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How does a rumor come to be believed as a fact as it spreads across a chain of consumers? This research proposes that because consumers' certainty about their beliefs (e.g., attitudes, opinions) is less salient than the beliefs themselves, certainty information is more susceptible to being lost in communication. Consistent with this idea, the current studies reveal that though consumers transmit their core beliefs when they communicate with one another, they often fail to transmit their certainty or uncertainty about those beliefs. Thus, a belief originally associated with high uncertainty (certainty) tends to lose this uncertainty (certainty) across communications. The authors demonstrate that increasing the salience of consumers' uncertainty/certainty when communicating or receiving information can improve uncertainty/certainty communication, and they investigate the consequences for rumor management and word-of-mouth communications.

Keywords: word-of-mouth communication, rumor, information transmission, certainty, metacognition

From Rumors to Facts, and Facts to Rumors: The Role of Certainty Decay in Consumer Communications

On October 3, 2008, unverified information that Apple's chief executive officer, Steve Jobs, *might have* suffered a major heart attack appeared on the website iReport. Despite the lack of certainty associated with this news, the rumor quickly gained momentum within financial circles, leading Apple's stock to drop from \$105.04 to \$94.65 per share, a shocking market value loss of \$9 billion. How could a rumor that should have been mired in skepticism and uncertainty gain such momentum and produce this drastic financial consequence?

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One explanation is that the financial actors, entirely cognizant of the lack of certainty associated with the rumor, weighted the probability that the rumor was false against the risk of not acting if the rumor were indeed true. The latter action may have been viewed as more costly. Though plausible, we put forth an alternative explanation for why these actors responded to the rumor as they did. We suggest that initial uncertainty might be lost as rumors are shared or passed from one person to another, causing a rumor to be treated as increasingly factual and making it more likely to be acted on. According to this view, in the Apple scenario, financial actors might have taken action because any initial doubt or uncertainty associated with the rumor became lost as the rumor spread, which made the rumor seem increasingly true, or factual, over time.

In this article, we aim to provide new insights into information transmission, specifically the spreading of rumors, by striving to understand the communication of consumers' certainty or uncertainty. We propose that the psychological certainty associated with a belief or attitude is more likely to be lost from one communication to another than the belief or attitude itself. Consequently, rumors might come to be viewed as facts as the uncertainty attached to them dissipates across communications. Conversely, facts might also come to be viewed as rumors as the certainty associated with them dissipates. We first review the literature

on information transmission, discuss the concept of belief certainty, and then explore the implications for understanding how rumors might come to be treated as facts and vice versa.

*INFORMATION TRANSMISSION IN MARKETING:
FROM SALACIOUS RUMORS TO RAVE REVIEWS*

A rumor refers to a belief or piece of information that is typically associated with high uncertainty and transmitted rapidly among people (e.g., Rosnow and Fine 1976). That is, although rumors can be positive or negative, a common feature is an initial sense of uncertainty stemming from the unofficial character of the rumor's source (e.g., Kapferer 1990) or ambiguity surrounding the rumor's content (Shibutami 1966). Despite the dangers rumors hold for companies and consumers alike (see Kapferer 1990; Kimmel 2004; Koenig 1985; Pleis 2009; Rosnow 1991), relatively little is known about the transmission of such negative word of mouth (WOM).

Although companies attempt to avoid negative rumors in general, they do want positive information about their brands to spread. Indeed, for many products and services, the transmission of positive WOM is a crucial part of the marketing plan (e.g., Kamins, Folkes, and Perner 1997; Ryu and Feick 2007). Consumers report that WOM is the most influential communication guiding their product choices (Allsop, Bassett, and Hoskins 2007). Furthermore, 69% of consumers report that advice offered in WOM communications is likely to affect their purchases in a manner consistent with the advice (Keller Fay Group 2006). Although some research has focused on features (e.g., speed; Berger and Heath 2008; Berger and Le Mens 2009) of the transmission itself, little is known about the psychological factors driving WOM transmission. We propose that distinguishing between different types of information (e.g., beliefs vs. belief certainty) and understanding the psychological value consumers place on them could help explain transmission phenomena and, in turn, inform marketers as to the type of information they should encourage or discourage consumers to share to maximize positive information transmission and mitigate negative information transmission.

BELIEF CERTAINTY

Consumers' beliefs can take the form of valenced (e.g., I like the hotel's restaurant) or unvalenced (e.g., This hotel has a pool) assessments of an object's properties. Importantly, consumers can hold their beliefs with varying degrees of certainty.¹ A belief is a primary cognition (e.g., I like this hotel), whereas belief certainty represents a secondary or metacognition about the belief reflecting one's subjective sense of conviction about it (e.g., I'm certain/uncertain that I like this hotel). Beliefs and belief certainty are psychologically distinct in that two consumers can hold the exact same belief about something but differ in their belief certainty (Tormala and Rucker 2007).

Over the years, much of the research on belief certainty has focused on the certainty with which people hold their

attitudes. Attitude certainty has been shown to be critical in predicting the persistence of attitudes over time, the resistance of attitudes to attack, and the influence of attitudes on behavior (see Karmarkar and Tormala 2010; Petty and Krosnick 1995; Rucker and Petty 2006; Tormala and Rucker 2007). Given its importance, many researchers have explored the factors that lead consumers to feel more or less certain of their attitudes. For example, consumers feel more certain when they perceive their attitudes as being based on a balanced consideration of both sides of an issue rather than just a single side (Rucker and Petty 2004), when they have direct rather than indirect experience with an attitude object (Fazio and Zanna 1978), and when the source of their information is high rather than low in credibility (Clarkson, Tormala, and Rucker 2008).

How can certainty inform the understanding of rumor transmission and WOM communications? We propose that belief certainty, relative to the beliefs themselves, typically exhibits faster decay in communication from one consumer to another. Our reasoning stems from recent developments in research on belief structure. In particular, the metacognitive model (MCM; Petty 2006; Petty, Briñol, and DeMarree 2007) posits that people store beliefs about objects (e.g., attitudes, thoughts) as well as secondary cognitions that "tag" or qualify those beliefs as valid or invalid. For example, a person might initially hold a favorable attitude toward a brand but label that favorable attitude as questionable if it is not derived from direct experience. A particular type of secondary validity tag is a tag of certainty or uncertainty.

The MCM suggests that though both beliefs and their validity (or certainty) tags are stored in memory, there is a hierarchical relationship when it comes to retrieval. A belief can be retrieved from memory with or without the corresponding tag. However, because the tag qualifies the belief, the tag itself is meaningless unless the belief has been brought to mind. Thus, consumers might sometimes recall a belief (e.g., I like this brand) without the accompanying certainty tag (e.g., but I am uncertain of my attitude), but the reverse—in which the certainty tag is recalled without the belief—is less likely. For example, a sensible reply to the question "How good is the hotel?" might include (1) "I definitely like it a lot" or (2) "I like it a lot" but not (3) "Definitely." Because the likelihood of information being used is affected by its accessibility or salience (e.g., Feldman and Lynch 1988), the impact of validity tags on consumers' judgments and behaviors might be more variable than the impact of primary beliefs.

