

Exploring the Linguistic Characteristics of Online Consumer Reviews by Top Reviewers and Ordinary Reviewers

Research-in-Progress

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Abstract

Consumer online purchase behaviors are heavily depending on online reviews as review platforms are booming. Prior works have identified the effects of different review characteristics on helpfulness, including the review being written by a top reviewer. This study examines the linguistic characteristics that make top reviewers different from ordinary reviewers in their reviews. Drawing on computational linguistic literature, this study performs a linguistic analysis on the reviews written by top reviewers and ordinary reviewers in terms of four language summary variables: analytical thinking, emotional tone, authenticity, and clout. The four variables are examined using review data collected from Yelp. Our preliminary results suggest that top reviewers exhibit higher analytic thinking and more positive emotional tone in their reviews. Interestingly, reviews by top reviewers appear to be lower in authenticity and clout, which can plausibly be interpreted as being more humble and impersonal.

Keywords: Review helpfulness, top reviewers, computational linguistics, analytical thinking, emotional tone, authenticity, clout

Introduction

In recent years, as the e-commerce transaction model has been increasingly accepted by consumers, the success or failure of the business of online products and services is inseparable from the word-of-mouth from consumers. Studies have shown that user reviews have become the most important basis for online shopping decisions and product sales (Chevalier and Mayzlin 2006; Gretzel and Yoo 2008; Liu 2006). Given the popularity of the online review systems, many online platforms (e.g., TripAdvisor, Amazon, Yelp) have developed features such as voting mechanism and badge award mechanism. This has aroused interests among researchers in exploring the characteristics for those reviews which were strongly voted as helpful comments. Specifically, considerable studies have tried to summarize common features of online reviews on usefulness at both the review message and the reviewer level.

Being a top reviewer has been proposed by many researchers as one of the important indicators on helpfulness (Baek et al. 2012; Guo and Zhou 2017; Kuan et al. 2015; Yin et al. 2014). There are studies showing that users in Yelp who have high social connectivity and contribute greatly to the site (Crain et al. 2016) will be awarded as “Elite” users, meaning they are typically more involved in the community and provide more explanatory information (Tucker 2011). The influence of top reviewers in Yelp also has almost twice as much impact on business revenue as non-elite members (Luca 2011). Although a

certain number of studies has demonstrated the influence of top reviewers through their reviews, there is limited research on understanding the underlying characteristics that differentiate top reviewers from ordinary reviewers. Hence, our primary research question would be whether top reviewers write their reviews differently compared to ordinary reviewers, and if so, in what ways are they different?

Drawing on literature in computational linguistics, this study aims to explore the cognitive, emotional, and language processes involved in the writing of top reviewers and how they are different from those of ordinary reviewers. In particular, this study focuses on four summary variables that have demonstrated predictive power in language research (Cohn et al. 2004; Kacewicz et al. 2014; Newman et al. 2003; Pennebaker et al. 2014): (1) analytical thinking, (2) emotional tone, (3) authenticity, and (4) clout. By studying the difference between top reviewers and ordinary reviewers in terms of these processes and variables, it furthers our understanding on how top reviewers exert their influences on consumer decisions via their writing.

Theoretical Background and Hypotheses

A number of online review platforms enable users to vote for the review they find helpful in their decision making. Research in online consumer review has examined the considerable influence of multiple characteristics from both the review message and the reviewer perspectives.

Review Helpfulness

From the review message perspective, prior researches attempted to evaluate both quantitative and qualitative characteristics on review helpfulness. In general, longer and more readable reviews were found to be more helpful (Chua and Banerjee 2014; Kang and Zhou 2016; Kuan et al. 2015, Liu and Park, 2015; Mudambi and Schuff 2010). Rating extremity is another characteristic that was found to affect review helpfulness. While extreme ratings are generally considered more helpful (Danescu-Niculescu-Mizil et al. 2009; Forman et al. 2008), the effect depends on the product type, with extreme ratings for experience goods being less helpful than those for search goods (Hong et al. 2017; Mudambi and Schuff 2010). Another characteristic is the emotion embedded in the review, with positive emotional reviews found to be more helpful in some studies (Liu and Park 2015; Ullah et al. 2015), but negative emotional reviews were found to be more helpful in other studies (Yin et al. 2013; Kuan et al. 2015)

