

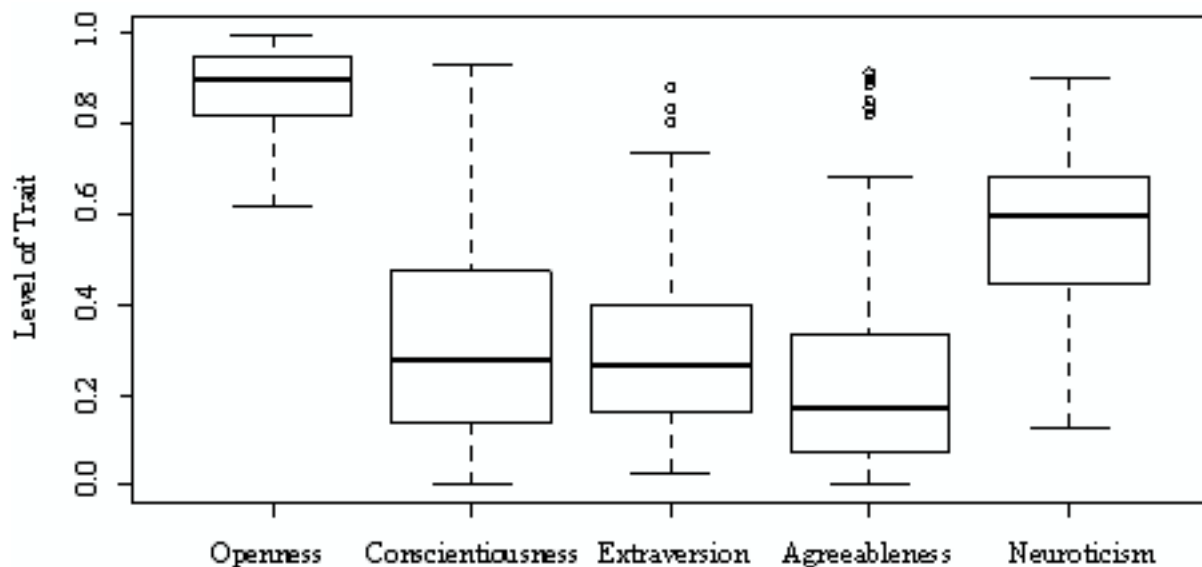
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## We Know your Personality! An Automated Personality Mining Approach on Twitter Data

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# Abstract

Twitter has become a globally relevant platform for political discussions. While social media analytics comprises various tools to identify important factors influencing political participation, the influence of personality traits in political discussions has only been investigated unsatisfactorily. We begin to close this research gap by developing a framework to identify the prevailing “big five” personality traits of Twitter users. Our framework is based on hypotheses derived from political psychology. The application prototype then enables automated personality mining using IBM Watson Personality Insights. Our applicability check with UK-based Twitter users’ data discussing the UK Brexit shows both practical applicability and interesting deviations from offline investigations for extraversion and neuroticism.

**Keywords:** Personality Mining, “Big Five” Personality Traits, Political Discussions, Twitter, UK Brexit

## 1 Introduction

In political discussions, Twitter has become a full-fledged multimedia platform in the last decade, enabling every user worldwide to easily publish ideas and thoughts in tweets and to exchange and interact with other people with practically no restrictions on reach and information growth (Oh and Kumar 2017; Gimpel et al. 2018; Yaqub et al. 2020). The behavior of expressing oneself politically is influenced by various factors. Especially in election campaigns, social media analytics tools have become widely used and powerful instruments for politicians and political parties to systematically gain insights into communication, popular topics and wording preferences to derive and adapt opinion forming strategies (Stieglitz and Dang-Xuan 2013; Nulty et al. 2016; Stieglitz et al. 2018). While personality traits have been a central component of various studies to analyze political behavior in offline contexts (Mondak and Halperin 2008; Hibbing et al. 2011; Cooper et al. 2013), the analysis of these traits of politically active social media users is unsatisfactory. Although researchers have examined the influence of various important factors, such as sociodemographic attributes like age, location and educational level, the behavior of people expressing their political opinions on social media cannot be explained satisfactorily (Hoelig 2016). This indicates that other important factors also have an influence on the intention to express political opinions on social media, e.g., Twitter. Mondak et al. (2010) were able to identify the influence of personality traits on political orientation and how a person expresses him or herself on political opinions in offline discussions. Predicting personality traits by analyzing published Twitter tweets using automated personality mining has been successfully applied in other areas, e.g., recruiting (e.g., Hu et al. 2016) or health (e.g., Rügger et al. 2016). Combining these research approaches and analyzing personality

traits of users active in political discussions on Twitter can help to understand political opinion forming. Therefore, we focus on the following research question:

**RQ 1:** How can personality traits be systematically analyzed for users expressing their political opinions on Twitter?

