# The Effects of Feedback and Habit on Content Posting in an Online Community

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**Abstract**
This study examined the relationship between feedback and content posting behavior in the social media system Everything2. Analyses paired survey data with behavioral data of user activity obtained from server logs. Results showed that both positive and negative feedback from other users was associated with more posting behavior. Habit strength moderated the effect of positive feedback such that those with higher habit were less affected by the feedback than those with lower habit. Habit, however, did not moderate the effect of negative feedback. Results suggest that systems that facilitate positive feedback mechanisms may encourage initial participation but may become less effective for users who have developed a habit.

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## 1 Introduction

Social media systems are strongly reliant on user generated content. Designers of such systems have thus focused on building features that encourage individual users' content contribution in order to keep the system socially sustainable. Understanding content contribution in a social media system is complex because users' behaviors occur within a socially dynamic environment, where their contributions are not only viewed by other users, but also evaluated. Many social media systems employ some form of user feedback in the system design—some examples include the "Like" button on Facebook, the helpfulness rating feature on Amazon product reviews, and up/down voting on news-sharing sites like Reddit.

While there has been much prior research examining the role of feedback on content contribution, much of the focus has been on the relationship between feedback and *initial* user behavior. However, users' content contribution behaviors on social media change over time (Velasquez, Wash, Lampe, & Bjornrud, 2013) and their non-conscious habits begin to explain more of the time they spend on a particular site than conscious motivations (Wohn, Velasquez, Bjornrud, & Lampe, 2012). Understanding the behavior of long-term users who have already developed a habit of using the site is therefore important from a retention perspective as the types of features that are designed to increase content contribution may not have the intended effect for people who have been on the site for a while.

## 2 Effect of Feedback on Posting Behavior

While content contribution has been examined from various perspectives, such as psychological motivation (Antin, 2009; Lampe, Wash, Velasquez, & Ozkaya, 2010; Nov, Naaman, & Ye, 2010), cost-benefit analyses, and network dynamics (Butler, 2001), this study focuses on the role of feedback from other users.

Feedback from other users is particularly interesting and pertinent to examine in the context of social media because these systems facilitate much social interaction through interactive features that can convey the sentiment and opinions of other users. Prior studies have found that feedback not only serves as a learning opportunity but also an opportunity for users to develop social relationships (Lee, Park, & Han, 2014). Positive feedback has also been found to be a significant predictor of how long a user stays involved in an online community (Sarkar, Wohn, & Lampe, 2012).

Studies that have examined behavior of people in online communities that involve user-generated content have found mixed results on how new users' initial behaviors are affected by feedback from other users. Joyce and Kraut (2006) found that among new users of a public newsgroup, those who received a reply to their initial post were 12% more likely to post a second time. Burke, Marlo, and Lento (2009) found that receiving a comment on a photo posted on Facebook increased the likelihood of posting again

during the subsequent two months by 6.2%. These results may suggest that a reply on a user's initial post acts as positive reinforcement. However, studying new users in the online community Slashdot, a Q&A website, Lampe and Johnston (2005) found that neither replies nor ratings predicted likelihood of the user posting a second time.

The role of the valence of the feedback is also unclear. Although early studies on verbal feedback suggest that positive feedback encourages behavior and negative feedback discourages behavior (Moos, 1963), Joyce and Kraut (2006) found that posts with replies that had a higher proportion of words indicating agreement or disagreement were slightly more likely to predict probability of the individual posting a second time, but the increase was not statistically significant. Lampe and Johnston (2005) found a significant effect of a positive rating on the first post as reducing the gap in time between a first and second post. There was no effect, however, for a negative rating.

These studies suggest that there are mixed results understanding how people's posting behaviors are affected by feedback and that it could be that feedback has different effects depending on the context of the posting behavior.

## 3 The Moderating Role of Habit

One commonality of existing studies about feedback is that they only provide a glimpse of user behavior based on their initial usage: Joyce and Kraut (2006) and Lampe and Johnston (2005) studied which factors related to the first post predicted users' posting a second time; Burke et al. (2009) looked at a slightly longer timeframe—users' first two months on the site—but this was still examining first-time user behavior. By selecting first-time users, these studies lack evidence of users who have been on the site for a long time. It could be that user behavior changes over time. In particular, these short timeframes may preclude the effect of habit, as habit is something that develops over a long period of time (Triandis, 1979).

