Comparison of Deceptive and Truthful Travel Reviews

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Abstract

As the use of online reviews grows, so does the risk of providers trying to influence review postings through the submission of false reviews. It is difficult for users of online review platforms to detect deception as important cues are missing in online environments. Automatic screening technologies promise a reduction in the risk but need to be informed by research as to how to classify reviews as suspicious. Using findings from deception theory, a study was conducted to compare the language structure of deceptive and truthful hotel reviews. The results show that deceptive and truthful reviews are different in terms of lexical complexity, the use of first person pronouns, the inclusion of brand names, and their sentiment. However, the results suggest that it might be difficult to distinguish between deceptive and truthful reviews based on structural properties.

Keywords: hotel reviews; deception; false; truthful; detection.

1 Introduction

It is increasingly common for individuals to read about product experiences of other consumers on the Internet (Schlosser, 2005), and also to write and share their own experiences. According to eMarketer (2007), about 75.2 million online users use CGC today in the US, and this number is expected to grow to 101 million by 2011. These online consumer-generated opinions are especially important for hospitality and tourism, whose intangible products are difficult to evaluate prior to their consumption and whose consumers thus rely heavily on word of mouth (Litvin et al., 2008). Recent reports found that nearly 50% of travel purchasers visited a message board, forum, or online community for their online travel purchasing (Compete, Inc 2006).

While growing numbers of consumers take advantage of online opinions generated by experienced other consumers, these new communication venues also create new opportunities for deception. Popular press articles have identified deception as a real risk for travel Websites and their users (Elliott, 2006). There are clear incentives for businesses, especially small providers, to influence consumer-generated reviews as they can have great impacts on the success of an establishment (Bhatnagar, 2006). While consumers appear to be rather sophisticated in their ways of trying to identify false reviews through judging the level of detail and polarity (Gretzel, Yoo & Purifoy, 2007), travel review providers see a great need to monitor reviews submitted to their

sites (Reiter, 2007). Their techniques range from labour-intensive detection by human editors and reliance of consumers to spot suspicious reviews to automatic scanning of reviews, applying allegedly sophisticated algorithms (Elliott, 2006).

Deception is defined as "a message knowingly transmitted by a sender to foster a false belief or conclusion by the receiver" (Buller and Burgoon, 1996, pg. 205). Traditional deception research has taken place in face-to-face communication settings where deception receivers have access to both verbal and non-verbal cues to evaluate a potential deceiver. Contrary, in online environments, it is difficult to identify and access a rich set of cues in order to detect deception and, consequently, mechanisms used in face-to-face communication do not apply or only to a limited extent (Zhou & Sung, 2008). The restricted access to deceptor cues makes online deception easier to accomplish and more challenging to detect. Especially, online product reviews provide an easy setting to create deceptive messages since most review sites do not have specific restrictions on posting reviews and require little additional information. Accordingly, review readers often appear to be concerned with untrustworthy or biased information when they receive other consumers' opinions online (Schindler & Bickart, 2005).

Online deception has been studied for a variety of online communication types, including emails and online communities (Zhou & Sung, 2008; Hancock et al., 2005). However, online reviews are different from previously examined types of eWOM communication since they represent one-to-many communication (Litvin et al., 2008) and typically one-way information flows (Schindler & Bickart, 2005). The specific characteristics of consumer reviews, in particular travel reviews, need to be taken into account in order to better understand deception and the potential for its detection. Consequently, a study was conducted to investigate the differences between deceptive hotel reviews and truthful hotel reviews.

2 Background

2.1 Online Consumer Reviews

Online consumer reviews are an independent information resource with growing popularity and importance, especially in the context of travel (Yoo & Gretzel, 2008). Chatterjee (2001) noted that consumer reviews and ratings are the most accessible and prevalent form of eWOM. Over 30 percent of Internet users have rated products online (Pew Internet & American Life Project, 2006) and 70 percent of US adults currently use consumer product ratings and reviews (Forrester, 2006). According to the typology of eWOM channels provided by Litvin et al. (2008), consumer reviews have characteristics in terms of communication scope and level of interactivity that are different from other forms of online communication. Consumer reviews are asynchronous while instant messaging is synchronous and consumer reviews constitute one-to-many communication while emails and instant messaging are most often one-to-one or one-to-few types of communication. In addition, information flow

is often one-way in online review sites since many sites do not allow interaction between writers and readers (Schindler & Bickart, 2005).

