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Impact of Mobility and Timing on User-Generated Content

Online reviews of services and products are increasingly posted via mobile devices rather than a website. Our research shows that opinions posted via mobile devices are more timely, shorter, more "to the point" and more negative than web reviews. Organizations need to understand the differences and react accordingly. We provide guidelines to help managers avoid mistakes and prepare for the era of ubiquitous mobile computing so they can best manage mobile-based customer opinions and conversations.[1]

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Mobile Technology Changes the Nature of User-Generated Content

The Internet has dramatically changed the way people communicate. But a further change is currently underway, brought about by two IT-induced phenomena: the proliferation of user-generated content and the emergence of mobile devices as viable computing platforms. This evolution of communication has important implications for modern organizations and their leadership. Consider the example of Yelp, the San Francisco-based business review site. On August 13, 2013, under pressure from its 10.4 million users who access the platform each month via mobile devices, Yelp allowed users to post reviews from their mobile devices.[2] Up to that date, Yelp had resisted enabling such reviews, citing concerns about their short length and overall quality.

The Yelp example suggests that even firms at the forefront of technology-mediated interaction with customers are struggling to manage the impact of new IT devices. Communication is increasingly mediated by mobile technology with ever-changing form factors,[3] and organizations are forced to make decisions about the optimal design of their communication platforms. Yet, they have limited reliable research on which to base such decisions. An example of the perils of promoting mobile-enabled feedback without a sound theory of its effects is provided by McDonald's. In 2012, in an impulse of technology experimentation, McDonald's launched a Twitter campaign using the hashtag #McDStories. It asked followers to share stories about their love for the burger-maker. The move unleashed a flood of negative, sarcastic and even insulting posts, prompting the firm to stop the initiative

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1 Dorothy Leidner is the accepting senior editor for this article.
2 http://officialblog.yelp.com/.
3 In computing and electronics design, the term "form factor" identifies size, shape and style of the device, as well as layout of the main elements. The "bar," the "brick" and the "phablet" are three different form factors for mobile phones.

after just two hours (e.g., "Dude, I used to work at McDonald's. The #McDStories I could tell would raise your hair.").

The reputations of companies, products and people are increasingly built and destroyed online. In the past, a brand manager could carefully craft brand messages that were then delivered to consumers through television, print, radio and static websites. Today, those same brand messages must compete with user-generated opinions that are published and distributed around the world through social media. The primary vehicle for this new type of one-to-many communication about products and services is online review platforms such as TripAdvisor, Yelp and Epinions.

Online review platforms enable individuals to post their personal evaluations of the products and services they have purchased for the benefit of a larger community of users and potential customers. Review sites, of course, trumpet the unbiased nature of their user-generated content. For example:

- *"Unbiased hotel reviews, photos and travel advice for hotels and vacations"* (TripAdvisor)
- *"Unbiased reviews by real people"* (Epinions)

However, the rhetoric is often at odds with the reality. Recent research has documented noticeable opinion dynamics in online reviews.[4] These studies corroborate the notion that publicly expressed opinions may not simply reflect the personal evaluation of the individual posting a comment. Rather, they are often influenced by the opinions of others and by timing effects.

For the past 10 years, we have been studying the competitive impact of information systems and more recently applied this work to online review platforms and online communication. Our objective in this study is to understand how personal opinions and evaluations interact with the design of the technology used to post them. Specifically, we ask: *What is the impact of the posting medium (mobile app or website) on the length, timing and tone of user-generated content?*

In shedding light on this emerging phenomenon in social computing, our findings have practical and theoretical significance. The growing presence and success of visual communication applications (e.g., Instagram, Pinterest) and short-burst communication (e.g., text messaging, Twitter, WhatsApp) suggest that there may be an ongoing shift in the way people communicate. This visual and short-burst communication is more public and more immediate than traditional interactions. Thus, organizations must understand the effect of the changing mode of communication on the content of human communication. This is particularly important for managers charged with protecting and fostering the reputation of their organizations.

Lack of Research into Motivations for Posting Online Reviews

Previous research has focused primarily on the impact of online reviews. This research has established that:

- Review ratings lead to greater sales[5]
- Independent consumer-generated product information is more influential than information available on merchants' sources[6]
- Reviews are helpful decision aids to readers.[7]

Commercial research corroborates these findings, attesting to the growing importance of user-generated content. For example, a recent PhocusWright study claims that 53% of travelers would not book a hotel that has no reviews.[8]

4 Moe, W. and Schweidel, D. "Online product opinions: Incidence, evaluation, and evolution," *Marketing Science* (2012); Li, X., and Hitt, L. M. "Self-Selection and Information Role of Online Product Reviews," *Information Systems Research* (19:4), pp. 456-474 (2008).

5 Anderson, M. and Magruder, J. "Learning from the Crowd: Regression Discontinuity Estimates of the Effects of an Online Review Database," *The Economic Journal* (122:563), 2012, pp. 957-989; Luca, M. *Reviews, Reputation, and Revenue: The case of Yelp.com,* Harvard Business School Working Paper, No. 12-016, 2011.

