



Trusting expert- versus user-generated ratings online: The role of information volume, valence, and consumer characteristics



Andrew J. Flanagin*, Miriam J. Metzger¹

Department of Communication, University of California, Santa Barbara, Santa Barbara, CA 93106, United States

ARTICLE INFO

Keywords:

User-generated content
Online ratings
Social media
Online social influence
Trust
Credibility

ABSTRACT

The warranting principle, signaling theory, and theories of informational social influence suggest conditions when either user-generated information, or information originating from traditional experts, might be privileged online. A random sample of 1207 U.S.-based adults with Internet access completed an experiment that manipulated the source, volume, and valence of online movie ratings in order to test predictions derived from these perspectives. Results indicated that ratings volume is positively associated with trust of, reliance on, and confidence in user-generated content, as well as the congruence between one's own and others' opinions; that ratings source and volume interact to impact credibility perceptions, reliance on user-generated information, and opinion congruence, such that people tend to favor experts when there is low information volume, but favor user-generated information under conditions of high information volume; and that people's opinions and behavioral intentions converge with the online ratings information to which they are exposed. In addition, these effects apply more strongly to people more conversant with user-generated content. Results indicate important theoretical extensions by demonstrating that social information online may be filtered through signals indicating its veracity, which may not apply equally to all social media users.

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1. Introduction

Among the most important consequences of digital media in recent decades is that they provide an environment where individuals are routinely exposed to a tremendous range of opinions, across a broad diversity of sources. Contributing to this informational fecundity is a dramatic rise in “user-generated content,” where individuals not only consume, but also produce many of the information resources available online (Bruns, 2008; Ochoa & Duval, 2008).

The user-generation of information is a potentially transformative development that nonetheless co-exists with more traditional and well-established information sources that have also been changed in important ways by the capacity of networked technologies. The relative credibility of these information forms, or the degree to which each can be believed (Hovland, Janis, & Kelley, 1953), remains unclear. Given increasing reliance on online information generally, and user-generated content specifically, accurate credibility evaluations are critical since they impact people's attitudes and behaviors, and because information consumers today often

make assessments without the aid of traditional credibility cues (Metzger & Flanagin, 2008).

To explore these issues, we examine various forms of information provision from multiple sources by considering the theoretical mechanisms suggesting when and how each should be privileged. We also argue that online information may be perceived and interpreted differently by users based on their familiarity and proficiency with social information provision online, an assertion that appears to be overlooked in studies examining user-generated content. We derive hypotheses for an experiment in which Internet users viewed online movie ratings originating from lay (user) and expert sources, and interpret the findings in light of how they support and extend theory in this arena.

2. User-generated and expert-provided information online

The contemporary media environment is remarkable in its capacity to promote, maintain, and sustain collective endeavors among disaggregated individuals. Tools such as blogs, social bookmarking, wikis, social networking sites, and a range of ratings, recommendation, reputation, and credentialing systems enable diverse opinions, experiences, and knowledge to be combined and distributed across individuals.

Implicit in these tools is the generation of *user-generated content* (UGC), the essential premise of which is that, given efficient means

* Corresponding author. Tel.: +1 805 893 7892.

E-mail addresses: flanagin@comm.ucsb.edu (A.J. Flanagin), metzger@comm.ucsb.edu (M.J. Metzger).

¹ Tel.: +1 805 893 8237.

of information sharing by individuals, collective benefits will emerge from aggregated contributions. The core advantage underlying UGC is its capacity to leverage the highly *experiential* aspects of people's knowledge and information, making aggregated individual experiences available to many. In spite of their relative lack of official authority, users may possess relevant expertise due to their firsthand knowledge or experience with a topic or situation, and thus may be accurately perceived by others as having a great deal of *experiential credibility* (Flanagin & Metzger, 2008; see also Wilson, 1983). Due to this, it is argued that networked tools and applications can “replace the authoritative heft of traditional institutions with the surging wisdom of crowds” (Madden & Fox, 2006, p. 2). In this way, non-credentialed forms of authority may gain credence due to the unique features of digitally networked media.

Overshadowed at times by the recent enthusiasm surrounding UGC, however, is recognition of the considerable online information resources provided not by typical Internet users themselves but rather by traditionally recognized “expert” sources. The credibility of these sources hinges not on the aggregated, crowdsourced opinions of many, but on traditional markers of expertise. These include specific education or training, formal or official positions attained by virtue of these, and institutional affiliations or credentials. Thus, alongside the tremendous user-generated information repositories available today, information from these more traditionally recognized expert sources is also prominent, and is more widely accessible than in the past due to the networked capacity of digital media technologies.

3. Processes of information evaluation in the digital media environment

In light of the potential of both the experiential credibility of UGC and the credentialed authority of experts, questions arise as to which information source might be privileged under what circumstances, and what factors might impact people's information evaluations. To address these questions, we invoke theories that focus on processes of information evaluation through methods of manipulation determination and social influence, including theories of warranting and signaling, as well as informational social influence. These perspectives provide insight into when and why aggregated UGC, such as that contained in consumer ratings or reviews online, might be viewed as a credible source of information, as well as the factors that impact user opinions and behaviors online.

