Linguistic Predictors of Trust in Online Reviews: Empathy, Analytic Thought, and Doubt

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Abstract

Using a randomly drawn sample of Yelp reviews, (N = 7548), this study tested four hypotheses regarding trust in reviews. Trust was operationalized as the amount useful votes. The hypotheses stated that (*i.*) the use of perceptual semantics in the review positively relates to trust, (*ii.*) emotional expression in the review has an inverted u-relationship with trust, (*iii.*) show of analytic thought in the review positively relates to trust, and (*iv.*) show of doubt in the review negatively relates to trust. A hierarchical regression found no significant relationship between perceptual semantics, analytic thought, and doubt on the hand, and trust on the other hand. However, the results showed a significant negative linear relationship between emotional expression and trust. An exploratory analysis indicated that the effect differs per type of emotion. Respectively, positive emotions are negatively related with trust whilst negative emotions are positively related with trust. The limitations scrutinize the interpretation of useful votes and propose for future research to investigate what it means to vote on a review.

Keywords: analytic thought, doubt, empathy, linguistics, online consumer reviews, trust

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Via a correlational data analysis, this field study aims to distil the relationship between perceptual semantics, emotional semantics, analytic thought, and tentative semantics on the one hand, and trust in Yelp reviews on the other hand. An online consumer review, a form of electronic word-of-mouth, offers consumers a unique source of information. Consumers can use a review to infer qualities of a consumption good that otherwise could only be established post-purchase. However, it seems rather unique that the reader trusts the review. Uncertainty reduction theory (Berger & Calabrese, 1975) proposes that trust is obstructed by the combination of the absence of an interaction history between consumer and reviewer on the one hand, and the inevitable anonymity of the reviewer in an online context on the other hand. Logically, the question follows: Why do consumers trust reviews? Or specifically, which reviews do consumers trust?

The question of which reviews do consumers trust can be answered by dissecting the review in the related yet dissimilar reviewer and review (Roberts, 2010). One might trust the information based on textual cues indicative of the potential trustworthiness of the reviewer, yet one might also trust the review itself based on its quality (Yi, Yoon, Davis, & Lee, 2013; Paglieri et al., 2014). Regarding the trust in the reviewer, trust entails interpersonal trust. Therefore, this study investigates the influence of empathy because it plays a big role in interpersonal trust (Ross & Young, 2009). Since empathy is inherently latent, the study focuses on the linguistics that might lead to the experience of empathy and thereby foster trust. These linguistic concern perceptual semantics and emotional expression. Regarding trust in the review, one trusts in the review's reliability. This study proposes that show of analytic thought and doubt may influence the perceived quality of the information, and in turn affect trust.

There are at least two grounds for the practical value of this research. Firstly, with the knowledge of what entails a subjectively good (trusted) review, the consumer can profit. If businesses apply findings, by for instance either making suggestions on writing style in the review box or coding the algorithm to display the most helpful reviews, the consumer can more easily find the perceptually trustworthy information. Secondly, from the ability to differentiate between reviews the business might profit as well. The overall presence of reviews increases purchase behavior (Askalidis & Malthouse, 2016), but effects are moderated by the perceived quality of content (Mo, Li, & Fan, 2015). If a business timely knows which reviews are or will be trusted, they can enhance the exposure of a trusted positive review and react or adapt regarding a negative review.

Trust in the reviewer via empathy

This study lends the definition for empathy from Levenson and Ruef (1992). Empathy is the ability to perceive accurately how another person is feeling. Empathy is multi-dimensionally complex, but due to the available information in the reviews, this study singles out the two aspects. These are (i.) awareness of a counterparty's emotions as well as (ii.) perspective taking (Batson, 2009; Elliott, Bohart, Watson, & Greenberg, 2011). These aspects have lead this study to investigate the perceptual semantics and the expressed emotion in the review. The perceptual semantics might allow the reader to accurately imagine the reviewer's situation, which in turn allows for perspective taking. It is found that people prefer to read content of reviewees they regard as similar to themselves (Levi, Mokryn, Diot, & Taft, 2012). The emotional expression may provide an accurate awareness in the reader of what the reviewer is feeling. Importantly, research has found that empathy is positivity related with trust. The induction of empathy can

lead to an increase of oxytocin (Barraza & Zak, 2009), which in turn predicts an increase in trust (Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr 2006; Zak, Kurzban, & Matzner, 2004).

Perceptual language. Perceptual semantics are the expression of a perceptual experience, e.g., tasting, smelling, seeing, feeling, hearing. This perceptual experience has an important role in the empathetic understanding of another party. The literature on mirror matching mechanisms suggests emotional conception is established through the activation of experiential motor knowledge (Carr, Iacoboni, Dubeau, Mazziotta, & Lenzi, 2003; Gallese, Keysers, & Rizzolatti, 2004; van Kleef, 2009). In an intervention designed to improve the empathy of medical students towards the elderly, they exposed students to conditions that perceptually placed them in the elderly's role. Among other things, students wore heavy rubber gloves to simulate manual dexterity and blurred goggles to simulate cataracts. These sensory simulations significantly increased empathy (Varkey, Chutka, & Lesnick, 2006). As Carr and colleagues (2003) summarize "To empathize, we need to invoke the representation of the actions associated with the emotions we are witnessing".

To increase the likelihood to empathize in a review void of non-verbal stimuli, this study proposes that semantic use might replace these stimuli. Namely, an explicit description of sensory experiences increases the gauges for perspective taking, potentially resulting in an increased likelihood to trust. Hence, the first hypothesis follows:

H1: The use of perceptual semantics in reviews positively relates to trust.

Emotional expression. Regarding the emotional side of empathy, a predictive role on trust is found across different interaction settings, e.g., a seller is trusted more when replying in an emotional tone to negative reviews (Sparks, So, & Bradley, 2015) and to establish trust people prefer an emotional tone over accuracy in human-AI interactions (Hamacher, Bianchi-Berthouze,

Pipe, & Eder, 2016). Moreover, in another study aimed to increase empathy in medical students, students showed an improvement after writing point-of-view essays on the patient's emotional valuation of the disease, compared to essays on the clinical assessment of the situation (Shapiro, Rucker, Boker, & Lie, 2006).

Furthermore, the Emotion As Social Information model states that one attends to expressed emotions to gain information (van Kleef, 2009), and specifically when one engages in reflective information processing (van Kleef, de Dreu, & Manstead, 2004), like one is doing when performing information search in reviews. The role of emotional content is highlighted by the finding that self-generated emotional arguments may even outweigh reason-based arguments in a dyadic interaction (Levine, Barasch, Rand, Berman, & Small, 2018).

Thus, to increase interpersonal trust via empathy, the presence of proxies of the reviewer's potential emotions are important to inform the reader. As such, this research proposes that when emotional expression in a review is high, this will translate to more trust. However, emotional expression might have an adverse effect on trust.