6 Bickart, B. and Schindler, R. M. "Internet forums as influential sources of consumer information," *Journal of Interactive Marketing* (15:3), 2001, pp. 31-40; Gu, B., Park, J. and Konana, P. "Research Note-The Impact of External Word-of-Mouth Sources on Retailer Sales of High-Involvement Products," *Information Systems Research* (23:1), 2011, pp. 182-196.

7 Mudambi, S. M. and Schuff, D. "What makes a helpful online review? A study of customer reviews on amazon.com," *MIS Quarterly* (34:1), 2010, pp. 185-200.

8 http://www.tripadvisor.com/PressCenter-i5569-c1-Press_Releases.html.

The literature provides much less information about the determinants of why and how online reviews are produced,[9] such as the motivation of those who write them.[10] Nor has any study that we are aware of investigated the effect of the posting medium (e.g., mobile app or website) on user-generated content. Early work in this area builds on research in the context of traditional word-of-mouth advertising[11] to provide an exhaustive taxonomy of the motives prompting people to post online reviews.

Of particular interest to our research question is the motivation individuals feel to achieve balance in their life[12] (known as "homeostase utility" in the literature[13]). When individuals experience strongly satisfying or dissatisfying experiences they will seek to restore psychological balance and verbalize their experiences by respectively expressing positive emotions or venting negative feelings.[14] The extent to which they do so, and the manner in which they share their opinions, have significant implications for the reputations of organizations and products.

The Research Study

Our primary data source for this study was all reviews posted on a leading online review platform for travel products in 2012 relating to the 25 largest U.S. markets (n=293,945). From this data, we extracted matched samples of all reviews posted via mobile devices (30,540) and via the web interface (38,248) for the same product on the same day.

For each review, we had access to the ratings (1 to 5) provided by the customer, as well as other characteristics of the customer (e.g., number of reviews posted), title and commentary. Consistent with prior research, reviews in our sample are overwhelmingly positive.

Before analyzing the reviews, we computed the timing of the review relative to when the service was provided by taking the time stamp of the review posting and the month in which the service occurred. This information enabled us to differentiate reviews contributed during the same month as the service and those posted in different months. However, it did not give us the ability to systematically identify reviews posted on the same day as the service was provided. Only reviews posted on the first day of the month in which the service was provided can be reliably identified as same-day reviews—we label them *true same-day reviews.*

We also extended the same-day reviews dataset by way of a supervised binary text classifier, a machine learning algorithm designed to establish if a review was posted on the same day as the service. The classifier was trained on the sample of true same-day reviews (n=1,305) versus those posted on day-one of the month following service in the previous month.[15] Analyzing the full set of 2012 reviews, the classifier identified 18,262 *predicted same day reviews* that we combined with matched pairs of true same day reviews (n=420), giving a total of 18,682 same-day reviews.

Findings from the Study

We found three significant differences between reviews posted via the mobile platform and those posted via the website.

9 Moe, W. W. and Schweidel, D. A., op. cit., 2012.

10 Cheung, C. M. K. and Lee, M. K. O. "What drives consumers to spread electronic word of mouth in online consumer-opinion platforms," *Decision Support Systems* (53:1), 2012, pp. 218-225.

11 Dichter, E. "How Word-of-Mouth Advertising Works," *Harvard Business Review* (44), November-December, 1966, pp. 147-157; Sundaram, D. S., Mitra, K. and Webster, C. "Word-of-Mouth Communications: A Motivational Analysis," *Advances in Consumer Research* (25:1), 1998, pp. 527-531.

12 Heider, F. "Attitudes and cognitive organization," *The Journal of Psychology* (21:1), 1946, pp. 107-112.

13 Balasubramanian, S. and Mahajan, V. "The Economic Leverage of the Virtual Community," *International Journal of Electronic Commerce* (5), 2001, pp. 103-138.

14 Hennig-Thurau, T., Gwinner, K. P., Walsh, G. and Gremler, D. D. "Electronic word-of-mouth via consumer-opinion platforms: What motivates consumers to articulate themselves on the Internet?," *Journal of Interactive Marketing* (18:1), 2004, pp. 38-52.

15 We subsampled the available training data so that positive and negative classes are matched according to the service provider and overall rating score of the review (positive > 3 stars, otherwise negative). This resulted in a training set of 1,988 reviews. We employed a linear kernel Support Vector Machine classifier with unigram (bag-of-words) features. We tuned the cost parameter, C, and chose a classification threshold based on five-fold cross validation experiments on the training data. In particular, we set the classification threshold to 0.25, corresponding to 73% precision and 12% recall in our cross-validation experiments. We then trained a new classifier on all of the training data and applied it to the full set of reviews posted in the same month as the service was provided (n=170,159).

