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POLITICAL IDEOLOGY AS A PREDICTOR OF ONLINE CONSUMER REVIEW CHARACTERISTICS

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Research

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Abstract

As online consumer reviews have tremendously gained in importance for consumer decision-making and firm strategies, scholars have greatly advanced our understanding of the effect of various review characteristics on review helpfulness and product sales. However, the question of what actually causes variations in these review characteristics remains largely unexplored. This study addresses this gap and establishes a novel link between online reviews and reviewer personality by arguing that certain personality characteristics of reviewers play a crucial role in shaping the way reviews are composed. Specifically, we draw on an innovative and unobtrusive measure of personality in the context of online behavior by building on theory on political ideology. Numerous scholars have shown that individuals' political ideologies are a result of stable, underlying personality characteristics. We hypothesize that, as a consequence, reviews by liberals exhibit more cognitively complex language, a greater diversity of arguments, more positively valenced language, a greater number of words, and a greater number of arguments compared to reviews by conservatives. By linking clickstream data to 245 online reviews, we provide support for our hypotheses. We discuss how the concept of political ideology can yield novel insights in online review research and how it allows website managers to provide more tailored incentives to potential reviewers.

Keywords: Online consumer reviews, Political ideology, Review characteristics, Reviewer personality.

1 Introduction

Being a regular feature on most consumer websites such as Amazon.com, online consumer reviews, i.e., “peer-generated product evaluations posted on company or third party websites” (Mudambi and Schuff, 2010, p. 186), have attracted much attention in the information systems community in recent years. Such reviews play a pivotal role both in consumer decision-making by making websites more useful and helping to reduce transaction risk and search effort (Dabholkar, 2006; Kumar and Benbasat, 2006) as well as for firm strategies where reviews can serve as a feedback mechanism on product quality and as a lever for brand building (Dellarocas, 2003).

In light of the economic importance of reviews, scholarly research has revealed that certain characteristics of reviews exist which can predict effects on product sales and review helpfulness. Besides examining review ratings (e.g., Chen et al., 2008; Chevalier and Mayzlin, 2006; Clemons et al., 2006; Li and Hitt, 2008), a large number of studies is concerned with textual characteristics of reviews such as length (e.g., Mudambi and Schuff, 2010; Pan and Zhang, 2011; Schindler and Bickart, 2012), content (e.g., Cao et al., 2011; Ghose and Ipeirotis, 2006, 2011; Lin et al., 2011; Sen and Lerman, 2007; Willemsen et al., 2011; Yin et al., 2014), and linguistic style (e.g., Ghose and Ipeirotis, 2011; Liu et al., 2008; Schindler and Bickart, 2012; Zhang and Varadarajan, 2006), which arguably are at least as important as purely numerical ratings (Archak et al., 2011; Pavlou and Dimoka, 2006).

Despite the prominence of such research, however, little is known about the underlying factors that actually explain those differences in reviews. In other words, to what extent the characteristics of a reviewer impact the way he or she uses language, builds arguments and commits effort to the review, remains unclear. While some nascent research has emerged in this field, studying for instance the impact of reviewer experience and expertise (Hu et al., 2008; Liu et al., 2008; Smith et al., 2005; Willemsen et al., 2011), the question of the influence of personality characteristics has, with few exceptions (Picazo-Vela et al., 2010), been mostly neglected. This is surprising given that personality has been considered an important factor to explain differences in e-commerce behavior (e.g., Gefen 2000) and in information systems use in general (Zmud, 1979). It appears reasonable to expect personality characteristics to also help explain what makes people vary in the way they compose reviews. Further advancing the understanding of reviews to include not just their consequences in the form of helpfulness and impact on product sales but also their antecedents is thus essential from both a theoretical and managerial perspective. In fact, evidence suggests that the amount of available information on a reviewer impacts the assessment of his or her review and, specifically, that such reviews are rated as more helpful (Forman et al., 2008).

Our paper aims to address this gap and to establish a novel link between online reviews and reviewer personality. Specifically, we draw on the concept of political ideology, i.e., the individuals’ liberal or conservative attitudes. Political ideology is a particularly intriguing concept because strong evidence exists that it is a reflection of various stable, underlying personality traits (see Jost et al. 2009, 2003 for reviews). As a result, ideology has already been used in research in relation to information systems, e.g., with regards to the impact of online platforms on ideological segregation (Barberá, 2014; Flaxman et al., 2013; Gentzkow and Shapiro, 2011; Himelboim et al., 2013) and the effect of ideology on technology adoption (Baxter and Marcella, 2012; Chen, 2010; Smith, 2013; Vergeer et al., 2013).

We introduce political ideology into online review research because we expect several of the associated personality characteristics to be highly relevant predictors of differences in review characteristics. Building on previous research, we theorize that individuals’ cognitive complexity (e.g., Van Hiel and Mervielde, 2003; Jost et al., 2003; Suedfeld and Rank, 1976; Tetlock, 1983), negativity bias (e.g., Dodd et al., 2012; Hibbing et al., 2014; Joel et al., 2013; Oxley et al., 2008), and pro-social behavior and altruism (e.g., Hilbig and Zettler, 2009; Van Lange et al., 2012; Zettler and Hilbig, 2010) are likely related to the way reviews are composed. We thus link these personality characteristics that are associated with political ideology to three of the most studied review characteristics which have been suggested to have a pivotal impact on sales and helpfulness, namely multifacetedness (Ghose and Ipeirotis, 2006, 2011; Willemsen et al., 2011), valence (Cao et al., 2011; Sen and Lerman, 2007; Willemsen et al., 2011; Wu, 2013; Yin et al., 2014) and review depth (Mudambi and Schuff, 2010;

Pan and Zhang, 2011; Schindler and Bickart, 2012; Willemsen et al., 2011). We argue (1) that differences between liberals and conservatives, i.e., individuals who express a more liberal or a more conservative political ideology, translate into the way they write reviews, specifically that liberals use more cognitively complex language, are more diverse in their use of positive and negative arguments, and that complex language mediates the effect of political ideology on argument diversity; (2) that conservatives, who tend to exhibit a stronger negativity bias, use more negatively valenced language in their online reviews, independent of review rating; and (3) that liberals, who are more likely to display altruistic tendencies, commit more effort to reviews and thus write longer reviews as well provide a greater number of arguments.