3.1. Information assessment through warrants and signals

Walther and Parks's (2002) *warranting principle* suggests that people's judgments of information obtained online, where key personal and relational information is often missing (and where users may suspect others of distorting their self-presentations), are more aptly based on information that cannot be easily manipulated by an information source. They define the “warranting value of information... as being derived from the receiver's perception about the extent to which the content of that information is immune to manipulation” (p. 552). Relatedly, *signaling theory* (Donath, 2007) argues that certain signals available online about information sources—particularly those signals that are difficult to fake, are supported by the rule of law or social convention, or are costly to obtain or to mimic—are most reliable for assessing information quality and source expertise and, therefore, can be trusted. Both of these perspectives suggest that specific information cues may be particularly credible online.

Tests invoking the warranting principle and signaling theory show that cues that are difficult to fake online are indeed seen as

more credible. For example, in support of the warranting principle, friends' comments about an individual Facebook profile owner were more influential in assessments of the individual's physical attractiveness than self-comments were (Walther, Van Der Heide, Hamel, & Shulman, 2009) and information generated by others had a higher impact than self-generated information on communal orientation (although some important boundary conditions were also discovered; Utz, 2010). Consistent with signaling theory, a variety of signals (i.e., seller reputation, product condition, and argument quality) have been shown to predict important outcomes in online auctions (e.g., number of bids, auction success, and willingness to pay; Shen, Chiou, & Kuo, 2011), and people also put greater emphasis on signals that are costly to fake when judging expertise online (Shami, Ehrlich, Gay, & Hancock, 2009).

3.2. Processes of informational social influence online

It is long-known and well-established that individuals are influenced by the opinions and actions of those around them, and that people respond to social pressures of various kinds, including persuasion, peer pressure, and conformity (Asch, 1951, 1955; Cialdini, 2001; Kelman, 1958; Milgram, 1974). *Informational social influence*, for instance, is the tendency to “accept information obtained from another as *evidence* about reality” (Deutsch & Gerard, 1955, p. 629). Particularly in the absence of firsthand experience, people tend to believe that others' interpretations are more correct than their own, and rely on other people to help them choose appropriate courses of action. In this manner, people will infer unobservable characteristics of a focal object by the observed opinions of others, thereby reducing their situational uncertainty, often by internalizing those opinions (Burnkrant & Cousineau, 1975). Information provided by others thus becomes influential as a means of removing ambiguity and establishing subjective validity. Conformity effects of this type are most pronounced when a situation is ambiguous and when others are viewed as having topic expertise (Aronson, Wilson, & Akert, 2004).

Demonstrating the effects of informational social influence online, people tend to rate movies consistent with the observed ratings of others (Cosley, Lam, Albert, Konstan, & Riedl, 2003), people's choices online are swayed by others' opinions in recommender systems (Zhu, Huberman, & Luon, 2011), and musically-induced emotions even conform to others' emotional ratings (Egermann, Grewe, Kopiez, & Altenmuller, 2009). In addition, the rate of adoption of user-created content online has been shown to be particularly prone to the social influences of friends (Bakshy, Karrer, & Adamic, 2009), and the social influence of others' opinions online has been demonstrated to guide individuals' expectations (Kowai-Bell, Guadagno, Little, Preiss, & Hensley, 2011). In these ways, informational social influence stems from the information resources provided by socially available others, which can serve to disambiguate complex or ambiguous information environments.

4. The nature of information provision and the construction of opinions and behaviors

The theoretical foundations of warranting, signaling, and informational social influence suggest specific influences on individuals acting in an information-rich environment populated with both UGC and expert opinions. As discussed earlier, both the warranting principle and signaling theory suggest that cues that are harder to manipulate are likely to be seen as more credible since they are usually difficult or costly to obtain. In many UGC applications, information sources are aggregated in a fashion that makes it unlikely that any among them has control over the opinions ultimately represented. Therefore, although any one instance of

UGC may be manipulated and may therefore be unreliable, user-generated information in the *aggregate* is less readily manipulated. And, according to the law of large numbers, any manipulation of a single or even a few data points is less consequential as the volume of UGC observations increases. Thus, aggregated UGC in high volume serves as an important warrant or signal that information is valid and reliable. Indeed, based on the warranting principle, consumer reviews have been found to be a stronger predictor of the trustworthiness of an online store than either store reputation or assurance seals, both of which are more readily controlled by the store itself (Utz, Kerkhof, & van den Bos, 2012). Expert-provided information, however, should be largely immune to enhanced credibility by virtue of increased volume, since the warrants or signals that indicate its believability are by definition provided by credentialed experts, whose expertise or validity is assured by means other than the aggregation of multiple opinions.

In addition, informational social influence demonstrates that people's perceptions tend to conform to available information, particularly in the absence of firsthand knowledge and when information sources are viewed as possessing situational expertise. With the sharing of UGC online, the social influence of others' knowledge has been shown to be profound, and user-generated information may provide a rich source of situational expertise, through the mechanism of shared experiential credibility. In this context, UGC likely serves as an observable indicator of information credibility, and thus may exert an important influence on people's attitudes and behavior.