1. Reviews Posted via Mobile Devices are Shorter

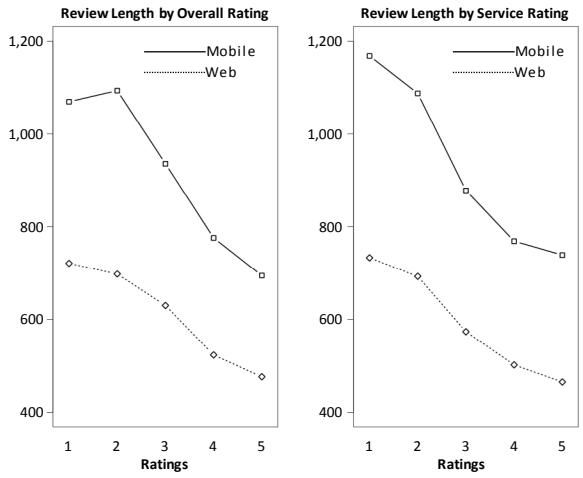
Regardless of the medium used, we found a relationship between negative reviews, length and rating score: negative reviews tend to be longer than positive reviews because people feel the need to elaborate more on their experience (see Figure 1). However, reviews posted via mobile devices are significantly shorter than those posted via the website (an average of 543 characters compared with 790 characters). Thus, reviewers posting via the website use, on average, 41.3% more text than mobile users.[16]

To corroborate this analysis, and in an effort to explicitly control for the individual characteristics of reviewers, we standardized individual reviewer differences by extracting the subset of individuals who posted reviews both via mobile devices and the website (1,933 reviews from 795 unique authors). We found that, on average, the same individual writes 33.5% more text when using the web, versus the mobile opinion platform.[17]

While perhaps intuitive, our finding about the length differences between online reviews posted via mobile devices and the website is important. It confirms the fears of some organizations (e.g., Yelp) that reviews written on mobile devices are shorter and therefore may be less helpful to readers. Previous research has established a link between review length and customers' perceptions of review helpfulness. Understanding why mobile reviews are shorter is therefore an important research imperative for both academics and practitioners because such knowledge will enable the design of more informative review systems. Moreover, having reliable evidence on which to base design decisions will enable firms to clearly communicate and strongly justify potentially unpopular design choices (e.g., not allowing the posting of reviews via smartphones, not allowing anonymous reviews).

In Box 1, we provide a deeper analysis of the different textual characteristics of reviews contributed via mobile devices and the web. We highlight that contributors who use the mobile platform use significantly less punctuation and more abbreviations than their counterparts writing with a full-size keyboard on the website. At present, we don't know whether this difference in writing style changes the interpretation of the text by readers. This is an area in need of research.

Figure 1: Review Length (Matched Data)



2. Reviews from Mobile Devices are Posted Earlier

We found significant differences ($p < .0001$) in the timing of reviews posted from mobile devices and via the website (see Figure 2). Specifically, we found that customers who used the mobile-enabled review system are 2.46 times more likely to contribute their comments on the same day as the service encounter compared to those using the website. Conversely, individuals commenting in the months following the service encounter are 1.38 times more likely to do so via the web-based review system. For opinions contributed during the month of service, but not on the same day, the difference is marginal—albeit statistically significant—in favor of the mobile platform.

In Box 2, we describe the textual characteristics of reviews according to the timing of when they were posted.

The difference in timing of reviews posted via mobile devices and the web is important because it provides empirical evidence that the portability and accessibility of mobile devices enables individuals to contribute their opinions closer in time to the service encounter. This is

16 After normalizing the distribution using a power transformation, and controlling for the rating and other characteristics of each review, we found that the length difference by medium is significant ($p < 0.000$).

17 For this analysis, we employed a random intercept model, computing the differences in opinion length between the two kinds of online review system.

Box 1: Linguistic Differences of Reviews Submitted via Different Platforms

It's no surprise that reviews posted using mobile apps are, on average, shorter than those generated on a full-size keyboard. Although length is the most obvious difference, there are other more subtle linguistic patterns in online reviews posted via different media. We trained a classifier to discriminate between mobile and web reviews in our dataset, controlling for differences in quantitative rating scores. The output of this classification is a list of features that maximally discriminate between the writing style and the content of reviews written via mobile devices or the website. These highly discriminating features represent general term (e.g., Wi-Fi, accommodation) included in reviews. We identified three classes of difference in the way these terms are expressed depending on whether they are posted via mobile apps or the web.

1. Punctuation

After excluding emoticons, reviews posted on mobile devices use less punctuation. Punctuation marks on many mobile devices are accessible only after switching to a different virtual keyboard. Moreover, while punctuation is critical for well-formed text, it is not usually necessary for understanding the message. The biggest differences we found were dashes (54% more common among web reviews), semi-colons (50% more common in web reviews) and parentheses (43% more common in web reviews). However, emoticons and exclamation marks were more common among reviews posted from mobile devices (54% more and 48% more, respectively).