From the reviewer perspective, past works are consistent on the argument that the credibility, expertise and reputation of the reviewers have significant positive effects on the helpfulness perception (Hong et al. 2017; Liu and Park 2015; Zhu et al. 2014; Park and Nicolau 2015; Cheng and Ho 2015). Except for the number of reviews people have written, one common way studies used to measure one's expertise is being identified as expert users by online websites using labels such as "elite", "top reviewer", etc. For example, Yelp awarded "Elite" badge to reviewers who were actively participating in online events and have gained reputation in the community. The "Top 10000 reviewer" on Amazon is also a clear signal of being an expert in the field of writing reviews. Numerous studies have validated that writings by those "elitists" and "top reviewers" are more likely to be voted as helpful. (Baek et al. 2012; Guo and Zhou 2017; Kuan et al. 2015; Yin et al. 2014). The basic idea is being labeled as "top reviewer" or "elite" provides a heuristic cue that the reviews written by the user are likely to be helpful (Chaiken et al. 1989).

Linguistic Characteristics of Reviewers

Although the great influence of top reviewers has been acknowledged, little is known regarding the features that differ them from others. Therefore, this study aims to explore the underlying characteristics of top reviewers that make them perceived as more helpful than ordinary reviewers. Specifically, we draw on literature in computational linguistics to analyze the linguistic features of reviews written by top reviewers, including the writing style and the use of words.

Computational linguistics attempts to provide an efficient and effective method for studying the emotional, cognitive, and structural components present in a person's writing (Pennebaker et al. 2015). In fact, computational linguistic has been applied into different studies for understanding people's psychological activities, because the functional and emotional words that people use provide important

psychological implications for their thinking processes, emotional states, intentions and motivations (Tausczik and Pennebaker 2010). Based on the writing text or speaking words, people's underlying state of mind can be inferred and thus their personal characteristics can be summarized.

Among the most commonly used computational linguistics software, Linguistic Inquiry and Word Count (LIWC) has been shown to be a useful tool in online review research. For example, Yang et al. (2015) introduced psychological process containing relativity, cognitive process, positive emotions in LIWC into their models, achieving more accurate prediction on the review helpfulness. The positive and negative emotion indicators in LIWC were also adopted in the study from Ngo-Ye, Sinha and Sen (2017) for the review helpfulness forecast. Additionally, sentiment scores from LIWC were employed in understanding the relationship between sentimental tone and review helpfulness (Agnihotri and Bhattacharya 2016)

Language Summary Variables

LIWC analyzes a written text based of word usage in different categories in terms of linguistic dimensions (e.g., pronouns, articles, prepositions), grammar (e.g., verbs, adjectives, comparisons), psychological processes (e.g., positive emotion, negative emotion, social processes), etc. In addition, based on the combination of word usage in these categories, LIWC provides four language summary variables: analytical thinking, clout, authenticity and emotional tone (Pennebaker et al. 2015). The four variables have been shown to be indicatives of college success (Pennebaker et al. 2014), psychological responses to emotional upheavals (Cohn et al. 2004), deception predict (Newman et al. 2003) and social hierarchies (Kacewicz et al. 2014). The four language summary variables are used in this study to explore the linguistic characteristics of top reviewers that differentiate them from ordinary reviewers.

Analytical Thinking

Analytical thinking, as a writing style, is related to the use of analysis or logical reasoning. Higher analytical thinking is associated with more formal and logical text. Analytical thinking is measured in LIWC by identifying formal, logical and hierarchical thinking patterns in text based on function words (e.g., pronouns, articles) and grammar words (e.g., prepositions, conjunctions) (Pennebaker et al. 2014). People low in analytical thinking tend to write and think using language in a more narrative, informal, and personal ways (Pennebaker et al. 2001).