The consumer assumes benevolence of the reviewer (Abdelhalim, Yuan, & Head, 2018; Zainal, Harun, & Lily, 2017), i.e., it is thought that the reviewer primarily goes through the costly process of reviewing merely to benefit fellow consumers. Predicted by attribution theory (Kelley & Michela, 1980), a unilateral extreme use of emotions can induce an ambiguous perception of the actor's motivations, e.g., an overly negative individual might be retributively motivated whilst an overly positive individual might indicate tainted intentions via a partisanship motivation. In other words, the reader might doubt the benevolence. In an interview study, interviewees reported on this ambiguity: extremely emotional reviewers are not necessarily, but

instead more likely to be manipulated, and their reviews can be viewed "as potentially 'bogus'" (Filieri, 2016).

In summary, emotional expression might be a facilitator for trust via empathy, but excessively expressed emotions might harm trust through ambiguity of the reviewer's motivation.

H2: Emotional expression in reviews has a negative quadratic relationship with trust, a moderate use being beneficial and an extreme use being damaging.

Trust in the review

Considering the perceived trustworthiness of the review, one trusts in the review's reliability. Relatedly, the literature coins the term *information diagnosticity*. For the review to be of high quality to the reader, diagnosticity means that the information is (i) reliable and (ii) discriminatory, i.e., lacking of doubt, so it can guide the reader towards either direction of the dichotomous choice of purchase (Filieri, 2015; Matutue, Polo-Redondo, & Utrillas 2016; Filieri, Hofacker, & Alguezaui, 2018).

Analytical thinking. One can assess the credibility of the information from different views. Firstly, a review is practically an argument convincing or dissuading the reader from a purchase (Racherla, Mandviwalla, & Connolly, 2012). As argument, it needs to have the appearance of being well argued. Relatedly, Kupor, Tormala, Norton, and Rucker (2014) found that proportionate analytic thought devoted to an advice increases its perceived reliability. Analytic thought does not mean that the argument must be robust. The mere perception that an argument seems logical can even cause one to comply (Langer, Blank, & Chanowitz, 1978). Furthermore, analytical thinking also relates to the trust in the reviewer, as perceived competence –properly forming an argument in this case– can increase trust (Fiske, Cuddy, & Glick, 2007;

Oleszkiewicz & Lachowicz-Tabaczek, 2016). Thus, this research predicts that if a review contains relatively more linguistics that express analytical thinking, the review is more likely to be trusted.

H3: Analytical thinking in reviews positively relates to trust

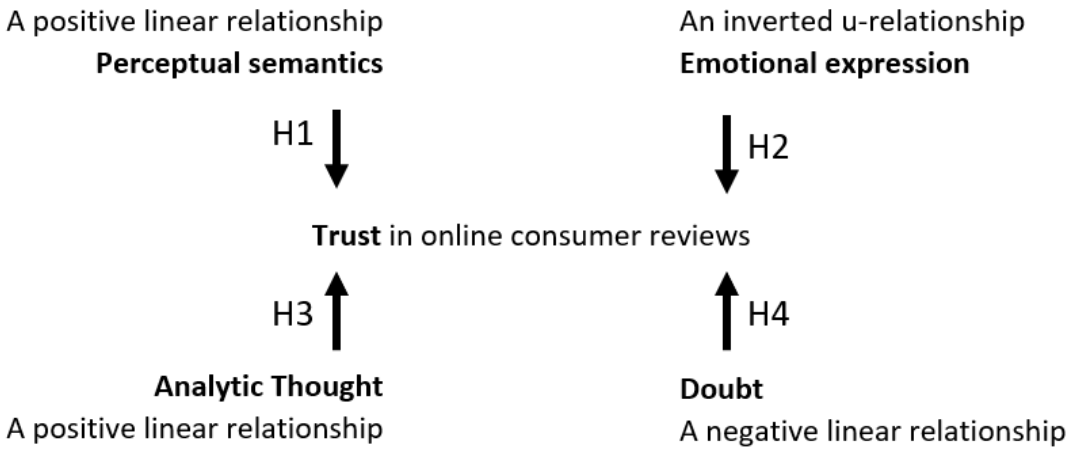
Doubt. Discriminatory certainty might also explain credibility. Despite divergent findings in trust and advice taking, there seems more evidence favoring a preference of certain advice. Gaertig and Simmons (2018) found that receivers prefer nuanced advice including a margin of error. On the contrary, van de Calseyde, Keren, and Zeelenberg (2014) found that people prefer a lack of doubt in a cooperative situation even if it leads to an inferior outcome. While confidence may backfire in the light of an unpredicted outcome, prior to outcome knowledge, confidence is always preferred (Tenney, Meikle, Hunsaker, Moore, & Anderson, 2018). Supported by the confidence heuristic – one is certain when one knows one is right, and one's lack of doubt makes one persuasive (Pulford, Colman, Buabang, & Krockow, 2018)–, precise first offers in dyadic transactions are seen as more reliable, resulting in less adjustment in the counteroffer (Mason, Lee, Wiley, & Ames, 2013). Lastly, decision by sampling also predicts the unfavorability of doubt. Stewart, Chater, and Brown (2006) found that we predictably misattribute probabilities by the linguistic frequency we utter probabilities. A disproportionate use of extreme probabilities diminishes the relative rank of relative certainties. Any subsequent slight amount of doubt is perceived as a rather serious uncertainty.

In conclusion, a review needs to provide apparent reliable information useful in guiding one's choice. The last hypothesis follows:

H4: Doubt in reviews negatively relates to trust

Figure 1

An overview of the hypotheses



Methods

In spirit of open access and transparency in research, the data analysis plan is integrated in the final paper. The results section provides explanations for when and why there are occurrences that the actual data analysis deviated from the planned analysis.

Sample and design

The reviews' sample for this correlational research design was randomly drawn from the data collection provided by Yelp (n.d.).

Three criteria were set for selecting reviews from this sample. Firstly, the text analysis tool in place, LIWC2015 respectively, makes a suggestion on their *how it works* webpage regarding the reliability, namely "Any text with fewer than 50 words should be looked at with a certain degree of skepticism" (LIWC, n.d.). To explain this with an example, according to LIWC a review like "*tasty hot chocolate"* consists of 67% perceptual semantics. Not only can a short text like the example substantially increase the potential percentage for the word type, it also gives such substantial weight to the ill-categorized words. In this case, "*hot*" resembles a third of the

example. Thus, the first criterium was that the review needed to have a minimal word count of 50. Secondly, to ensure that reviews had exposure, the analysis only included reviews that were online for at least a full month since the data collection. Assuming that Yelp collected the data the month prior to the release of the dataset, January 2019, this will merely include reviews from a date no later than November 30, 2018. Lastly, taking the variable of perceptual semantics into account, this research is in parts interested in interpersonal trust in reviews on experience goods. Hence, the reviews in the sample are reviewing restaurants.