To substantiate these hypotheses, we draw on clickstream data, which allows us to observe the online behavior of a diverse sample of US households in an unobtrusive manner. We study 245 consumer reviews from Amazon.com, Tripadvisor.com, and Yelp.com. In order to quantify political ideology in our sample, we apply an innovative behavioral measure developed by Flaxman, Goel, and Rao (2013), which infers ideology based on online news media consumption. This is based on empirical evidence which suggests that the political preferences of news media outlets and their audience are very similar (Baum and Groeling, 2008; DellaVigna and Kaplan, 2007; Gentzkow and Shapiro, 2010; Iyengar and Hahn, 2009). Our analyses yield support for all our hypotheses with the exception of the hypothesized mediating role of cognitive complexity on the effect of political ideology on argument diversity.

To the best of our knowledge, our research is the first to show that the differences in core characteristics of reviews observed in the extant literature such as language, argumentation, and length are a direct result of differences in the personality of the reviewer, as measured by political ideology. Previous research was limited to situational variables as antecedents, such as experience or expertise (Hu et al., 2008; Liu et al., 2008; Smith et al., 2005; Willemsen et al., 2011). By going beyond that, we reach a more granular understanding of the drivers of review characteristics, and ultimately review helpfulness and sales impact. Furthermore, we provide evidence of the great potential of political ideology as an important construct in information systems research, and particularly research on online behavior, by establishing that—unlike conventional self-report measures which may be prone to biases (Podsakoff et al., 2003)—it allows for an unobtrusive measurement based on actual human behavior and can be clearly linked to stable individual personality characteristics. Finally, our study also contributes to specific debates in the political science literature, e.g., by showing that differences between liberals and conservatives in cognitive complexity can be seen not only in politicians but also in the general public.

The remainder of the paper is organized as follows: We first review existing literature on online consumer reviews and political ideology before linking these two to develop our hypotheses. Next, we outline our methodological approach and summarize the results. Finally, we discuss these results and highlight the contribution of our work, both in theory and practice, and lay out further avenues for research.

2 Online Consumer Reviews

Online consumer reviews nowadays constitute a regular feature on most consumer websites, especially in e-commerce, and consequently have become a focal topic of research in the information systems community. Mudambi and Schuff (2010) defined them as “peer-generated product evaluations posted on company or third party websites” (p. 186). Including reviews on websites allows customers to build stronger social rapport with the website (Kumar and Benbasat, 2006) and to reduce both transaction risk and search effort (Dabholkar, 2006). Firms, in turn, can use reviews as a feedback mechanism for product development and quality control (Dellarocas, 2003).

As reviews play such a prominent role in decision-making processes, scholars have devoted much attention to understanding how reviews differ from one another and which factors most strongly predict product sales and perceived helpfulness of reviews. On a general level, research suggests that reviews are directly related to sales in that a change in review ratings is followed by a change in sales (Chen et al., 2008; Chevalier and Mayzlin, 2006; Li and Hitt, 2008; Zhu and Zhang, 2010). With regards to predictors of review helpfulness, in particular length, content, and stylistic features of reviews have received much attention. Longer reviews generally are evaluated more positively than shorter ones (Mudambi and Schuff, 2010; Pan and Zhang, 2011). Likewise, the argument density, i.e., the degree to which evaluative statements are substantiated by arguments, is positively related to helpfulness (Willemsen et al., 2011). Content-wise, reviews that contain a mixture of objective product information and subjective evaluative statements (Ghose and Ipeirotis, 2006, 2011) as well as reviews that include a high diversity of arguments, i.e., both positive and negative arguments (Willemsen et al., 2011), are perceived to be more useful by readers. Furthermore, higher-quality arguments which are easily understandable, objective, and supported by facts are positively correlated with purchase intention (Lin et al., 2011). In addition, a number of studies have examined the role of valence in reviews. Although exceptions exist (Wu, 2013), most studies have found that negative reviews tend to be perceived as more helpful (Cao et al., 2011; Sen and Lerman, 2007; Willemsen et al., 2011), likely because they better help customers gauge the extent of risk that is inherent in online shopping (Cao et al., 2011). Helpfulness has also been shown to depend on linguistic style (Zhang and Varadarajan, 2006) such as sentence complexity or grammatical errors (Ghose and Ipeirotis, 2011; Liu et al., 2008; Schindler and Bickart, 2012).

While differences in review characteristics have been well studied in recent years, potential drivers for variance in review characteristics have been explored much more sparsely. This is especially surprising in the case of potential personality drivers since personality has been shown to be an important factor in e-commerce (e.g., Gefen 2000) and in information systems use in general (Zmud, 1979). Few exceptions exist. Specifically, Picazo-Vela et al. (2010) have found that conscientiousness and neuroticism correlate with an individual’s intention to provide reviews. In addition, reviewers that appear to have higher expertise, either through their own claims in the review (Smith et al., 2005; Willemsen et al., 2011) or through past reviews for similar product categories (Liu et al., 2008), provide more influential reviews. Clearly however, this research domain is still in its initial stages. Further advancing such research is important, in particular because evidence exists that shows that the amount of information available on a reviewer impacts the assessment of the review as they are rated as more helpful (Forman et al., 2008).

3 Theoretical Background on Political Ideology

Political ideology research is predominantly concerned with how specific individual personality traits predict differences in political ideology and how, as a consequence, such ideology impacts concrete observable behavior. The core tenet of political ideology research is that differences in ideology are grounded in differences in underlying personality traits (Jost et al., 2009, 2003). Thus, individuals’ political ideologies, conceptualized as their liberal or conservative attitudes and beliefs, are the reflection of stable personality characteristics rather than differences in situational circumstances (Alford et al., 2005; Block and Block, 2006).