Habits are "learned sequences of acts that have become automatic responses to specific cues" (Verplanken & Arts, 1999). The automaticity associated with habit is different from unconsciousness. The brain is fully functioning (Yin & Knowlton, 2006); it is just that the individual may not be consciously thinking of why or how they engage in that behavior. Some simple examples of habit-related automaticity could include flipping on a light switch when one enters a dark room or reaching for the remote control when sitting on a couch.

Several studies of online media have found that habit explains more variance of time spent using a media than motivations—in the context of general Internet use (LaRose, Mastro, & Eastin, 2001), online communities (Wohn, Velasquez, Bjornrud, & Lampe, 2012), and social network games (Wohn, 2012). These studies have consistently shown that habit is a strong construct that explains more of how much time people spend on that media than conscious motivations.

Why would habit explain so much of our behavior in how we use media? LaRose (2010) suggested that in the initial and early stages of media use, conscious motivations primarily explain why people use the media, but as time goes by, the media use gradually becomes habitual, which is why habit would explain more of media usage behavior after the initial stage of adoption.

If habits trump motivation, it could also be that habits make one more resilient to external factors, such as feedback. It is thus important to consider how people's behaviors change after they develop a habit—namely see if habit attenuates or diminishes the effect of feedback on posting behavior.

## 4 Study Context: Everything2

The present study is a mixed-methods field study conducted in the context of the website Everything2.com. It was part of a larger data collection related to the understanding of online community participation. Everything2 is a user generated content website in which the main activity on the site is to write about any topic. The website holds the repository of users' contributions.

Unlike knowledge repositories such as Wikipedia, Everything2 users can write about both fact and fiction, and instead of editing articles collectively, each article is one author's unique contribution. This particular user generated content site was ideal for a field study because 1) the site has been active for 15 years, which may provide some variance in terms of users who have high habit strength and users with low habit strength, and 2) site administrators allowed access to the site's server logs, thus providing, to a certain extent, behavioral data of what users are doing online.

Everything2 allows users to evaluate others' content through a voting system. Upvotes are positive evaluations that users can assign to the articles written by other users, a form of positive reinforcement. Downvotes are similar to Upvotes, but only differ in that they are negative evaluations. A negative evaluation can be a form of punishment, but it could also be deemed a positive reinforcement if the user

perceives the feedback as attention. Cools are similar to Upvotes, but can only be given by users who have had a certain minimum level of activity on the site. Users may only vote once on each article and are limited in the number of votes they may assign within a given timeframe, encouraging them to be somewhat thoughtful about their voting behavior.

### 4.1 **Explaining Posting Behavior in Everything2**

To see if habit had a moderating effect on different types of feedback, one type of behavior was isolated: posting articles. (Here, a distinction is made between "posting" and "writing" because the system can only tell when the user posted the article.) This behavior was selected as it has very distinctive valences in terms of the feedback it gets from other users. As introduced above, there are three types of feedback that can be given to an article: an Upvote, a Cool, and a Downvote. Applying the general assumptions of feedback from prior research, one can assume the following:

H1. Feedback with a positive valence will increase the number of posts.

H2. Feedback with a negative valence will decrease the number of posts

However, these hypotheses apply before we take into consideration the effect of habit. Once we factor habit into the equation, we would expect that people with higher habit strength are less affected by feedback compared to those with lower habit strength:

H3. Habit strength will moderate the relationship between feedback and the dependent variable such that the feedback affects low habit users more than high habit users.

## 5 Methods

### 5.1 **Survey Data**

Existing users of Everything2 were invited to take a survey about their use of Everything2 through a banner ad located on the top of the front page of the site. The advertisement was only viewable for those users who had logged in with their unique ID, and once clicked, led to a consent form and online survey. The banner remained viewable on the site until the user had participated in the study or declined to do so by clicking on a "no thanks" option.

Participants filled out eight items adapted from the Self-Report Habit Index (SRHI; Verplanken & Orbell, 2003) that were reworded to make sense in the context of online community usage (e.g., "Using Everything2.com is something I do automatically," "…I do without thinking," "…I do without having to consciously remember." See full scale in appendix.) They rated these items on a 7-point Likert-type scale from "strongly disagree" to "strongly agree." The scale was very reliable and showed a normal distribution among survey participants (*M*= 4.0, *S.D.*= 1.58, Cronbach's alpha= .95).

To measure feedback, several alternative approaches were taken and are illustrated in Table 1.