Considering the testing of four hypothesis, whilst assuming a power of .80 and an α = .05, the planned sample would at least need to consist of 772 reviews to find an average correlation of r = .2 according to the table of Bujang and Baharum (2016). However, referring to this assumed effect size in the initial proposal as optimistic is an understatement. Hence, the sample consisted of 10,000 reviews. After filtering the sample according to the above criteria, the final sample (N = 7548) had a word count between 50 and 965 (M = 153.62, SD = 107.59). The average amount of years online to date of collection was 3.35 (SD = 2.39), the oldest dating to August 7, 2008 and the most recent dating back to July 1, 2018. The average prevalence of perceptual semantics was 2.96 percent (SD = 1.99, ranging from 0 to 14.6), 6.38 percent (SD = 2.71, ranging from 0 to 21.1) for affect, 58.24 percent (SD = 22.29, ranging from 1 to 99) for analytic thought, and 2.63 percent (SD = 1.76, ranging from 0 to 17.3) for tentativeness.

Measures and materials

LIWC2015 (Linguistics Inquiry and Word Count; hereafter LIWC) was used to perform a computerized text analysis on the reviews. LIWC is a text analysis program that identifies and categorizes words (*see also* https://liwc.wpengine.com/how-it-works/). If a text is inserted, the algorithm provides an overview in percentages of linguistic categories that text consists of.

Trust. Trust was conceptualized as the number of useful votes (useful).

Time online. The publication date of the review was considered as a covariate. It was expected that time positively relates with potentiating votes. Considering two equally useful reviews with the same likelihood to be voted for, the one that has been longer online has had more exposure and thereby increased chances to be voted for. The time online was computed by subtracting the publication date from the date the Yelp challenge was posted, January 2019 respectively. The variable is expressed in years online (years).

Perceptual semantics. As measure of perceptual semantics, the overall perceptual processes' score (percept) was used, which expresses the percentage of perceptual semantics in the review. This score consists of semantics regarding seeing, hearing, and feeling.

Emotional expression. The expression of emotions was measured by the affect score (affect), which expresses the percentage of emotional semantics in the review, both positive and negative emotions.

Analytic thought. Analytical thought was measured through the proxy analytical thinking (analytic), which captures the degree of formal, logical, and hierarchical thinking patterns. A higher score reflects relatively more analytic thought.

Doubt. LIWC provides an account for tentativeness as well as certainty. In this research there was only looked at the tentativeness score. While certainty might be described as a lack of doubt, the presence of certainty does not necessarily exclude doubt. On the contrary, any form of tentativeness by definition does erode certainty. For this consideration, the measure of doubt was operationalized as the tentativeness score (tentat), which expresses the percentage of doubtful semantics in the review.

Data analysis plan

Firstly, a distribution analysis will be conducted to test the assumption of an exponential increase in useful votes. A finding of such distribution would be an indication that the algorithm on Yelp might distort the effect of the predictors on a bigger scale. These outliers may either conceal or drive an effect. The analysis will be done both with outliers and without outliers. The first is important for the ecological validity of the results, i.e., these outliers are present and may be important in a real-world setting. However, for the scientific understanding of the relationship between variables, the data will also be analyzed in the exact same way, yet with the outliers excluded.

A curve estimation will be executed for all variables (percept, affect, analytic, tentat) to check for the predicted quadratic effect on useful votes. The variables will be fitted and plotted in a linear as well as a quadratic model. If a variable shows a quadratic curvature in its distribution by a significant fit, a new variable will be computed by quadrating. Then, a hierarchical polynomial regression analysis will be conducted including regression coefficient estimates, model fit, and R^2change, trust being the dependent variable, the first block being the covariate of date, and the second block being the independent variables.

To test the first hypothesis that the use of perceptual semantics is positively correlated to trust, it will be checked whether the perceptual semantics has a positive linear relationship with useful votes. If significant, the hull-hypothesis will be rejected.

To test the second hypothesis that the emotional expression is negatively quadratic related with trust, it is expected that there will be a significant reversely u-shaped distribution. If the step-by-step polynomial regression analysis shows that emotional expression is significantly negatively quadratic related to trust, and that a quadratic model provides the best fit, the null-

hypothesis will be rejected. If the quadratic model does not provide the best fit, yet there is a significant match with a different model, this finding will be explained and adopted in the suggestions for future research.

To test the third hypothesis that analytical thinking is positively related to trust, the linear regression analysis will be checked for a significant positive regression coefficient in order to reject the null-hypothesis.

To test the fourth hypothesis that the expression of doubt is negatively related to trust, the linear regression analysis will be checked for a significant negative regression coefficient in order to reject the null-hypothesis.

Assumptions.

In theory, it is possible for one to vote for a review after having participated in consumption. Furthermore, one can also vote for a review, yet undo this vote after conflicting experiences. If a considerable number of useful votes are removed or given after consumption, the useful votes in this case would resemble trustworthiness of the reviewer. However, by studying trust, it is assumed that the actual trustworthiness of the reviewer and review is unknown to the reader. That is, the reader has not yet participated in consumption, nor has one undone their vote.

