness as people becoming an increasingly important issue.

Platforms for social media have been seen to support personalization and have become a venue in which candidates are present as persons (Enli & Skogerbø, 2013; Hermans & Vergeer, 2012), whether they use dialogue-based or more marketing-oriented campaigning styles (Enli & Skogerbø, 2013). Hermans and Vergeer (2012) suggest that campaign personalization takes place online in three ways: through professional personalization (disclosure of oneself as a politician), description of personal preferences, and focus on home and family. One reason for applying a personalized approach in online political campaigning is that citizens seem to value it. Kruikemeier, van Noort, Vliegenthart, and de Vreese (2013) illustrate how personalization in online spaces increases citizens' feeling of political involvement and positive experience of politics.

In practice, however, the focus on personae seems to have its negative effects too. Highfield (2016) points out several cases of social-media users seizing on mistakes and gaffes made by politicians, along with various mechanisms of doing so. Such scandals offer useful moments also for candidates from other parties. Since parties have no fundamental ideological differences to pursue today, the parties and their leaders are seeking more and more ways to create political capital out of the failings of their rivals (Thompson, 2005, p. 47). This phenomenon is studied as negative campaigning.

Negative campaigning

Negative campaigning has no single agreed definition (e.g., Lau & Rovner, 2009). According to Swint (1998), campaign personnel stress in their rhetoric that actions should be deemed negative campaigning only when the content is untruthful – i.e., when false information or rumors are spread deliberately. In contrast, Surlin and Gordon (1977) suggest that citizens see any attack on a political opponent as negative campaigning. However, Lau and Rovner (2009) showed that citizens do differentiate between what they deem justified and unjust-seeming forms of negativity. Nowadays, many forms of negative campaigning are personalized – for example, attacks on the personality of other candidates – and negative campaigning hence is tied to the personalization of politics discussed above.

While research on negative campaigning often is carried out from a United States perspective, the phenomenon is known also in Europe (e.g., Walter, 2014). European studies

have observed a link between party politics and negativity. Walter (2014) argues that negative campaigning is more common in two-party majoritarian systems and is seen considerably less in multi-party systems. No existing research is available from the Finnish context, which also represents a multi-party system, where votes are given to individual candidates.

Recently, researchers have observed social media acting as a venue for negative messaging or event-based attacks (Ceron & D'Adda, 2016; Highfield, 2016; Stromer-Galley, Zhang, Hemsley, & Tanupabrungsun, 2016). Ceron and D'Adda (2016) examined negative campaigning in the run-up to Italy's 2013 elections on Twitter. As others do, they suggest that negative campaigning indicates greater competitiveness in the race. However, they state also that a "negative campaign is effective when targeted against a rival adjacent party, bringing 'indifferent' voters (spatially close to both parties) to [the] support [of] the attacker rather than its opponent." Stromer-Galley et al. (2016) enumerated many characteristics of pre-US-election negative campaigning on Twitter that are cited in the existing literature. They observed, for example, that challengers employ a more negative campaign style and that third-party candidates are more active. Surprisingly, they report that the competitiveness of the race had no impact on the extent of negative.

Method and approach

The methods applied are in line with the aim for this paper as discussed in the introduction: to study candidate–candidate interaction in online political campaigning and to demonstrate and discuss how researchers can blend ethnography and data science within a research setting. We demonstrate our mixed-methods approach here by examining the online interaction between candidates during the campaign period for the 2015 election for the Parliament of Finland. For the month before election day, we engaged in large-scale online data collection by following all the nominated candidates on multiple social-media platforms. We employed two distinct but parallel data collection procedures: one ethnographic and interpretive and the other using automated computational tools to extract information from social-media services. We begin the discussion by contextualizing our case in the political and technological environment of Finland. After that, we will position our study in existing methodological discussion of ethnography and among the works on

data science, with detailed descriptions of our data collection.

The case and context

Finland is an interesting example to examine in connection with political use of social media because of the country's political structure and patterns of Internet use. Finland has a multi-party system, with 15 individual parties and 15 electoral districts. A parliament of 200 representatives is elected every four years. In the 2015 parliamentary election, 12 parties nominated, in total, 2,146 candidates. In the Finnish open-list system, the constituents vote for individual candidates who represent parties or electoral alliances and are not set in a fixed order by the party beforehand. The candidates thus are competing not only against contestants from rivaling parties but also against those on the same list as they are. This setting of competition between the individuals even within a party imposes pressure with respect to personal attributes and campaigning solutions (Gibson, 2004; Karvonen, 2006).

The party structure in Finland is rather stable. In the 2015 elections, 73.7% of the candidates were representing a party that already had parliamentary representation (OSF, 2015a). For decades before the national elections in 2011, three major parties–the Centre Party, the Social Democratic Party, and the National Coalition Party–dominated the parliamentary elections in Finland. In the 2015 elections, the biggest winner was the Centre Party, becoming the largest parliamentary group, with almost a quarter of all the seats.

A further factor is the important role of online services in the Finnish mediascape: citizens here spend more time per day using social media than they devote to traditional media (OSF, 2015b). According to surveys in Finland, 51% of the population follows social-networking services, but only 6% express their political or social opinions online (OSF, 2015b). In a recent study, 15% of the Finns surveyed reported that they had followed the 2015 parliamentary election through social media (Strandberg, 2016). This trend has increased the attractiveness of social media as a campaigning platform for candidates.

Ethnography and fieldwork in online environments

Ethnography is a method aimed at generating understanding and making sense of human life, human communities and their social meanings, everyday practices, and rituals (Brewer, 2000; Geertz, 1973; Madden, 2010). Therefore, ethnographic studies are usually

conducted in the natural environments of human action. The aim with ethnography is to create a detailed description of the phenomena under study and, further, to create a higher-level explanation based on that description. The most commonly used method in ethnography is participatory observation, a setting in which the researcher observes the community that is under study. This part of the research is called *fieldwork*, a phase wherein the researcher intensively follows, observes, and possibly participates in the life of the community studied. Hence, the role of the researcher in an ethnographic setting ranges from that of outside observer to full participant (Madden, 2010). Regardless of the level of participation, the researcher commonly writes detailed *field notes*, which provide a so-called thick description (Geertz, 1973) of the events and practices observed. Field notes focus on documenting highly detailed and specific descriptions of the behavior and the environment, often with analysis or interpretation kept to a minimum.

As human activity has increasingly moved to online arenas or expanded into them, different approaches to conducting ethnographic research have emerged, especially ones suitable for studying social action taking place in online communities. There are several distinct sub-approaches to online ethnography. These range from studying Web sites with "webnography" (Puri, 2007) and performing network ethnography with fieldwork-aided network analysis (Howard, 2002) to studying online communities and online phenomena by means of "netnography" (Kozinets, 1998, 2002) and tracing the interconnectedness of culture and the technology by using what is known as virtual ethnography (Hine, 2000). Key differences within the individual approaches are related mostly to the extent of participation pursued by the observer and the question of what, in general, is deemed to be participation online – a question that has been prominent in discussions of online ethnography (cf. Markham, 2016) Markham (2013), however, suggests that, instead of asking how ethnography can be moved to online contexts, researchers should rethink the notion of fieldwork altogether, whether ethnographic or not. She suggests that the field should be conceived of as not a place or object but as movement, a flow or process the researcher follows.

Among the approaches that rely more on observation than participation are media ethnography and trace ethnography. Building on the premises of media studies, media

ethnography (Peterson, 2005; Sumiala, 2012) is an approach in which the researcher observes and participates as a media-user, listening, watching, and engaging in the various mediated practices of culture emerging in mediated contexts. Media ethnography underlines that in digital surroundings a visitor rarely is merely an observer. Visitors always leave some kind of trace of their actions (for instance, in the form of mouse clicks). The traces of users are of interest also in trace ethnography (Geiger & Ribes, 2011), a recently developed form of online ethnography that retrospectively explores the traces of the participants' practices within a system. Trace data provide thick information: not only who did what but information about how the trace was created. These markers and other data are included in the ethnographic exploration of events unfolding through log data.