2. Abbreviations

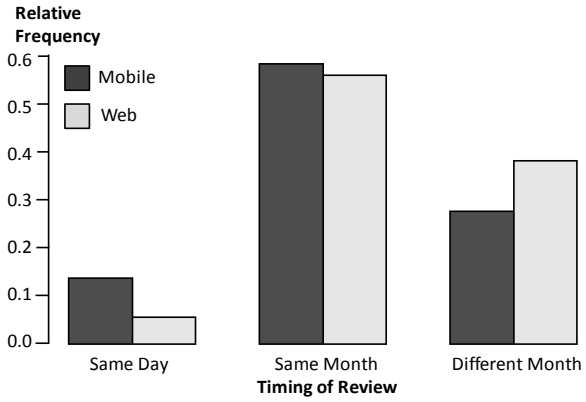
Mobile reviews use more abbreviations and Internet slang than their web counterparts. For example, compared to web reviews, mobile reviews more often use "btw" to mean "by the way," "im" instead of "I'm" and "ur" over "you're."

3. Autocorrect

Perhaps counter-intuitively, text written on mobile devices has fewer misspellings. For example, while 28% of web reviewers misspell the words accommodate, accommodating and accommodations, we found that mobile reviewers only make this mistake 13% of the time.

Our results are in line with the changing nature of computer-mediated communication. As found by previous studies, our results show that individuals writing on mobile devices tend to favor speed over well-formed text. What is interesting, and novel, however, is that the less precise writing style in reviews from mobile users is meant for public consumption, not as private communication (e.g., an SMS written directly to a friend). This may have implications for designers of online review platforms. Given that the lower quality of writing may reduce the readability of reviews, designers could compensate, for example, by automatically expanding common abbreviations (such as replacing "btw" with "by the way").

Figure 2: Distribution of the Timing of Online Reviews by Medium



Box 2: Linguistic Differences of Reviews by Timing of Posting

Reviews via the mobile platform are generally posted closer to the service date than reviews posted via the web interface. Controlling for these device-specific effects, we trained the classifier to predict whether a review is posted in the same month or the month following the service and found several interesting, but predictable, linguistic differences. For example, reviews posted in the following month will typically identify the service provision date by referencing a holiday (Christmas, Memorial Day, etc.) or the month of provision (January, February, etc.). In contrast, reviews posted in the same month as the service will identify the service date by day of the week (Monday, Tuesday, weekend, etc.) and by relative timing expressions (today, yesterday, now, etc.).

both a blessing and a curse for service providers. On the one hand, since service assessments are by their very nature perceptual, a shorter elapsed time from experience to review should increase the factual accuracy of the opinions. Conversely, however, the ability to post reviews soon after the service encounter may stimulate emotional and impulsive responses.

3. Reviews Posted from Mobile Devices are More Negative

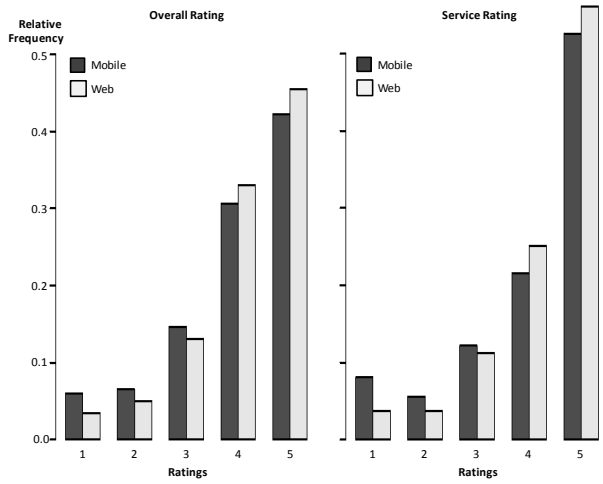
Reviews posted via mobile channels are both significantly more negative and more dispersed around the mean. Table 1 provides the statistical data that supports this finding.

Table 1: Means and Standard Deviations of Ratings by Posting Medium

	Mean				Standard Deviation			
Category	**Web**	**Mobile**	χ^2	***p* value**	**Web**	**Mobile**	χ^{2*}	***p* value**
Overall rating	4.08	3.95	331.0	.000	1.043	1.161	254.1	.000
Service rating	4.19	4.02	589.6	.000	1.067	1.258	244.5	.000
Location rating	4.57	4.40	794.2	.000	0.724	0.923	723.9	.000
Value rating	3.93	3.89	665.0	.000	1.077	1.232	437.3	.000

* Fligner-Killeen test for homogeneity of variance

Figure 3: Distribution of Overall and Service Ratings by Posting Medium (Relative Frequency)



These differences stem from the fact that the distribution of evaluations differs significantly by posting medium (see Figure 3), with reviews posted via mobile devices having a greater relative occurrence of negative ratings and a lower relative occurrence of positive evaluations than those posted via the web. Specifically, compared with those using the web, customers posting their commentary through the mobile platform select the worst evaluation (i.e., "terrible") proportionally 1.66 times more often for their overall rating and 2.02 times more often for their rating of service. The results are similar for "poor" ratings, albeit of lesser magnitude (1.27 and 1.35 times for overall and service ratings, respectively).

We found that reviews written through the mobile platform are consistently more negative than web-based reviews regardless of the timing of their submissions (see Figure 4).[18] The largest gap is when customers post their comments through the mobile app during the same month, but the gap does reduce the longer it is before the review is posted.