Scholars have provided abundant evidence on personality differences and motives that give rise to political ideologies. The two most important types of motives underlying political ideology are epistemic and existential ones, each of which relate to an array of related personality characteristics along which conservatives and liberals tend to differ (Jost et al., 2009, 2003). Epistemic motives include elements of how humans deal with uncertainty, ambiguity, or complexity, how strongly they need to order and structure information or how mentally rigid and closed-minded they are. For instance, conservative ideology correlates with a high intolerance of ambiguity (e.g., Budner, 1962; Sidanius, 1978), low cognitive complexity (e.g., Tetlock, 1983), strong conscientiousness (e.g., Carney et al., 2008; Rentfrow et al., 2009) as well as need for cognitive closure (e.g., Chirumbolo et al., 2004; Van Hiel et al., 2004), low openness to experience (e.g., Van Hiel and Mervielde, 2004; Rentfrow et al., 2009), and stronger individualistic and less altruistic tendencies (e.g., Van Lange et al., 2012; Zettler and Hilbig, 2010). Existential motives relate to how individuals perceive and cope with threats to the current societal system as well as their particular position within it. To the extent that individuals differ in the perception of such threats, they also differ in their worldview. Research has shown that, among others, more pronounced negativity bias (e.g., Hibbing et al., 2014; Joel et al., 2013), fear of threat and loss (e.g., Jost et al., 2007; Lavine et al., 1999), death anxiety (e.g., Greenberg et al., 1990; Rosenblatt et al., 1989), as well as anger and aggression (e.g., Altemeyer, 1998; Tomkins, 1995) breed a more conservative worldview.

4 Linking Political Ideology and Online Reviews

We employ political ideology and its associated personality characteristics to cast light on how individual differences may explain differences in characteristics of online reviews. Research has shown that political ideology directly impacts every-day human behavior beyond the political sphere, in areas as diverse as lifestyle choices and purchase behavior (Carney et al., 2008; Jost et al., 2008), management practices (Chin et al., 2013; Christensen et al., 2015; Hutton et al., 2014; Tetlock et al., 2013) , and interpersonal relations (Farwell and Weiner, 2000; Hilbig and Zettler, 2009; Van Lange et al., 2012; Zettler and Hilbig, 2010; Zettler et al., 2011). Furthermore, political ideology has already been established as a focal variable in relation to information systems, particularly with regards to the impact of online platforms on ideological segregation (Barberá, 2014; Flaxman et al., 2013; Gentzkow and Shapiro, 2011; Himelboim et al., 2013) and the effect of ideology on technology adoption (Baxter and Marcella, 2012; Chen, 2010; Smith, 2013; Vergeer et al., 2013). These studies have demonstrated that such behavioral differences can be traced to the inherent differences in personality which are the underlying drivers of political ideology. In the following, we elaborate on how such personality differences may also impact the way online reviews are composed.

4.1 Cognitive complexity and review multifacetedness

Consumers consult online reviews during the decision making process to reduce the information asymmetry between the seller and themselves in order to be more certain whether or not a product or service fits their requirements (Hu et al., 2008; Kumar and Benbasat, 2006; Mudambi and Schuff, 2010). In this pursuit, review multifacetedness, i.e., the degree to which multiple perspectives are considered in the review, has been shown to be of importance. Reviews that present both positive and negative information are perceived by consumers to be more helpful than reviews that are one-sided (Willemsen et al., 2011). Including both positive and negative arguments in a review will act as a validation cue that the reviewer is independent and telling the truth (Crowley and Hoyer, 1994).

While this aspect of balanced argumentation is relatively novel in the online review research, it has been a major research stream for political ideology scholars in the form of cognitive complexity. The concept of cognitive complexity captures how sophisticatedly and balanced individuals process information on the basis of which they form their decisions or opinions (e.g., Harvey et al., 1961; Van Hiel and Mervielde, 2003; Suedfeld and Rank, 1976). As such, an individual exhibiting low cognitive complexity is characterized by “rigid evaluations of stimuli, the rejection of dissonant information, submissiveness to authority and prestige suggestions” (Suedfeld and Rank, 1976, p. 170). An individual with high cognitive complexity, in contrast, will interpret old and new information in a flexible fashion, combine and integrate stimuli, as well as consider multiple viewpoints.

Tentative scholarly consensus is that conservatives tend to display a lower cognitive complexity than liberals (Jost et al., 2003). This so-called rigidity-of-the-right hypothesis states that conservatives are more likely than liberals to feel threatened by ambiguous information and thus develop rigid, dichotomous mental models, i.e., display low cognitive complexity (Tetlock, 1984). Since cognition and communication are hard to separate (Slatcher et al., 2007), cognitive complexity is also strongly visible in the language individuals use. Multiple studies have examined cognitive complexity in oral and written communication (e.g., Tetlock, 1983; Tetlock et al., 1984) and have found support for the rigidity-of-the-right hypothesis.

We therefore hypothesize that liberals will display more cognitive complexity in the language they use in reviews.

> *H1a: Online reviews submitted by liberals display more cognitively complex language than online reviews submitted by conservatives*

Furthermore we hypothesize that liberals, who have been shown to be more likely to process information in a more complex and balanced way, will formulate online reviews that are more balanced concerning positive and negative arguments, independent of the review rating.

H1b: Online reviews submitted by liberals display greater argument diversity than online reviews submitted by conservatives

Finally, we expect argument diversity to be the result of thinking and expressing oneself in a more cognitively complexity fashion. Specifically, the more balanced information processing exhibited by liberals, which makes them rely on more complex language, may result in a stronger focus on providing balanced argumentation. We thus hypothesize that cognitively complex language will act as a mediator for the effect of political ideology on argument diversity.

H1c: Cognitively complex language mediates the effect of political ideology on argument diversity

4.2 Negativity bias and review language valence

The valence of an online review plays a major role in how it is received by a prospective customer. An individual is more likely to purchase a product if she reads a positive review compared to a negative review (e.g., Clemons et al., 2006). Furthermore, research suggests that negative reviews are perceived to be more helpful than positive ones (Cao et al., 2011; Sen and Lerman, 2007; Willemsen et al., 2011).

Differences in negativity bias, i.e., the processing of valenced stimuli, between liberals and conservatives form one of the central themes in political ideology research. Numerous studies have provided evidence that conservatives tend to allocate more attention to negative stimuli and exhibit stronger reactions to those stimuli. For example, Dodd et al. (2012) conducted an eyetracking study to find that when confronted with valenced images, conservatives gravitate more towards looking at aversive than appetitive images compared to liberals. Similarly, scholars have shown that conservatives tend to pay more attention to negatively valenced language than liberals do (Carraro et al., 2011). Conservatives were also shown to be more likely to experience greater emotional reactions to negative personal outcomes (Joel et al., 2013).