Conducting online fieldwork. In our study, we conducted fieldwork with online observation carried out for one full month before election day. In this approach, we were inspired by the aforementioned approaches of *media ethnography* (Peterson, 2005) and trace ethnography (Geiger & Ribes, 2011). Observation was conducted by three researchers in total: one of the authors and two research assistants. One researcher focused on the right-wing parties and candidates and another on the left-wing ones. The third researcher concentrated on the overall discussions and hashtags emerging on social-media platforms. The two researchers who focused on observing the political parties created separate researcher profiles on both Facebook and Twitter. This allowed them to generate a feed that included all candidates from the selected parties, along with the parties' general profiles. In addition, TweetDeck, a tool that allows running parallel searches on the user's Twitter stream, was used to follow the candidates and conversations on Twitter. A check for updates to the the feeds followed was performed at least once a day.

The form of participation conducted was rather non-active in nature. Accordingly, we acknowledge that our fieldwork setting does not fully represent a traditional in-depth ethnographic research setting. However, following the relatively new approaches of applying ethnography-inspired methods in online settings (e.g., Markham, 2016), we combined the perspectives of netnography (Kozinets, 1998) and media ethnography (Peterson, 2005). We believe that ethnography-oriented participatory approaches are well suited to studying the

current media system, which is characterized by Chadwick (2013); Chadwick, Dennis, and Smith (2016) as a hybrid media system, a system in which older and newer media and their logics interact and coevolve, forming information flows that are difficult to follow with other methods (cf. Markham, 2013).

Since the fieldwork was motivated by a rather broad research question for the overall project, focusing on the online publicity surrounding the elections, the ethnographers were paying close attention also to any themes or online events related to the elections, campaigning, politics, the public sphere, and various communication practices. We focused especially on the communication practices the candidates were pursuing and their interaction with other actors. Detailed field notes were taken during the fieldwork period. The notes included a description of the events and discussions observed, description of the relevant actors, and notions conceived of by the individual researcher, and relevant links and screenshots were collected. In addition, the time was recorded for each event time. The special setting offered by the online environment allowed us to store and collect the data points in multiple ways, from saving links to copying the text and taking screenshots (cf. Markham, 2013). In addition, the fieldwork supported our big data collection, for observations informed updating of the list of search terms used. For example, emerging hashtags, actors, and campaigns were added to our data-collection tool, to expand the data set.

Data science and computational data analysis

Computer scientists have recently focused on *data science*–that is, research that finds patterns in, and provides insights into, unstructured data. The overall aim is to use computing power to examine questions that traditional research might not consider otherwise (e.g., Baumer, 2015; Dhar, 2012). “Data science”, “big-data studies” (e.g., Boyd & Crawford, 2012), and “computational data analysis” (e.g., Cioffi-Revilla, 2010) are considered parallel terms. We use “data science,” to reflect both the improvement of methods (computational data analysis) and the quantity of data (big data). However, neither of these terms on its own captures the current approaches used to study digital trace data. According to Cioffi-Revilla (2010), computational methods include tools such as simulation and geographical information

systems (GIS) that are not at the core of data science. The idea of big data applies similarly in situations wherein the data velocity is high – that is, updates are frequent (Laney, 2001). However, most studies of digital trace data focus on a static view of already-collected large data sets, not on big data in its own right.

There are two driving forces that promote increased popularity of data science. First, access to digital data for research purposes has increased significantly, thanks to online services and overall digitalization of society (Lazer et al., 2009).Second, the methods available for examining such data and making these methods attractive to social scientists increase the opportunities to conduct "data science" (e.g., Cioffi-Revilla, 2010). Such methods include ways of using text as data and analyzing factors that previously could not be quantified (e.g., the tone of messages). One very prominent form of data science, called *data-mining*, is concerned with extracting information from (unstructured) data. Taking advantage of recent developments in computer science and statistics, data-mining is a method that holds promise for handling large data sets that are beyond the capabilities of traditional social-science researchers' methods.

Among examples of data-mining for social-science-related topics is automated grouping of data into smaller groups (Levy & Franklin, 2013). The difference between traditional statistics and computational approaches of various sorts is fluid, because traditional statistical methods are often applied in combination with data-mining. For example, regression models are cited as one form of data-mining (see e.g., Hastie, Tibshirani, & Friedman, 2009). In addition to various statistical tests, there are three central means of conducting data-mining by using machine learning approaches: supervised learning to apply pre-existing classification, unsupervised learning to find new classifications, and reinforced learning that applies both approaches.

Conducting the data collection. As is explained later in the analysis, for the purposes of this study we focused on the candidates' Facebook activities. The candidates' updates updates on Facebook were collected via the automated programming interfaces (FQL APIs) of the services, directly from the public candidate profiles or candidate pages. The data set for our study contains about 137,000 contributions (i.e., updates or comments on those updates), from

1,111 candidates' pages, collected between March 19 and April 19, 2015.Each of these data items contains the message text, a timestamp, and user information.

Analysis and findings

We started framing our research problem further by analyzing the qualitative material collected during the fieldwork. The research material included the actual field-note reports (in total, 122 pages, with screenshots) and a database of the hashtags observed and their use patterns, along with material on parody accounts. All field notes were classified in accordance with a data-driven, inductive approach by means of qualitative analysis software. Two researchers, one who participated in the fieldwork and another, who did not, each conducted primary coding for the data autonomously, after which the codes and findings were discussed in joint consideration before a second round, for refining the codes.

We began our analysis with a detailed reading of all the data in an effort to identify segments of text relevant for addressing the research problem. After the coding phase, we ended up with the six most prominent codes being critique, campaigning styles, interaction, humor, wrangling, and hashtags. After discussion by the whole research team, which included development of our thoughts on the notions most suitable for computational analysis, we put special emphasis on re-tracking all notions connected with interactivity and interaction between actors as observed in the field notes. Finally, these notions and observations were discussed among all the researchers, for formulation of a common perspective on the findings.

During the fieldwork period, we encountered only a few in-depth conversations between candidates and citizens. Instead, the conversations tended to be superficial and very short. It seems that, in the main, candidates posted something on their social media stream but never returned to comment on the conversation afterwards. It appears also that members of only a small, core group of commentators tended to comment repeatedly on the conversations. Therefore, it seems that the elections at issue in our case demonstrated the same tendency found inxs previous research: the candidates used social media primarily as a one-way communication channel rather than an arena of interaction with the citizenry (e.g., Graham et

al., 2013), and only the most politically enthusiastic of citizens actually engaged in conversations with the candidates (cf. Ausserhofer & Maireder, 2013).

However, there were new and interesting findings too. One of the most intriguing observations we made was that candidates actively used social media to mention[1] each other in the posts. Furthermore, when they mentioned candidates from other parties in this manner, the language tended to be negative in tone. It was consistently observed that candidates repeatedly pointed out any apparent mistakes, misbehavior, or false statements by their rivals. We observed, for example, a case wherein Green Party candidates were spreading an image of a National Coalition Party candidate (a minister) in connection with fur farming and used the image as a device for public shaming of the minister's entire party (see Figure 1).