The relative frequency of very negative reviews (1: terrible) posted via the mobile platform is 53.7% higher (for overall rating) and 27.8% higher (for service rating) when written on the same day as service than on any other day of the same month. There is a similar pattern for negative reviews (2: poor): 19.3% higher (overall rating) and 30.1% higher (service rating), respectively (see Figure 5).

Finally, when charting the proportion of rating levels according to the time of posting, we found that true same-day reviews (day 1 of the same month as the service) have the highest proportion of extreme negative ratings (14.3% for overall ratings and 14.1% for service ratings). Reviews with extreme negative ratings posted on the following day (12.5% for overall ratings and 13.3% for service ratings) could be either true same-day reviews or commentaries posted on the first day after the service. For each additional day, the probability that a review is a true same-day review decreases. The proportion of negative ratings decreases asymptotically over time to the level of same-month ratings over a 15-day period (respectively ~7% and ~9% for overall and service ratings).

The proportion of extreme positive reviews (rating of 5) follows an opposite pattern over time tending to ~39% and ~50% for overall and service ratings, respectively (see Figure 6). This pattern is consistent with the view that the

18 Given the nature of review ratings, we used an ordinal logistic regression model estimating the simultaneous effect of medium and time in this analysis.

Figure 4: Overall and Service Ratings by Posting Medium and Timing

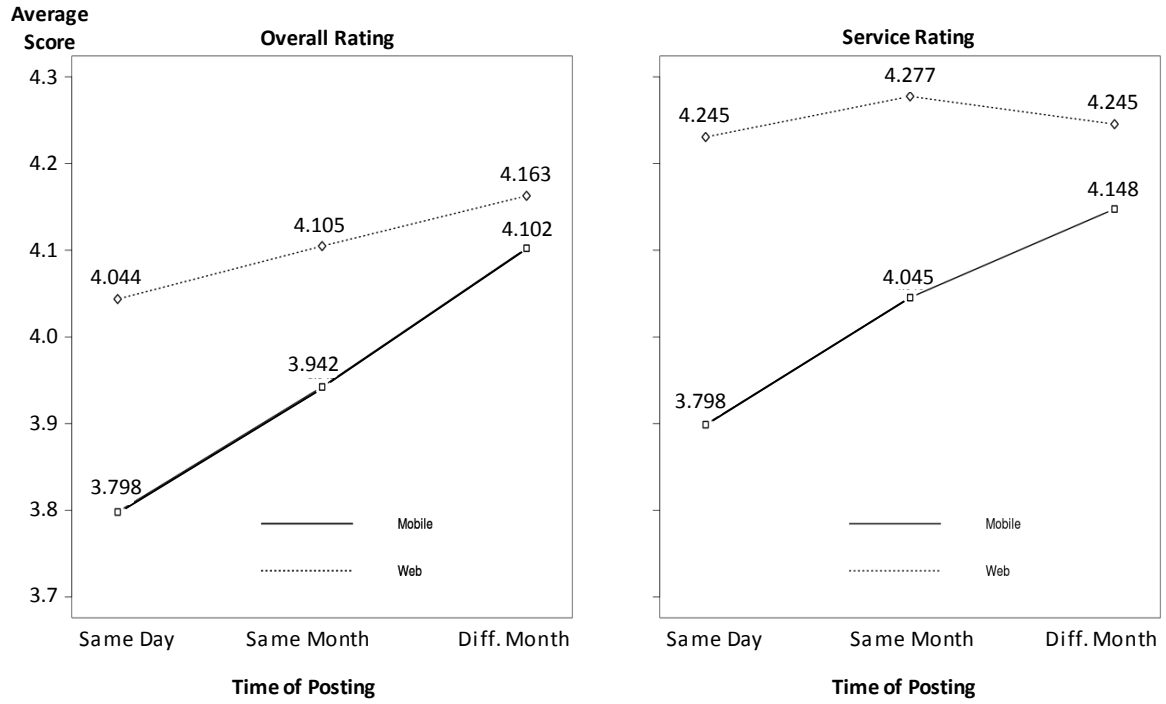
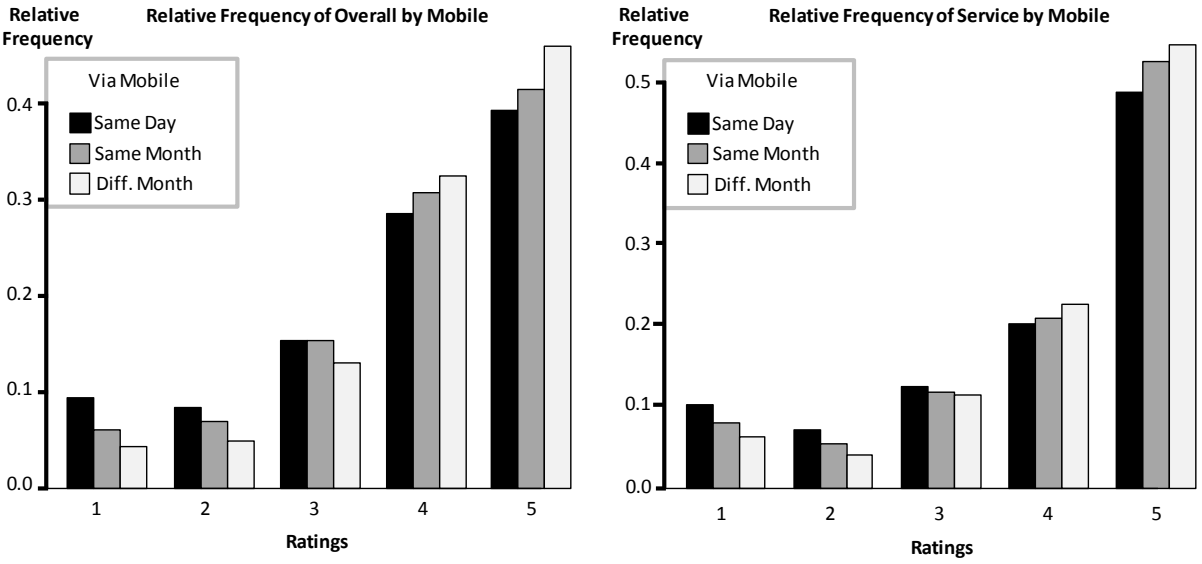