**RQ 2:** How can the prevailing “big five” personality traits of UK-based Twitter users discussing the Brexit can be deduced?

We deduce twelve generally applicable hypotheses based on scientific findings of political psychology in offline discussions (first literature review). To test these hypotheses with Twitter tweets, first an automated personality mining framework is developed (second literature review). We discuss this framework to systematically examine personality traits of politically active Twitter users. To check its applicability, we test the hypotheses focusing on the most active UK-based Twitter users, who commented on the UK Brexit while answering RQ 2. Finally, we present limitations and conclusions.

## **2 Theoretical Background and Hypotheses**

### **2.1 Political Behavior and Political Discussions on Twitter**

Political behavior includes any action taken by people in their role as citizens, without coercion, to seek a political outcome (Houghton 2009; Van Deth 2014). Traditional forms of political participation include voting and engagement in a political party, but also actions aimed at raising awareness of specific problems, such as using demonstrations or petitions (Inglehart 1990; Van Deth 2014). For Internet-based political behavior, however, a distinction is made between the three forms of political behavior. While e-parties involve supporting a party by registering online as a member, e-target refers to online political activism in the form of signing online petitions (Gibson and Cantijoch 2013). E-expression, on the other hand, refers to the political behavior that takes place primarily in social media channels, in which users publicly express their political opinions through discussing positions and commenting on articles (Gibson and Cantijoch 2013; Rojas and Puig-i-Abril 2009). In particular Twitter can be highlighted as a platform for e-expression. The intention of Twitter is to encourage expressions of opinion, setting itself apart from other social media by enabling public, hashtag-based discussions where users who have not yet been in touch can exchange ideas and opinions (Schmidt 2014; Oh and Kumar 2017; Stolee and Caton 2018). By enabling users to retweet, use hashtags and address other users in a targeted manner, Twitter as a real-time information platform allows complex discussions in which a wide range of users can discuss issues (Oh and Kumar 2017). The social network allows its users to publicly post short text messages called tweets, which are limited to 280 characters. This limitation encourages users to focus on the most important information, which in turn promotes the rapid and unfiltered spread of concise information (Parmelee and Bichard 2012).

elections, and consider if the hypotheses derived in Section 3 are supported. We focused entirely on the expression of personality traits in the political environment on Twitter. However, the decision to actively participate in political discussions on Twitter is also influenced by other important factors, such as age as well as educational, social and cultural background. Therefore, these factors can be included to assess the influence of personality traits on commentator behavior with the consideration of these control variables. However, this faces the challenge that such information is difficult to extract and validate from Twitter profiles. Despite our limitations discussed above, our research makes several illustrative contributions to analyze personality profiles of people engaging in political discussions on Twitter.

## **8 Conclusions**

We developed a personality mining framework to investigate the personality trait profiles of Twitter users engaging in political discussions. By applying this framework to UK Brexit discussions on Twitter, we showed how this framework can be adapted to gain deeper insights into the personality profiles of politically active users on Twitter by analyzing a series of hypotheses. The social network Twitter has grown to become a central platform where users around the world can exchange and discuss political opinions in real time with minimal effort and virtually no restrictions on reach. Although various researchers have investigated the connection between personality traits and political behavior by conducting survey-based studies, no particular attention has so far been given exclusively to the expression of political opinions in the social network Twitter. By combining scientific findings from the field of political psychology and personality mining methods, our aim was to show how the personality profiles of politically active users on Twitter can be analyzed.

To contribute to the understanding of political discussions on Twitter, we developed twelve hypotheses regarding the personality traits of Twitter users engaged in political discussions. During an applicability check we tested the previously developed procedure framework, on 800 UK-based Twitter users who were the most active participants in political discussions about Brexit in a four-day timeframe around the withdrawal date. Around the withdrawal date, we discovered that Twitter users politically involved in Brexit discussions, e.g., have a higher degree of neuroticism than in political offline discussions, which could be attributed to their anonymity on Twitter.

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