Informational social influence is likely to be particularly effective in high volume, where convergence among multiple opinions signals enhanced subjective reality. Indeed, studies demonstrate that group size is positively related to peer conformity effects (Asch, 1955; Latané & Wolf, 1981; Mullen, 1983). In addition, the volume of user ratings has been shown to be positively associated with outcomes in other domains involving peer influence and UGC specifically, such as the influence of customer reviews on purchasing intention in ecommerce contexts (e.g., Lee, 2009; Liu, 2006; Park, Lee, & Han, 2007; Zhang, Lee, & Zhao, 2010). In sum, informational social influence can serve to guide individuals' attitudes and behavior by virtue of the purchase it provides on subjective validity by disambiguating information environments, such as those involving whether to trust information provided by anonymous and uncredentialed sources. Based on these theoretical perspectives and findings, we propose that:

H1_{a-e}: The volume of social information available is positively associated with (a) its perceived credibility, (b) people's reliance on the information, (c) their confidence in information accuracy, (d) the congruence between their own and others' personal evaluations of the information, and (e) its influence on their behavioral intent when it is provided by lay users, but not when it is provided by experts.

As discussed earlier, the *relative* credibility of UGC and expert evaluations is difficult to discern since experiential credibility and more authoritative means of credibility are both prominent in participatory websites today. Signaling theory and the warranting principle, for example, would indicate on the one hand that expert opinions may be privileged since the required credentials are difficult to obtain and hard to manipulate. However, these perspectives would also indicate that the high experiential credibility implicit in UGC is itself a valid form of expertise, particularly if tallied across a large number of users. Similarly, informational social influence conformity effects are most pronounced when information sources are viewed as experts, but the notion of expertise can apply equally to authoritative, credentialed experts and those whose authority is a function of experiential credibility.

Research has begun to address these issues, but with mixed results. For example, in the domain of ecommerce, whereas some studies show that positive user reviews influence purchase intent (Flanagin, Metzger, Pure, & Markov, 2011; Flanagin, Metzger, Pure, Markov, & Hartsell, in press; Sundar, Xu, & Oeldorf-Hirsch, 2009), or that user-generated reviews are related to increased website traffic—although editor (i.e., more “expert”) reviews are not (Zhang, Ye, Law, & Li, 2010)—other research indicates that online user reviews have little persuasive effect on consumer purchase decisions (Duan, Gu, & Whinston, 2008). Other research demonstrates that reviews provided by experts are viewed as both trustworthy and expert (the core dimensions of credibility) primarily when experts are deemed to be “experts” by users themselves (Willemssen, Neijens, & Bonner, 2012). We therefore propose RQ1 to examine the relationship between UGC and expert information sources:

RQ1: In what way does the source of social information (i.e., user-generated versus expert-produced) influence people's perceptions of the information's quality (i.e., credibility and confidence in information accuracy), reliance on the information, congruence with others' evaluations, and behavioral intent?

If the nature of the information source (expert versus lay users) is considered in conjunction with the volume of opinions, the outcome is potentially even more complex. Although past research has examined the volume (Flanagin et al., 2011) or the source (Sundar et al., 2009) of social information, the effects of both together are unclear. For instance, is a low volume of expert ratings more or less credible than a high volume of user ratings? Is there an inflection point past which user-generated opinions equal—or trump—expert opinions, or is the influence of even a single expert always greater than user-generated information? RQ2 explores these issues by asking:

RQ2: Is there an interaction between the volume of social information and the ratings source (i.e., user-generated versus expert-produced) on people's perceptions of the information's quality (i.e., credibility and confidence in information accuracy), reliance on the information, congruence with others' evaluations, and behavioral intent?

Looking beyond the volume and source of information, the *valence* of others' opinions may also be subject to social influence. In fact, informational social influence suggests that information valence should be reflected in individual evaluations of, and behavioral intentions toward, a target. Indicators of subjective validity like opinion valence should be particularly prone to informational social influence effects, since even objective reality (which is more difficult to influence) has consistently been demonstrated to be heavily swayed by conformity effects stemming from others (Asch, 1951, 1955). Accordingly, past research in related online contexts has shown that higher user-generated ratings are positively associated with online product sales (Chevalier & Mayzlin, 2006), and that people online rate movies consistent with the observed ratings of others (Cosley et al., 2003). Thus, H2 predicts:

H2_{a-b}: People's personal evaluations of a target and their behavioral intentions with regard to it are positively associated with the valence of information about it provided by others.

5. The intersection of source and receiver characteristics

Past research on online information credibility has examined a variety of source characteristics (e.g., website design, the source's sex, number of presentation errors, etc.), which have been shown to influence individuals' perceptions of information and source credibility. For the most part, receiver characteristics have been

ignored despite evidence demonstrating that Internet users vary greatly in their relation to information online, which has implications for how individuals perceive and interpret the social information available to them (Del Giudice, 2010). The perceived credibility of information sources is best understood, however, as a function of the nature of the source, coupled with the unique perspective of the information consumer or receiver according to their individual characteristics. For example, people's knowledge or experience may influence the extent to which they understand a particular signal or warrant and may therefore impact their credibility judgments. More specifically, the ability to understand the warranting value of a signal (e.g., the extent to which a piece of information might be successfully manipulated) may be influenced by the knowledge a person has about how that information is derived, suggesting that warrants or signals may not be interpreted uniformly by all information receivers.

Indeed, the warranting and signaling capacities of UGC may be amplified as users' own knowledge of social information provision increases, for a number of reasons. First, the degree to which people's fears that UGC may be illegitimate may be assuaged by their own participation in UGC provision because those contributing their own information may be more likely to believe that UGC reflects objective opinions from ordinary users. Similarly, those contributing UGC more may be better able to understand the verity of UGC, and particularly how difficult ratings information is to fake in high volume. Finally, as people make it their habit to provide information to others in online venues, they may be prone to pay greater attention to such resources, and to make it their practice to treat such repositories as legitimate information tools.