Past studies show that people strong in analytical writing will engage in more evaluation and reflection, more high-level planning and questioning (Durst 1987; Rivard 1994), representing that more diagnostic values can be found in analytical writing. This is in line with researches in online consumer reviews that looked at review helpfulness in terms of information diagnosticity (Jiang and Benbasat 2004; Lee and Youn 2009; Mudambi and Schuff 2010). Specifically, reviews that are more diagnostic are considered to be more helpful, and analytical writing which contains diagnostic information is generally deemed to be helpful. Hence, we hypothesize that:

H1: Elite users exhibit more analytical thinking in their reviews than non-elite reviewers.

Emotional Tone

Emotion or valence is a subjective feeling that people perceive pleasantness or unpleasantness (Barrett 1998). The aim of emotional writing is to provoke emotional reactions with the audience. Emotional tone is measured in LIWC based on positive and negative emotions, social processes, and causation expressed in the writing (Cohn et al. 2004). It combines both positive and negative emotion dimensions into a single summary variable with a higher (lower) emotional tone indicates a more positive (negative) tone.

In the context of online consumer reviews, some studies found negative reviews to be more helpful, while some studies found that positive reviews to be helpful (Schindler and Bickart 2012; Agnihotri and Bhattacharya 2016), and other studies argued that users should find an emotional review useful regardless whether it is a positive or negative review. (Hu et al. 2014; Salehan and Kim 2016). In terms of the tone used in writing, the use of an overall positive emotional tone in the writing should be more helpful (Schindler and Bickart 2012). The is because the positive information in valence evaluation is more consistent with the preference of a customer who has pre-decision, conveys excitement and

enthusiasm, provides validation for users' interests, simplifies the decision process and thus can be perceived helpful (Russo et al. 1998; Schindler and Bickart 2012). As a result, we hypothesize that:

H2: *Elite users exhibit more positive emotional tone in their reviews than non-elite users.*

Authenticity

Authenticity is primarily concerned with credibility and trustworthiness. Authenticity in LIWC detects whether people express in an authentic or honest way. Communication research shows that when people reveal themselves in an authentic or honest way, they are more personal, disclosed, and vulnerable (Pennebaker et al. 2015). Their writings are likely to establish a relationship between themselves and their stories, to take responsibilities for their behavior. Conversely, people involved in deceptive communication tends to distant themselves by using fewer first and third person singular pronouns, more negative words, etc. (Newman et al. 2003).

We argue that trustworthy and credibility of users can be inferred from authentic writing. People with an authentic writing style would be considered to have high credibility and be generally trusted by others (Chaiken et al. 1989; Chen and Chaiken 1999). Given that the reviewer's credibility have a positive and remarkable effect on review helpfulness and information adoption (Filiari 2015; Forman et al. 2008; Chua and Banerjee 2014), reviews in authentic writing with certain trustworthy and credibility will consequently have similar positive effects, which leads to the hypothesis:

H3: *Elite users exhibit stronger authenticity in their reviews than non-elite users.*

Clout

Clout refers to the relative social status, confidence, or leadership that people display through their writing or talking. In LIWC, a high degree in clout indicates a writing style that is high in confidence, leadership and social status, whereas a low degree of clout number suggests a more tentative and humble style in the writing (Pennebaker et al. 2001).

Previous studies have shown that confidence is positively correlated with the expertise in a particular field (Trafimow and Sniezek 1994; Sniezek and Van Swol 2001). Hence, opinion leaders, as members with higher confidence in online forums, probably incorporate more expertise views in the text, showing their certainties on the information they present. The delivery of this kind of confidence can be reflected by the expertise revealed in their writing. Linking to the claim that the expertise of the reviewer has significant positive effect on the helpfulness perception (Liu and Park 2015; Zhu et al. 2014; Park and Nicolau 2015), the confidence of the reviewers that comes with the expertise also has a positive effect. This leads us to hypothesize the following:

H4: *Elite users exhibit stronger clout in their reviews than non-elite users.*

Methodology

Data Collection

Yelp, the largest review forum in the U.S. connecting local residents with local businesses, was selected to conduct our research and analysis. The dataset includes information about local businesses in 10 metropolitans across 2 countries from October 2004 to early July 2018. However, to control for the difference in elite status over the years and the potential change in linguistic characteristics in the reviews, we focus on the reviews by users joining Yelp on or after 2017 and having at least one review count. Hence, the sub-sample included in this study consists of 1,033 elite users who gained elite badge in 2017 or 2018 and 105,682 non-elite users who did not. The number of review records we obtained in 2017 and 2018 written by those particular elite users and non-elite users are 20,462 and 199,095 respectively.