FIGURE 1 HERE

"The minister of agriculture and forestry is posing here holding dead foxes' fur in his hands. Beside him is the executive manager of the Fur Farming Industry Association, Marja Tiura, who used to be an MP for the National Coalition Party". (Translation of a Green Party candidate update accompanying an image posted on Facebook on March 31, 2015)

Such messages display an aggressive and accusatory style, with the overall aim of casting the relevant competitor(s) in a bad light and challenging one's rivals in order to raise the stakes. They can be likened to the shaming phenomena that are commonly observed especially in online turmoil associated with sexism and racism (e.g., Cheung, 2014; Highfield, 2016; Massanari, 2015). Furthermore, in an observation running counter to the theories about the personalization of politics, often criticism was targeted not only at individual politicians or candidates but at the entire opposing party as an actor. We assume that it is easier and perhaps also more effective for users to shame faceless actors such as parties. Also, the political setting and the positions in the competition are clearly visible from the interaction patterns. In particular, we recorded rather harsh language use in connection with critical arguments directed against actions and statements of the National Coalition Party (NCP). The most likely

[1] The word "mention" here extends also to practices of merely referencing other candidates' names without using a technological function such as Twitter @mentions or Facebook tagging

explanation for that party being a central target of criticism is that the NCP was the party of the prime minister at the time.

However, we also repeatedly observed cases wherein the candidates ended up engaging in dialogue as the persons mentioned stood up to defend themselves. For example, in early April, Carl Haglund, chairman of the Swedish People's Party, published a newspaper advertisement stating that having the world's highest tax rate is not a competitive advantage. Several candidates accused Haglund of false advertising, since Finland's tax rate is not, in fact, the highest in the world. Haglund responded by defending himself in multiple messages saying that the slogan refers to a possible future scenario, not to the current situation. An example of a conversation between the candidates–or, rather, two party leaders–in this connection is illuminating:

> "The world's highest tax rate is not a competitive advantage. To which country are you referring here, @Calle_Haglund? I would rather concentrate on questions concerning Finland". (Translation of a tweet from Paavo Arhinmäki, chairman of the Left Alliance, on April 7, 2015)
>
> "@paavoarhinmaki By saying this, I am trying to tell where Finland would end up if, for example, the Left Alliance got to realize their election promises" (Translation of a tweet from the chairman of the Swedish People's Party, on April 7, 2015)

The remarks above are from Twitter, but the critical messages were circulated on multiple platforms. Hence, the case shows an example of the political news cycle in a hybrid media system as described by Chadwick (2013), a storyline in which messages travel from one medium to another and many actors, of various stripes, are involved in the cycle. We noticed that, in fact, very often the negative interactions were related to something happening outside the social-media platform used; the origins lay in, for example, blogs, newspaper articles, televised debates, advertising, or offline events, and the occurrence at issue was later brought up in social media, where the conversation continued.

We chose to name this phenomenon, as a specific form of negative interaction among the candidates, "battling." The core allusion is to "rap battles," fights with words between two rival rap singers. We connect these observations of "battling" to the theories about mediated

public life (Thompson, 2005) presented in the introduction, especially with regard to attempts to acquire political capital by shaming one's rivals. In light of our data, the notions of both shaming and battling characterize a prominent form of negative campaigning that takes place in online environments. Whether or not these are or could be used as parts of planned campaign assemblages (Nielsen, 2011) remains to be seen as practices of social-media use develop.

Proceeding from the ideas that emerged in the qualitative analysis, we decided to use our social-media data to study the ways in which battling as a form of negative campaigning is played out online. Building on the observations made during the fieldwork, we proposed the following hypothesis for further analysis:

Hypothesis 1. Negative discussion is more recurrent in candidate–candidate interaction between members of different parties than between members of the same party.

A data-science perspective on candidate–candidate interaction

The fieldwork allowed us to review the variety of candidate–candidate interactions, and the results led to the hypothesis above, which we examined further by using the data of all posts and replies made during the one-month period examined. We used the data described above, comprising, in all, 137,000 online items: Facebook posts from candidates and comments on those posts. We chose to concentrate on Facebook for two reasons. The first of these is a practical and technical one – the Facebook platform affords its users' engagement in conversations better than other platforms do, via its reply function. Hence, Facebook data allow us to identify unique conversation threads more easily than the sporadic, unorganized messaging of Twitter does. The second factor is more important: in the election lead-up studied, Facebook was more widely employed by both the candidates and citizens of Finland (Strandberg, 2016).

As in traditional quantitative research, we next operationalized our hypothesis, which included both preprocessing the data and conducting formal analysis. First, we filtered our data for those Facebook threads wherein a) the original post is from a candidate and b) there is at least one comment on that post from another candidate. We operationalized negative campaigning by deeming it to occur if there are negatively valenced messages within these

threads. Evaluation of this claim requires us to consider the positivity or negativity of each message, which can be done through a data-mining method known as sentiment analysis. We used SentiStrength, which is specially optimized for social-media content, to estimate the sentiment of each message (Thelwall, Buckley, Paltoglou, Cai, & Kappas, 2010). The SentiStrength system is built on the basis of algorithmic rules of sentiment analysis and further optimized by means of machine learning techniques. SentiStrength estimates both negative and positive emotional content on a scale of 0 to 4, and the estimates produced are stored for each message. We then compared the negative sentiments in responses directed to candidates from one's own party with those in responses to candidates from other parties, by using Wilcoxon–Mann–Whitney testing. This test was chosen to avoid unwarranted assumptions of normality.

We observed, in total, 359 candidate–candidate interactions, which is not a high number relative to the total count of comments made on Facebook. Regarding the overall patterns, we observed no clear trends over time (see Figure 2). However, a sporadic rhythm can be observed; i.e., there are dates on which candidate interaction occurred more and days when candidates were less active in this respect. There are two days of markedly greater candidate–candidate activity, one at the start of the observation period and one near the end. When the field notes are consulted, it becomes clear that these spikes are connected with certain gaffes. As for the number of candidates involved in the candidate–candidate interaction, we observed a total of 198 initiators and 176 targets of candidate–candidate interaction. The distribution of both initiators and targets follows a power law; i.e., only a few candidates were extremely active, and there was a long tail of candidates who engaged in candidate–candidate interaction only once.

FIGURE 2 HERE

FIGURE 3A AND 3B HERE

Overall, the candidate–candidate interactions were mostly neutral (see Figure 3a and 3b). There is clearly more variance on the positive side of the scale, and candidates' interaction with other candidates was more positive than negative in tone. Regarding negative sentiment, we observed that few comments had a negative tone, 5.6% of the full sample.

Table 1 presents a summary of the numbers of comments made on other candidates' pages, showing the target (the candidate whose page or profile was commented upon) and initiator (the candidate who commented), sorted by party. We can see that most (70%) of the candidate–candidate interactions are comments made on posts by candidates who are members of the same party; i.e., they are within-party comments (down the diagonal in the table). Furthermore, two parties stand out as sources of the most active commenting: the right-wing NCP and the Greens. These were also the parties that had the largest number of candidates with a social-media presence (Marttila, Laaksonen, Kekkonen, Tuokko, & Nelimarkka, 2016). Overall, the within-party comment frequencies measured reflect the general level of activity of the parties in social media during the campaigning (Marttila et al., 2016).

Despite the small number of cases, we found support for Hypothesis 1. We conducted analysis of negative messaging within a party and between parties, and observed that candidate–candidate interaction showed more negative sentiments (Wilcoxon–Mann–Whitney 10064, $p = 0.002105$). This was explained mostly by the higher ratio of negative comments in the between-parties condition (12.6% as opposed to 3.5%). We also looked for potential differences in the positive sentiments but detected none (Wilcoxon–Mann–Whitney 10666, $p = 0.6007$). This additional check was conducted to confirm that the methods used did not obviously lead to spurious findings.

From a methodological perspective, we conclude that the observations we were able to make through data science corresponded to the observations the ethnographers made when exploring the interaction as it took place on the Web. Therefore, we consider our work to have correctly measured the phenomenon under study, thereby successfully addressing an issue common to many studies that use computational tools.