We expect the increased weighting of negative over positive information often displayed by conservatives to translate into the valence of their communication. Empirical evidence shows, e.g., that there is a parallel between a stronger negativity bias and more pronounced linguistic use of negatively valenced emotive intensifiers (e.g., “terribly”) across different cultures (Jing-Schmidt, 2007). We hypothesize that conservatives thus make use of language that is overall less positively valenced than liberals in their reviews, independent of review rating.

H2: Online reviews submitted by conservatives display less positively valenced language than online reviews submitted by liberals

4.3 Altruism and review depth

While the benefits of online reviews are apparent and have been widely discussed, one could argue that the benefits of posting a review for the reviewer are limited compared to its costs. Benefits generally associated with online information sharing such as social status enhancement (Lee and Ma, 2012; Lu and Hsiao, 2007; Wasko and Faraj, 2005) or reciprocity (Chiu et al., 2006) are potentially less pronounced in the context of online reviews because reviews are anonymous and lack direct one-to-one interactions (Wasko and Faraj, 2005). On the cost side, however, reviewers must allocate attention, time, and effort to composing the online review (Hew and Hara, 2007; Sun et al., 2014).

For the prospective customer, the amount and quality of information are important factors to consider when evaluating the benefits of a review. Mudambi and Schuff (2010) and Pan and Zhang (2011), for example, have found that the longer the online review, the more helpful and beneficial it is to prospective customers. Likewise, Willemsen et al. (2011) have shown that the greater the number of arguments included, i.e., the argument density of a review, the more useful it is to prospective customers.

Thus, while the benefits for the customer tend to increase with the length and the number of arguments in a review, so do the costs for the reviewer. Composing a three-word review (e.g., "I love it") requires considerably less attention, time, and effort than a 300-word one, and the same holds for the number of arguments. The increasing gap between consumer benefits and reviewer costs raises the question of what kind of person is willing to write longer reviews or such with a high number of arguments.

Related research suggests that altruism is a contributing personality trait for composing online reviews, as it is a key driver for online knowledge sharing (Hars and Ou, 2002; Hew and Hara, 2007). Altruistic individuals are willing to "pay a personal cost to provide benefits to others in general, regardless of the identity of the beneficiaries" (Fowler and Kam, 2007, p. 813). Thus, we would believe that the more altruistic an individual the more likely it is that he or she puts a great deal of effort into composing an online review. Such self-sacrificial tendencies are regularly associated with a left-wing political orientation. Indeed, liberals have been found to generally exhibit more altruism and to be thus more inclined to help others in need (Farwell and Weiner, 2000; Hilbig and Zettler, 2009; Van Lange et al., 2012; Zettler et al., 2011). This is because liberals tend to favor greater equality, while conservatives are thought to accept inequality as an inevitable consequence of individual freedom and rewarding individualistic goals (Jost et al., 2003; Van Lange et al., 2012).

We hypothesize that since liberals tend to be more altruistic, they will more likely be willing to put more effort into composing a review than conservatives, and thus, will submit longer reviews.

> *H3a: Online reviews submitted by liberals are longer than online reviews submitted by conservatives*

In a similar vein, we hypothesize that not only will the reviews that liberals submit be longer, but they will also contain a greater number of arguments than reviews submitted by conservatives.

> *H3b: Online reviews submitted by liberals contain more arguments than online reviews submitted by conservatives*

Figure 1 summarizes our research model.

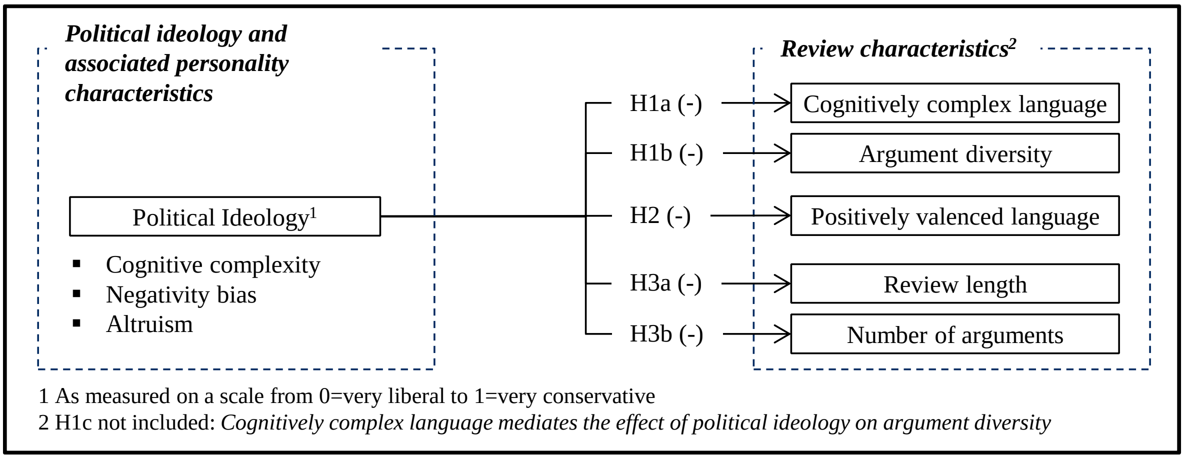

Figure 1. Research model

5 Methodology

5.1 Data sample

To test our hypotheses, we rely on two data sources: clickstream data and manually collected customer review data from online platforms. First, the clickstream data is used to measure the political ideology of the individuals in the sample, i.e., our main independent variable. Second, we use online customer reviews written by individuals in our sample to measure our dependent variables.

Clickstream data has become an important data source in Internet research, as it has several advantages over traditional data sources such as surveys or experiments. First, as we track actual behavior of the subjects, we avoid self-report biases such as the consistency motif, social desirability, or priming effects (Podsakoff et al., 2003). Second, as clickstream data collection is fairly unobtrusive, we can assume that we capture genuine behavior (Bucklin and Sismeiro, 2009; ComScore, 2013). Third, we are able to minimize temporal behavioral biases through a longitudinal data collection over a period of six months.

The clickstream data we use in this paper is derived from a panel of web users maintained by comScore, a US-based market research firm (ComScore, 2013). Our initial dataset comprises 17,097 individuals from 9,933 households in the US. Their Internet activity on their home computers was tracked from March until August 2014. After removing individuals from the dataset that either did not provide all demographic information or did not meet the criteria for the measurement of political ideology (see next section), our ideology sample consists of 3,873 individuals from 3,361 households.