Most relevant to the current concerns, we predict that certainty's status as a secondary cognition will be of consequence in determining its (un)successful transmission. In support of this reasoning, Allport and Postman (1947) argue that people often favor communicating primary or focal elements of information over secondary or contextual elements. Though never tested empirically, if certainty is construed as a secondary element, it might be less likely to be communicated from one consumer to another than the primary belief to which it is attached. Moreover, consumers receiving WOM communications might seek out or attend to certainty information less actively than they do information about primary beliefs. That is, certainty's status as a secondary cognition might make it less salient to receivers of a communication, causing them to fail to extract it from a message even when it is communicated.

¹Consistent with prior research (Petty and Krosnick 1995; Tormala and Rucker 2007; cf. Peterson and Pitz 1988), our approach treats certainty and confidence as synonyms.

According to this logic, because of the loss of certainty at both the transmission and reception stages, information related to certainty should dissipate faster than information related to the primary belief across a chain of senders and recipients. As a consequence, rumors initially seeded in uncertainty could come to be treated as facts. For example, a negative rumor that McDonald's hamburgers contain worm meat might be received with great skepticism initially but be regarded as increasingly factual as the uncertainty associated with it dissipates across transmissions. Similarly, the loss of uncertainty attached to the Apple rumor in the opening example might explain why financial actors sold their shares. This asymmetric transmission also has relevance for beliefs (e.g., favorable product impressions) initially held with high certainty. In this case, certainty decay could reduce the likelihood of subsequent consumers acting on recommendations (e.g., trying a new restaurant for which they receive favorable WOM), because they would acquire the favorable assessment but not the certainty originally attached to it.

ALTERNATIVE PERSPECTIVES AND PREDICTIONS

An argument, based on Gricean norms (Grice 1975, 1978), might be that information transmission does not vary between beliefs and belief certainty. That is, just as consumers communicate the valence of their beliefs (e.g., I like/dislike this bistro), they should also transmit the certainty of those beliefs (e.g., I'm sure/unsure that I like/dislike this bistro). Furthermore, according to Gricean norms, message recipients should view all information from a sender as relevant and important. Thus, if a person explains that his opinion of the product is unfavorable and that he is certain of his opinion, this would tell the recipient that both the evaluation and the accompanying certainty are important pieces of information that should be attended to and presumably passed along in subsequent communications.

Another possibility is that people only share information related to certainty when they are certain rather than uncertain. That is, senders may intentionally omit hesitation or doubt because these are typically viewed as undesirable characteristics (e.g., Tversky and Fox 1995; for a review, see Camerer, Bhatt, and Hsu 2007). This would produce a pronounced loss in the transmission of uncertainty but should not affect the transmission of certainty.

As an initial test of this possibility, we examined whether people share hesitation or uncertainty with others in online reviews. In a sample of more than 250 online consumer reviews, we found that 34% of reviews contained thoughts expressing certainty but 22% of reviews contained thoughts expressing uncertainty.² On the one hand, these data suggest that consumers seem willing to share both certain and uncertain information in their reviews. On the other hand, these data suggest that many consumer communications

²Two independent coders assessed 256 consumer reviews of 20 products in five product categories (electronics, shoes, home furniture, jewelry, and software) of an online retailer. Each review was coded for thoughts expressing certainty, thoughts expressing uncertainty, or thoughts not expressing certainty or uncertainty. In the case of certainty/uncertainty thoughts, coders counted the number of thoughts related to or qualified by some mention of certainty (e.g., I'm *sure* about my opinion) versus uncertainty (e.g., I have some *doubt* in my opinion). Initial agreement between raters was 94% or better for each dimension, with disagreements resolved through discussion.

are devoid of any mention of certainty, consistent with our perspective. Overall, however, it remains unclear whether and how one's beliefs versus the certainty attached to those beliefs might be shared and transmitted.

Summary and Overview of Experiments

On the basis of recent theorizing distinguishing cognitions (i.e., beliefs) from metacognitions (i.e., belief certainty), we predict and demonstrate that certainty/uncertainty will often be more prone to decay in transmission than the belief with which it is associated. We also examine whether the loss of certainty information arises from receivers imperfectly grasping communicators' certainty even when it is expressed at transmission, and we identify managerial interventions that can be adopted to enhance the transmission of certainty and uncertainty. Finally, we explore the implications of our framework for rumor management.

EXPERIMENT 1: FROM RUMOR TO FACT

Experiment 1 tested our hypothesis of differential decay of beliefs versus belief certainty. Our paradigm featured a belief initially associated with high uncertainty and transmitted throughout a chain of people successively invited to orally share their impressions with one another and examined how an initial difference in certainty persisted across chains of consumers. Although our hypothesis is informed by the MCM, Experiment 1 also provides a test of an alternative possibility raised by the Gricean norms discussed previously.

Participants and Design

One hundred forty-two undergraduate students participated in a ten-minute lab experiment. Participants entered the lab sequentially in small groups and were placed into a "chain" of consumers in which one consumer orally communicated information to another. Each chain consisted of four participants, with each participant occupying one position in the chain (i.e., first, second, third, or fourth) by virtue of when his or her group participated in the experiment. Thus, each experimental session had four phases, or waves, of participants who arrived one after the other.

Participants were assigned to receive a negative rumor accompanied by high uncertainty versus no uncertainty information (control). At the outset of the experiment, participants were individually approached by experimenters and given a message about a restaurant. They were then told to orally transmit the information from the message as accurately as possible to the next participant who would take his or her position in the subsequent session. All participants completed a five-minute filler task and then verbally delivered their message to a participant in the next (i.e., second, third, or fourth) position. Two types of chains were thus formed: one in which initial brand information was communicated with uncertainty and one in which initial brand information was communicated without reference to uncertainty. This created initial differences in certainty that could be tracked across the chain of participants.

Procedure

Participants in the first position. Participants in the first position were individually approached by an experimenter

who asked them to complete a short survey about various businesses and restaurants. In the process, the experimenter verbally communicated a rumor about one of the restaurants in the survey and expressed uncertainty or did not mention certainty or uncertainty information. After being told about the restaurant, participants reported their belief about the restaurant, level of certainty, and behavioral intentions (for a similar manipulation, see Tybout, Calder, and Sternthal 1981).

Participants in subsequent positions. Participants in subsequent positions were in the uncertain or the control condition by virtue of the type of staged message communicated to the participant in the first position. Each participant in the second position completed a measure of beliefs, belief certainty, and their behavioral intentions and then orally communicated the message about the restaurant to a participant in the third position. Each participant in the third position orally communicated the message to a participant in the fourth position after completing the same measures. Finally, participants in the fourth position communicated their message out loud to a subsequent set of “participants” (in reality, research assistants) and answered the same questions. Thus, “chains” of four consumers were created, enabling us to track how the belief and the associated initial certainty had been disseminated.

Independent Variables

Experimenter certainty. The certainty manipulation consisted of the staged message orally communicated to participants in the first position. It either emphasized the uncertainty attached to the information (high uncertainty) or did not mention any certainty-related information (control; see Appendix A).

Position in chain. As we noted previously, participants in the first position received an oral communication from the experimenter. Subsequent participants received an oral communication from a previous participant immediately preceding him or her in the chain.

Dependent Variables

Belief. After each participant received the message, he or she reported in writing the content of the belief. Two independent raters rated the extent to which participants’ answers contained the core belief that they were given (i.e., this restaurant is using worm meat in the preparation of its burgers), using a scale ranging from 1 to 9, anchored by “very similar to the core belief” and “very different from the core belief” ($r = .91$).