However, considering that the type of candidate–candidate interaction examined was not prominent, we went further, conducting *post hoc* analysis of the data. We examined the number of "likes" of candidate–candidate comments to examine whether these comments garnered additional importance expressed on the Facebook platform, which curates Facebook-stream-based comments and comment likes as well. We observed that comments with a negative tone (negativity 1 or higher) had more likes than those with neutral

sentiment (for negative tones, mean 3.35, median 3; for neutral, mean 2.31, median 1). This difference was statistically significant ($W = 2193.5$, $p = 0.0216$). Therefore, we can conclude that the negative comments gained more attention on Facebook.

Discussion

During our fieldwork period, we observed not only that the online arena was used by candidates to send campaign messages or for discussion with voters but also that the candidates discussed things among themselves. While Ausserhofer and Maireder (2013) have observed such interaction, we know rather little of this phenomenon as compared with citizen–candidate interaction in social media explored in traditional research. When examining interaction within a party, we observed this to be the most prominent form of candidate–candidate interaction. From the data analysis, we found that this interaction manifested fewer characteristics of negative campaigning; that is, it was less negative in tone. Thus, intra-party competition seems not to have led to negative campaigning. However, we did not observe the relevant comments to be higher in positive tone either. This would seem to indicate that these interactions were not purely a form of cheering either but rather neutral in tone, a conclusion borne out by the field notes. We can assume that, despite the competitive setting, candidates do not let their possible within-party disagreement show in their public appearances online.

During our fieldwork, we observed that the interaction between parties was predominantly negative. These findings motivated us to view the interaction as an extreme form of negative campaigning. However, unlike traditional negative campaigns, in these the rival candidate presented their views in the social-media stream of the candidate attacked – i.e., mentioned that candidate on Twitter or commented on a Facebook post he or she had made. The public nature of these services also allows the targets to comment in response. Therefore, building on the theories about personalization and scandalization of mediated public life (Thompson, 2005; Vergeer & Hermans, 2013), we chose to use the term “battling” for this phenomenon, a predominantly social-media-based form of negative campaigning. It seems that social media constitute a technological arena, in which the rituals developed (cf. Highfield, 2016) encourage users to seize on any fumbles their rivals make. Simultaneously, such battles are fairer than those in traditional media environments in the sense that the immediateness and

interactivity of the platforms also supports the possibility of those who are accused answering to the accusations and presenting their own views. Hence, battles can also emerge as an opportunity for the participants.Furthermore, being mentioned by other candidates might also drive politicians to engage more via social media: it can be assumed that ignoring a question from a voter is easier than ignoring an accusatory message from a competitor.

With the foregoing analysis, we have provided two answers to the research question "how do candidates interact with other candidates?" First, we are able to distinguish between two forms of interaction, within one's party and between parties. The former is much more common, with a total of 280 instances found in our data set (70%). While that finding may be considered important only in a multi-party system, a similar type of interaction may occur in two-party systems between candidates from the same party for different districts. However, we did not observe any particular patterns in the style of this interaction. That said, one thing is abundantly clear: the interaction within the parties was clearly negative, a finding that emerged both in the field observations and in our computational data analysis.

Finally, we emphasize that we chose the strictest possible definition of interaction in the analysis phase: the other candidate must have been explicitly sought out and referenced by means of the tagging function on Facebook. The ethnographic observations reveal other forms of targeting of rival candidates too. For example, as we noted above, criticism may be directed towards parties instead of a particular candidate. Also, while other candidates may be referenced explicitly by name, such references do not necessarily reach the awareness of the candidate referenced. In their one-sided effect, they may then resemble what may be considered more traditional negative campaigning.

Towards a mixed-methods setting of big-data-augmented ethnography

On the basis of the mixed-methods perspective adopted and our experiences from the empirical study described in this paper, we propose a new approach to studying social interaction online, which we call *big-data-augmented ethnography*. As explained above, our methodological setting integrated ethnography with computational data collection. The main argument for mixed-methods studies is that in a combination approach, the weaknesses of one research method are offset by the strengths of the other(s) (e.g., Johnson, Onwuegbuzie,

& Turner, 2007), or, according to some writers, a setting may even be created that allows for more intensive investigation of the phenomenon (Teddlie & Tashakkori, 2010). Big-data-augmented ethnography supplements ethnographic fieldwork with analysis of computationally collected large data sets. Using a large data set, the research team can generalize the ethnographic observations by means of computational data analysis.

By the same token, results from the computations can be conceptualized and interpreted in light of the knowledge gained through ethnography.

Our choice for this empirical study was to employ a parallel data-collection strategy but to use a consecutive procedure in the analysis phase. That is, the field notes were analyzed first by means of a grounded approach. This yielded some clear benefits. First, without the field observation period and the open-ended analysis of the field notes, we would not have arrived at the idea of studying candidate–candidate interaction specifically. The ethnographic observations not only guided us to ask certain questions by looking at our data but also brought validity to the data analysis, since the two approaches led to similar findings. After calculating the occurrences of interaction of the type we wished to consider, it became clear that it is not very common in the data. From the perspective of big-data studies alone, such observations could have been readily disregarded as noise. However, the observers, both limited and guided by their backgrounds, the platforms, and the algorithms used, all independently paid attention to the candidate–candidate discussions. By quantifying the phenomena and using computational methods and statistical tests, we were able to confirm that the key observation made in the fieldwork was accurate and statistically significant, even if the magnitude of the phenomenon was smaller than we expected.

The integrated research process applied in data-augmented ethnography, illustrated in Figure 4, consists of three stages.

FIGURE 4 HERE

1. During data collection, online observation is used to ensure that relevant emergent phenomena are considered in the data-collection strategy.

2. In the analysis phase, field notes are used to guide the computational analysis and computational analysis is used to test hypotheses constructed in line with the

ethnographic observations.

3. During validation, the field notes and observations are used to provide human interpretation to computational findings, while computational analysis is used to generalize the findings from ethnography also.

The process begins, as does any research process, with the formulation of the research problem. Next, the research context and problem are approached with a phase of online ethnographic fieldwork. Ethnography is complemented or followed by collection of data from the relevant platforms and users. The preliminary insights from the observation aid in demarcating and selecting the data of interest. Simultaneous data collection is advisable because content online can be modified or deleted. Only after this point can the research questions be formulated precisely, and the process proceeds to the analysis stage, in which both computational data analysis and detailed analysis of the ethnographic data are conducted in order for the researchers to build an overall impression of the phenomenon studied. The final phase we propose for the process entails finalizing the methodological setting with a confirmatory or interpretative qualitative analysis of a smaller set of the data sampled with the assistance of the computational analysis – for example, a qualitative content classification. Next, we will discuss our case study, reflecting on the methodological solutions. Our argument is organized around three propositions.

Ethnographic enhancement of contextual framing. As we highlighted in the introduction, computational data analysis involves a common challenge of accounting for the context in the interpretation (Boyd & Crawford, 2012). A hurdle arises from the relationship between computational results and the "reality," the context of the research. As Markham (2013) writes, in social media even observation easily becomes archival of data, even though the focus should be on the participation and engagement with the field and the culture. Boyd and Crawford (2012) discuss how data alone, without in-depth context, do not provide any value. Instead, the data must be explored with consideration for how the data set was compiled and what it presents (cf. Grimmer, 2015). All of the authors cited above highlight that just collecting data and running an algorithm over said data does not produce good social science. Instead, researchers must, just as before, acknowledge the context and understand the

directions of causal links.

Ethnography is a method that effectively brings the context into the study. We argue that observation conducted simultaneously with the data collection yields better understanding of the research context during both data collection and analysis. Furthermore, ethnographic observations can be used in formulating more relevant research questions for the computational analysis.In our study, the ethnographic observations gave us important insights about the verbal practices of competition taking place between candidates and the role of social media in a larger media system. Ethnographic notes and observations can thus be used as an aid in asking better research questions, forming more detailed hypotheses, and selecting good potential methods to operationalize and quantify the phenomena.