Consumer reviews are perceived as particularly influential because they are written from a consumer's perspective and, thus, provide an opportunity for indirect experience (Bickart & Schindler, 2001). They are also perceived as more credible than information provided by marketers (Smith, Menon & Sivakumar, 2005). However, at the same time, online consumer reviews also provide an opportunity for deception since they can be generated without specific author information such as a real name or photo (Fogg et al., 2001) and are submitted by a source that has little or no relationship with the message receivers (Schindler & Bickart, 2005). This absence of source cues (Jin et al., 2002; Smith et al., 2005) challenges review readers in their effort to detect and distinguish deceptive reviews from truthful reviews.

In addition, while online travel agencies can make sure that only customers with actual booking records can submit reviews (Reiter, 2007), it is often the case on travel review sites like TripAdvisor that consumers booked the hotel somewhere else but then leave comments on the review site (O'Conner, 2008). For those providers who do not have the luxury of backing reviews up with transactional data, detecting deception has become an important necessity in order to maintain usefulness and credibility of the content provided on their sites.

2.2 Deception in Online Environments

Online environments are usually not capable of supporting high-bandwidth interactions and the majority of online communication technologies are only text-based messages which filter out certain informational cues such as nonverbal cues, which are particularly important in the context of deception (Carlson et al., 2004). Indeed, past research has found that humans are less able to detect deception in visible lies compared to audible lies (Bond & DePaulo, 2006). Reduced cues in online communication may actually provide a fertile venue for deception (Donath, 1999) and deception detection in online environments is more challenging than in other settings (Zhou & Sung, 2008). Difficulties in detecting deception in online environments have been discussed quite extensively in the literature (Jin et al., 2002; Smith, Menon & Sivakumar, 2005; Dellarocas, 2006). On the other hand, deception detection can potentially be easier as technology can be used to automatically scan contributions and detect irregularities. Consequently, identifying cues embedded in deceptive text is critical for successful deception detection (Zhou & Sung, 2008).

2.3 Detecting Deception in Online Communication

A number of studies have tried to investigate the differences between deceptive messages and truthful messages for the purpose of successful deception detection (Zhou et al., 2004; Zhou & Sung, 2008; Burgoon et al., 2003; Hancock et al., 2005). Zhou et al. (2004) compared deceptive emails with truthful emails and found significant differences in the language structure of the emails. Hancock et al. (2005) compared messages from liars to those from truth tellers and suggested that the

messages are different in terms of number of words, use of pronouns and use of terms that described the senses. Burgoon et al. (2003) suggest that deceptive senders of messages display higher 1) quantity, 2) nonimmediacy, 3) expressiveness, 4) informality, and 5) affect; and less 6) complexity, 7) diversity, and 8) specificity of language in their messages. Similarly, a recent study by Zhou and Sung (2008) suggested major categories of verbal cues to deception. Those are quantity, language complexity, language diversity and non-immediacy. While these studies were focused on text-based verbal cues, Zhou (2005) broadened knowledge of deceptive behavioural cues to nonverbal indicators, namely keyboard-related, participatory and sequential behaviours. For example, instant messaging participation behaviour was measured by number of turns, average pause intervals and response latency.

Findings in online deception studies are contrary in some aspects but similar in others to findings from face-to-face communication research. Interpersonal deception theory (Buller and Burgoon, 1996) argues that deceivers generally use fewer words and sentences also give less detail in their message to avoid being caught. Contrary to this, the study by Zhou et al. (2004) found that deceptive email senders created longer messages than truth-tellers. But similar to traditional deception studies, they found that deceivers provided less complex and less diverse messages. In addition, Hancock et al. (2005) found that liars produced more words, used more "other" pronouns like he, she or they and used more terms that described the senses such as "see", "hear" and "feel". Thus, general communication and deception theories seem to apply to online deception, at least as far as verbal cues are concerned. While these studies extend our general knowledge regarding online deception, travel review-specific research is needed to better inform the providers of travel review sites.