Certainty. Using seven items adapted from prior research (Petrocelli, Tormala, and Rucker 2007), participants reported the extent to which they were certain of the message content. Responses were provided on scales ranging from 1 to 9, anchored by “not certain at all” and “extremely certain.” Sample questions included “How certain are you that this restaurant is using worm meat in the preparation of its burgers?” and “How sure are you that this restaurant is using worm meat in the preparation of its burgers?” We aggregated the items into a single index ($\alpha = .93$).

Behavioral intentions. Participants also reported the likelihood that they would eat at the restaurant in the next week, next month, and next quarter, using scales ranging from 1 to 9, anchored by “not likely at all” and “extremely

likely.” We aggregated these items to form a measure of behavioral intentions ($\alpha = .79$).

*Results*³

We counterbalanced all questions, and there was no order effect. Next, we submitted the beliefs, certainty, and behavioral intention scores to a 2 (certainty: uncertainty, control) \times 4 (position: first, second, third, fourth) analysis of variance (ANOVA).

Beliefs. There were no differences across conditions or positions on whether participants grasped the core content of the message they received ($F < 1$).

Certainty. Participants reported lower certainty when the message was staged to be uncertain ($M = 3.62$, $SD = 1.11$) than when it was not ($M = 5.72$, $SD = 1.25$; $F(1, 134) = 158.65$, $p < .001$). There was no main effect of position on certainty ($F(3, 134) = 1.15$, $p < .05$). Importantly, there was a significant certainty \times position interaction ($F(3, 134) = 13.76$, $p < .001$). This interaction indicated that the difference created by the certainty manipulation was greatest for the initial receiver ($M_{diff} = 4.00$) and decreased across the second ($M_{diff} = 2.82$), third ($M_{diff} = 1.15$), and fourth ($M_{diff} = .05$) positions (see Figure 1).

Behavioral intentions. In general, participants reported lower likelihood of eating at the restaurant when the negative message was not associated with any certainty information ($M = 2.05$, $SD = 1.37$) than when it was associated with uncertainty ($M = 4.13$, $SD = 1.23$; $F(1, 134) = 223.51$, $p < .001$). There was no main effect of position on certainty ($F(3, 134) = 1.61$, $p = .19$). Importantly, there was a reliable certainty \times position interaction ($F(3, 134) = 10.98$, $p < .001$), indicating that the difference created by the certainty manipulation on intentions was greatest for the initial receiver ($M_{diff} = 2.97$) and decreased across the second ($M_{diff} = 2.21$), third ($M_{diff} = 1.54$), and fourth ($M_{diff} = .52$) positions.

Mediation. To link the loss of certainty to changes in behavioral intentions, we conducted a mediation analysis across positions and examined whether participants’ level of certainty predicted differences in behavioral intentions. We dummy-coded original certainty such that 0 = control condition and 1 = uncertain condition. When we entered both the certainty condition and participants’ expressed certainty into a regression predicting behavioral intentions, the effect of the certainty manipulation was no longer significant ($\beta = -.17$, $t(141) = -1.29$, $p = .18$) but participants’ expressed certainty did predict intentions ($\beta = .41$, $t(141) = 2.67$, $p < .01$). We tested the overall significance of the indirect effect (i.e., the path through the mediator) by constructing a 95% confidence interval (CI) as Shrout and Bolger (2002) suggest. Zero fell outside the interval (95% CI = .07 to .94), providing further evidence of successful mediation.

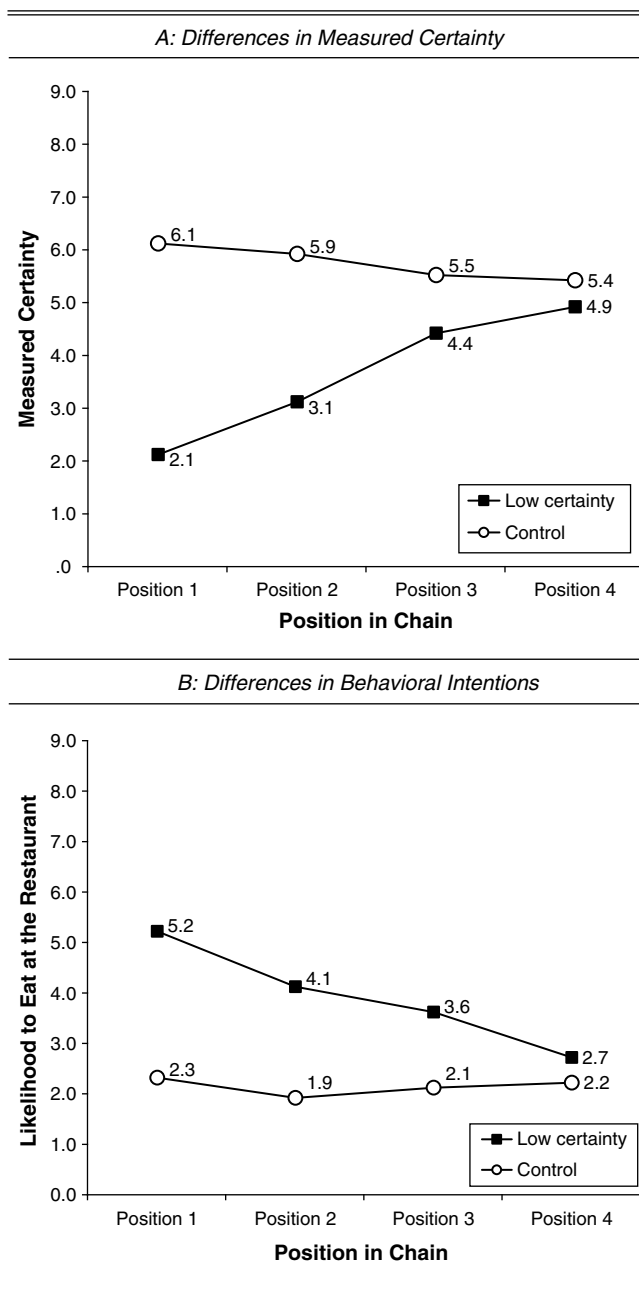
Discussion

Experiment 1 found preliminary support for our hypothesis of an asymmetry in the transmission of beliefs and belief certainty. The results also rule out a Gricean norm

³In both Experiments 1 and 2, we also analyzed the data using a simplex model (Marsh 1993) in which each chain of participants is treated as one observation. This analysis supported the conclusions of our analysis of variance approach.

Figure 1

EXPERIMENT 1: DIFFERENCES AS A FUNCTION OF CERTAINTY MANIPULATION AND POSITION IN CHAIN



explanation, predicting that any information transmitted early would be viewed as relevant and important and remain salient thereafter. Last, they illustrate how rumors might quickly become facts, due to loss of certainty across transmission.

EXPERIMENT 2: THE LOSS OF CERTAINTY IN TRANSMISSION

It is possible that the results of Experiment 1 stem from people's discomfort with expressing uncertainty. Because certainty is often viewed more favorably than uncertainty (Camerer, Bhatt, and Hsu 2007; Tversky and Fox 1995),

people might be more motivated and, thus, more likely to transmit certainty than uncertainty. According to a motivation-based perspective, the decay might be limited to situations in which the belief being transmitted is originally held with uncertainty. To address this possibility, in Experiment 2 we varied initial certainty to be low or high. Unlike a motivation-based perspective, our differential decay hypothesis suggests that certainty information should decay faster across a chain of consumers than valence information, regardless of whether an attitude is originally held with certainty or uncertainty.