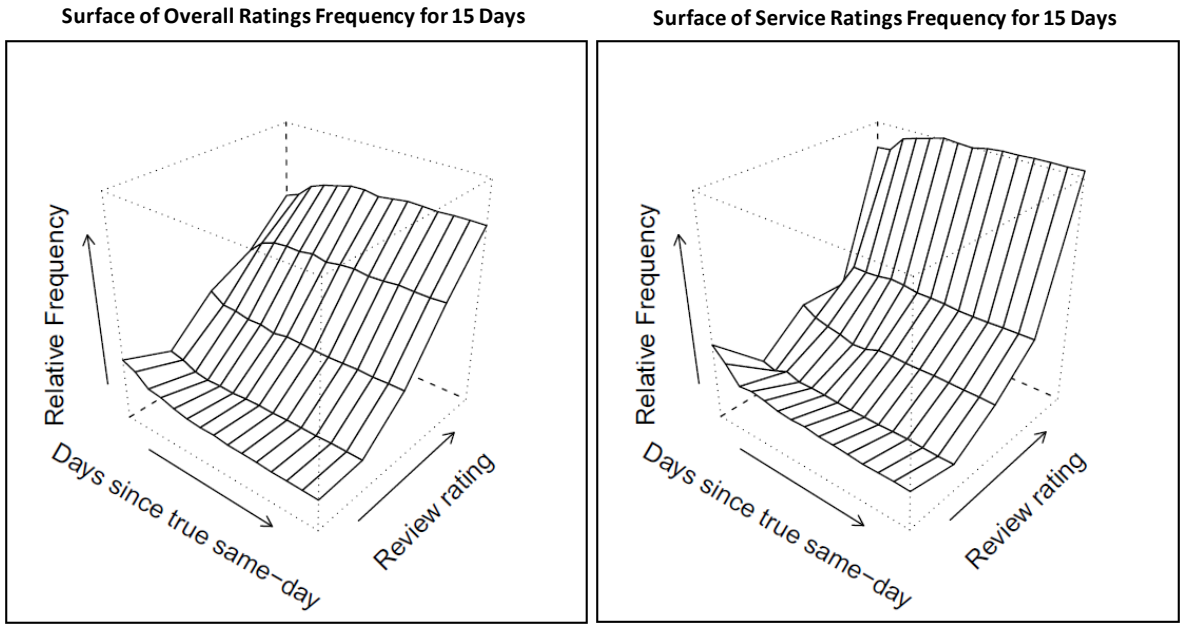
Figure 5: Relative Frequency of Mobile-Posted Overall and Service Ratings, by Timing



negative effect on review rating decreases over time but does not completely disappear.

The findings from our study provide empirical evidence of the relationship between the media used to write online reviews and their ratings. While this finding may seem to be intuitive, we believe our results are both interesting and useful to practicing managers. They confirm that, on average, reviews posted via mobile devices are more impulsive. However, they also point to a systematic negative bias in reviews posted via the mobile platform that cannot be ascribed just to timing. The negative bias of mobile reviews remains significant months after the service

Figure 6: Proportion of Extreme Positive Ratings by Days since Service Provided



encounter. This is an important finding for organizations because it points to a "design effect" of mobile review platforms. In other words, it is the very act of writing the opinion through a mobile device that biases it toward a more negative review.

This negative bias in reviews posted via mobile platforms may stem from the "on-the-go" use that is typical of mobile technologies. On-the-go use refers to "fitting in" or embedding digital mobile use in the course of daily life, such as quickly checking email while in the elevator or posting an Instagram update when a dinner partner goes to the restroom.[19] Thus, understanding and managing this effect is critical for designers of online review systems, as well as for service providers. We provide guidelines for organizations in the next section.