Results

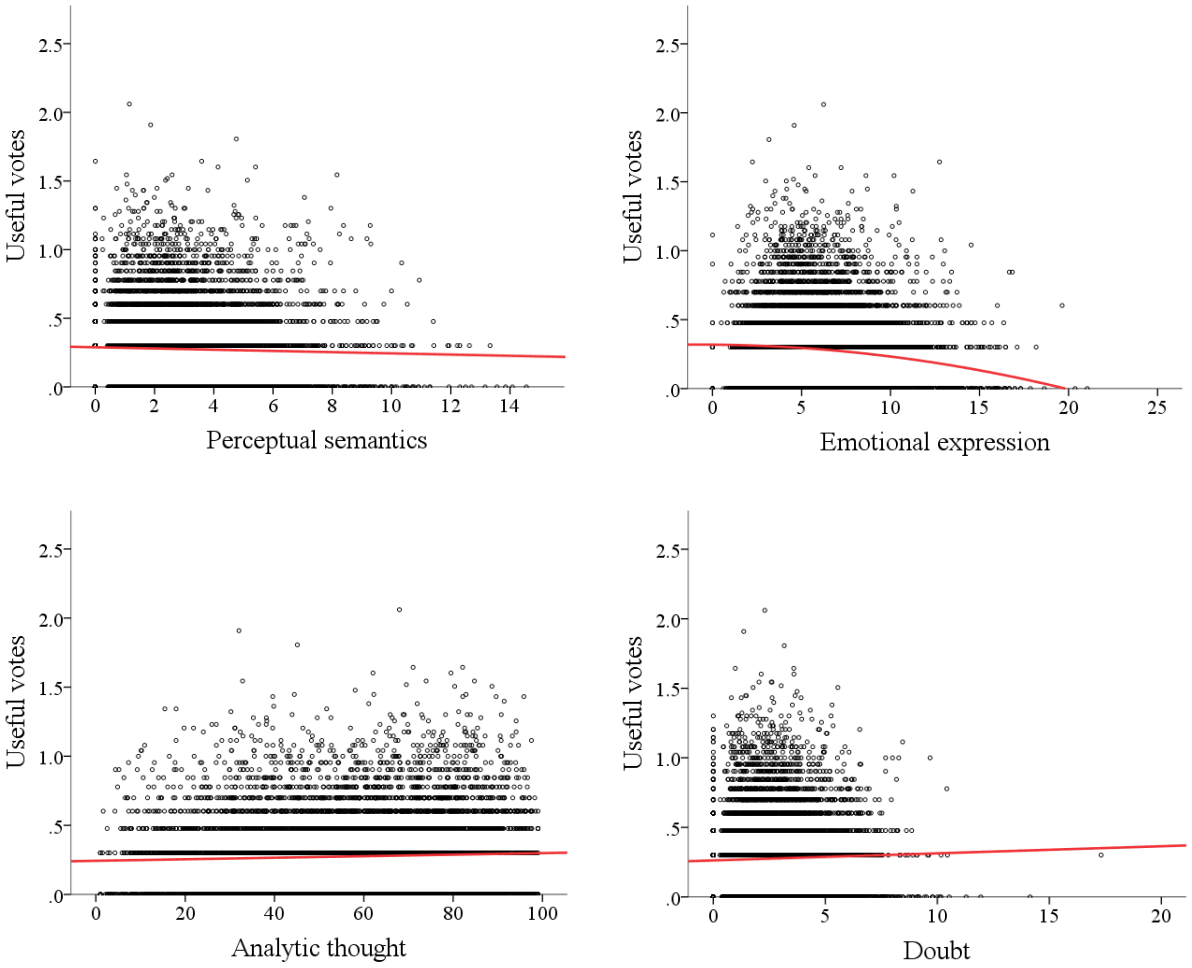
The useful votes ranged from 0 to 114 (M = 1.61, SD = 3.40). The distribution was not exponentially distributed but showed a high skewness (skewness = 10.38) and had with 45.7% a dense representation of 0 useful votes (kurtosis = 231.55). Hence, the dependent variable was logarithmically transformed resulting in a relatively more appropriate distribution for analysis (skewness = 1.02; kurtosis = .75). Hence, the regression coefficients reflect the estimated

changes needed to change the number of useful votes with one unit. Moreover, due to the clustered way the data presented itself, a big portion of the data points would classify as being an outlier. There is insufficient reason to discard the validity of extreme values, hence trimming is no option. Winsorizing was considered. However, due to the skewness this would have no effect on the lower boundary, and only would only *shrink* the upper boundary. In this research, the ecological validity was weighted more significantly compared to a clean data set. In other words, no further reviews were omitted.

Before testing any of the hypotheses, a visual representation was created in the form of a scatterplot to help with further inferences regarding the results (see *Figure 2*). Given that one cannot intuitively infer the type of relationship using these scatterplots, it was taken as a signal to be wary of any significant results.

Figure 2

Scatterplats of all independent variables and useful votes



Note. Useful votes were logarithmically transformed. In line with the hypotheses, the best fit line for emotional expression is quadratic and the best fit lines for perceptual semantics, analytic thought, and doubt are linear.

Next, to avoid the hyper-sensitivity of a curve estimation, the linearity was tested in a different way than planned. The existing independent variables were used to compute a variant to test the quadratic relationship. By quadrating the difference to the mean ($[\text{variable}]^2 = (x - \bar{x})^2$), it was expected that the newly computed variable shows a linear relationship with useful votes. Then, the planned hierarchical regression was performed, the first step included time online, the second step added the standard variables to test for a linear regression, and the unplanned last step added the computed variants to test for a quadratic relationship. The results of these analysis are presented in Table 1.

The first hypothesis supposed that the use of perceptual semantics in reviews is positively related to useful votes. Nevertheless, the hierarchical regression analysis did not support any relationship between perceptual semantics and useful votes, $\beta = .00$, $t(7542) = -.15$, $p = .88$. Therefore, the alternative hypothesis was rejected.

The second hypothesis predicted that use of emotional expression and useful votes would show an inverted U relationship. The hierarchical regression analysis did not support such quadratic relationship, $\beta = -.01$, $t(7538) = -1.29$, $p = .20$. However, the data did reveal a negative linear relationship between emotional expression and useful votes, $\beta = -.10$, $t(7542) = -8.97$, $p < .001$. That is, the more affect one showed in a review, the less likely one was trusted with a useful vote. Thus, the alternative hypothesis was rejected. Furthermore, for future research directions exploratory analysis were executed to potentially uncover whether this relationship was differently driven by the type of emotion (*positive* vs *negative*).

The third hypothesis stated that analytic thought is positively related to trust expressed in useful votes. However, the hierarchical regression analysis showed no support for any type of relationship, $\beta = .02$, $t(7542) = 1.47$, $p = .15$. Therefore, this hypothesis was rejected.

The fourth hypothesis predicted that an increase of doubt in a review would be linearly linked to a decrease in the number of useful votes. Because the hierarchical regression analysis revealed no relationship between doubt and useful votes, $\beta = .01$, $t(7542) = 1.17$, $p = .25$, this hypothesis was rejected as well.

Notably, the hierarchical regression analysis revealed that the number of years online had a significant effect $\beta = .28$, $t(7542) = 25.00$, $p < .001$, i.e., the longer the review had been online, the more likely it is that votes had been generated. Moreover, the regression showed a significant quadratic relationship between useful votes and all but the predicted variable of emotional expression.

In consideration of the unpredicted quadratic effects, further analyses were performed to check the validity of these significant findings. To test whether the variables have a quadratic distribution the following method was used. By establishing the peak of the variable -the top of the (inverted) u-, it should hold true that left side of the peak should have a significant effect in the opposite direction compared to the right side. That is, when the left margin shows a significant positively linear effect, the right margin should conversely show a significant negatively linear effect (Haans, Pieters, & He, 2015). However, for none of these variables this peak was well within the data range. Regarding both doubt and analytic thought, the peak lied outside of the data range. For use of perceptual semantics, the reflection point lied proximate to zero to the extent that on the left margin only monotonous zero value data points were left. This means that no further analysis could be performed to support the finding of a quadratic effect. Hence, the null hypotheses were not rejected.