Method

One hundred sixty undergraduate students were recruited from local dining halls and residences. Participants were placed into a "chain" of consumers. Each chain consisted of four participants, with each participant occupying one of four positions in the chain. Participants in the first position were assigned to conditions in a 2 (valence manipulation: positive, negative) \times 2 (certainty manipulation: low, high) between-subjects design. Participants in the second, third, and fourth positions were given a message from one of the prior participants in the immediately preceding position. Four types of chains were thus formed: initial positive attitude with low certainty, initial negative attitude with low certainty, initial positive attitude with high certainty, and initial negative attitude with high certainty.

Procedure

Participants in the first position. Participants in the first position were approached by the experimenter and asked to complete a survey on consumer opinions. The experimenter gave participants a typed copy of a review of a hotel ostensibly originating from an earlier participant. In reality, the experimenter staged the review. The reviewer's opinion was either positive or negative and reported to be held with a low or high degree of certainty (see Appendix B).⁴ After reading this information, participants wrote a short message in the form of an e-mail to a friend or coworker about the hotel.

Participants in subsequent positions. Participants in the second position were randomly assigned to receive one of the messages written by a participant in the first position. As a result, participants in subsequent positions were in the positive/negative valence condition and high/low certainty condition by virtue of the type of staged feedback given to the first participant. Participants in the second position then wrote a message that would be received by a participant in the third position; participants in the third position wrote a message that would be received by a participant in

⁴A pretest (N = 60) confirmed that the certainty manipulation varied the perceived attitude certainty of the sender, not other strength-related properties of attitudes (Petty and Krosnick 1995). Specifically, participants received either the low or the high certainty manipulation provided in Appendix B and completed a series of attitude strength measures. The manipulation affected participants' attitude certainty ($p < .01$) but not attitude importance, knowledge, expertise, intensity, complexity, ambivalence, accessibility, or affective-cognitive consistency ($p > .10$). For a complete list of pretest measures see the Web Appendix (<http://www.marketingpower.com/jmrdec11>).

the fourth position. Finally, participants in the fourth position subsequently wrote a message supposedly for another participant.

Two independent raters, blind to conditions, coded each message for (1) the total number of thoughts, (2) the number of positive and negative thoughts, and (3) the number of thoughts expressing certainty or uncertainty. In the case of certainty, coders were instructed to count the number of thoughts related to or qualified by some mention of certainty (e.g., I'm *sure* about my opinion) or uncertainty (e.g., I have some *doubt* about my opinion). Initial agreement between raters was 86% or better for each dimension, with disagreements resolved through discussion.

Results

Coded messages were submitted to a 2 (valence manipulation: positive, negative) × 2 (certainty manipulation: low, high) × 4 (position: first, second, third, fourth) ANOVA.

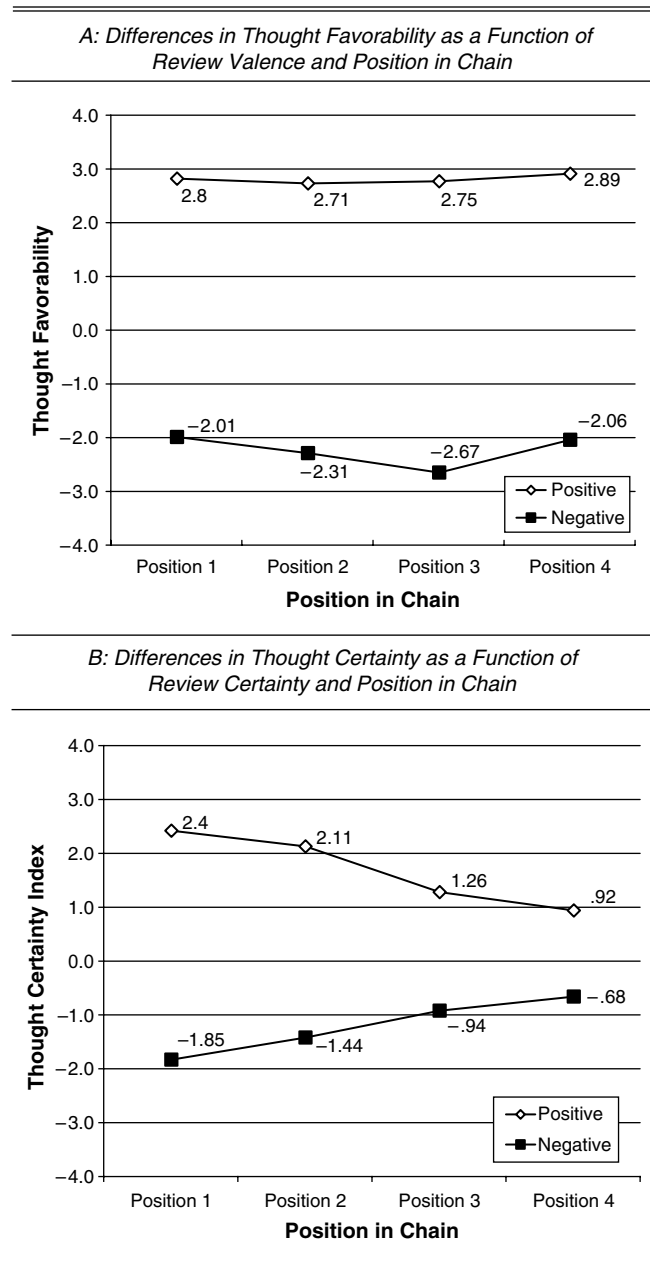
Total number of thoughts. There were no significant main effects or interactions on the total number of thoughts participants generated ($F < 1$).

Valence of thoughts. We computed a thought-valence index by subtracting the number of negative thoughts from the number of positive thoughts. This index could range from large positive values (i.e., many positive thoughts, few negative thoughts) to large negative values (i.e., many negative thoughts, few positive thoughts). There was only a main effect of the reviewer valence such that participants' thoughts were more positive when the initial feedback was positive ($M = 2.78$, $SD = .83$) rather than negative ($M = -2.36$, $SD = 1.44$; $F(1, 144) = 651.88$, $p < .001$; see Figure 2, Panel A). No other effects were significant ($p > .35$), suggesting that this effect did not dissipate across the chain.

Thought certainty index. We computed an index of thoughts expressing certainty by taking the number of thoughts expressing certainty and subtracting from it the number of thoughts expressing uncertainty. This created an index ranging from large positive values (i.e., many thoughts expressing certainty, few expressing uncertainty) to large negative values (i.e., many thoughts expressing uncertainty, few expressing certainty). Overall, participants expressed greater certainty in their message when the staged message was from a certain ($M = 1.69$, $SD = .99$) rather than uncertain ($M = -1.21$, $SD = .90$) person ($F(1, 144) = 528.84$, $p < .001$). There was no main effect of position on certainty ($F(3, 144) = 1.32$, $p = .27$). However, there was a significant certainty × position interaction ($F(3, 144) = 23.19$, $p < .001$). Specifically, the difference created by the certainty manipulation was greatest for the initial receiver ($M_{diff} = 4.25$) and decreased across the second ($M_{diff} = 3.55$), third ($M_{diff} = 2.20$), and fourth ($M_{diff} = 1.60$) positions (see Figure 2, Panel B). There were no main effects or interactions involving valence ($p > .50$). We also examined the total number of thoughts related to certainty or uncertainty as a function of position and found that this value was greatest in the first position ($M = 2.13$, $SD = .88$) and decreased across the second ($M = 1.88$, $SD = .94$), third ($M = 1.10$, $SD = .67$), and fourth ($M = .80$, $SD = .79$) positions ($F(3, 144) = 22.97$, $p < .001$).