Measures

In our research, we regard the elite status as our binary dependent variable where each elite user was labeled as 1 and non-elite user was labeled as 0. Other independent variables can be classified into user

level variables and review content level variables. Table 1 provides a summary of the descriptive statistics of the data.

	Variable	Elite users		Non-elite users		T-stat	P value
		Mean	S.D.	Mean	S.D.		
Review content level independent variables	WC	135.200	95.357	83.300	83.222	74.935	< 0.001
	Readability	6.727	2.242	6.751	2.641	-1.473	0.141
	Rating Extremity	0.778	0.643	1.072	0.857	-60.083	< 0.001
	Analytical	56.951	23.672	51.387	26.839	31.602	< 0.001
	Tone	82.280	24.355	74.166	34.263	43.445	< 0.001
	Authentic	46.109	28.379	46.530	32.604	-1.993	0.046
	Clout	50.871	23.362	54.748	27.242	-22.236	< 0.001
	Days	205.500	137.533	267.700	151.156	-61.014	< 0.001
	N	1,033		105,682			
User level independent variables	Review count	19.808	33.124	1.884	2.794	17.392	< 0.001
	Num of friends	108.180	160.142	32.752	76.387	15.121	< 0.001
	Num of fans	5.670	11.649	0.052	0.379	15.501	< 0.001
	Total useful	32.378	225.212	0.736	2.398	4.516	< 0.001
	Total funny	10.340	89.546	0.169	1.205	3.651	< 0.001
	Total cool	21.512	192.281	0.189	1.161	3.564	< 0.001
	Average useful	1.079	2.425	0.381	1.324	9.238	< 0.001
	Average funny	0.398	2.039	0.083	0.701	4.975	< 0.001
	Average cool	0.657	1.949	0.082	0.390	9.471	< 0.001
	Tenure	401.839	99.649	386.519	102.902	4.916	< 0.001
	N	20,462		199,095			

Table 1. Descriptive Statistics

On the user level, we will inspect the following variables: 1) Review_count: the total number of reviews the users have written. 2) Num_of_friends: the number of friends they have. 3) Num_of_fans: the number of followers they have. 4-6) Total_useful/Total_funny/Total_cool: the number of useful/funny/cool votes they have received for their reviews in 2017 and 2018 from the given dataset. 7-9) Average_useful/Average_funny/Average_cool: the number of average useful/funny/cool votes they have received for their reviews in 2017 and 2018. 10) Tenure: days from their joining date to 02-07-2018(i.e., the data collected date). Consistent with previous research, elite users have much more useful/funny/cool votes in total from the t-test results. Compared with non-elite users, elite users also have certain advantages on average votes per review.

On the review level, we control features as following: 1) WC: the number of the words in the review. 2) Readability: Coleman-Liau index, with a smaller number indicates simpler and more readable text. 3) Rating Extremity: the absolute difference of review star rating and existing business star rating. 4) Analytic: "Analytic" value in LIWC suggesting formal and logical thinking patterns. 4) Tone: "Tone" value in LIWC suggesting positive or negative emotion preference. 5) Clout: "Clout" value in LIWC suggesting leadership and confidence. 6) Authentic: "Authentic" value in LIWC suggesting a more personal, honest and true text. 7) Days: days from the reviews date to the data collection date.