Table 1

Hierarchical regression analysis on useful votes

Model	Predictor	*Unstandardized coefficient*		*Standardized coefficients*		R^2	R^2 *change*	*F*	*p*
		B	*SE*	*β*	*p*				
1									
	Years	.036	<.01	.28	**<.001**	.076	-	624.98	**<.001**
2									
	Years	.035	<.01	.27	**<.001**	.088	.011	144.30	**<.001**
	Percept	.00	<.01	.00	.88				
	Affect	-.01	<.01	-.10	**<.001**				
	Analytic	.00	<.01	.02	.14				
	Tentat	.00	<.01	.01	.22				
3									
	Years	.035	.00	.27	**<.001**	.091	.004	84.29	**<.001**
	Percept	.00	.00	.01	.33				
	Affect	-.01	.00	-.09	**<.001**				
	Analytic	.00	.00	.01	.36				
	Tentat	.01	.00	.04	**<.01**				
	$Percept^2$	.00	.00	-.03	**.02**				
	$Affect^2$	.00	.00	-.02	.19				
	$Analytic^2$	.00	.00	-.02	**.05**				
	$Tentat^2$	.00	.00	-.05	**<.001**				

Note: The variables $Percept^2$, $Affect^2$, $Analytic^2$, and $Tentat^2$ are the variables computed by quadrating the difference to the mean of their standard variants. Different from the standard APA rules, the explained variance is displayed up to the third decimal because we are dealing with online conversion rates that are notorious for small effects.

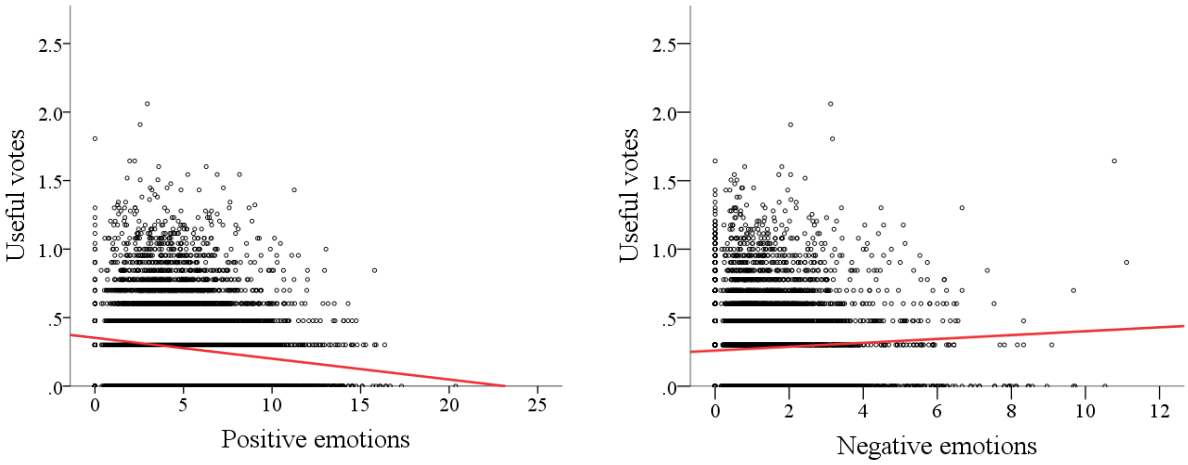
Exploratory analysis

To get more insight into how emotional expression influenced useful votes, an exploratory analysis followed. These analyses tested whether the found effect of emotional expression on trust was different for the expression of negative emotions (M = 1.11, SD = 1.28) compared to positive emotions (M = 5.06, SD = 2.68). A scatterplot was produced to give an impression of the distribution (see *Figure 3*). Given the initial hypothesis that emotional expression predicted an inverted u relationship, new variables were computed again by quadrating the difference to the mean. Next, a stepwise regression analysis was executed. The first step included time online, the second step added positive emotions and negative emotions, and the last step added the computed variants of both positive emotions and negative emotions.

The second model added an explained variance of 1.6% on top of the 7.8% of the first model. The third model added 0.1%. The expression of positive emotion had a significant negative linear relation to useful votes, β = -.12, $t(7544)$ = -10.39, p < .001. That is, the more positive emotion one expressed, the less likely it was that one received votes. The expression of negative emotion was positively correlated with useful votes, both linear, β = .03, $t(7544)$ = 2.17, p = .03, and quadratic, β = -.04, $t(7542)$ = -2.85, p = <.01. However, the peak of the supposed quadratic function lied outside the dataset. Hence, there is no data to confirm a quadratic relationship. Thus, the linear relationship was accepted. That is, the more negative emotion one expressed in a review, the more likely the review was voted for.

Figure 3

Scatterplats of useful votes with positive emotions as well as negative emotions



Note: Useful votes were logarithmically transformed. Because overall emotional expression showed a linear relationship, the plotted best fit line is linear as well.

Discussion

Summary

The readers of online consumer reviews are in a situation of seemingly unresolvable uncertainty from not knowing the reviewer (Berger & Calabrese, 1975). This study aimed to highlight some semantic factors that might facilitate trust in online consumer Yelp reviews. It was hypothesized that a review is more likely to be trusted with a useful vote when there is relatively (H1) a higher use of perceptual semantics, (H2) an intermediate emotional expression, both extremes having a negative effect on trust, (H3) more analytic thought, and (H4) less expression of doubt. Noteworthy, trust was operationalized as the number of useful votes a review had generated. The findings regarding these hypotheses are discussed chronologically.

With regards to the first hypothesis, contrary to the hypothesized positive relationship between the perceptual semantics in reviews and trust, the results do not show a significant relationship. Firstly, a *mea culpa* is appropriate. The variable perceptual semantics was derived from empathy, a latent construct. Resultingly, the defense of any finding is not robust. Nevertheless, this paper proposes two explanations. The finding might suggest that perceptual semantics in reviews have a negligible effect on the experience of empathy and therefore no effect on trust. Alternatively, regardless whether perceptual semantics affect empathy, empathy might not affect trust in the review. There is a strong body of evidence on the relationship between empathy and trust (Ross & Young, 2009; Barraza & Zak, 2009; Kosfeld et al., 2006; Zak, et al., 2004). Additionally, it has been found that a consumer review has additional value compared to an objective description, because only the consumer review offers similarity between the reader and the writer. The consumer review effectively allows the reader to empathize with the review(er) (Bickart & Schindler, 2001). Therefore, of the two arguments, it is

more likely that perceptual semantics in reviews have a negligible effect on the experience of empathy. A possible effect might be obscured by stronger effects, for instance readability (Korfiatis, García-Bariocanal, & Sánchez-Alonso, 2012) or factors that heuristically inform us on the source credibility, such as whether or not the reviewer has a profile picture, the amount of reviews posted by this profile, the amount of votes the review has generated already (Burton & Khammash, 2010; Lu, Tsaparas, Ntoulas, & Polanyi, 2010). Based on this finding, restaurants and consumers are not harmed by nor benefit from experientially vivid reviews such as "*Meringue was light and fluffy and tasted like clouds*".