Figure 2

EXPERIMENT 2: DIFFERENCES IN THOUGHT FAVORABILITY AS A FUNCTION OF REVIEW VALENCE AND POSITION IN CHAIN AND THOUGHT CERTAINTY INDEX AS A FUNCTION OF REVIEW CERTAINTY AND POSITION IN CHAIN



Discussion

The finding that both certainty and uncertainty faded in Experiment 2 contradicts a motivational account explanation for why certainty is lost. Taken together, Experiments 1 and 2 provide convergent evidence for the differential decay hypothesis. At the same time, they raise new questions. First, does the certainty information decay stem from a lack of transmission of certainty information, a lack of reception of certainty information, or both? Second, what can managers do to minimize the loss of certainty in communication? We conducted Experiments 3 and 4 to answer these questions.

EXPERIMENT 3: INCREASING THE RECEPTION OF CERTAINTY

One question arising from the first two experiments pertains to whether the loss of certainty information stems from a failure to transmit such information or a failure to receive such information when it is transmitted. To answer this question, the next two experiments focused on the factors underlying the reception (Experiment 3) and transmission (Experiment 4) of certainty-related information. Experiment 3 focuses on the reception stage and tests whether a cause of certainty decay is that receivers fail to extract or integrate certainty information even when it is provided in a communication. If this is the case, increasing receivers' awareness of the information sent should enhance the reception of certainty. In addition, if making certainty clearer increases the reception of certainty information, this would rule out an alternative explanation suggesting that people are simply uninterested in or ignore certainty information.

We used a two-stage procedure that consisted of senders and receivers. We exposed half the receivers to a numeric attitude certainty score of the sender, and the other half received only the sender's written message. This is akin to customer review websites that provide summaries of opinions; however, in one of our conditions, we incorporated an additional summary of certainty. We anticipated that having a simple summary statement of other consumers' certainty would enhance the reception of certainty. In addition, Experiment 3 used a new product and a new certainty manipulation.

Method

One hundred twelve undergraduate students took part in the study in exchange for partial course credit. In the first phase, senders were provided with an initial review of a new toothpaste product. We manipulated certainty by having the message come from either an expert (dentist Jeffrey Kohlhardt, DDS) or a nonexpert (Paul, a 24-year-old consumer; see Appendix C). We held the message itself constant across conditions, containing strong arguments in favor of the product, and participants were asked to read the message carefully. Specifically, the reviewer stated, "The toothpaste has a fresh and clean feeling to it, and it does a great job of whitening my teeth and freshening my breath." This message was geared to create similar attitudes despite differences in the expertise of the source. That is, given the compelling arguments, feeling certain because the source is an expert does not necessarily mean that people will be more positive; rather, it suggests that they can be more certain of their positive evaluation.⁵

After reading the message, senders wrote an e-mail telling another person about the toothpaste. Next, senders answered questions that assessed their attitudes toward the toothpaste and their attitude certainty. Attitudes were

reported on semantic differential scales ranging from 1 to 9 with the following anchors: "unfavorable/favorable," "negative/positive," and "good/bad." We averaged the items to form a composite attitude index ($\alpha = .75$). Certainty was assessed through a series of scales ranging from 1 to 9, anchored by "not certain at all" and "extremely certain" (Petrocelli, Tormala, and Rucker 2007). Sample questions included "How certain are you that your attitude toward the toothpaste is the correct attitude to have?" and "To what extent is your true attitude toward this toothpaste clear in your mind?" We aggregated the items into a single index ($\alpha = .89$). Finally, we analyzed senders' on the same dimensions as in Experiment 2. Agreement between two coders, blind to condition, was 87% or better on all measures, with disagreements resolved through discussion.

In the second portion of the experiment, we randomly assigned participants to receive the e-mail message from one of the earlier senders who had been placed in either the high or the low certainty condition. All receivers were given one sender's attitude score. In the high certainty salience condition, receivers also received a certainty score based on the average of the certainty items completed by the sender. That is, we took the mean of the seven items from the certainty questionnaire provided by the sender and presented it to receivers. For example, if an earlier participant had an average certainty score of 6.5, six-and-a-half stars out of nine would be shown. A sample of the type of feedback received appears in Appendix C. In the low certainty salience condition, the certainty score was not provided; only the written message along with the attitude score was received. Finally, receivers completed measures of attitudes and certainty. We analyzed all data using ANOVA. We report the results for senders who were exposed only to the certainty (i.e., source expertise) manipulation and then for receivers who were exposed to the full 2 (source expertise) \times 2 (certainty salience) design.

Results for Senders

Total number of thoughts. There was no effect of source expertise on the number of thoughts generated in senders' messages ($F < 1$).

Valence of thoughts. The valence of the senders' thoughts was unaffected by the expertise of the source ($F < 1$).

Thought certainty index. Senders had more thoughts that expressed certainty than uncertainty when they received a message from an expert ($M = .34$, $SD = .83$) than when they received it from a nonexpert ($M = -.54$, $SD = .74$; $F(1, 54) = 18.05$, $p < .001$).

Attitudes. There was no difference in senders' attitudes as a function of whether the initial message came from an expert ($M = 6.21$, $SD = 1.91$) or a nonexpert ($M = 6.26$, $SD = 1.25$; $F < 1$). This null effect is not surprising, because prior research suggests that given the motivation to process unambiguously strong arguments, source expertise does not necessarily affect attitudes (e.g., Chaiken and Maheswaran 1994; Tormala and Petty 2004), but it does affect attitude certainty (Clarkson, Tormala, and Rucker 2008; Tormala, Briñol, and Petty 2006).

Certainty. Senders were more certain when they received the message from an expert ($M = 6.58$, $SD = 1.34$) rather than a nonexpert ($M = 5.57$, $SD = 1.28$; $F(1, 54) = 8.36$, $p < .01$).

⁵Pretesting revealed a significant effect of the source manipulation on attitude certainty and perceived expertise, as we expected given that prior research has shown that source expertise influences certainty (e.g., Clarkson, Tormala, and Rucker 2008; Tormala and Petty 2004). The pretest found that this manipulation did not affect other strength-related properties (Petty and Krosnick 1995), such as importance, intensity, complexity, ambivalence, accessibility, and attitude consistency ($p > .10$).

Results for Receivers

Attitudes. Receivers had similar attitudes regardless of whether they received a message from a sender exposed to an expert ($M = 6.07$, $SD = .87$) or a nonexpert ($M = 6.26$, $SD = .80$; $F < 1$) message. In addition, receivers' attitudes did not vary regardless of whether the numeric certainty rating from the sender was present ($M = 6.35$, $SD = .73$) or absent ($M = 5.98$, $SD = .90$; $F(1, 52) = 2.63$, $p = .11$). There was also no source expertise \times certainty salience interaction ($F < 1$).