2.4 Deceptive Travel Reviews

Bhatnagar (2006) reports that ratings that look too good to be true are suspicious; in addition, reviews that note a negative aspect but mitigate the negative experience and indicate repurchase desire raise red flags. Keates (2007) suggests that fake travel reviews are likely those for which ratings differ greatly from the average rating, which mention nearby properties as superior, and which are submitted by a user who has written about only one hotel and visited the site once, on the date the review was posted. Based on Dellarocas' (2003) assumption that source credibility is a function of the number of reviews posted, O'Connor (2008) shows that single review postings on TripAdvisor.com are indeed doubtful in that they are more likely to contain extreme ratings. While O'Connor's study provides an important insight in detecting deceptive travel reviews, other deception cues have yet to be tested in the context of travel reviews. Especially cues related to the text structure could be easily identified by automatic scanning programs. Therefore, a study was conducted to test structural cues previously identified for deception in online communication.

3 Methodology

Following definitions of deception that emphasize "intention to deceive" as a critical element (Masip, Garrido & Herrero, 2004), a deceptive review was defined as a review that was written with the intent to mislead its readers. Thus, reviews that contain false information caused by the ignorance or misinformation of a reviewer do not count as deceptive reviews, although they may be false reviews. For the context of the study, deceptive reviews were further defined as being written by the individual hotel provider for the purpose of promoting their business. Negative reviews written by competitors or positive reviews written by consumers who were provided with specific incentives to engage in this behaviour were not taken into account as it was not possible to simulate these behaviours in the context of the experiment. On the other hand, truthful reviews were defined as reviews that were posted on the review platform. While there is of course no guarantee that those reviews were indeed truthful, they had gone through a screening process and were perceived as being truthful by the site editors. The study was conducted in the context of hotel reviews, as they are the most prominent review category in travel and are perceived as having the greatest impact by travellers (Gretzel, Yoo & Purifoy, 2007). Specifically, the study focused on TripAdvisor.com, as it is the most prominent online hotel review platform currently available (Yoo & Gretzel, 2008).

3.1 Hypotheses

Based on Zhou and Sung's (2008) study, structure was defined as encompassing 1) quantity; 2) complexity; 3) diversity; and 4) non-immediacy. Quantity refers to the total number of words included in the review. Since the findings from the literature are contradictory with respect to quantity, it was assumed that hotel providers would try to write more to be more convincing and promote more aspects of their hotel. Complexity was operationalized as lexical complexity, i.e. the average word length. Diversity refers to the ratio of the total number of unique words to the total number of words in the review. Last, non-immediacy involves self-reference and, thus, was measured as the total number of first person singular and plural pronouns used in a review (i.e. I, me, my, mine, myself, we, us, our, and ourselves) divided by the total number of words. The following hypotheses were formulated for these structural properties:

H1: Deceptive reviews contain more words.
H2: Deceptive reviews are less complex.
H3: Deceptive reviews are less diverse.
H4: Deceptive reviews contain less self-references.

Also, it was assumed that hotel reviewers would be particularly concerned with identifying their property and engaging in branding. Branding effort was defined as the number of times the hotel brand was mentioned. The following hypothesis was developed to test this assumption:

H5: Deceptive reviews contain a greater number of references to the hotel brand.