Proposition 1: Ethnographic observations allow for contextualization of the data and help one recognize emergent phenomena from a large data set.

This being said, we acknowledge that even with the aid of ethnography, the knowledge of the context remains limited. Limitations are imposed by three factors: first, the properties of the technical platform; second, the displacement between the researcher and some parts of the field; and, third, the person doing the observation.

Firstly and most importantly, the context of online ethnography is to some extent limited to the online context only. As scholars (Isomäki, Lappi, & Silvennoinen, 2013; Wittel, 2000) have emphasized, online ethnography is characterized by lack of a shared physical context in which the observer and the observed would be co-located. It is difficult, if not impossible, to trace the conversations back to other contexts present: the current situation in the debate and competition, the political system, the offline surroundings of the candidates, and so forth. A participatory observer online remains, to some extent, an outsider and therefore is limited to an outsider perspective. With regard to political campaigning, Nielsen (2011) has emphasized the limitations of media-centric approaches such as Web site analysis and issues a reminder that participatory observation provides researchers with data of what people actually do, not what they say they do. This benefit can be gained to some extent with online observation, as researchers follow events as they unfold. Some parts of the lived experience of the research subjects and their human lives, however, remain hidden, beyond the interface of the media

(e.g., Hine, 2000; Isomäki et al., 2013; Markham, 2013; Nielsen, 2011).

Still, since the entire idea of social interaction and human activity can be claimed to be mediated when humans interact online, it could be argued that the online ethnographer can be as much an insider as any user of the given platform (cf., Markham, 2013). Recently developed approaches to field observation and ethnography, such as media ethnography (Peterson, 2005; Sumiala, 2012) and netnography (Kozinets, 1998), allow for more subtle forms of participation such as participating and observing as a media-user. In our case, as the researchers created researcher profiles and started following and liking various politicians, they not only increased the counts of followers and likes but also revealed their existence to the candidates. Acknowledging and analyzing the limits this imposes on the information that can be obtained through observation is still important. For instance, we could observe negative interaction between rival candidates but cannot draw conclusions about the motives and feelings behind their actions unless interrogating the users via an alternative method such as interviews.

Secondly, the content – and thereby context – that researchers see on social-media sites is not neutral but developed through algorithms (Anderson, 2011; Gillespie, 2014). Accordingly, users never see *everything* that is posted on the pages or profiles they follow; instead, they see a curated selection of content. Also, if the battle cases elicit numerous comments and great interest, algorithms might promote them in the feeds. This would explain, in part, why certain occurrences were so prominent in our field notes. To address such issues, we suggest following the suggestion of van Dijck (2014, 202), who sees data as a cultural object ("Big Data configured as a rhetorical text which has been generated for specific purposes and which can be probed by various groups of people") rather than as reflections of reality that can be reliably mined and extrapolated from to reveal the truth. Technology itself takes part in the creation of such a cultural object. Ethnography helps to illuminate these purposes and cultural factors behind the data.

We suggest that, with respect to ecological validity, circumstances with limited context are still adequate as a starting point for analysis. What ethnographers observe can be considered similar to individual citizens' perspective – first, since the ethnographers

themselves are citizens and, second, because citizens face similar limitations related to accessing and comprehending the full range of events online. This view is in line with the premises of media ethnography (Peterson, 2005; Sumiala, 2012). In our case study, we created pseudonymous research profiles and use a separate research browser (cf. Rogers, 2013) to minimize the effect of the ethnographers' past browsing history on the Facebook feeds used.

Computational data analysis as an aid to generalization. A known limitation of ethnographic accounts is related to generalization of the results (e.g., O'Reilly, 2009). From the perspective of quantitative research, the results of ethnography are regarded as something anecdotal and idiographic, especially when based on a single study. As Devine (2002, 207) reminds the reader, researchers must be "tentative about making inferences from a small number to the population at large." Lazer et al. (2009) suggest that computational data collection can be used to produce a data set that allows for such inferences.

In our case example, ethnographic observations aided in developing a hypothesis for the computational analysis. The amount of communication used to confirm this hypothesis– over 100,000 contributions – clearly is in excess of what one could analyze by using ethnographic or other qualitative means. With the data we gathered, we were able to conduct computational analysis and statistical tests to confirm and generalize the initial findings made in the ethnography phase, and generalize our observations to the population studied.

Proposition 2: Computational analysis of a large data set can be used for generalizing the findings made in field observations.

However, we need to stress that even when sophisticated techniques are used for analyzing digital data, several factors can limit the generalization possible. First, social-media channels are known for unrepresentativeness among the population (e.g. Yasseri & Bright, 2014). Second, one can question whether it is ever possible to capture the entire phenomenon, no matter what methods are used (see also van Dijck, 2014). For example, social-media privacy settings often hinder access to data, or the data may be modified retrospectively, after collection. As Gulbrandsen and Just (2011, p. 1102) write, when studying the online, a researcher must "admit that what one is conducting is an analysis of a construct, a snapshot of a collaborative process, depicting how, at a specific and subjectively

chosen point in time, two-way mass communication is unfolding online." In a conclusion consistent with our ideas, the writers also state that the only way to overcome this limitation is to collect both qualitative and quantitative data in the snapshot. We, however, highlight that, beyond merely mixing quantitative and qualitative approaches, field observation specifically allows for following the phenomena as they unfold in real time. This offers the researchers fuller possibilities of immersion in the meanings the participants (the observed actors) give to the events as they happen. Our view is in line with that of Markham (2013, 440): "After all, understanding culture has never been a matter of collecting everything and then analyzing it later."

Interpretation and operationalization: Choices made during research.

A combination of ethnographic observations and computational analysis allows researchers to cross-validate the findings and thereby evidence greater overall reliability of the study. However, in practice, validity and reliability emerge from the choices made by the researchers during the research process: the operationalizations of the phenomena and the interpretation of data and findings. Such selections, operationalization, and interpretation are needed in all methodological approaches, even though in data science they are seldom explicitly mentioned.

In qualitative research, the researcher is responsible for giving meaning to the data. In ethnography, for instance, operationalization and conceptualization are intertwined in a continuous process (see Madden, 2010). There are benefits in this, such as understanding complicated constructs (e.g., irony), but at the same time the work is hampered by a seeming lack of objectivity. A researcher always conducts analysis from a certain standpoint, from the perspective of a personal background and a context whose influence he or she cannot exclude during the qualitative analysis. This is an epistemological issue known as the double hermeneutic (e.g., Jensen, 2011; Marsh & Furlong, 2002): the world is interpreted firstly by the actors internally, then by the researcher who studies them. Hence, the findings made during this stage always reflect the researchers' interpretation of the activities. For instance, while discussing our qualitative-analysis findings, we noted that some researchers interpreted a seemingly extreme remark as made in earnest while others took it to be ironic on the basis of

contextual clues.

Though often less explicit about them, researchers make similar choices when using computational methods. In practice, the researchers choose how they will measure elements, such as hostility, from the data. Such measurements are limited by the methods used to quantify the phenomenon, and they always entail assumptions about the meaning of the metrics or the nature of the data. For example, the measurements used to evaluate interaction may not fully capture what a human observer might consider interaction. Sentiment analysis is particularly prone to errors; neither is it well accommodated to differences in languages and cultures (e.g., Liu, 2010). This also constitutes a limitation of our empirical study. For this reason, researchers have argued that computational analysis should be triangulated with human analysis (Grimmer & Stewart, 2013; Huhtamäki, Russell, Rubens, & Still, 2015). Our approach, however, is a step out to a level higher than that of the more technical questions commonly posed in relation to social-media data studies (e.g., Lorentzen & Nolin, 2015; McKelvey, DiGrazia, & Rojas, 2014), towards a more profound challenge related to interpretation and understanding of the phenomena studied. We posit that field observation can be used in parallel with other methods, first, for formulating the research questions and establishing the framing, then for validating the computational analysis of large data sets.