Certainty. Receivers were more certain of their attitudes when they received a message from a sender whose information came from an expert ($M = 6.20$, $SD = 1.77$) than a nonexpert ($M = 4.43$, $SD = 1.05$; $F(1, 52) = 33.32$, $p < .001$). Receivers were also more certain when the attitude certainty score was present ($M = 5.91$, $SD = 1.77$) than when it was absent ($M = 4.72$, $SD = 1.41$; $F(1, 52) = 15.02$, $p < .001$). Of greatest interest, however, is that these main effects were qualified by the predicted source expertise \times certainty salience interaction ($F(1, 52) = 19.73$, $p < .001$). When the certainty score was absent, there was no difference between participants who received a message from a sender who was certain (i.e., received the message from an expert; $M = 4.93$, $SD = 1.64$) and those who received a message from a sender who was uncertain (i.e., received the message from a novice; $M = 4.52$, $SD = 1.17$; $F < 1$). However, when the certainty score was explicitly included, receivers were more certain when the sender was certain (i.e., received the message from an expert; $M = 7.48$, $SD = .56$) rather than uncertain (i.e., received the message from a novice; $M = 4.35$, $SD = .95$; $F(1, 52) = 52.17$, $p < .001$).

Discussion

Experiment 3 revealed that the loss of certainty in interpersonal communications occurs in part because of the lack of attention at information reception. We found a main effect of sender certainty on the senders' transmission, suggesting that they were indeed sending certainty that was detectable by our coders when the coders were asked to look for it. However, receivers were better able to pick up the senders' certainty when we provided them with a numeric summary score. This finding suggests that receivers are not always looking for certainty information but can be directed to do so when it is made salient.

EXPERIMENT 4: HOW TO STOP A RUMOR

Experiment 4 examined another potential intervention for rumor management: making communicators explicitly question whether they can be certain of their beliefs based on the information they received. Several researchers (e.g., Kapferer 1990; Kimmel 2004) concur that simply denying a rumor fails to eliminate its negative impact, but few remedies have been offered to counteract negative rumors. As an exception, Tybout, Calder, and Sternthal (1981) propose that a reassociation strategy, in which the negative stimulus (e.g., worm meat) associated with the target brand (e.g., McDonald's) is reassociated with a positive stimulus (e.g., the French use worm meat in their cuisine), can reduce the rumor's negative effects on consumers' attitudes toward the brand. Yet reassociation can sometimes prove problematic, either because of the difficulty of finding positive stimuli

that can offset the negative effect or because of the monetary and cognitive costs necessary for customers to learn new associations (Meyers-Levy and Tybout 1989).

Experiment 4 investigates an alternative strategy to counter rumors, based again on our perspective that recipients do not attend to the uncertainty associated with rumors. Specifically, if rumors stem from beliefs associated with uncertainty, increasing recipients' attention to the initial sender's uncertainty should lead them to be less certain of the information. As a consequence of being less certain, recipients should subsequently be less willing to transmit the belief, or, even when they do transmit, given great accessibility of the initial sender's uncertainty, they should be more likely to reflect this uncertainty in their own communications.⁶ As a consequence, asking consumers to question or reconsider whether they can be certain of a belief they have heard may lead them to focus on and reconsider how certain the sender of the information was. Doing this should reduce recipients' certainty in cases in which the sender was initially uncertain.

Participants and Procedure

Sixty undergraduate students took part in the study in exchange for \$10 and were randomly assigned to a 2 (certainty: uncertainty vs. control) \times 3 (strategy: denial vs. reassociation vs. questioning) between-subjects factorial design. Participants were informed that they would be given information and asked questions about various brands. Participants were exposed to the low certainty or control message used in Experiment 1 and then presented with one of three scenarios. In the first scenario (denial), they received an excerpt from a press release by the restaurant's chief executive officer denying the rumor. In the second condition (reassociation), participants received a short message, inspired by Tybout, Calder, and Sternthal (1981), aimed to reassociate the negative object (worm) with a positive stimulus (French food). In the third condition (questioning), participants received a quote from the spokesperson asking them to question their certainty.

Independent Variables

Certainty. The certainty manipulation (uncertainty vs. control) was virtually identical to Experiment 1, with the exception that it was communicated in writing.

Counter rumor strategy. We manipulated the information participants received following the message with the rumor. In the *denial condition*, participants received an excerpt of a restaurant's spokesperson denying the rumor. Specifically, the message, signed by the restaurant's chief executive officer, stated: "Restaurant X categorically denies including any amount of worm meat in the preparation of its burgers." In the *reassociation condition*, participants received a message adapted from Tybout, Calder, and Sternthal (1981), which associated the negative stimulus (worm meat) with a positive stimulus (French cuisine). Specifically, participants

⁶At first glance, the finding that making someone more uncertain about a belief decreases that person's willingness to transmit that belief might seem at odds with our pretest finding that people do share uncertainty. However, the pretest merely suggests that people share their uncertainty and not that, among the same people, they are as likely to share beliefs about which they are uncertain and certain.

were told: “Internationally renowned French Chef Xavier Mercier will soon open a restaurant in Chicago. Among his recipes, he will bring with him his famous worm-made sauce that accompanies most of his highly praised and regarded meals.” In the *questioning condition*, participants received an excerpt from an interview in which the restaurant’s chief executive officer stated: “One thing I would ask our customers to do is to ask how certain they are this rumor is true, based on what they heard and where they heard it.”

Dependent Measures

Willingness to transmit information. Using a nine-point scale anchored by “not at all” and “very likely,” participants reported the likelihood that they would transmit the information about the restaurant’s rumors.

Written communication. Participants wrote a short message as if writing a message to a friend. We analyzed the messages on the same dimensions as in the previous experiments. Agreement between two coders, blind to condition on all measures, was 93% or better, with disagreements resolved through discussion. The same index that assessed expressed certainty in Experiment 2 was also computed.

Behavioral intentions. As in Experiment 1, participants indicated how likely they would be to eat at the restaurant in the next week, next month, and next quarter, using scales ranging from 1 to 9, anchored by “not likely at all” and “extremely likely” ($\alpha = .79$).

Results

Total number of thoughts. There was no effect of certainty or strategy on the number of thoughts generated in participants’ communications ($F < 1$).

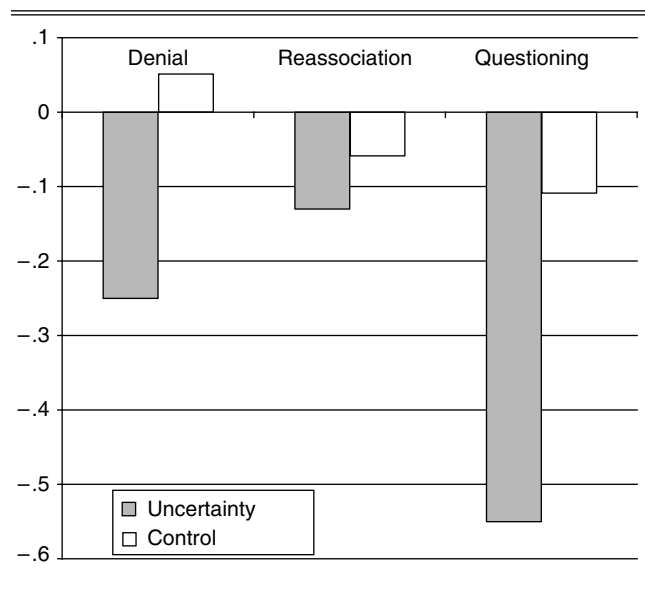
Valence of thoughts. The valence of participants’ thoughts was unaffected by certainty or strategy ($F < 1$).