Guidelines for Managing Reputation in the Ubiquitous Mobile Computing Era

Unlike other forms of computing devices, most mobiles are nearly always on, always connected and always with their owners. As we enter the post-PC era, businesses will be increasingly dealing with customers who are carrying mobile and wearable computers that seamlessly integrate into their daily lives. The initial driver of this trend is the smartphone, the first computing device in history to be uniquely associated with an individual and to be always in the vicinity of that person. However, all indications are that the smartphone is just the beginning of the trend to ubiquitous mobile computing. Computing devices are quickly disappearing from view by being embedded in the most varied form factors, from intelligent cameras (e.g., cameras with the SceneTap app) to automobiles (e.g., Ford Sync, the integrated in-vehicle communications and entertainment system) to wearable items like watches (e.g., Pebble SmartWatch) or eyewear (e.g., Google Glass).

Always-on availability enables an unprecedented level of real-time access to individuals who can, as a consequence, register their impressions and sensations emotionally and impulsively. In particular, the availability of mobile apps for posting service evaluations has significant implications for executives and their companies. We found that reviews contributed

19 Humphreys, L., Von Pape, T. and Karnowski, V. "Evolving Mobile Media: Uses and Conceptualizations of the Mobile Internet," *Journal of Computer Mediated Communication* (18:4) pp. 491-507.

via mobile platforms are shorter, more recent and more negative than those posted via websites. Moreover, the most troubling of these changes is brewing below the surface. We believe that the relative small percentage of reviews posted via mobile devices has thus far masked the negative bias we document in this article. As the number of reviews posted via mobile platforms grows, managers will increasingly have to contend with the negative bias that we have identified. A simple countermeasure, already adopted by some of the large online review platforms, is to clearly label whether the source of the review was the web, a smartphone or a tablet.

More generally, while the proliferation of mobile devices that people can use to generate public content complicates brand management and the protection of company reputations, we believe these devices can also present reputation-management opportunities. We provide four guidelines for recognizing the opportunities and proactively adjusting to the characteristics of opinions posted via mobile devices.

1. Manage the Essential Nature of Reviews Posted via Mobile Devices

The findings from our study indicate that reviews written on mobile platforms are shorter and more focused than those submitted through a traditional web interface. Compared to the web, mobile form factors limit the ability to write balanced, reflective opinions that capture the complexity of a service encounter. It is still unclear whether this limitation stems from the physical characteristics of the device (i.e., small virtual keyboards), their typical on-the-go use or a combination of these factors. However, as our findings demonstrate, people use 33% less text when writing through a mobile device and therefore tend to address only the core elements of their experience—whether positive or negative.

The "essential" nature of these reviews suggests that managers may be able to stimulate positive reviews. Some hotels, for example, host a happy hour or free cocktails on the executive floor. There may be opportunities to cleverly think about how to incentivize "essential positive reviews" during these moments. It is too early in our research for us to provide specific advice about the design of these "essential events." Eventually, however, we may imagine the use of technology that increases immediacy (e.g., Twitter), visual appeal (e.g., Instagram), social interaction (e.g., Facebook) or professional resonance (e.g., LinkedIn) as the vehicle for these initiatives.

It is also important for organizations to have a strategy for responding to negative reviews posted via mobile devices. The key, in our opinion, is to recognize that the response is written for a public forum, not for the customer posting the review, and that the content will be permanently available to future potential customers. The shorter nature of negative reviews contributed via mobile platforms could provide an opportunity for organizations to broaden the perspective of those who read the reviews by highlighting positive elements of the experience the customer may not have mentioned. The objective is to add the missing balance to the negative opinion—perhaps pointing the reader to the content of lengthier positive reviews provided by other reviewers.

2. Recognize the Triggered Nature of Mobile-Posted Reviews

Our study shows there are systematic differences in the timing of content generated via mobile platforms and the web; mobile reviews are 2.46 times more likely to appear on the same day as the service. The anytime, anywhere availability of mobile devices enables customers to contribute their opinions in response to triggers. A trigger may be an event during the service encounter (e.g., a rude response by an employee, a delay in the service). Or it could be a delayed event (e.g., a friend asking about the experience) that prompts the individual to contribute an opinion. These triggers may cause individuals to post a review emotionally and impulsively. There were several triggered inflammatory comments in our study posted from mobile devices. One titled "Sleep? Where?" reads: "It's loud, loud neighbors (walls are too thin here). You can hear cars passing by often. I'm writing this at 4:15am because I can't sleep at the 'Sleep Inn'." Another one titled: "Car Broken Into" reads: "Don't stay here unless you want your car burglarized."

It is still unclear which triggers lead to posting a review and whether they can be proactively managed or at least influenced by firms and their employees. A better understanding of the triggering mechanisms may identify practices for stimulating positive reviews (as suggested above).

In the absence of such research, however, recognizing the triggered nature of the mobile review platform suggests caution when attempting to engage with customers. With hindsight, McDonald's marketing department should have realized before launching the #McDStories Twitter initiative described earlier that the constraining (140 characters) and on-the-go nature of Twitter posts would prompt impulsive, "essential" writing. In light of our findings, it is clear that Twitter is not a conducive medium for eliciting the type of heartwarming stories McDonald's management was likely seeking. With the 140-character constraint, it is much simpler to shoot off a quick joke or snappy remark—as indeed happened.