Proposition 3: A combination of field observation and computational analysis allows for the cross-validation of the findings and operationalizations, to increase the overall reliability of the study.

Challenges and limitations

Some practical challenges remain with big-data-augmented ethnography: it is rather resource-intensive and requires collaboration by scholars with very different backgrounds. In addition, ethics issues arise in the handling of personal data.

First, we address the resources and skills needed from the research team. In the study presented, three researchers conducted ethnography for a few hours every day for a month. This necessitates hiring and training the members of the research teams before data collection can begin. Such operations are difficult to start *ad hoc* in the face of a sudden media event. This constrains the opportunities to apply big-data ethnography to research themes that can be

foreseen. Computational data collection, in contrast, can be commenced rather quickly (e.g., with a commercial data provider).

Furthermore, we acknowledge that, for a data-augmented ethnography setting, the research team usually requires expertise in several methods. Challenges may emerge because a team does not possess a shared understanding of the possibilities and limitations of the methods. At a deeper level, the proposed setup easily builds on different epistemological premises, as all mixed-methods research does. Quantitative approaches are often – but not always – used from a positivist perspective and qualitative approaches often from an interpretative perspective (e.g., Read & Marsh, 2002). In our setting, we followed the conception of Reichardt and Cook (1979, p. 16, cited in Read & Marsh 2002, p. 234) that "paradigms are not the sole determinant of the choice of methods." In our approach, we started with the premise that the phenomenon studied (here, the online publicity related to the election) is constructed in the social interaction between the participating actors. Digital traces remain from this action, and some parts of these traces can be processed into a measurable form. Selections, operationalizations, and interpretation are needed in both the qualitative and the quantitative process. For success in this, genuine dialogue between researchers who differ in their background and expertise is required – as is a willingness to step beyond one's methodological comfort zone and paradigm preferences.

Second, ethics concerns have been raised in connection with online data collection. Discussion has addressed matters such as informed consent and the ethics of a data-driven approach and of social-media research in general (e.g., Boyd & Crawford, 2012; Markham, 2016; Markham & Buchanan, 2012). The greatest concern is related to the fact that online data typically include some personal details of the users. The literature has also discussed questions linked to understanding of science and the limits of data-driven approaches, from ethics concerns to data-ownership issues (Boyd & Crawford, 2012; Ekbia et al., 2015; van Dijck, 2014). These are large questions that remain to be answered, but researchers can address them by, at minimum, acknowledging the attendant problems and being very careful to not induce harm to the research subjects.

Conclusion

Academics have recently been interested in research that applies computation in data collection or analysis, often termed data science or "big data." However, this approach is known to have contextualization issues, in terms of validity of the computed results and in relation to the operationalization process. To address these challenges, we have presented the *big-data-augmented ethnography* approach, wherein ethnographic fieldwork is conducted in tandem with the computational data collection. We illustrated this mixed-methods approach with a case study of candidate–candidate interaction in social media during election campaigning.

We framed a practice of negative campaigning online and characterized it with the term "battling." We observed that candidates not only publish negative posts about their rivals on social-media platforms but also engage in verbal battles with each other. The magnitude of the candidate–candidate interaction, however, was not as large as we had assumed from the field notes on their own. However, there was strong support for the notion that the candidates do interact with their competitors. The conversation that emerged was not very constructive or conversational; rather, it was imbued with an aggressive and accusatory style, with the overall aim of challenging one's rivals in order to raise the stakes. We elaborated on this finding by running sentiment analysis and statistical tests on candidates' Facebook communication, and we confirmed that the candidates used more negative language when addressing candidates from other parties. While this is a practice that might prove effective in terms of the election results and the visibility gained both in social media and in traditional media, the finding does not inspire optimism with respect to hopes for digital deliberative democracy (e.g., Dahlberg, 2011; Wright, 2012). Instead of generating genuine political conversations online, encounters of this nature seem to result ultimately in fierce verbal fights. More research is required, however, for ascertaining whether the situation is different when Parliament is in session or the presumption of a permanent campaign (Blumenthal, 1982) affects the discussions also between elections.

Our case study highlights how human observation can allow us to gain insights and tie computational analysis into the wider context of events. Furthermore, triangulation between the ethnographic field notes and computational data analysis enhances the overall validity of

both research perspectives through synthesis. When compared to traditional ethnography, data-augmented ethnography allows carrying out (at least limited) generalization with respect to the phenomena studied. We believe this is an enormous asset in studying something as emergent and fluid as social action and political discussions in social media, where campaigns develop into assemblages of loosely linked elements that traverse multiple arenas of the hybrid media system (Chadwick, 2013). Finally, we believe the suggested approach also responds to the calls for better methodological settings in political communication research in the current mediascape (Karpf et al., 2015).

References

Adams, A., & McCorkindale, T. (2013). Dialogue and transparency: A content analysis of how the 2012 presidential candidates used twitter. *Public Relations Review*, *39*(4), 357–359.

Anderson, C. W. (2011). Deliberative, Agonistic, and Algorithmic Audiences: Journalism's Vision of its Public in an Age of Audience Transparency. *International Journal of Communication*, *5*, 529–547.

Ausserhofer, J., & Maireder, A. (2013). National Politics on Twitter. *Information, Communication & Society*, *16*(3), 291–314.

Baumer, B. (2015). A Data Science Course for Undergraduates: Thinking with Data. *The American Statistician*, *69*(4), 334–342.

Blumenthal, S. (1982). *The Permanent Campaign*. New York: Touchstone Books.

Boyd, D., & Crawford, K. (2012). Critical Questions for Big Data: Provocations for a cultural, technological, and scholarly phenomenon. *Information, Communication & Society*, *15*(5), 662-679.

Brewer, J. D. (2000). *Ethnography*. Philadelphia: Open University Press.

Ceron, A., & D'Adda, G. (2016). E-campaigning on Twitter: The effectiveness of distributive promises and negative campaign in the 2013 Italian election. *New Media & Society 18*(9), 1935-1955.

Chadwick, A. (2013). *The Hybrid Media System. Politics and Power.* Oxford: Oxford University Press.

Chadwick, A., Dennis, J., & Smith, A. P. (2016). Politics in the Age of Hybrid Media: Power,

Systems, and Media Logics. In Christensen, C., Bruns, A., Enli, G., Skogerbo, E., & Larsson, A. (Eds.). *The Routledge Companion to Social Media and Politics* (pp. 7-22). New York: Routledge.

Cheung, A. (2014). Revisiting Privacy and Dignity: Online Shaming in the Global E-Village. *Laws*, *3*(2), 301–326.

Cioffi-Revilla, C. (2010). Computational social science. *Wiley Interdisciplinary Reviews: Computational Statistics*, *2*(3), 259–271.

Dahlberg, L. (2011). Re-constructing digital democracy: An outline of four 'positions'. *New Media & Society*, *13*(6), 855–872.

Dahlgren, P. (2005). The Internet, Public Spheres, and Political Communication: Dispersion and Deliberation. *Political Communication*, *22*(2), 147–162.

Devine, F. (2002). Qualitative Methods. In D. Marsh & G. Stoker (Eds.), *Theory and methods in political science* (pp. 197–215). New York: Palgrave Macmillan.

Dhar, V. (2012). Data Science and Prediction. *Communications of the ACM* , *56* (12), 64–73.

Ekbia, H., Mattioli, M., Kouper, I., Arave, G., Ghazinejad, A., Bowman, T., Sugimoto, C. R. (2015). Big data, bigger dilemmas: A critical review. *Journal of the Association for Information Science and Technology*, *66*(8), 1523–1545.