The online reviews we analyze have been written by individuals in our sample on Amazon.com, Tripadvisor.com, and Yelp.com. The reviews were extracted in a three-step process. First, we identified URLs in our sample that referred to the posting of an online review on the three platforms. We chose Amazon.com, Tripadvisor.com, and Yelp.com since these websites used URLs that allowed us to identify when an online review was being posted and because they are popular enough in our dataset (ranked 7, 249, and 507 by page views, respectively) to provide us with a large sample of online reviews. Furthermore, online reviews from Amazon.com and Tripadvisor.com have been used by scholars in previous studies (Chevalier and Mayzlin, 2006; Mudambi and Schuff, 2010; Willemsen et al., 2011; Wu, 2013). Second, we manually identified the respective user accounts on these pages using the information we have on the reviewed product/service and the review date, as well as demographic data on the user such as age, gender and location. Third, we extracted the most recent reviews the user had submitted (up to 10 reviews). In total, our final sample consists of 245 reviews containing 23,459 words.

5.2 Measuring political ideology

We measure political ideology using a behavioral approach, based on a scale developed by Flaxman et al. (2013), which uses data on the news media consumption of individuals to infer their political ideology. This is possible since empirical evidence suggests that the political preferences of news media outlets and their audience are very similar (Baum and Groeling, 2008; DellaVigna and Kaplan, 2007; Gentzkow and Shapiro, 2010; Iyengar and Hahn, 2009). Flaxman et al. (2013) estimate the political slant of news outlets by assigning a conservative share to the top 100 online news outlets based on the fraction of readership that voted for the Republican candidate in the 2012 US presidential election (see Appendix). Such an approach offers the advantage that unlike conventional self-report measures which may be prone to biases (Podsakoff et al., 2003) it allows for an unobtrusive measurement based on actual human behavior.

To approximate the political ideology of the individuals in our sample, we calculate the average conservative share of online news outlets they visited in the six-month period weighted with the relative page views each outlet accounts for. To ensure reliability of our measure, we only include individuals who have consumed online news on a regular basis and thus, similar to Flaxman et al. (2013), we limit our sample to individuals with on average at least four monthly page views on these news outlets. We measure political ideology on a scale from 0 to 1, where a liberal ideology is indicated by a score below 0.5 and a conservative ideology by a score above 0.5.

We scrutinized our political ideology measure by comparing our distribution to the one found in the sample of Flaxman et al. (2013), as well as to the voting records of the 2012 presidential election. Both comparisons strengthen our conviction in the validity of our measure. First, while Flaxman et al. (2013) find that 66 percent of users have a political ideology score between 0.41 and 0.54, we find that 65 percent of our sample is in that range. Additionally, the ideological distance between two randomly selected individuals in their sample is 0.11 compared to 0.12 our sample. Second, similar to the voting records, we find that liberals have a stronger representation in young age groups as well as in metropolitan areas than conservatives (New York Times, 2012; Roper Center, 2012).

5.3 Measuring cognitively complex language

We measure cognitive complexity in the review language with a linguistic measure developed by Pennebaker and King (1999) using the word count dictionaries from LIWC (Pennebaker et al., 2001). The measure has been frequently used to measure cognitive complexity (Abe, 2011; Saslow et al., 2014; Slatcher et al., 2007) as it captures the degree to which an individual differentiates and weighs multiple perspectives. When doing so, individuals use more exclusive words (e.g., “but”, “if”), tentative words (e.g., “almost”, “perhaps”), negations (e.g., “can’t”, “wouldn’t”), and discrepancies (e.g., “must”, “ought”), and fewer inclusive words (e.g., “with”, “and”). We counted the words belonging to the LIWC categories “exclusive” (excl), “tentative” (tentat), “negations” (negate), “discrepancies” (discrep) and “inclusion” (incl) used in online reviews. In line with Slatcher et al. (2007) we subsequently compute cognitive complexity using the z-scores of the categories and the following formula:

$$Cognitively\ complex\ language = zexcl + ztentat + znegate + zdiscrep - zincl$$

In our final sample, the reliability of the measure indicated by Cronbach’s alpha is 0.61, which is, for the sake of comparison, above the reliability of the cognitive complexity measure (0.52) in the sample of Slatcher et al. (2007). Furthermore, it is above the threshold of 0.60, which indicates acceptable reliability (Hair et al., 2009).

5.4 Measuring argument diversity

To measure argument diversity, we manually coded the reviews for direct (e.g., “This camera is amazing”) and indirect valenced statements (e.g., “The pictures this camera takes are amazing”). Similar to Willemsen et al. (2011) we consider indirect valenced statements as arguments, while direct valenced statements are considered to be merely evaluative assertions. We measure argument diversity by calculating the proportion of positive (“p”) and negative indirect statements (“n”) in an online review using the formula in Figure 2. Similar to Willemsen et al. (2011) we measure argument diversity on a scale from 0 (low diversity) to 1 (high diversity). Two raters coded all reviews independently. Cohen’s kappa was 0.86, indicating very good intercoder reliability (Landis and Koch, 1977).

5.5 Measuring language valence

We measure the language valence with the Janis-Fadner coefficient of imbalance (Janis and Fadner, 1943), which is frequently used by scholars in the context of content analysis (e.g., Deephouse, 2000; Pollock and Rindova, 2003), using the formula in Figure 2. As we aim to capture the emotional tenor of the language our subjects use, we consider each individual word as our recording unit. To classify the words in conveying positive (“p” in the formula below) or negative emotions (“n”), we use the categories “positive emotions” (e.g., “beautiful”, “sharing”) and “negative emotions” (e.g., “awkward”, “nasty”) from the LIWC dictionary.

$$Argument\ Diversity = \begin{cases} \frac{n}{p}\ if\ p > n; \\ 1 \quad if\ p = n; \\ \frac{p}{n}\ if\ n > p; \end{cases} \qquad Language\ Valence = \begin{cases} \frac{p^2 - pn}{(total)^2}\ if\ p > n; \\ 0 \qquad if\ p = n; \\ \frac{pn - n^2}{(total)^2}\ if\ n > p; \end{cases}$$

Figure 2. Formulas to measure argument diversity and language valence

5.6 Measuring review length and number of arguments

We measure the length of a review as the simple count of words in the review. This approach is widely accepted and was, for example, recently used by Mudambi and Schuff (2010). We measure the number of arguments in an online review by summing up the positive and negative indirect statements.