3. Proactively Manage Communication Channels

The most troubling aspect of our findings is the significant negative bias that we detected in the ratings posted from mobile devices. This bias is heightened by the timing of the post, with reviews being more negative when posted closer to the service encounter. This finding has potentially profound implications for the design of customer service systems and for company operations. One approach to limiting the impulsiveness, and consequent negative bias, of reviews posted via mobile platforms could be to prohibit anonymous reviewing from mobile devices. Such devices are generally associated with one user and therefore uniquely addressable, making seamless authentication feasible. However, prohibiting anonymous reviews treats the symptom, rather than the cause of the negative bias. Moreover, organizations can only prohibit anonymous comments from being posted on their own websites; they cannot control the policies of third-party rating systems such as TripAdvisor or Yelp.

Balance theory suggests that individuals who have a strongly dissatisfying experience can restore psychological balance by posting a negative review online. It may be almost impossible to prevent customers from grabbing their mobile phone and posting a negative review in the heat of the moment. Even though it's deceptively hard to do, managers should seek to mitigate the need for customers to vent their frustration online by providing them with an opportunity to restore psychological balance before they write a review. The standard approach is to create a climate that welcomes and encourages feedback and empowers employees to redress the situation.

However, the front-line employees that a dissatisfied customer often tries to engage with are often powerless to do anything. Because they lack the real-time information needed to see and address problems, organizations create rigid complaint-escalation procedures that frustrate customers. Confronted with the futility of complaining to employees during the service encounter, individuals are more likely to turn to the mobile review outlet.

The disconnect between intended guest service strategies and their implementation is rooted in an information problem, and the ubiquity of computing devices offers the opportunity to solve this problem. Consider the example of Meliá Hotels, an international lodging chain headquartered in Spain, which is piloting a project that weaves Twitter functionality into all aspects of the resort experience.[20] While the main focus is on enabling social interaction between current guests, customers can also interact directly with hotel staff using Twitter. This approach, if successful, could contribute to lower communication barriers between mobile-carrying customers, those who are most likely to post negative reviews, and employees who can intervene to redress negative experiences.

4. Monitor for Early Signs of Customer Dissatisfaction

Since the emergence of the public Internet over 20 years ago, many businesses have viewed consumer technology with suspicion, often regarding technological evolution as a threat. Yet companies have access to the same technology as their customers and generally

20 http://www.meliahotelsinternational.com/en/press-room/07222013/sol-wave-house-first-ever-twitter-experience-hotel.

can invest more resources than individuals in efforts to turn the technology to their advantage. For example, while the Internet has simplified price comparisons for customers, it has enabled unprecedented levels of data collection and personalization by firms seeking to differentiate their products and services.[21] The ubiquitous mobile computing era arms customers with the ability to post reviews anytime, anywhere—we call these flows of real-time digital content "digital data streams."[22] Savvy organizations are learning to tap into digital data streams, finding new ways to extract value. Meliá is an early example of experimentation.

As digital data streams proliferate, their savvy use by organizations may help to counter the loss of control over digital conversations. It is too early for us to provide tangible guidelines supported by our findings. However, many social networks accessed largely via mobile devices, such as Twitter, Instagram and Pinterest, offer organizations the opportunity to tap into a real-time flow of opinions that can serve as an early warning signal for more permanent negative reviews. Our advice at this time is to embrace the change and systematically experiment with digital data streams so you can begin to climb the learning curve. A natural avenue for experimentation is to complement customer service strategy with a monitoring system designed to intercept negative experiences from digital data flows. This will enable organizations to offer redress to customers who, having achieved psychological balance, will be less likely to contribute negative reviews that will be permanently available on an online review platform.

Concluding Comments

In this article, we have provided an analysis of the differences between user-generated reviews posted via mobile platforms and the web. The way in which people post reviews is shifting away from carefully crafting text and using a formal tone to increasingly using mobile devices while multitasking on-the-go. We have investigated how user-generated content changes when it is mediated by mobile devices. Our findings suggest that the linguistic characteristics of communication changes, with less punctuation, more abbreviations and greater use of more direct language. More importantly and more subtly, however, people seem to change what they say, not just how they say it; there is a greater prevalence of negative reviews posted via mobile platforms. Organizations that fail to understand the changing nature of user-generated content in the ubiquitous mobile computing era do so at their own peril. But those that proactively tap into and respond to these emerging conversations stand to reap the benefits by preparing for the unavoidable new world of continuous digital conversations.

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21 Piccoli, G. and Watson, R. T. "Profit from Customer Data by Identifying Strategic Opportunities and Adopting the 'Born Digital' Approach," *MIS Quarterly Executive* (7:3), 2008, pp. 113-122; Watson, R. T., Piccoli, G., Brohman, M. K. and Parasuraman, A. "Customer-Managed Interactions: A New Paradigm for Firm-Customer Relationships," *MIS Quarterly Executive* (4:2), 2005, pp. 319-327.

22 Piccoli, G. and Pigni, F. "Harvesting External Data: The Potential of Digital Data Streams," *MIS Quarterly Executive* (12:1), 2013, pp. 143-154.