Accordingly, signaling theory argues that signals can be ambiguous, and their interpretation may vary between individuals depending on their understanding of the factors guaranteeing a signal's honesty (Donath, 2011). Thus, different people may comprehend signals differently, based on their experiences, background, or group memberships. Indeed, in some cases, only those with particular experiences or backgrounds ("the initiated") can understand some signals accurately, or may understand them in ways that differ from people with other backgrounds or experiences (Donath, 2011). Signaling theory thus demonstrates the necessity of considering the qualities of information receivers in conjunction with characteristics of the information source.

For these reasons, individuals' social information provision habits may constitute an important characteristic influencing the degree to which people perceive and interpret UGC information as legitimate and trustworthy. We therefore consider the influence of receiver characteristics on people's processing of source features by suggesting that information receivers' own proficiency with social information provision will moderate the effects of ratings source, volume, and valence on perceptions of credibility and confidence in information accuracy, reliance on ratings information, congruence with others' ratings, and behavioral intentions. This extension adds a new dimension to warranting theory by examining whether warranting cues are subject to individual differences, as articulated in H3, which states:

H3: The frequency of online information provision will moderate the proposed effects in H1–2 and RQ1, such that the effects will be more pronounced among people who provide greater amounts of online information.

Fig. 2 illustrates the hypothesized relationships in H1–3.

6. Method

Internet users' evaluation of social information online was assessed by an experiment, in which a fictitious movie rating website

was viewed by participants, who responded to a series of questions after exposure to the site.

6.1. Sample and procedures

Because the target population for this study was Internet users, web-based survey techniques were used for stimuli presentation and data capture. Materials were administered to a random sample of U.S.-based adults with Internet access in October, 2011, by the professional research firm Knowledge Networks, using a probability-based panel of households representative of the entire U.S. population according to census data. 1207 participants completed the questionnaire in their own homes, at their convenience, thereby making their survey experience as naturalistic as possible. Fifty-one percent of the sample was female (49% male), the mean participant age was 49 ($SD = 16.19$; range = 18–93), and participants had 15 years ($SD = 6.75$) of Internet experience on average.

One randomly selected screenshot of a webpage constructed for the study from the fictitious site *boxofficepicks.com* was presented to each participant, followed by questions about the web page they viewed. The pages depicted ratings of a new movie that, although not yet released at the time of the study, was portrayed as being in theatres. The webpage stimuli varied by (a) the movie rating (low, medium, or high, indicated by various values on a 10-point scale), (b) the source of the rating (movie-goers or expert movie critics), and (c) the volume or number of ratings supplied (low, medium, and high), for a total of 18 experimental conditions.

6.2. Measures

Rating source was primed by pre-exposure instructions and varied by the specific source indicated on the stimuli pages. Prior to exposure, participants were informed that they would see "a webpage from *boxofficepicks.com*, a popular movie review website" and, depending on the condition, that the webpage "shows a movie rating supplied by *people who have seen the movie themselves* and have provided their own rating of the movie through this website" or, alternatively, that the webpage "shows a movie rating supplied by *expert movie critics* who work for major newspapers, magazines, news services, or television shows." The page that each participant viewed varied by the attributed information source accordingly.

Pages also indicated a low, medium, or high volume of ratings, where specific values in these categories varied according to whether they were portrayed as coming from users or experts. The exact number of "low," "medium," and "high" values differed between the expert and user conditions since expert ratings are considerably less common than user ratings. Pretests of this variable with a sample separate from that used in this study—initially informed by interviews and open-ended queries, then confirmed by responses to experimental stimuli—indicated the optimal values for the low, medium, and high number of ratings conditions that were used in the study (1, 3, and 26, for expert critic reviews and 1, 26, and 357 for user-generated reviews). *Movie ratings* ranged on a 10-point scale from low (2 of 10), to medium (5 of 10), to high (9 of 10). Fig. 1 shows a sample page from the study, with a user-generated rating of 5, originating from a high number of layperson reviewers.

Perceived credibility was composed of the mean of (a) the extent to which participants indicated they would trust the ratings information provided and (b) how credible they found the ratings information to be ($r = .65$, $p < .001$; $M = 2.86$, $SD = .78$). *Reliance* on the information was derived by the degree to which participants indicated they would rely on the ratings information provided to help them decide whether to see the movie ($M = 2.77$, $SD = .95$). *Confidence* in information accuracy was assessed by asking people the degree to which they were "confident that the ratings information



Fig. 1. Example stimulus page.

provided on this webpage is an accurate reflection of this movie's quality" ($M = 2.73, SD = .84$). In the context of this study, *behavioral intentions* were measured by the mean of (a) the extent to which subjects indicated they would be likely to see the movie in question, and (b) how interested they were in seeing the movie ($r = .77, p < .001; M = 2.49, SD = .89$). All of these variables were measured on a 5-point Likert-type scale ranging from 1 = strongly disagree to 5 = strongly agree.

Congruence between a participant's and others' personal evaluations of the ratings information ($M = 2.31, SD = 1.81$) was assessed by taking the absolute value of the difference between the movie rating provided on the stimulus page they viewed and their response to a query to "personally rate this movie on a scale of 1 to 10" (which, considered alone, was the measure for *personal evaluations* of the movie; $M = 4.91, SD = 1.69$). In this manner, congruence scores closer to 0 indicate higher congruence between

self-generated information and information generated by pre-summated website users online.