5.7 Control variables

To prevent non-focal variables from confounding our result, we include a set of control variables. All regressions control for age, gender, annual household income, which in an e-commerce context has been shown to be a valid predictor for socio-economic status and education (Chiou-Wei and Inman, 2008), amount of Internet use, review rating, and source website of the review as a dummy variable.

Including review ratings, i.e., the numerical star rating (ranging from 1 to 5) indicating the satisfaction of the reviewer with the product or service (Mudambi and Schuff, 2010), in our model is also expedient as prior research has shown that online reviews on e-commerce sites are overwhelmingly positive (Chevalier and Mayzlin, 2006). Indeed, we find that in our sample, the average rating of the reviews is 4.2 out of 5 stars. Furthermore, for hypothesis 2, controlling for the review rating is paramount to isolating the effect of valenced language use from the reviewer's satisfaction with the reviewed product or service.

Lastly, we control for the review word count in the model for hypothesis 1. We do not do so for hypothesis 2 as the word count is already included in the language valence measure or hypothesis 3 as the word count is used as the measure for the dependent variable.

6 Results

Table 1 contains summary statistics and pair-wise correlations for all variables used in our analyses. To test for multicollinearity, we calculated the mean variance inflation factors, which at 1.78 for model 2 and 4, 1.74 for model 5, and 1.81 for model 7, 9 and 11, are well below the suggested threshold of 10.0 (Hair et al., 2009; Kutner et al., 2004).

Variables	**Mean**	**SD**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1 Cognitively Complex Language	-0,14	3,15	1						
2 Argument Diversity	0,25	0,39	-0,07	1					
3 Languag Valence	0,01	0,33	-0,05	0,21 *	1				
4 Wordcount	95,95	106,32	0,01	-0,04	-0,21 *	1			
5 Number of Arguments	2,96	2,47	-0,08	-0,23 *	-0,20 *	0,64 *	1		
6 Political Ideology[1)]	0,43	0,50	-0,14 *	-0,08	-0,17 *	-0,16 *	-0,21 *	1	
7 Age	44,98	17,93	-0,21 *	0,11	0,05	0,03	0,05	0,09	1
8 Gender[2)]	0,44	0,50	0,16 *	0,21 *	0,03	-0,10	-0,27 *	0,17 *	-0,13
9 Internet Usage	2,43	0,56	0,05	-0,08	-0,26 *	0,18 *	0,21 *	0,15 *	-0,04
10 Income	6,64	3,17	-0,08	0,03	0,20 *	-0,08	-0,10	0,01	-0,04
11 Review Stars	4,26	1,24	-0,17 *	-0,09	0,10	-0,27 *	-0,17	0,04	-0,04
Variables			**8**	**9**	**10**	**11**			
8 Gender[2)]			1						
9 Internet Usage			-0,14 *	1					
10 Income			0,12	-0,73 *	1				
11 Review Stars			-0,08	-0,03	0,09	1			

Notes: 1. Liberal=0, Conservative=1 2. Male=0, Female=1 *p < 0.05

Table 1. Descriptives and correlations (n=245)

To test H1a, H3a, and H3b, we use random effects OLS regression models to account for the panel structure of our dataset. To test H1b and H1c, we employ a pooled fractional probit model, as argument diversity, the dependent variable, is a fractional outcome variable (Baum, 2008; Papke and Wooldridge, 2008). To test H2, we use a random effects Tobit model, as language valence, the dependent variable, is a censored variable (Wooldridge, 2001). The results for all models are presented in Table 2. Models 1, 3, 6, 8 and 10 are control models for H1a, H1b, H2, H3a and H3b respectively.

Model 2 provides support for H1a as we find a negative and significant ($p < 0.01$) coefficient for political ideology, suggesting that liberals formulate online reviews which exhibit more cognitively complex language than those formulated by conservatives. Similarly, we find support in Model 4 for H1b, albeit with a slightly less significant coefficient ($p < 0.05$) for political ideology. Contrary to our expectations, we do not find a mediating effect of cognitively complex language for the effect of political ideology on argument diversity. As depicted in Model 5, when cognitively complex language is added to Model 4, political ideology still has a significant effect on the dependent variable. The results of Model 7 lend support to H2, as political ideology has a negative and significant ($p < 0.05$) coefficient, thus suggesting that liberals tend to use language with a more positive valence compared to conservatives in online reviews. Finally, we also find support for H3a in Model 9 and H3b in Model 11. As anticipated, the results in Model 9 show that the word count, i.e., the review length, is higher for reviews submitted by liberals than for those submitted by conservatives. Model 11 supports our hypothesis that liberals make use of more arguments in their online reviews than conservatives.

	H1a				H1b				H1c	
	Model 1		Model 2		Model 3		Model 4		Model 5	
Variables	**Cogn. Compl. Lang.**		**Cogn. Compl. Lang.**		**Arg. Diversity**		**Arg. Diversity**		**Arg. Diversity**	
Age	-0.03**	(0.01)	-0.03**	(0.01)	0.01*	(0.00)	0.01*	(0.00)	0.01*	(0.00)
Gender[1)]	0.18	(0.47)	0.37	(0.47)	0.42*	(0.18)	0.49**	(0.18)	0.52**	(0.17)
Internet Usage	0.27	(0.60)	0.62	(0.61)	0.09	(0.26)	0.27	(0.23)	0.30	(0.23)
Income	-0.07	(0.10)	-0.02	(0.10)	0.01	(0.04)	0.03	(0.04)	0.03	(0.04)
Word Count	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)
Review Stars	-0.53**	(0.16)	-0.55***	(0.16)	0.12	(0.08)	0.12	(0.08)	0.10	(0.08)
Amazon[2)]	1.59*	(0.63)	1.43*	(0.62)	0.41	(0.25)	0.36	(0.26)	0.40	(0.27)
Yelp[2)]	0.23	(0.61)	-0.10	(0.61)	0.26	(0.29)	0.12	(0.31)	0.11	(0.32)
Political Ideology[3)]			-11.16*	(4.88)			-4.94*	(2.02)	-5.51**	(1.96)
Cogn. Compl. Lang.									-0.04	(0.04)
Wald chi2	33.49***		40.21***		13.25		22.78**		24.00**	
R^2	0.14		0.16							