Concerning the second hypothesis, the results do not support an inverted-u relationship between emotional expression and trust. However, the data does reveal support for a linear relationship. Via exploratory analyses it was shown that the direction of the effect depends on the type of expressed emotion. That is, the presence of relatively more positive emotions in a review are more likely to harm trust and more negative emotions are more likely to facilitate trust. This suggests that businesses need to be extra attentive with their reaction to negative reviews and should avoid ordering reviews with a relatively too positive emotions too high. Notably, the dichotomous distinction between emotions is oversimplified. Both positive emotions and negative emotions are a compilation of many distinct individual emotions. The effect might differ per specific type of emotion (van Kleef, de Dreu, & Manstead, 2010).

Nevertheless, this dichotomy between positive and negative emotions as well as the linear -instead of a quadratic- relationship can be explained retrospectively. This paper offers an account related to prospect theory. Prospect theory predicts a risk-seeking tendency in the face of a loss, compared to a risk-averse tendency in the face of a gain (Kahneman & Tversky, 1979). A positive review frames the purchase as a gain, e.g., *the pizza at this restaurant is a true steal*.

This provides a generally risk-averse setting. This risk-aversion is further promoted by the reader's awareness of potential partiality of the reviewer (Filieri, 2016). An increase of positive affect increases the probability that the review might be partial and insincere. Resultingly, an increase of positive affect might increasingly lower the reader's tendency to trust. Contrastingly, a negative review warns for a loss. This provides a context that supports a risk-seeking tendency. The higher the expression of negativity, the higher the chances of a potential loss. In the face of this loss, one becomes increasingly likely to perform the risk-behavior of trusting the reviewer in order to avoid the loss. Compared to the original hypothesized inverted-u relationship, this account predicts a linear relationship that is in line with the findings.

The following account is rather hypothetical yet valuable. For the literature review of this study, no studies were found that investigate whether positive reviews compared to negative reviews differ in importance for different kinds of information search. However, a line of research suggests that overall readers have different intentions for reading reviews (Burton & Khammash, 2010). One might engage in information search about a future purchase. However, via a choice-supportive bias, one might also use reviews as dissonance reduction to reassure themselves that the already (mentally) opted consumption was the right choice (Hennig-Thurau, Gwinner, Walsh, & Gremler, 2003). This study proposes the following: When it regards a future purchase, one's information search is focused at making the right choice. This inherently means avoiding bad alternatives. Hence, one might look for reviews high in negative affect to dismiss those alternatives, because positive reviews not necessarily exclude alternatives. The more negative affect is expressed, the easier it is to dismiss an alternative, which results in relatively more usefulness. Conversely, a positive review is specifically useful for supporting one's choice: elevating the benefits of one's choice is more economical than demoting the multitude of

alternatives. The more positive affect is expressed, the more useful the review. However, as the review functions as self-reinsurance, the trust is not directed at the review but at oneself instead. Thus, if a review consists of relatively more positive affect, it is less likely that trust will be directed at the review. Despite that the review is useful in its purpose, it effectively results in less votes. Compared to the hypothesized quadratic relationship, this account too predicts a linear relationship in line with the findings.

Thirdly, instead of the predicted positive linear relationship, no significant relationship was found between the show of analytic thought and trust. It is found that there is a different type of information search in consumer review compared to marketing information (Burton & Khammash, 2010). Regarding marketing information, the reader expects a cohesive logical account from the business. Concurrently, the reader expects that this account is potentially biased and is not experientially descriptive, i.e., the consumer is unable to predict what the actual consumption is like. Thus, instead of a logical account, the consumer searches for an experiential account of a fellow consumer whom one can empathize with (Bickart & Schindler, 2001). It is found that an analytic account is inferior to an emotional account across settings, such as commercials (Deighton, Romer, & McQueen,1989) and cooperation (Levine et al., 2018) Whilst analytic thought may be beneficial for persuasive advice giving (Kupor et al., 2014; Langer et al., 1978), this study suggests that it might have no effect in a consumer-to-consumer interaction in the context of restaurants reviews.

Lastly, instead of the hypothesized negative linear relationship, no significant relationship was found between the expression of doubt and trust. Notably, contrasting to the hypothesis, it has been found that the expression of doubt also can have a positive effect on trust in advice-taking (Gaertig & Simmons, 2018). Thus, the conditions may be essential for the relationship

between doubt and trust. The conditions might vary between reviews. That is, there both might be a negative as well as a positive effect of doubt on trust. People read reviews to acquire the wisdom of the many (Burton & Khammash, 2010). That is, a review is contextual. Wisdom of the many supposes that it is important what *most* people say. Overall, people might like a business, be on the fence regarding a business, or dislike a business. If the business is either generally liked or disliked, then a review that expresses a lack of doubt in line with the opinion of the mass might seem more trustworthy. Oppositely, when the general opinion is rather nuanced, then a review that expresses doubt about whether the consumption is "worth the buy" is in line with the opinions of the mass. These two contrasting relations between doubt and trust might occur proportionately to one another. This would level an effect overall.

Alternative explanations

In general, there are several factors that might influence the rejection of the alternative hypotheses. The role of effect size is important. Contrary to most experiments, this was a field experiment rather than a lab study. Considering the file-drawer problem –the grounded suspicion that articles with significant findings, and thereby likely higher effect sizes, are more likely to get published–, one merely tends to find out both the upper-boundary of effect sizes as well as unsubstantially supported findings (Rosenthal, 1995). Contrary to this field study, those effect sizes are artificially high via the process of fine-tuning and careful control of noise in a lab setting (Pham, 2013). Moreover, the found effect sizes of conversion rates for online behavior are very small. Nuanced effects in controlled studies might not replicate in a field setting.

Multiple elements in this field-experiment might have obscured effects that otherwise could be found in a controlled setting. Crucially, readers only pay a degree of attention to the first few reviews (Askalidis & Malthouse, 2016). Those first reviews are in part ordered by user

rating (Yelp, n.d.). One is likely to validate what the right choice is by reflecting the choice of the majority (Cialdini, Wosinska, Barrett, Butner, & Gornik-Durose, 1999; Goldstein, Cialdini, & Griskevicius, 2008). Thus, social validation potentially conceals the effects via the suggestion of source credibility, a persuasive factor for trusting a review (Pornpitakpan, 2006; Cheung, Sia, & Kuan, 2012; Filieri, et al., 2018). Because not all reviews are weighted equally important nor are even read, finding a significant effect of a subtle linguistic cue becomes rather unlikely. In line with this, Levi and Mokryn (2014) report that the initial useful rating serves as a robust predictor of more votes. Reviewers who receive useful votes on their reviews, receive them increasingly over time as it might function as a heuristic indicative of quality.