Online information provision was assessed by the extent to which people reported using a host of social information provision opportunities online. Respondents indicated (from 1 = "never" to 5 = "very often," excluding responses when they did not know what the tool was) the extent to which they wrote or post information on (a) blogs, (b) online groups or forums, (c) microblogs (e.g., Twitter), (d) social question and answer sites, and (e) wikis, as well as how often they provide (f) ratings, written reviews, or testimonials, and the degree to which they (g) look to see where others have "checked in" using location-based mobile applications. The mean of these items constituted the measure of online information provision ($M = 1.42, SD = .57$; Cronbach's $\alpha = .84$).

Relevant control variables, used as indicated in the Results, included how often participants "watch movies like this one" ($M = 2.51, SD = .91$) and the degree to which they assessed their taste as similar to those from whom the ratings they viewed had originated (either movie-goers or movie critics; $M = 2.59, SD = .84$), both of which were measured on 5-point scales similar to the variables defined above.

7. Results

Hypothesis 1. The first hypothesis predicted that, when exposed to user-generated input, the volume of movie ratings will act as a signal or warrant, or as an indicator of subjective reality, such that as the volume increases people will demonstrate greater levels of (a) perceived information credibility, (b) reliance on the information, (c) confidence in information accuracy, and that (d) the congruence between their own and others' personal evaluations of the information and (e) its influence on their behavior will increase. MANCOVA analyses, controlling for how often participants watched movies like the one used in the stimulus and the degree to which their movie taste is similar to those whose ratings they viewed, showed that among those exposed to user-generated ratings there was a significant multivariate effect of the volume of ratings, Wilks's $\lambda = .92, F(10,1116) = 4.83, p < .001$, partial

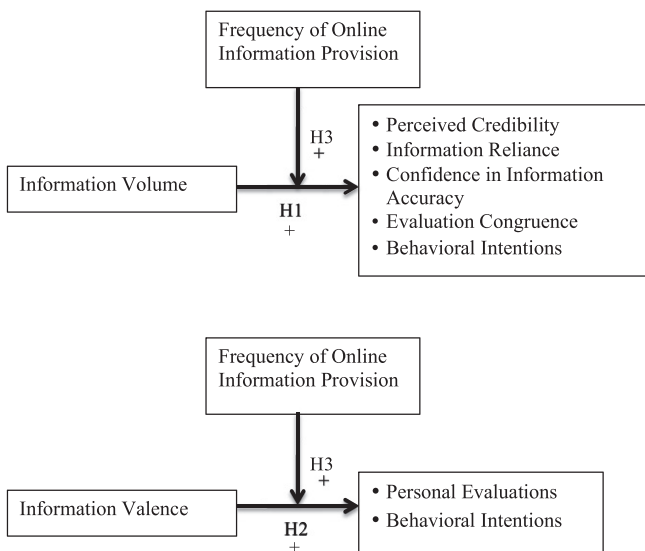


Fig. 2. Illustration of hypothesized relationships in H1–H3.

$\eta^2 = .04$. Univariate follow-up tests showed significant differences across ratings volume for credibility perceptions, $F(2,562) = 19.21, p < .001$, partial $\eta^2 = .06$; confidence in the accuracy of the ratings, $F(2,562) = 8.62, p < .001$, partial $\eta^2 = .03$; reliance on the ratings viewed, $F(2,562) = 9.91, p < .001$, partial $\eta^2 = .03$; and the congruence with others' ratings, $F(2,562) = 3.84, p < .05$, partial $\eta^2 = .01$. For congruence, the low ($M = 2.43$) and medium ($M = 2.47$) volumes differed from the highest volume of ratings ($M = 2.02; p < .05$; higher values indicate greater disagreement), but not from one another. Values for credibility, confidence, and reliance within the lowest volume of ratings ($M = 2.56, M = 2.48$, and $M = 2.47$, respectively) differed from those in the medium ($M = 2.94, M = 2.81$, and $M = 2.83$, respectively; $p < .001$) and high levels ($M = 2.95, M = 2.75$, and $M = 2.81$, respectively; $p < .001$), which did not differ from one another. A similar MANCOVA analysis of only subjects who were exposed to the expert movie ratings showed no effect for ratings volume (multivariate effect $p = .10$; although there were significant univariate effects for credibility and confidence).

Thus, $H1_{a-d}$ were largely supported (though $H1_e$ was not): as subjects viewed higher volumes of ratings originating from fellow movie-goers their perceived credibility of, reliance on, and confidence in those ratings increased, as did the congruence between their own ratings and those to which they were exposed, though this did *not* occur for users exposed to expert ratings. Results also suggest that these effects may be curtailed by a "ceiling effect," where values within the medium to high volume conditions were perceived as similar to one another.

Research Questions 1 and 2. Research Questions 1 and 2 were analyzed using SPSS's GLM procedure. A 3 (rating volume: low, medium, high) \times 2 (rating source: users vs. experts) MANCOVA was conducted with perceived credibility, reliance, confidence, congruence, and behavioral intentions as the dependent variables, while controlling for how often participants watched movies like the one used as the stimulus and the degree to which subjects' movie taste is similar to those whose ratings they viewed.