	H2				H3a				H3b			
	Model 6		Model 7		Model 8		Model 9		Model 10		Model 11	
Variables	**Language Valence**		**Language Valence**		**Word Count**		**Word Count**		**Number of Arg.**		**Number of Arg.**	
Age	0.00	(0.00)	0.00	(0.00)	0.25	(0.44)	0.33	(0.41)	0.00	(0.01)	0.01	(0.01)
Gender[1)]	0.00	(0.01)	0.00	(0.01)	-16.00	(16.35)	-7.89	(15.46)	-0.65	(0.41)	-0.46	(0.38)
Internet Usage	-0.01*	(0.01)	-0.01	(0.01)	43.92*	(20.60)	58.80**	(19.65)	0.47	(0.51)	0.84	(0.48)
Income	0.00	(0.00)	0.00	(0.00)	4.09	(3.45)	6.25	(3.27)	0.01	(0.09)	0.07	(0.08)
Review Stars	0.00	(0.00)	0.00	(0.00)	-22.22***	(5.30)	-22.06***	(5.26)	-0.25*	(0.11)	-0.26*	(0.11)
Amazon[2)]	0.00	(0.01)	-0.00	(0.01)	-19.28	(21.68)	-21.27	(20.60)	-1.75***	(0.52)	-1.82***	(0.49)
Yelp[2)]	0.01	(0.01)	0.00	(0.01)	6.89	(20.79)	-2.68	(20.44)	0.08	(0.49)	-0.19	(0.48)
Political Ideology[3)]			-0.10*	(0.05)			-448.12**	(158.44)			-10.81**	(3.92)
Wald chi2	16.05*		22.18**		32.71***		43.93***		44.72***		60.83***	
R^2	0.08		0.10		0.14		0.17		0.24		0.28	

Notes: 1. Male=0, Female=1 2. Dummy Variables; Reference Category: Tripadvisor 3. Liberal=0, Conservative=1

Models 1, 2, 8, 9, 10, and 11 calculated using random effects OLS regression; Models 3, 4, and 5 calculated using pooled fractional probit regression;

Models 6 and 7 calculated using random effects Tobit regression; *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$; n=245; Groups (i.e., Individuals)=37

Table 2. Regression results

7 Discussion

Our research establishes a novel link between reviewer personality and online reviews and contributes to theory and practice in several ways. To the best of our knowledge, we are the first to explain relevant differences in the way individuals write reviews based on differences in their personality, as reflected in political ideology. In contrast, scholars have previously examined non-personality induced differences such as expertise and experience (e.g., Hu et al., 2008; Liu et al., 2008; Willemsen et al., 2011); or, if they have studied personality, they have not done so in relation to review characteristics but rather attitudes such as intentions to provide a review (Picazo-Vela et al., 2010).

Given that the impact of differences in online reviews on sales and helpfulness has been a major topic in information systems research in past years, the lack of scholarly attention towards explanatory variables of such differences is surprising. Our research addresses this gap and advances the understanding of what actually drives review differences. We contribute by illuminating how the personality of the reviewer is directly reflected in the way he or she uses language, builds arguments and commits effort to the review.

We address some of the most relevant dimensions of review characteristics that have taken center stage in the online review literature in past years, in particular those of review multifacetedness (e.g., Ghose and Ipeirotis, 2006, 2011; Willemsen et al., 2011), review valence (e.g., Cao et al., 2011; Sen and Lerman, 2007) and review depth (e.g., Mudambi and Schuff, 2010; Schindler and Bickart, 2012). We find that liberals, who have been shown to be more likely to exhibit greater cognitive complexity, display greater cognitive complexity in the language used in their reviews and are more balanced between positive and negative arguments, independent of review rating. Contrary to expectations, we do not find a mediating effect of cognitively complex language for the effect of political ideology on argument diversity. A possible explanation for this could be that the greater argument diversity exhibited by liberals is not only a result of greater cognitive complexity, but also of greater tolerance of ambiguity (Jost et al., 2003). Additionally, we find that conservatives, who tend to exhibit a stronger negativity bias, use more negatively valenced review language, again independent of review rating. Finally, we show that liberals tend to be more altruistic when writing reviews, both with respect to the absolute number of words they write and, perhaps more interestingly, with respect to the number of arguments they devise in their reviews. On average, reviews by liberals (political ideology score < 0.5) contain 97 words and 3 arguments, while reviews by conservatives (political ideology score > 0.5) contain only 71 words and 2 arguments. Thus, liberals tend to commit more effort, both in terms of time and cognition, into writing reviews that are meaningful to the recipients.

Furthermore, we contribute to information systems research by providing further evidence for political ideology to be a construct with great potential, as it allows for unobtrusive measurement based on actual behavior, which is less prone to biases of self-report measures (Podsakoff et al., 2003), is a result of stable personality traits (Jost et al., 2009, 2003), has been shown to influence every-day human behavior outside of politics (e.g., Carney et al., 2008; Jost et al., 2008), and has already proved itself in relation to information systems (e.g., Flaxman et al., 2013; Gentzkow and Shapiro, 2011). Additionally, we provide added evidence that behavioral differences exist between liberals and conservatives, confirming the argument of Carney et al. (2008) that “the political divide extends far beyond overtly ideological opinions to much subtler and more banal personal interests, tastes, preferences, and interaction styles” (p. 835).

Finally, we show that political ideology as inferred from web browsing behavior meaningfully predicts distinct behavioral patterns. In contrast to existing survey-based measures which may often suffer from self-report biases (Podsakoff et al., 2003), such an approach offers the advantage of being unobtrusive. We demonstrate that our approach, which is based on Flaxman et al. (2013), can be automated for large samples and thus especially lends itself to capturing unbiased, genuine behavior.