Expressed certainty. There was a reliable main effect of certainty, such that participants had fewer thoughts expressing uncertainty (than certainty) in the control condition ($M = -.04$, $SD = .56$) than in the uncertainty condition ($M = -.31$, $SD = .69$; $F(1, 54) = 9.05$, $p < .001$). Consistent with our hypothesis, there was also a main effect of strategy on expressed certainty, such that participants expressed fewer uncertain thoughts in the denial ($M = -.01$, $SD = .34$) and reassociation ($M = -.09$, $SD = .51$) conditions than in the questioning condition ($M = -.33$, $SD = .47$). Importantly, however, there was a significant certainty \times strategy interaction ($F(2, 54) = 3.41$, $p < .05$), such that the effect of the uncertainty manipulation on expressed uncertainty was higher in the questioning condition ($t(59) = 2.36$, $p < .05$) than in both the denial ($p > .3$) and the reassociation ($p > .3$) conditions (see Figure 3).

Behavioral intentions. There was a reliable main effect of certainty, such that participants reported being more likely to eat at the restaurant (i.e., less affected by the negative rumor) in the uncertain condition ($M = 3.70$, $SD = 1.31$) than in the control condition ($M = 2.86$, $SD = 1.61$; $F(1, 54) = 3.80$, $p = .05$). There was also a main effect of strategy on behavioral intentions, such that participants reported being significantly more likely to eat at the restaurant in the questioning condition ($M = 4.65$, $SD = 1.29$) than in the denial ($M = 2.05$, $SD = 1.15$) or reassociation ($M = 3.15$, $SD = 1.42$) conditions ($F(2, 54) = 6.32$, $p < .01$).

Figure 3

EXPERIMENT 4: EXPRESSED CERTAINTY AS A FUNCTION OF STRATEGY AND CERTAINTY

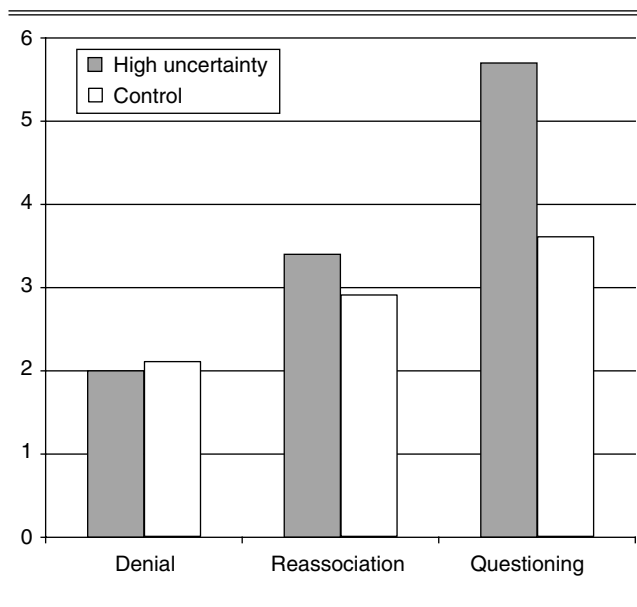


Post hoc contrasts further revealed that participants were significantly more likely to eat at the restaurant in the questioning condition than in both the denial ($t(59) = 3.13$, $p < .01$) and the reassociation ($t(59) = 2.51$, $p < .05$) conditions. Consistent with Tybout, Calder, and Sternthal (1981), participants in the reassociation condition were more likely to eat at the restaurant than participants in the denial condition ($t(59) = 2.32$, $p = .05$). Of greatest importance, there was a significant certainty \times strategy interaction ($F(2, 54) = 3.17$, $p < .05$), such that participants exposed to the questioning strategy reported significantly greater intentions to eat at the restaurant when in the uncertain condition than in the control condition ($t(59) = 2.58$, $p < .05$), but there were no differences between the uncertain and the control conditions for the two other strategies ($p > .2$; see Figure 4).

Willingness to transmit information. Consistent with our pretest, there was no main effect of certainty on willingness to transmit information ($F < 1$). However, there was a significant effect of strategy, such that participants reported being significantly more likely to transmit the information in the denial ($M = 7.24$, $SD = 1.34$) and reassociation ($M = 5.85$, $SD = 1.39$) conditions than in the questioning condition ($M = 4.25$, $SD = 1.68$; $F(2, 54) = 8.54$, $p < .01$). Post hoc contrasts revealed that participants were significantly less likely to transmit the information in the questioning condition than in both the denial ($t(59) = 3.09$, $p < .01$) and the reassociation ($t(59) = 2.76$, $p < .01$) conditions, which also differed from each other ($t(59) = 2.44$, $p < .05$). Of greatest importance, there was a significant certainty \times strategy interaction ($F(2, 54) = 4.54$, $p < .05$), such that the difference between the uncertainty and control conditions was greater in the questioning condition ($t(59) = 2.29$, $p = .05$) than in both the denial ($p > .2$) and the reassociation ($p > .3$) conditions (see Figure 5).

Figure 4

EXPERIMENT 4: BEHAVIORAL INTENTIONS AS A FUNCTION OF STRATEGY AND CERTAINTY

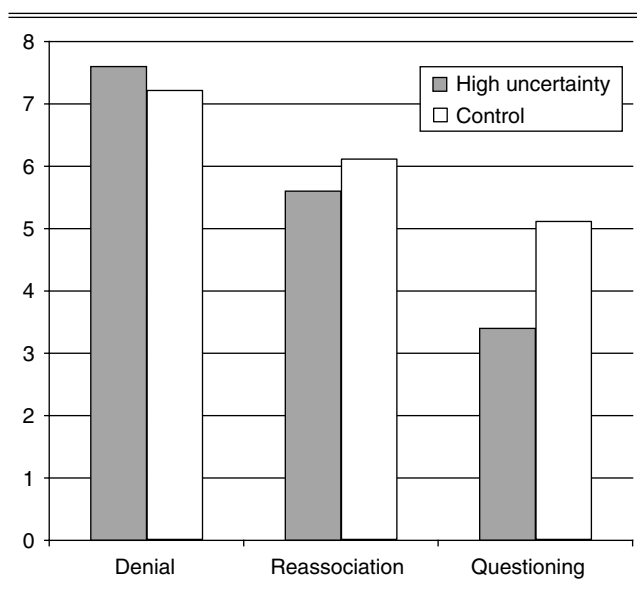


Discussion

Asking consumers to pay attention to their feelings of uncertainty apparently led them to think about and reconsider the certainty conveyed by the sender. When the sender was uncertain in our paradigm, this greater attention to the sender’s level of certainty led to a reduction in the recipient’s certainty. Importantly, the results also provide insights into how reassociation and questioning strategies might differentially counter the negative effect of rumors. Although participants in both the reassociation and the questioning strategies (compared with the denial strategy)

Figure 5

EXPERIMENT 4: WILLINGNESS TO TRANSMIT INFORMATION AS A FUNCTION OF STRATEGY AND CERTAINTY



reported more favorable behavioral intentions toward the brand and a reduced likelihood of transmitting the negative rumor, only the questioning strategy led to greater uncertainty about the rumor. In contrast, the reassociation strategy did not affect certainty, implying that its effect might operate through a different process, such as lowering the overall importance of the rumor information.

This experiment also offers prescriptions for managers; it shows that making uncertainty salient to consumers can (1) help prevent rumors from being transmitted and (2) dampen the effects of negative rumors that have already been transmitted. Calling attention to and questioning the certainty is a strategy that can be easily implemented to prevent and combat the spreading of rumors.