Results showed that the multivariate interaction effect was significant, Wilks's $\lambda = .98, F(10,2264) = 2.41, p < .01$, partial $\eta^2 = .01$. In addition, there were significant multivariate main effects of the volume of ratings, Wilks's $\lambda = .96, F(10,2264) = 4.20, p < .001$, partial $\eta^2 = .02$; and of the source of ratings, Wilks's $\lambda = .98, F(5, 1132) = 3.63, p < .05$, partial $\eta^2 = .02$, on the dependent variables.

Regarding the interaction, univariate tests demonstrated a significant interaction effect between ratings volume and ratings source for credibility, $F(2, 1136) = 4.40, p < .05$, partial $\eta^2 = .01$, reliance, $F(2, 1136) = 3.78, p < .05$, partial $\eta^2 = .01$, and congruence, $F(2, 1136) = 4.76, p < .01$, partial $\eta^2 = .01$, but not for confidence or behavioral intention. Focused MANOVA tests were used to identify the precise nature of the interaction effects. Significant differences on credibility emerged when the ratings volume was low: a low volume of ratings originating from other users was seen as significantly less credible ($M = 2.53$) than when a low volume of ratings came from experts ($M = 2.78$), $F(2, 1186) = 25.03, p < .05$. No other mean differences on credibility were significant. Reliance showed a similar pattern, such that a low volume of ratings originating from other users was seen as significantly less reliable ($M = 2.43$) than when a low volume of ratings came from experts ($M = 2.76$), $F(2, 1182) = 12.97, p < .001$. By contrast, for congruence between the participant's own rating of the movie and the rating they viewed in the stimulus, significant differences were found at only the high volume level, $F(1, 1171) = 6.19, p < .01$, with a marginal effect at the medium volume level, $F(1, 1171) = 3.40, p = .07$, and no differences at the low volume level, $F(1, 1176) = .49, p = .48$. In this case, subjects who saw a high number of ratings from fellow users showed greater congruence ($M = 2.00$) than participants who saw a

high number of ratings from experts ($M = 2.44$) (note that lower scores indicate greater congruence).

Regarding the main effect for ratings volume, univariate follow-up tests showed significant effects for credibility perceptions, $F(2, 1136) = 19.67, p < .001$, partial $\eta^2 = .03$; confidence in the accuracy of the ratings, $F(2, 1136) = 10.30, p < .001$, partial $\eta^2 = .02$; and reliance on the ratings viewed, $F(2, 1136) = 8.45, p < .001$, partial $\eta^2 = .02$; but not for behavioral intentions or congruence with others' ratings. Post hoc tests showed that values for credibility, accuracy, and reliance are significantly lower in the low volume conditions than in the medium and high ratings volume conditions, but that medium and high volume values do not differ on these factors. Thus, as ratings volume increases so too do perceptions of information credibility and accuracy, as well as reliance on that information, though there is no perceived difference between medium and high volume levels on these factors.

Regarding the main effect for source (experts versus users), univariate follow-up tests also showed significant effects for credibility perceptions, $F(1, 1137) = 9.60, p < .01$, partial $\eta^2 = .01$; confidence in the accuracy of the ratings, $F(1, 1137) = 9.03, p < .01$, partial $\eta^2 = .01$; and reliance on the ratings viewed in deciding whether to see the movie, $F(1, 1137) = 16.86, p < .001$, partial $\eta^2 = .02$; but not for behavioral intentions or congruence with others' ratings. Post hoc tests showed that values for credibility, accuracy, and reliance are significantly lower in the user-generated information conditions than in expert provided information conditions.

Hypothesis 2. Hypothesis 2 predicted that social information in the form of numeric movie ratings will be positively associated with (a) people's behavioral intentions and (b) their personal movie evaluations (i.e., their own rating). $H2$ was tested via a one-way MANCOVA, with valence of ratings as the independent variable and behavioral intent and personal rating as the dependent variables. As before, the frequency of watching movies like the one used in the stimuli and the degree to which subjects saw their tastes as similar to raters' taste in movies were controlled in the analysis. Results showed a significant multivariate main effect on the dependent variables for ratings valence, Wilks's $\lambda = .92, F(4, 2304) = 24.20, p < .001$, partial $\eta^2 = .04$. Follow up univariate tests indicated a significant effect for personal ratings of the movie, $F(2, 1153) = 48.77, p < .001$, partial $\eta^2 = .08$, and for behavioral intention, $F(2, 1153) = 3.72, p < .05$, partial $\eta^2 = .01$. Personal ratings increased as rating increased from 2 out of 10 ($M = 4.34$), to 5 out of 10 ($M = 4.96$), to 9 out of 10 ($M = 5.45$), and the three means differed significantly from each other at $p < .001$. Behavioral intent was higher when the rating was 9 of 10 ($M = 2.58$) than when the rating was 2 of 10 ($M = 2.38$). Thus, the data largely support $H2_{a-b}$.

Hypothesis 3. The last hypothesis sought to explore the effects of individuals' online information provision behaviors on the relationships examined in $H1-2$ and $RQ1$. Hierarchical multiple regression analyses were used to test $H3$. Multiplicative terms were constructed to test the interaction between information provision and each independent variable (i.e., rating volume, rating source, and rating valence). The same two control variables as before were entered in the first block, and the interaction term was entered afterward to determine if it explained additional variance beyond the controls, across each of the dependent variables in the study. Where interactions were significant, further tests probed the specific nature of the interaction. Bonferroni corrections were applied in all analyses to maintain experimentwise error at .05. This analytic strategy was used to re-examine $H1-2$ and $RQ1$, as proposed by $H3$.