Our research also has important managerial implications. As online reviews have become an integral success factor for online retailers (e.g., Dellarocas, 2003; Kumar and Benbasat, 2006), these firms rely heavily on their customers to provide helpful reviews. Our findings suggest that the personality of the reviewer influences the review’s multifacetedness and depth, characteristics that have been linked to review helpfulness (e.g., Mudambi and Schuff, 2010; Willemsen et al., 2011). Thus, if online retailers are able to track and infer (e.g., by means of cookies) the political ideology of their customers based on news media consumption, they could try to increase the proportion of helpful reviews they receive by means of personalized incentives. For example, as conservatives are prone to exhibit less argument diversity, firms could provide these reviewers with a more structured submission template, in which the reviewer is asked to provide positive and negative feedback to the product. Similarly, to increase review depth, conservatives, who tend to write shorter reviews, could be incentivized to write longer reviews by rewarding them with coupons for example, if their review surpasses a specified length.

As any empirical study, ours also has some limitations. First, we base our measure of political ideology on a relatively novel methodology by Flaxman et al. (2013). While this measure has been developed in an analytically rigorous approach, research would profit from further validation of the measure. Second, as we do not directly measure any personality characteristics, we cannot empirically rule out that the effects analyzed in this study might be caused not by the hypothesized but by different personality characteristics associated with political ideology. While we acknowledge the possibility that argument diversity might be caused by tolerance of ambiguity and not cognitive complexity, from a theoretical standpoint we are confident that this is not the case for language valence or review depth. According to our theorizing, none other than the hypothesized personality characteristic would sufficiently explain the observed effects. Third, we also cannot fully rule out a selection bias in our sample, as the applicability of our political ideology measure is, by definition, restricted to those individuals who regularly consume news via the Internet on their home computers. Fourth, in an ideal world, we would have analyzed only online reviews submitted for one particular product during a limited time period. We do, however, control for variations in product quality by including the review ratings as proxies for quality in our models. Fifth, as our measure, sample, and much of the cited political ideology research are highly US-centric, the generalizability of our findings to other countries might be limited. We thus strongly encourage future research in other countries and cultures. Lastly, given that we rely on a quantitative methodology, we can only report correlations between the ideology consumption and review characteristics. To uncover and explain the drivers of these review characteristics in greater detail, future studies should consider employing a more qualitative ethnographic approach.

Not only the limitations of our study open up opportunities for further empirical research; so do our findings. Specifically, we wonder: Do individuals also have personality-induced preferences in *reading* online reviews? In other words, do individuals perceive different review characteristics as helpful based on their personality? Individuals with a greater cognitive complexity might, for instance, not only compose reviews that provide more balanced arguments to evaluate a product but likewise prefer to read such reviews. As a result, the helpfulness of reviews might be audience-specific. This conjecture would have far-reaching implications. For researchers, audience-specific helpfulness could explain some conflicting evidence as to the direction of the effect of specific review characteristics, such as review length and language valence, on helpfulness (e.g., Cao et al., 2011; Mudambi and Schuff, 2010; Schindler and Bickart, 2012; Wu, 2013). Managers, in turn, could exploit audience-specific preferences to increase the helpfulness of reviews for their customers and thus drive sales by displaying specific reviews more prominently for customers based on their personalities.

Overall, this paper contributes to the literature by introducing personality as an integral driver of online review characteristics. We view our study as a first step towards a deeper, more nuanced understanding of how reviews are created. We, thus, encourage scholars to not only empirically further validate our findings, but also explore additional potential effects of personality in the context of reviews.

Appendix

Domain	Conservative Share	Domain	Conservative Share	Domain	Conservative Share	Domain	Conservative Share
timesofindia.indiatimes.com	0.04	news.com.au	0.39	csmonitor.com	0.47	jsonline.com	0.61
economist.com	0.12	dailykos.com	0.39	realclearpolitics.com	0.47	newsmax.com	0.61
northjersey.com	0.14	bloomberg.com	0.39	usatoday.com	0.47	factcheck.org	0.62
ocregister.com	0.15	dailyfinance.com	0.39	cnbc.com	0.47	reason.com	0.63
mercurynews.com	0.17	syracuse.com	0.39	dailymail.co.uk	0.47	washingtonexaminer.com	0.63
nj.com	0.17	usnews.com	0.39	mirror.co.uk	0.47	ecanadanow.com	0.63
sfgate.com	0.19	timesunion.com	0.40	news.yahoo.com	0.47	americanthinker.com	0.65
baltimoresun.com	0.19	time.com	0.40	abcnews.go.com	0.48	twincities.com	0.67
courant.com	0.22	reuters.com	0.41	upi.com	0.48	jacksonville.com	0.67
jpost.com	0.25	telegraph.co.uk	0.41	chicagotribune.com	0.49	opposingviews.com	0.67
prnewswire.com	0.27	businessweek.com	0.42	ap.org	0.50	chron.com	0.67
sun-sentinel.com	0.27	cnn.com	0.42	nbcnews.com	0.50	startribune.com	0.68
nationalpost.com	0.28	politico.com	0.42	suntimes.com	0.51	breitbart.com	0.70
thestar.com	0.28	theatlantic.com	0.42	freep.com	0.52	star-telegram.com	0.74
bbc.co.uk	0.30	nationaljournal.com	0.43	azcentral.com	0.53	stltoday.com	0.75
wickedlocal.com	0.30	alternet.org	0.43	tampabay.com	0.54	mysanantonio.com	0.77
nytimes.com	0.31	ajc.com	0.44	orlandosentinel.com	0.54	denverpost.com	0.80
independent.co.uk	0.32	forbes.com	0.44	thehill.com	0.57	triblive.com	0.85
philly.com	0.32	seattletimes.com	0.44	nationalreview.com	0.57	sltrib.com	0.85
hollywoodreporter.com	0.33	rawstory.com	0.44	news.sky.com	0.58	dallasnews.com	0.86
miamiherald.com	0.35	newsday.com	0.44	detroitnews.com	0.59	kansascity.com	0.93
hungtonpost.com	0.35	cbsnews.com	0.45	express.co.uk	0.59	deseretnews.com	0.94
guardian.co.uk	0.37	rt.com	0.45	weeklystandard.com	0.59	topix.com	0.96
washingtonpost.com	0.37	theepochtimes.com	0.46	foxnews.com	0.59	knoxnews.com	0.96
online.wsj.com	0.39	latimes.com	0.47	washingtontimes.com	0.59	al.com	1.00

Source: Flaxman et al. (2013)

Appendix. List of News Websites and Conservative Share

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