In addition, previous studies indicate that deceptive messages differ from truthful messages in terms of their sentiment. Newman et al. (2003) argued that deception should be characterized by more words reflecting negative emotion while Zhou et al. (2004) found that deceivers display more positive affect in order to mislead. Since in this study, fake reviews are intended to position a hotel positively, the following hypotheses were developed:

H6: Deceptive reviews contain a greater percentage of positive words.
H7: Deceptive reviews contain a smaller percentage of negative words

3.2 Data Collection

Deceptive hotel reviews were collected from a group of tourism marketing students at a University in the United States. Most students had taken several marketing-related courses and many had real-world work and particularly marketing experience in hotels. The students were instructed to write a hotel review for a specific property from the perspective of a hotel manager who wanted to promote the hotel. They were told that the review needed to be convincing and realistic. They were not informed about the goal of their assignment. The reviews were written for a Marriott hotel next to an airport. This hotel was selected as none of the students had actually stayed there but they knew the destination and the hotel brand well enough to fake a review. Also, this specific property had a significant amount of reviews posted on TripAdvisor.com. The text of these truthful reviews was extracted from the TripAdvisor.com Website since Tripadvisor employs a team trained in fraud detection to monitor fake reviews and also has software which continually tracks the reviews for anomalies (Fearis, 2007; Reiter, 2007). Reviews were coded as either deceptive or truthful based on their origin (student-derived or from TripAdvisor.com). Data collection occurred in April 2008. A total of 42 deceptive and 40 truthful reviews were collected and analysed.

3.3 Analysis

The unit of analysis was a single hotel review. Quantity and complexity were measured using the word count tool in Microsoft Word. The frequencies of unique words, of pronouns, and of references to the brand were established using CATPAC (Woelfel & Stoyanoff, 1993). One of the major limitations of CATPAC is that it is limited to detecting 160 unique words. In a small number of cases, this word limit was exceeded. Since the hypotheses assumed that the deceptive reviews would be longer, there was a concern of under-representing those. However, only two deceptive reviews were affected and the difference between 160 and counts of the real amount of unique words was very small. The percentages of positive and negative words were measured using *General Inquirer*, a computer assisted tool for content analysis (Stone et al., 1966). An inherent problem in computer-assisted content analysis is that high-frequency words have different meanings in different contexts and thus may belong to several tag categories (Scharl, Pollach & Bauer, 2003; Stone et al., 1966). To avoid this potential problem, analysed positive and negative words were carefully rechecked in the original review context. Differences between deceptive and truthful reviews were tested using independent sample t-test statistics.

4 Results

Descriptive statistics for the various structural properties of reviews are presented in Table 1. They show that reviews come in various forms and shapes, especially as far as length is concerned. Deceptive reviews were between 45 and 374 words long, while truthful reviews ranged from 46 to 595 words.

Hypothesis 1 tested for differences in the length of the review based on quantity, i.e. the total number of words. The t-test showed that there was no significant difference between deceptive and truthful reviews with respect to quantity (Table 2). Hypothesis 2 assumed less complexity in deceptive reviews. A significant difference was found, but the results showed greater complexity in the writing of deceptive reviews. Hypothesis 3 tested for differences in diversity as the ratio of unique words to total words. No significant difference was found. Hypothesis 4 tested the immediacy hypothesis using a ratio of number of first person pronouns to total words. The results were significantly different; however, the results indicate that deceptive reviews are more likely to include self-references.

Table 1. Descriptive Statistics

Structural Property	Mean		Std. Dev.		Minimum		Maximum	
	D	T	D	T	D	T	D	T
Quantity	164.24	202.3	72.77	143.63	45.00	46.00	374.00	595.00
Complexity	4.63	4.43	.32	.30	4.10	3.94	5.55	5.19
Diversity	62.76	61.02	9.0	15.8	42.78	10.59	83.33	84.62
Immediacy	6.49	4.73	3.20	2.60	.00	.00	13.33	14.29
Branding	1.83	1.00	1.75	1.09	.00	.00	11.00	4.00
Positive Sentiment	8.57	4.66	3.17	2.07	2.50	1.06	22.22	9.80
Negative Sentiment	1.53	2.96	1.21	1.86	.00	.00	5.48	9.61