In terms of the relationships implicating ratings volume examined in $H1$, the degree to which participants provide information online interacts with the volume of ratings, on behavioral intent,

Table 1
Results of Hypothesis 3 for information provision habits.

	Omnibus test		F change	R ² change	b	se	β	t
	Overall F	Adj R ²						
<i>Set 1: Information provision habits by volume</i>								
Behavioral intent	179.24	.483	8.04*	.007	.044	.016	.086	2.84*
Credibility	46.68	.197	35.10**	.049	.102	.017	.224	5.93**
Reliance	41.97	.177	21.10**	.030	.100	.022	.176	4.59**
Confidence	26.73	.120	11.43*	.018	.067	.020	.134	3.38*
Congruence	7.83	.024	4.18	.007	-.089	.043	-.086	-2.05
<i>Set 2: Information provision habits by source</i>								
Behavioral intent	458.62	.544	5.84	.002	.037	.015	.048	2.42
Credibility	80.32	.171	13.50**	.010	.060	.018	.099	3.68**
Reliance	82.33	.176	17.48**	.013	.080	.022	.112	4.18**
Confidence	49.67	.113	9.54**	.007	.056	.020	.086	3.09**
Congruence	5.55	.008	.03	.000	-.010	.046	-.005	-.18
<i>Set 3: Information provision habits by valence</i>								
Behavioral intent	463.66	.548	12.83**	.005	.037	.010	.072	3.58**
Personal rating	162.58	.299	98.32**	.061	.242	.024	.248	9.92**

Note:

* Test is significant at $p < .01$ with Bonferroni corrections.

** Test is significant at $p < .001$ with Bonferroni corrections.

perceived information credibility, reliance on the information, and people's confidence in the accuracy of ratings (though not on opinion congruence). These results are shown in Table 1 in the "Set 1" row. Further analyses of the interactions show that those with higher levels of information provision tended to exhibit higher values on behavioral intent, credibility, reliance on rating information, and confidence in the accuracy of ratings, supporting the underlying contention of H3 that effects in this study are more pronounced for those more conversant in the provision of social information via online sharing tools.

With regard to the impact of information provision on the relationships implicating rating source (UGC versus expert) in RQ1, results show that participants' social information provision habits interact with rating source on their perceived credibility of the information, reliance on ratings information, and confidence in the accuracy of ratings (see the "Set 2" row of Table 1). Those more steeped in social information provision tend to see slightly fewer differences between expert-generated information and UGC (on credibility, information reliance, and confidence, as noted above), compared to those who provide social information less actively. These results are consistent with H3.

For the relationships examined in H2, which assessed the effects of rating valence on behavioral intentions and participants' personal movie rating, there was a significant interaction effect between ratings valence and information provision habits, for behavioral intention and for personal rating of the movie, as shown in the "Set 3" row in Table 1. Those who provide social information more are more likely to intend to see the movie and to rate movies similar to others' ratings, compared to those who provide information themselves less often. Stated differently, as online information provision increased, participants' personal ratings comported even more strongly with the rating they saw on the stimulus page and their behavioral intentions were affected as well. Across all analyses, the data provide considerable support for H3.

8. Discussion

One consequence of the recent rise in user-generated content online is the co-existence of the credentialed authority of experts alongside the experiential credibility of typical Internet users. Against this backdrop, and while also considering cues in online contexts about information volume and valence, we examined

the perceived credibility of, reliance upon, and confidence in expert-provided information and UGC, focusing on how this information shapes people's opinions, their congruence with others' opinions, and their behavioral intentions. We invoked theoretical perspectives that consider how users interpret available source cues in light of the social influences that act on their information processing and tested our hypotheses by an experiment with a representative sample of Internet users in the U.S., the results of which were generally supportive of these perspectives, while also indicating important ways to extend them.

For example, as shown in Hypothesis 1, the volume of social information provided by others is positively related to its perceived credibility, people's reliance on it, their confidence in its accuracy, and the congruence between subjects' own ratings and those to which they were exposed. Consistent with warranting and signaling theories, which suggest that the aggregated opinions of lay users should guard against perceived manipulations and therefore be perceived to be more credible—whereas information originating from experts should be immune to volume effects because their authority adheres in their credentials—these results held when people viewed ratings information from other users, but not from experts. The signal or warrant of UGC volume, however, appears not to be unlimited, as demonstrated by the apparent ceiling effect where a medium number of user-generated opinions produced the same effect as a high volume of opinions.

The results of H1 also support informational social influence's observation that people rely on available cues to establish subjective validity under ambiguous circumstances and are consistent with research that finds greater conformity effects as group size increases. That said, theories of informational social influence remain relatively silent about the precise mechanisms by which influence occurs. Signaling theory (Donath, 2007) and the warranting principle (Walther & Parks, 2002), however, provide some purchase on precisely *how* informational social influence might operate in information-rich environments online. It appears that people treat high information volume as a signal or warrant that drives information trust: as information is aggregated in high volume, it is more difficult to fake and is less susceptible to individual raters' subjective biases. Its influence is therefore amplified. Even expertise itself can be signaled by aggregated user opinions: expert reviewers who are endorsed by a multitude of users, rather than those that are self-proclaimed, derive boosts in perceived credibility (Willemsen et al., 2012). Overall, these findings suggest that

informational social influence may operate through processes of warranting/signaling, suggesting a more complete portrait of the processes by which people are influenced by social information online. Further research, however, is required to validate this newly proposed relationship and should, in particular, examine the degree to which users are actually aware of the warranting value of informational cues, which is implied, but not measured directly, in this study.