Enli, G. S., & Skogerbø, E. (2013). Personalized Campaigns in Party-Centred Politics. *Information, Communication & Society*, *16*(5), 757–774.

Gainous, J., & Wagner, K. M. (2014). *Tweeting to power: the social media revolution in American politics*. Oxford: Oxford University Press.

Geertz, C. (1973). Thick Descripion: Toward an Interpretive Theory of Culture. *The Interpretations of Culture*, *15*, 3–30.

Geiger, R. S., & Ribes, D. (2011, January). Trace Ethnography: Following Coordination through Documentary Practices. In *2011 44th Hawaii International Conference on System Sciences* (pp. 1–10). IEEE.

Gerodimos, R., & Justinussen, J. (2014). Obama's 2012 Facebook Campaign : Political Communication in the Age of the Like Button Obama ' s 2012 Facebook Campaign : Political Communication in the Age of the Like Button. *Journal of Information*

Technology & Politics (February 2015), 37–41.

Gibson, R. (2004). Web campaigning from a global perspective. *Asia-Pacific Review*, *11* (1), 95–126.

Gillespie, T. (2014). The relevance of algorithms. In T. Gillespie, P. J. Boczkowski, & K. Foot (Eds.), *Media technologies: Essays on communication, materiality, and society* (pp. 167–194). Cambridge: MIT Press.

Graham, T., Broersma, M., Hazelhoff, K., & van 't Haar, G. (2013). Between Broadcasting Political Messages and Interacting With Voters. The use of Twitter during the 2010 UK general election campaign. *Information, Communication & Society*, *16*(5), 692–716.

Grimmer, J. (2015). We Are All Social Scientists Now: How Big Data, Machine Learning, and Causal Inference Work Together. *PS: Political Science & Politics*, *48* (1), 80–83.

Grimmer, J., & Stewart, B. M. (2013). Text as Data: The Promise and Pitfalls of Automatic Content Analysis Methods for Political Texts. *Political Analysis*, *21*(3), 267–297.

Gulbrandsen, I. T., & Just, S. N. (2011). The collaborative paradigm: towards an invitational and participatory concept of online communication. *Media, Culture & Society*, *33*(7), 1095–1108.

Hastie, T., Tibshirani, R., & Friedman, J. (2009). *The Elements of Statistical Learning*. New York, NY: Springer New York.

Hawthorne, J., Houston, J. B., & McKinney, M. S. (2013). Live-Tweeting a Presidential Primary Debate: Exploring New Political Conversations. *Social Science Computer Review*, *31*(5), 552–562.

Hermans, L., & Vergeer, M. (2012). Personalization in e-campaigning: A cross-national comparison of personalization strategies used on candidate websites of 17 countries in EP elections 2009. *New Media & Society*, *15*(1), 72–92.

Highfield, T. (2016). *Social Media and Everyday Politics*. Malden: Polity Press. Hine, C. (2000). *Virtual ethnography*. London: Sage.

Holtz-Bacha, C., Langer, A. I., & Merkle, S. (2014). The personalization of politics in comparative perspective: Campaign coverage in Germany and the United Kingdom. *European Journal of Communication*, *29*(2), 153–170.

Howard, P. N. (2002). Network Ethnography and the Hypermedia Organization: New Media, New Organizations, New Methods. *New Media & Society*, *4*(4), 550–574.

Huhtamäki, J., Russell, M. G., Rubens, N., & Still, K. (2015). Ostinato: The exploration-automation cycle of user-centric, process-automated data-driven visual network analytics. In S. A. Matei, M. G. Russell, & E. Bertino (Eds.), *Transparency in social media: Tools, methods and algorithms for mediating online interactions* (pp. 197–222). Switzerland: Springer.

Isomäki, H., Lappi, T.-R., & Silvennoinen, J. (2013). Verkon etnografinen tutkimus. In S.-M. Laaksonen, J. Matikainen, & M. Tikka (Eds.), *Otteita verkosta. verkon ja sosiaalisen median tutkimusmenetelmät.* Tampere: Vastapaino.

Jensen, K. B. (2011). New Media, Old Methods - Internet Methodologies and the Online/ Offline Divide. In M. Consalvo & C. Ess (Eds.), *The handbook of internet studies* (pp. 43–58). Chichester: John Wiley & Sons.

Jick, T. D. (1979). Mixing Qualitative and Quantitative Methods: Triangulation in Action. *Administrative Science Quarterly*, *24*(4), 602–611.

Johnson, R., Onwuegbuzie, A., & Turner, L. (2007). Toward a Definition of Mixed Methods Research. *Journal of Mixed Methods Research*, *1*(2), 112 - 133.

Joseph, K., Landwehr, P. M., & Carley, K. M. (2014, April). Two 1% s don't make a whole: Comparing simultaneous samples from Twitter's streaming API. In *International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction* (pp. 75-83). Springer International Publishing.

Jungherr, A., Schoen, H., & Jürgens, P. (2016). The Mediation of Politics through Twitter: An Analysis of Messages posted during the Campaign for the German Federal Election 2013. *Journal of Computer-Mediated Communication*, *21*(1), 50–68.

Karpf, D., Kreiss, D., Nielsen, R. K., & Powers, M. (2015). The Role of Qualitative Methods in Political Communication Research: Past, Present, and Future. *International Journal of Communication*, *9*, 19, 1888–1906.

Karvonen, L. (2006). Demokratian kehityksen seuranta Suomessa: lähtökohtia ja edellytyksiä. In S. Borg (Ed.), *Suomen demokratiaindikaattorit* (pp. 314–323). Helsinki:

Oikeusministeriö / Ministry of Justice.

Kozinets, R. V. (1998). On netnography: Initial reflections on consumer research investigations of cyberculture. *Advances in consumer research*, *25* (CMC), 366–371.

Kozinets, R. V. (2002). The Field Behind the Screen: Using Netnography for Marketing Research in Online Communities. *Journal of Marketing Research*, *39*(1), 61–72.

Kruikemeier, S., van Noort, G., Vliegenthart, R., & de Vreese, C. H. (2013). Getting closer: The effects of personalized and interactive online political communication. *European Journal of Communication*, *28*(1), 53–66.

Laney, D. (2001). 3D data management: Controlling data volume, velocity and variety. *META Group Research Note*, *6*, 70.

Lau, R. R., & Rovner, I. B. (2009). Negative Campaigning. *Annual Review of Political Science*, *12*(1), 285–306.

Lazer, D., Pentland, A. S., Adamic, L., Aral, S., Barabasi, A. L., Brewer, D., ... & Jebara, T. (2009). Life in the network: the coming age of computational social science. *Science (New York, NY)*, *323*(5915), 721–723.

Levy, K. E. C., & Franklin, M. (2013). Driving Regulation: Using Topic Models to Examine Political Contention in the U.S. Trucking Industry. *Social Science Computer Review*, *32*, 182–194.

Lilleker, D. G., & Malagon, C. (2010). Levels of Interactivity in the 2007 French Presidential Candidates' Websites. *European Journal of Communication*, *25*(1), 25–42.

Liu, B. (2010). Sentiment analysis: A multifaceted problem. In *Ieee Intelligent Systems* 25, 76–80.

Lorentzen, D. G., & Nolin, J. (2015). Approaching Completeness Capturing a Hashtagged Twitter Conversation and Its Follow-On Conversation. *Social Science Computer Review*, September 29, 2015.

Madden, R. (2010). *Being ethnographic: A guide to the theory and practice of ethnography*. London: Sage Publications.

Markham, A. N. (2013). Fieldwork in Social Media What Would Malinowski Do? *Qualitative Communication Research*, *2*(4), 434–446.

Markham, A. N. (2016). Ethnography in the digital era: From fields to flow, descriptions to interventions. In N. Denzin & Y. Lincoln (Eds.), *The sage handbook of qualitative research, 5th edition* (5th ed.). Thousand Oaks, CA: Sage Publications.