GENERAL DISCUSSION

The findings have bearing on two related literature streams. For the literature on rumors, the observed loss of expressed uncertainty over time provides evidence on how negative rumors might be born and transmitted, despite being held and even initially expressed with doubt. Likewise, the observed loss of expressed certainty helps explain how the effects of favorable WOM can dissipate even when initial consumers hold highly certain positive attitudes toward a product. In each case, beliefs become more (less) influential as they are passed on with increasing (decreasing) certainty.

This research also sheds light on how certainty is shared and transmitted. In particular, as a secondary cognition, certainty seems more susceptible to being lost during communication. Despite a long and storied history of research on certainty (see Petty and Krosnick 1995; Rucker and Petty 2006; Tormala and Rucker 2007), the bulk of the work has focused on understanding certainty at an intrapersonal level. The current research examines the interpersonal nature of certainty and, in doing so, provides an inroad to understanding how attitude certainty is transmitted from one consumer to another. This research also suggests that the transmission of primary and secondary cognitions follows an asymmetrical pattern. In addition, this research is important in providing an empirical test of the MCM (Petty, Briñol, and DeMarree 2007). Consistent with the MCM, we demonstrated in the context of WOM communication that making the secondary cognition of attitude certainty more accessible to senders or receivers increased its transmission between consumers, but without intervention the constructs showed different communication patterns.

Last, this research complements classic laboratory work on group structure (e.g., Shaw 1964) and network composition (Brown and Reingen 1987) effects on communication by investigating, for the first time, how metacognitions are communicated from one person to another. Aside from structural elements of a network, such as the ties of its members or its size (which may weaken or strengthen information transmission), we suggest that understanding the relationship between beliefs and belief certainty can also shed light on how people communicate information with one another.

Limitations and Further Research

Additional research might explore the role of certainty in whether people spontaneously choose to transmit their

opinions in the first place. It seems that people are generally more likely to share their attitudes with others as the certainty with which they hold those attitudes increases (Visser, Krosnick, and Simmons 2003; but see Gal and Rucker 2010). Likewise, in Experiment 2 we found that certainty about a favorable attitude produced greater willingness to recommend a service (i.e., a hotel) to others. Willingness to recommend products and services, or share opinions more generally, is a central aspect of net promotion and company growth (Reichheld 2003) and thus provides yet another reason for researchers to investigate certainty further.

Research should also examine the psychological characteristics, message features, or situational factors that might naturally moderate the loss of certainty observed in our experiments. For example, in contexts in which consumer involvement is relatively high, consumers might scrutinize the message content more systematically and, consequently, be more likely to attend to and pass on certainty-related information. In addition, the extremity of the message content (e.g., when the information seems truly unbelievable) might make any stated level of certainty more focal and, thus, less likely to dissipate across transmissions. Moreover, the loss of certainty observed in our studies might be reduced in situations that require or prompt people to clearly state their certainty when passing on information, such as in eyewitness testimony or jury deliberations (e.g., Brewer and Wells 2006).

Managerial Implications

This research has potentially important implications for rumor management. It demonstrates how rumors about products, brands, companies, and even people can spread because of the failure to communicate uncertainty. Rumors might start with considerable skepticism or doubt but move closer to perceived facts as uncertainty, but not the belief forming the core of the rumor, decays across the communication chain. This loss of uncertainty causes people to behave differently (in our studies, more negatively) toward the brand, acting as if the rumor were true. Our approach is not only descriptive but also prescriptive in suggesting how companies can manage certainty to prevent or encourage the spread of negative and positive information.

Whereas prior research has focused on WOM effects in relation to the complexity of networks (e.g., Brown and Reingen 1987) and the nature of the product being discussed (e.g., Giese, Spangenberg, and Crowley 1996), the current research takes a psychological approach by studying the dynamic transmission of beliefs and certainty in WOM messages. By considering the role of certainty in this context, the current experiments shed light on a new variable that can critically moderate the effectiveness of WOM marketing efforts. For example, whether a consumer acts on positive WOM from a coworker by creating buzz or just transmitting a piece of information might ultimately depend on whether he or she perceives the coworker's beliefs to be accompanied by certainty or uncertainty, if it is salient enough.

Ultimately, our findings have particular relevance for online businesses (e.g., Yelp, Amazon.com), for which reliance on WOM and consumer opinions has become

the norm. Given the role of certainty in affecting behavior, both companies and consumers might benefit from encouraging the transmission of certainty in online reviews. Experiment 3 provides a relatively easy intervention in this regard; companies simply need to share customers' numeric certainty ratings with prospective buyers. Similarly, Experiment 4 suggests that directly asking consumers to question their certainty can provide a simple means to counter rumors and reduce their negative consequences. Indeed, our work helps explain how beliefs initially held with certainty have less impact with each transmission, while beliefs initially held with uncertainty can have more impact. We suggest that keeping uncertainty and certainty salient can have important implications for combating rumors and maintaining goodwill stemming from favorable evaluations.

APPENDIX A

Message Received in the High Uncertainty Condition

"Hey, I'm going to tell you something but I am not really sure about it. Restaurant X seems to have recently started to include a small amount of worm meat in the preparation of its burgers. . . . The taste of worm meat is very close to the actual ground meat, and much cheaper, which might have led Restaurant X to decide to use some worm meat in its burgers."

Message Received in the Control Condition

"Hey, I'm going to tell you something. Restaurant X has recently started to include a small amount of worm meat in the preparation of its burgers. . . . The taste of worm meat is very close to the actual ground meat, and much cheaper, which has led Restaurant X to decide to use some worm meat in its burgers."

(Note that for purposes of confidentiality, we masked the name of the restaurant used in the experiment.)

APPENDIX B

Text Received from Reviewer with a Positive Attitude

"So, I just saw an ad for an AMAZING HOTEL that looks very nice. . . . Seems pretty great, with multiple pools, lots of beachfront, fancy restaurants and such, and also, it looks relaxing and luxurious!"

Text Received from Reviewer with a Negative Attitude

"So, I just saw an ad for a LACKLUSTER HOTEL that looks very mediocre. . . . Doesn't seem great, it lacks multiple pools, has little beachfront, and has only a few restaurants and such, and also, it looks modest and average."

Additional Text Received from Reviewer with High Certainty

"I'm pretty certain of my assessment. That is, based on my experience, I'm pretty confident that my perception about this hotel is correct."

Additional Text Received from Reviewer with Low Certainty

"I'm pretty uncertain of my assessment, though. That is, based on my experience, I'm not confident that my perception about this hotel is correct."

Appendix C

EXPERIMENT 3: STIMULI PRESENTED TO PARTICIPANTS BY CERTAINTY SALIENCE CONDITIONS

A: Stimuli Presented in the Low Certainty Salience Condition

Imagine that you are considering to change your brand of toothpaste...

On www.ConsumerReviews.com, the following was written:

-----TEXT FROM PARTICIPANT WAS INSERTED HERE-----




Attitude score: ★★★★★★★★

B: Stimuli Presented in the High Salience Condition

Imagine that you are considering to change your brand of toothpaste...

On www.ConsumerReviews.com, the following was written:

-----TEXT FROM PARTICIPANT WAS INSERTED HERE-----



Attitude score: ★★★★★★★★

Certainty score: ★★★★★★★★

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