Research Model

To test our hypotheses on the differences between elite users and non-elite users, we adopt the following logistic regression models to examine the relationship between elite and non-elite users in terms of the review characteristics.

$$\text{Model 1} = \text{label} \sim \text{WC} + \text{Readability} + \text{Rating Extremity} + \text{Days}$$

$$\text{Model 2} = \text{label} \sim \text{WC} + \text{Readability} + \text{Rating Extremity} + \text{Analytic} + \text{Tone} + \text{Authentic} + \text{Clout} + \text{Days}$$

Preliminary Result

The results of the logistic regression models are summarized in Table 2. As shown in Model 2, reviews by elite users are found to be significantly higher in analytical thinking and more positive in emotional

tone than those by non-elite users. Hence, H1 and H2 are supported. Interestingly, contrary to H3 and H4, reviews by elite users are lower in authenticity and clout. Hence, H3 and H4 are reversely supported.

	Model 1		Model 2	
	Coef.	S.E.	Coef.	S.E.
Analytic			8.902 ***	0.309
Tone			11.148 ***	0.318
Authentic			-2.771 ***	0.280
Clout			-10.168 ***	0.336
WC	5.443 ***	0.068	6.295 ***	0.074
Readability	-19.508 ***	3.429	-31.026 ***	3.454
Rating Extremity	-593.774 ***	10.616	-471.985 ***	11.284
Days	-2.835 ***	0.052	-2.812 ***	0.053
McFadden		0.086		0.108
Cox & Snell (ML)		0.052		0.065
Cragg & Uhler		0.112		0.140

*We rescale the coefficients and standard errors by dividing each variable by 1000 when building the model. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$*

Table 2. Results of Logistic Regression Models

Discussion

Our results suggest that elite users involve in more formal, logical thinking patterns and more positive overall tone when writing reviews, presenting information in a coherent and consistent way with positive attitudes. This could be one of the reasons why their reviews are perceived as more helpful.

Interestingly, elite users were found to have a lower authenticity in their reviews than non-elite users. However, it does not necessarily mean elite users are providing fake reviews. Given how analytical thinking is measured in LIWC (Newman et al. 2003), the lower authenticity is possibly due to the fact that elite users have a lower usage of the first person singular pronouns (e.g., I) and third singular pronouns (e.g. she, he), and a higher usage of motion words (e.g., go, walk, carry), which are often associated with deceptive communication. However, in the context of online consumer reviews, lower use of first and third singular pronouns may simply mean that elite users are more likely to speak from an objective perspective because they talk more about the objects rather than people in their reviews, such as the service and the food, resulting in a low value in authenticity according to LIWC. Moreover, motion words in LIWC are regarded as simple and concrete descriptions that are more readily accessible when fabricating information, but the high use of motion words in elite users can be attributed to their preferences on plain and common words, bringing high readability to their texts, though at the same time losing some authenticity unexpectedly.

Besides, elite users were also found to have lower clout in their reviews than non-elite users. Given how clout is measured in LIWC (Kacewicz et al. 2014), one probable interpretation for the lower clout for elite users is that reviews by elite users are generally more humble than those non-elite users. In fact, the more use of tentative words (e.g., maybe, perhaps, guess) by elite user brings about this humble and tentative style, which may be one of the reasons for the lower clout. In addition, the lower clout for elite users may be due to the lower use of personal pronouns (especially the first person plural) relative to impersonal pronouns (e.g., it, its) compared to non-elite users. In the context of online consumer reviews, it may suggest that elite people focus more on the businesses whereas non-elite users focus more on the people.

Below are examples of review by non-elite user high in authenticity and clout and review by elite user high in analytical writing and emotional tone respectively.

Non-elite: “... *We arrived at 5:20pm and were told a 30 minute wait. We have a small child so at 6:30pm when we still hadn't been called we asked and they said we were next and a table was being cleared. Which they then sat a different group at and left us waiting...*”

Elite: “*This walk up crepe stall in the Paris hotel... I had the ham and cheese. The filling was thick and had a nice salty ham. It was grilled nicely and had a tasty benchmark sauce. Overall it is a good value and place to grab a late night bite if staying in the Paris...*”

Summary

This study examined the difference between elite and non-elite users in terms of analytical thinking, emotional tone, authenticity, and clout. Our findings suggest that reviews by elite users are higher in analytical thinking, more positive in emotional tone. However, they are lower in authenticity and clout, which may be interpreted as being more humble and business-focused. Further analyses are undergoing in order to gain a better understanding of the findings.

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