Markham, A. N., & Buchanan, E. (2012). *Ethical decision-making and Internet research: Version 2.0. Recommendations from the AoIR Ethics Working Committee*. Association of Internet Researchers. Retrieved from: https://aoir.org/reports/ethics2.pdf

Marsh, D., & Furlong, P. (2002). A Skin not a Sweater: Ontology and Epistemology in Political Science. In D. Marsh & G. Stoker (Eds.), *Theory and methods in political science* (2nd ed., pp. 17–41). Houndmills, Basingstoke, Hampshire, New York: Palgrave Macmillan.

Marttila, M., Laaksonen, S.-M., Kekkonen, A., Tuokko, M., & Nelimarkka, M. (2016). Digitaalinen vaaliteltta: Twitter politiikan areenana eduskuntavaaleissa 2015. In K. Grönlund & H. Wass (Eds.), *Eduskuntavaalitutkimus 2015: Poliittisen osallistumisen eriytyminen*. Helsinki: Oikeusministeriö / Ministry of Justice.

Massanari, A. (2015). #Gamergate and The Fappening: How Reddit's algorithm, governance, and culture support toxic technocultures. *New Media & Society,* October 9, 2015.

McKelvey, K., DiGrazia, J., & Rojas, F. (2014). Twitter publics: how online political communities signaled electoral outcomes in the 2010 US house election. *Information, Communication & Society*, *17*(4), 436–450.

Nielsen, R. K. (2011). Mundane internet tools, mobilizing practices, and the coproduction of citizenship in political campaigns. *New Media & Society*, *13*(5), 755–771.

Nielsen, R. K., & Vaccari, C. (2013). Do people "like" politicians on Facebook? Not really. Large-scale direct candidate-to-voter online communication as an outlier phenomenon. *International Journal of Communication*, *7*, 24.

O'Reilly, K. (2009). *Key Concepts in Ethnography*. Los Angeles: Sage Publications.

OSF Official Statistics of Finland (2015a): *Parliamentary elections [e-publication]*. ISSN=1799-6279. Helsinki: Statistics Finland. Retrieved from: http://www.stat.fi/til/evaa/index_en.html

OSF Official Statistics of Finland. (2015b). *Use of information and communications*

technology by individuals. Helsinki: Statistics Finland. Retrieved from: http://www.stat.fi/til/sutivi/index_en.html.

Papacharissi, Z. (2002). The virtual sphere: The internet as a public sphere. *New Media & Society*, *4*(1), 9-27.

Penney, J. (2016). Motivations for participating in 'viral politics: A qualitative case study of Twitter users and the 2012 US presidential election. *Convergence: The International Journal of Research into New Media Technologies*, *22*(1), 71–87.

Peterson, M. A. (2005). *Anthropology & Mass Communication. Media and Myth in the New Millennium.* New York: Berghahn Books.

Puri, A. (2007). The web of insights: The art and practice of webnography. *International Journal of Market Research*, *49*(3), 387–409.

Read, M., & Marsh, D. (2002). Combining quantitative and qualitative methods. In D. Marsh & G. Stoker (Eds.), *Theory and methods in political science* (2nd ed., pp. 231–248). Hampshire: Plagrave Macmillan.

Rogers, R. (2013). *Digital Methods*. Cambridge: MIT Press.

Semaan, B. C., Robertson, S. P., Douglas, S., & Maruyama, M. (2014, February). Social media supporting political deliberation across multiple public spheres: towards depolarization. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing CSCW'14* (pp. 1409-1421). ACM.

Strandberg, K. (2016). Ehdokkaiden ja kansalaisten internetin ja sosiaalisen median poliittinen käyttö vuosien 2003-2015 eduskuntavaaleissa. In K. Grönlund & H. Wass (Eds.), *Eduskuntavaalitutkimus 2015: Poliittisen osallistumisen eriytyminen.* Helsinki: Oikeusministeriö / Ministry of Justice.

Stromer-Galley, J. (2000). On-line interaction and why candidates avoid it. *Journal of Communication*, *50*(4), 111–132.

Stromer-Galley, J. (2004, 11). Interactivity-as-Product and Interactivity-as-Process. *The Information Society*, *20*(5), 391–394.

Stromer-Galley, J., Zhang, F., Hemsley, J., & Tanupabrungsun, S. (2016, June). *Tweeting the attack: Predicting gubernatorial candidate attack messaging and its spread.* Paper

presented at the Political Communication Division of the International Communication Association conference, Fukuoka, Japan.

Sumiala, J. (2012). *No Media and ritual: Death, community and everyday life*. London: Routledge.

Surlin, S. H., & Gordon, T. F. (1977). How Values Affect Attitudes Toward Direct Reference Political Advertising. *Journalism & Mass Communication Quarterly*, *54*(1), 89–98.

Swint, K. (1998). *Political consultants and negative campaigning: The secrets of the pros*. Lanham: University Press of America.

Tashakkori, A., & Teddlie, C. (1998). *Mixed Methodology. Combining Qualitative and Quantitative Approaches* (Vol. 46). Thousand Oaks, CA: Sage Publications.

Teddlie, C., & Tashakkori, A. (2010). Overview of contemporary issues in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 1–41). London: Sage Publications.

Thelwall, M., Buckley, K., Paltoglou, G., Cai, D., & Kappas, A. (2010). Sentiment in short strength detection informal text. *Journal of the American Society for Information Science and Technology*, *61*.

Thompson, J. B. (2005). The New Visibility. *Theory, Culture & Society*, *22*(6), 31–51.

Van Aelst, P., Sheafer, T., & Stanyer, J. (2012). The personalization of mediated political communication: A review of concepts, operationalizations and key findings. *Journalism*, *13*(2), 203–220.

van Dijck, J. (2014). Datafication, dataism and dataveillance: Big data between scientific paradigm and ideology. *Surveillance and Society*, *12* (2), 197–208.

Vergeer, M., & Hermans, L. (2013). Campaigning on Twitter: Microblogging and Online Social Networking as Campaign Tools in the 2010 General Elections in the Netherlands. *Journal of Computer-Mediated Communication*, *18*(4), 399–419.

Vergeer, M., Hermans, L., & Cunha, C. (2013). Web campaigning in the 2009 European Parliament elections: A cross-national comparative analysis. *New Media & Society*, *15*(1), 128–148.

Villi, M., & Matikainen, J. (2016). Participation in Social Media: Studying Explicit and

Implicit Forms of Participation in Communicative Social Networks. *Media and Communication*, *4*(4).

Walter, A. S. (2014). Negative Campaigning in Western Europe: Similar or Different? *Political Studies*, *62*, 42–60.

Walther, J. B. (1996). Computer-Mediated Communication: Impersonal, Interpersonal, and Hyperpersonal Interaction. *Communication Research*, *23*(1), 3–43.

Walther, J. B., & Jang, J.-w. (2012). Communication Processes in Participatory Websites. *Journal of Computer-Mediated Communication*, *18*(1), 2–15.

Welser, H. T., Smith, M., Fisher, D., & Gleave, E. (2008). Distilling Digital Traces: Computational Social Science Approaches to Studying the Internet. In N. G. Fielding, R. M. Lee, & G. Blank, G. (Eds.). *The SAGE handbook of online research methods* (pp. 116–140). London: Sage.

Wittel, A. (2000). Ethnography on the Move: From Field to Net to Internet. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, *1*(1).

Wright, S. (2012). Politics as usual? Revolution, normalization and a new agenda for online deliberation. *New Media & Society*, *14*(2), 244–261.

Yasseri, T., & Bright, J. (2014). Can electoral popularity be predicted using socially generated big data? *Information Technology*, *56*(5), 246–253.