Informational social influence processes were also seen to operate in the context of information valence (as demonstrated in H2), where movie ratings to which participants were exposed co-varied with their own ratings of the same movie and their intention to see the movie, consistent with past research (Cosley et al., 2003). These effects were more pronounced among people higher in social information provision, whose personal ratings aligned even more strongly with the rating they saw on the stimulus page (as demonstrated in H3). Together, these results suggest how prone people can be online to the influence of social information, perhaps particularly when they are not terribly motivated to exert a great deal of effort toward a goal. Indeed, increasing evidence on the evaluation of information credibility suggests that under such circumstances people are quite likely to rely on heuristic strategies to make information evaluations (Hilligoss & Rieh, 2008; Metzger, Flanagin, & Medders, 2010; Sundar, 2008). Findings from this study add to this idea the notion that those with relevant experience or expertise with social information tools might be particularly prone to this strategy.

A key motivation for this study was to examine the ambiguity surrounding the credibility of UGC and expert-generated content online. In some ways, findings from this study clarify these distinctions, while in other ways they merely raise further questions. For example, findings from RQ1 showed participants were influenced by whether movie ratings originated from fellow users or from expert movie critics, such that ratings from other users were consistently judged as less credible, less accurate, and to be relied on less than ratings from expert movie critics. This indicates that traditional notions of source expertise (e.g., credentialed authorities) are still influential in people's judgments of information quality, exceeding experiential credibility.

However, results of RQ2 showed that source interacted with the volume of ratings in three ways: experts are seen as more credible than lay users at a low volume of ratings; people are more willing to rely on expert ratings than UGC when a low volume of ratings is available; and the congruence between people's own and others' ratings at high volume is greater when the source is other users, versus experts. Together, these findings suggest that low information volume favors experts, whereas high information volume favors users. Once again, social informational influences, combined with warranting/signaling perspectives, appear to be at work here. People's perceptions conform to available information, but absent sufficient signals or warrants they rely on credentialed information. When such signals or warrants are present, however—such as when there is a high volume of ratings—UGC can equal, or even trump, expert information. Nonetheless, though suggestive, these findings do not definitively answer the question of whether UGC or expert information is more credible and influential. To resolve this may require a head-to-head test of the influence of UGC and expert opinions, where users are simultaneously exposed to each, in order that they must make direct, comparative cognitive evaluations. Our experimental design, however, did not allow for this.

Results also largely support the assertion (in H3) that the effects found in this study are more pronounced for those people who are more conversant and comfortable with the use of social information sharing tools. Participants who were more immersed in online information provision (a) tended to exhibit higher values on many

of the outcome measures in this study in the directions hypothesized, (b) tended to perceive a smaller gulf between expert- and user-generated information, and (c) were more influenced by the rating on the stimulus page, compared to participants who were less active social information providers themselves. Looking across the analyses for H3, it is clear that the receiver characteristic of online information provision influenced people's evaluation of, trust in, and usage of social information online.

These results have important implications for theories of social influence. First, they add further evidence that informational social influence operates in the context of social media generally, but more importantly they suggest that theory in this area should be extended by posing differential effects for more active social media users since these people may be more influenced by social information than others. Second, research in information evaluation usually focuses on source characteristics (e.g., source credentials or qualifications) rather than on information receiver characteristics or skills which, when included, tend to be studied largely independent of source characteristics (e.g., Hargittai, Fullerton, Menchen-Trevino, & Thomas, 2010). Informational social influences, however, have been shown to vary according to cultural (Bond & Smith, 1996) and individual differences (Cialdini, Wosinska, Barrett, & Gornik-Durose, 1999), suggesting that they may affect individuals to varying degrees depending on factors like differences in personality, attitudes, or past experience. Accordingly, findings from this study suggest that receiver characteristics are important, both independently and in conjunction with social information source features since they affect people's ability to understand signals. In fact, the results of H3 suggest an extension of warranting theory by showing the importance of receiver characteristics as a factor in how individuals interpret, and thus may be affected by, warranting cues. To date, research invoking the warranting perspective has not focused on the degree to which individuals perceive the warranting value of information. Consequently, receiver characteristics should be more fully integrated into theories of social information processing, information evaluation, and social influence.

Considered in their entirety, the results of this study demonstrate that people attend to the substantial information resources provided to them online by others, which are influential in shaping their opinions, attitudes, and beliefs, particularly when available cues align to establish the trustworthiness of the information through consensus or when information consumers themselves are especially active in social information provision. As even greater amounts of social information accumulate online over time, and as people become more accustomed to obtaining and producing user-generated information via social media themselves, it is likely that the factors explored in this study will become more important to understand, even as the challenge of doing so will be amplified by their continuing evolution. For researchers, this suggests the ongoing need to decipher the dynamic influences on information consumption online, including factors beyond those considered here, such as the nature of the information under consideration, the cognitive orientation of information consumers, differences in relevant attitudes and personality traits, and the critical role of information context. Importantly, it also demands that researchers continue to refine the theories that help to account for these processes, since these constitute the contributions that will endure, even as the specific tools of social information evolve.

Acknowledgments

The authors thank the John D. and Catherine T. MacArthur Foundation for their support of this work, and Ethan Hartsell, Alex Markov, and Rebekah Pure for their contributions to this research.

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