D=Deceptive; T=Truthful

A big difference was found regarding the use of the brand name. Almost all (90.5%) of the deceptive reviews mentioned the brand name while only 62.5 percent of the real reviews included a reference to the brand. Only 22.5 percent of the truthful reviews mention the brand more often than once while 47.6 percent of the deceptive reviews mention the brand at least twice. This difference was significant, therefore Hypothesis 5 was supported. Hypotheses 6 and 7 were tested using a ratio of number of positive and negative words to total words. Deceptive reviews contain on average 8.6 percent of positive words while truthful reviews include only 4.7 percent. Contrary, deceptive reviews have on average only 1.5 percent of negative words while truthful reviews contain 3 percent of negative words. The t-test results

confirmed the differences were highly significant, thus Hypothesis 6 and 7 were supported. Overall, the findings provide greater support for the hypotheses that were concerned with content rather than actual structural properties, except for complexity.

Table 2. T-Test Results

Structural Property	Mean Difference	Std. Error Difference	p-value	Hypothesis
Quantity	-38.06	24.97	.131	Not supported.
Complexity	.20	.07	.005	Supported, but reverse
Diversity	1.74	2.82	.539	Not supported
Immediacy	1.76	.65	.008	Supported, but reverse
Branding	.83	.32	.012	Supported
Positive Sentiment	3.91	.59	.000	Supported
Negative Sentiment	-1.42	.35	.000	Supported

5 Conclusions

All marketers are liars (Godin, 2005). The findings of the study presented in this paper suggest that marketers are indeed pretty good liars. No differences were found regarding the quantity and lexical diversity of the reviews while greater lexical complexity, the mentioning of brand names, the more frequent use of first person pronouns as well as positive sentiment revealed the deceptive reviews. While text data can be easily parsed to analyze structural properties, content analysis is far more complex. Especially identifying brand names would be a daunting task for a platform like TripAdvisor that, according to its Website, at present features reviews for over 230,000 hotels. Sentiment analysis is also a challenge but research has made progress in terms of sentiment classification and more automated approaches have evolved.

The findings stand somewhat in contrast to previous findings regarding deception, especially as far as the directionality of the relationships is concerned. It seems that deception is different in the case of reviews, where communication happens in an asynchronous manner and liars can actually review real comments, extensively deliberate on their writing, can model their writing after reviews posted by others, and are likely professionals with copy writing experience. This suggests that it is indeed necessary to study deception specifically in the context of reviews.

While this study tested several aspects of reviews, there are clearly more properties of reviews that could be analyzed regarding the source as well as the text of the review. Also, the properties were tested in isolation. Algorithms could be developed to red flag reviews which score suspiciously on a number of the features. Each one of the

indicators might not be alarming by itself, but the sum of such indicators might be. More research is needed to identify additional properties and their interrelationships before the automation of deception detection can be truly supported.

While the subjects who wrote the deceptive reviews had marketing experience and some also hotel management experience, the reviews they wrote were not for a property they worked for. Thus, the deception condition was artificial. However, one can expect that those who work for the hotel would be even better liars about the property, making it even more difficult to detect their submissions based on the structural criteria identified in the literature. In addition, although a major metropolitan city was chosen as the setting for the research, none of the hotels had a substantial number of reviews. This clearly limited the sample size. Additional studies are needed to confirm the specific study findings. In particular, other hotel properties and other types of hotels need to be included to be able to generalize the findings.

With the growing popularity of online consumer reviews, it will become ever more important to ensure that contents posted are credible. While it is valuable to detect deception on such sites that is initiated by marketers, it is also important to encourage consumers to provide accurate information. In the end, it seems that it is equally important to educate hoteliers that they hurt their business if they lure in customers and then cannot deliver to meet the expectations of these people. By posting deceptive reviews, hoteliers seek to attract consumers that would not have been attracted otherwise. However, this could also mean that consumers who should not be attracted might become patrons.

Online deception is a complex topic and should be expanded to all kinds of communication methods available, including avatars. As social networking sites increasingly merge with virtual worlds, users might eventually be able to provide reviews in a virtual environment that can support different forms of source cues and make the detection of deception easier.

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