Limitations

For the generation of the first two hypotheses on perceptual semantics and emotional expression, the study relied on findings on the latent variable of empathy. Since this is unobservable, it harms the overall reliability. Furthermore, the operationalization of trust as useful votes deserves some scrutiny. Firstly, it is untraceable when the review is voted for. If one who already experienced the value of what is being reviewed votes for the review, then the vote would be an expression of trustworthiness instead of trust. Secondly, the expression of trust is different from the experience of trust. One might trust the review but does not necessarily needs to show this by voting. Thirdly, people tend to gain information from multiple reviews to create an impression (Askalidis & Malthouse, 2016). The review exists in context of other reviews and finds validation in relationship to other reviews. Can it be expected that this aggregated impression translates to individual well-balanced ratings of the review, which are then transformed into the expression of trust via voting? The current study did find research on the effect of votes yet found no research on the behavior of voting on reviews. Fourthly, this also

raises the question of *what is actually expressed by voting?* Useful votes as a measure of trust was a presupposition in this study. However, it is unsure what it actually means for one to vote. Whilst this meaning could be in line with the given name of the vote and is an actual rating of usefulness, the current study proposes an alternative interpretation for further investigation: voting is a form of praise.

As reported in the introduction, the reader assumes benevolence of the reviewer (Abdelhalim et al., 2018; Zainal et al., 2017). The reader beliefs that the reviewer intents to act charitable by giving up time and effort to inform others. This might be not just any information, but a protective warning of what should be avoided. Afterall, the expression of useful votes decreases when the review consists of positive affect (promotional) and increases when it consists of negative affect (warning). Ghose and Ipeirotis (2011) found that an overall increase of useful votes predicts a decrease of sales. Put in philosophical terminology, such a warning might be considered a *saintly* or *supererogatory act*: one is not expected nor can be commanded to perform the act, nor can one be blamed if one does not perform the act, but when one does perform the act, one is worthy of praise (Urmson, 1958; Archer, 2018). In the case of a review, one cannot be expected nor commanded to go charitably out of one's way to give up time and go through the effort of informing others, nor can one be blamed if one does not do so. However, if one seemingly goes through outstanding efforts, the rater might reciprocate the supererogatory efforts by the praise. One of the available tools to express is praise is the useful vote icon.

Future research

Given the impact of reviews (Askalidis & Malthouse, 2016) in relation to social validation (Cialdini et al., 1999; Goldstein, Cialdini, & Griskevicius, 2008), it is important to understand what it means to vote for a review. The hypothesis is proposed that votes resemble

general praise. This can be tested in several ways. If people are aware of their motivation for voting, an experimental interview might provide insight. Moreover, regarding supererogation, outstanding might become relative. The relative effort of writing the review might predict useful votes. That is, overall word count might be a good reflection of effort and time *donated*. However, when one page shows many reviews instead of few, it is more likely that relatively more words are needed from the reviewer to stand out from the contextual norm. Clarity of the message is important as well, as without clarity the review does not benefit the reader.

Conclusion

This research suggests that the linguistic factors of perceptual semantics, analytic thought, and doubt are not important for the generation of useful votes on reviews. Furthermore, businesses might benefit from being extra attentive to negative reviews. These reviews not only provide a harmful opinion toward the business' reputation, but such reviews expressing negative affect are also more likely to receive validation through votes. Whilst some businesses aim to benefit from the influence of reviews through promotion reviews very high in positive emotion, such practices may not be beneficial. These positive reviews are less likely to generate public validation via votes and might be distrusted. However, this study is hesitant on conclusions beyond the statement that more research is needed, specifically regarding the interpretation of voting-behavior on reviews as well as the potential different function of a positive versus a negative review.

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Tables

Table 1

Hierarchical regression analysis on useful votes

		Unstandardized coefficient		*Standardized coefficients*					
Model	Predictor	*B*	*SE*	*β*	*p*	R^2	R^2 *change*	*F*	*p*
1									
	Years	.036	<.01	.28	**<.001**	.076	-	624.98	**<.001**
2									
	Years	.035	<.01	.27	**<.001**	.088	.011	144.30	**<.001**
	Percept	.00	<.01	.00	.88				
	Affect	-.01	<.01	-.10	**<.001**				
	Analytic	.00	<.01	.02	.14				
	Tentat	.00	<.01	.01	.22				
3									
	Years	.035	.00	.27	**<.001**	.091	.004	84.29	**<.001**
	Percept	.00	.00	.01	.33				
	Affect	-.01	.00	-.09	**<.001**				
	Analytic	.00	.00	.01	.36				
	Tentat	.01	.00	.04	**<.01**				
	$Percept^2$	.00	.00	-.03	**.02**				
	$Affect^2$	.00	.00	-.02	.19				
	$Analytic^2$	.00	.00	-.02	**.05**				
	$Tentat^2$	.00	.00	-.05	**<.001**				

Note: The variables $Percept^2$, $Affect^2$, $Analytic^2$, and $Tentat^2$ are the variables computed by quadrating the difference to the mean of their standard variants. Different from the standard APA rules, the explained variance is displayed up to the third decimal because we are dealing with online conversion rates that are notorious for small effects.

Figures

Figure 1

An overview of the hypotheses

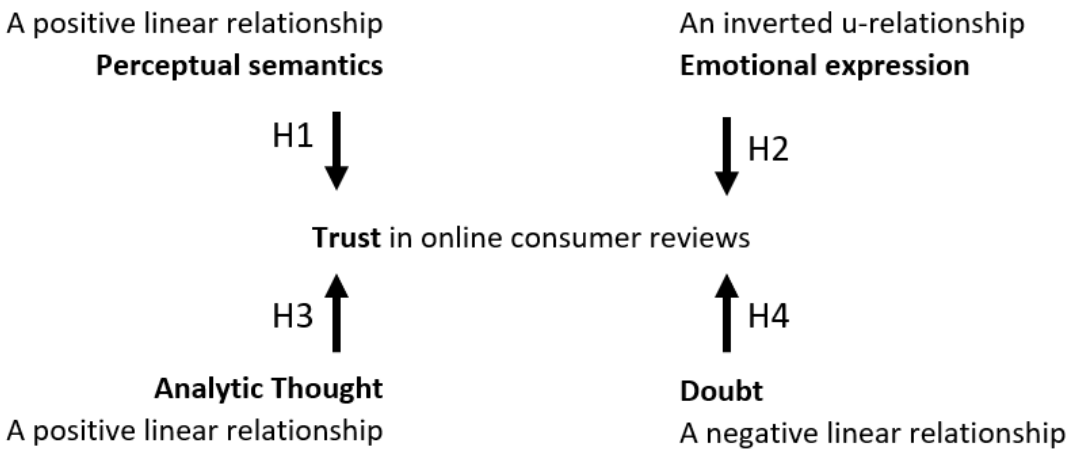
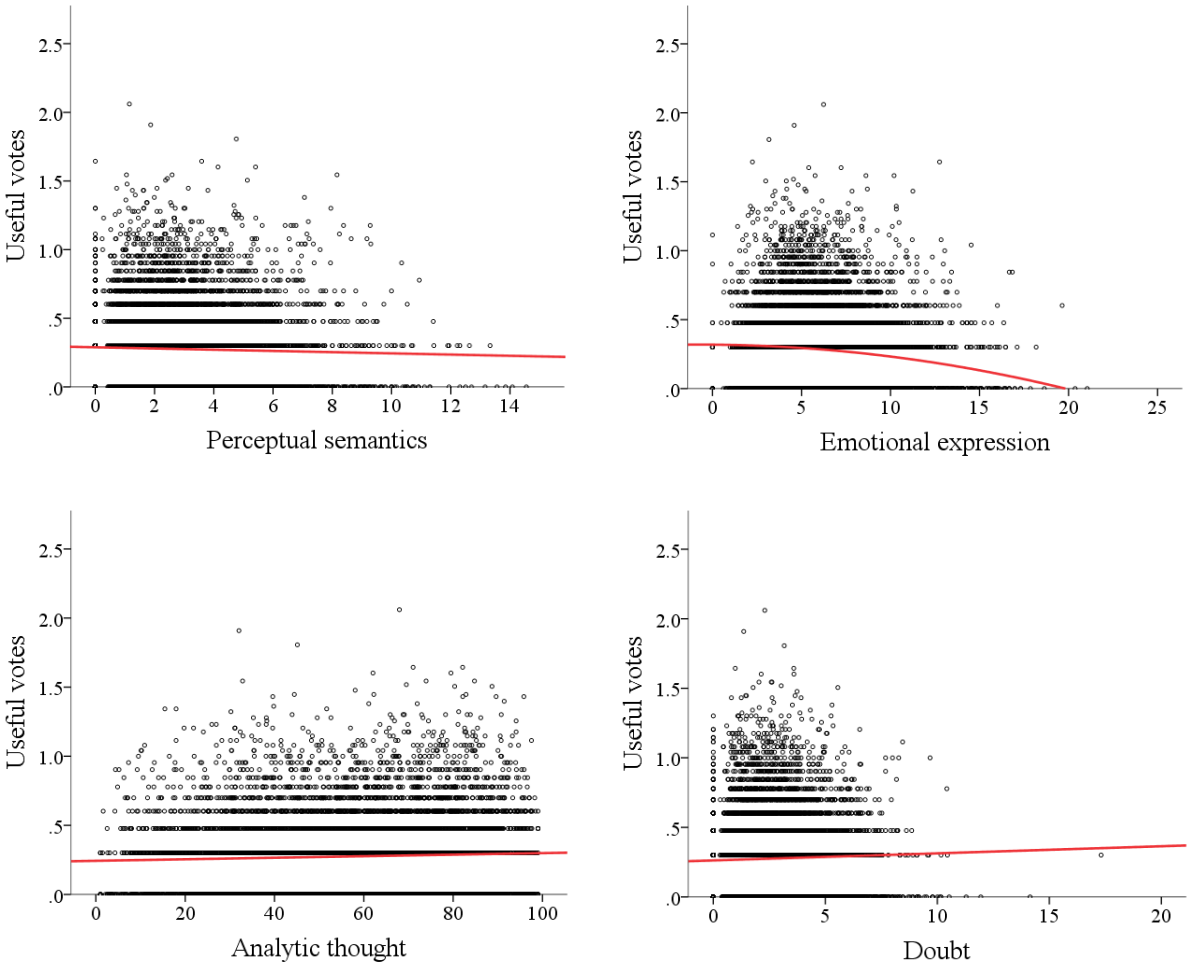


Figure 2

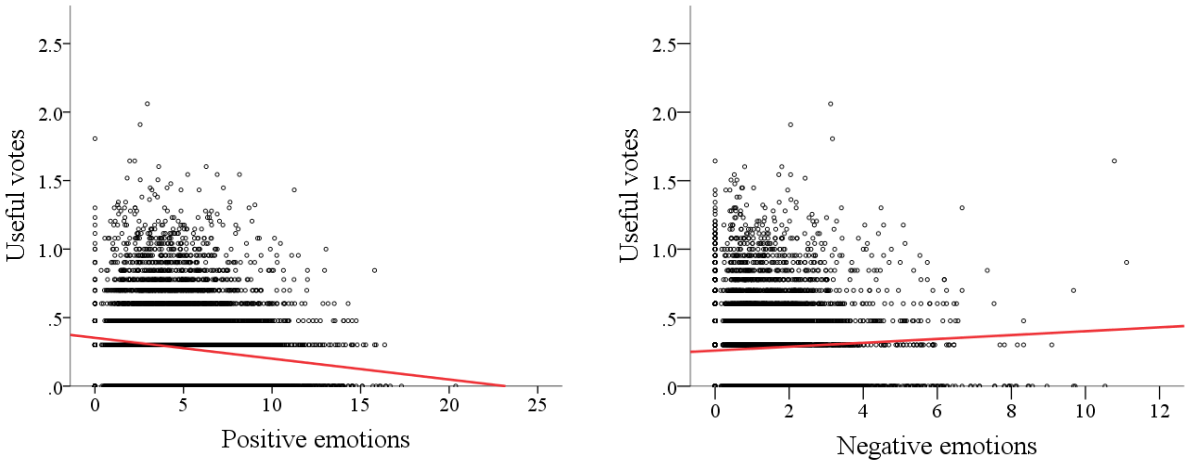
Scatterplats of all independent variables and useful votes



Note. Useful votes were logarithmically transformed. In line with the hypotheses, the best fit line for emotional expression is quadratic and the best fit lines for perceptual semantics, analytic thought, and doubt are linear.

Figure 3

Scatterplats of useful votes with positive emotions as well as negative emotions



Note: Useful votes were logarithmically transformed. Because overall emotional expression showed a linear relationship, the plotted best fit line is linear as well.

Data Analysis and Measures

For the data set follow:

https://www.dropbox.com/s/4twszmn0on5rhwf/data_thesis_bca_bakx.sav?dl=0

For the syntax follow:

https://www.dropbox.com/s/2perl731m07igg0/syntax_thesis_bca_bakx.sps?dl=0