**Table 1. Alternative operational definitions of feedback**

| Conceptual definition | Operational definition |
|---|---|
| Ratio of positive to negative feedback | • (Upvotes + Cools) / (Downvotes) ……...(a) |
| Number of positive feedback | • Upvotes + Cools ……...(b) |
| Number of total feedback | • Upvotes + Cools + Downvotes ……(c) |
| Number of negative feedback | • Downvotes ……(d) |

### 5.2 **Behavioral Data**

Behavioral data was extracted from the server of Everything2 by using a customized script in PERL. This required scraping all the logs in the server and partitioning the data into tables before creating specific code to extract particular variables. Behavioral data included the timestamps of all the articles written by the users in a three-month period after they took the survey, and timestamps of all votes and Cools that those articles received in separate files.

The range of the number of articles that users posted in the three-month period was zero to 1,654 (*M*=35.07, *SD*=178.39, Median=2.0). The distribution was a power-law distribution (right-skewed) with one outlier, who had 1,654 articles (1,446 more than the individual with the next-highest number of articles). The skew was 2.8, far beyond the lax criteria of 2.0 for a skewed distribution (Garson, 2012). Removing this individual did not improve the skewness (2.8) but it reduced the range to 207 and reduced

the standard deviation (*M*=24.69, *SD*=43.06, Median=5.0). Analyses were therefore conducted with this individual removed. The final dataset contained 86 individuals.

The hypotheses examined the relationship between different feedback and the number of articles that the individual posted in the three-month period after the survey, taking into account the moderating effect of habit strength measured at the time of the survey. A negative binomial regression model was used to test all of the hypotheses, as the dependent variable was a count variable, and the distribution of the dependent variable was a power-law distribution where the standard deviation of the dependent variable was larger the mean, indicating an overdispersion in the distribution. This model is a type of generalized linear model, which takes into consideration non-normal response distributions (Agresti, 2002).

## 6 Results

First, we examined the effect of the *ratio* of positive to negative feedback (Table 1, a) on the number of posted articles. Ratio was defined as the total number of Upvotes and Cools received for all three months divided by the total number of Downvotes received in the same period. The model (Table 2, Model 1) was not statistically different from the null model. The ratio ($\beta$= -.07, *p*= .33) as well as habit strength ($\beta$= -.31, *p*=.64) were both not statistically significant predictors. The interaction was also non-significant ($\beta$= .03, *p*= .35).

Next, we examined the effect of the *number* of positive reinforcement on posting behavior using the total number of Upvotes and Cools received as the independent variable, predicting the total number of articles posted. The model (Table 2, Model 2) was significantly different from the null and showed a main positive effect of positive feedback ($\beta$= .01, Wald $\chi^2$= 9.48, *p*= .002) but no significant main effect of habit strength ($\beta$=.83, Wald $\chi^2$= 2.51, *p*=.11). The interaction was significant ($\beta$= -.01, Wald $\chi^2$= 4.54, *p*= .03) such that those with individuals with low habit strength were more positively affected by the feedback than individuals with high habit. In interpreting results of this negative binomial regression, effect size of the independent variables should be interpreted by looking at the Wald statistics rather than the coefficients.

The third model (Table 2, Model 3) used the total number of Upvotes, Cools, and Downvotes received, habit, and the interaction between total feedback and habit as the independent variables, predicting the total number of articles posted in that same period.

The model was significant with an intercept of .896 and showed a main positive effect of feedback ($\beta$= .01, Wald $\chi^2$= 11.66, *p* <.001) and no statistically significant main effect of habit strength ($\beta$= .18, Wald $\chi^2$= 2.18, *p*=.14). The interaction was significant ($\beta$= -.001, Wald $\chi^2$= 4.41, *p*= .04) such that those with higher habit strength were less affected by feedback.

The fourth model (Table 3, Model 4) looked at the effect of negative feedback, habit strength, and the interaction between negative feedback and habit predicting number of articles posted. The model showed a significant effect of Downvotes ($\beta$= .08, Wald $\chi^2$= 6.13, *p*=.01) but opposite of the proposed direction—people who received negative feedback actually were more likely to post more. A main effect of habit was present ($\beta$= .26, Wald $\chi^2$= 4.85, *p*= .001) but no interaction between habit and Downvotes ($\beta$= -.01, Wald $\chi^2$= 2.50, *p*= .11).

The results from models 3 and 4 suggested that Downvotes, even though they are negative in valence, were actually encouraging posting behavior. This suggested that it may not be the valence of the feedback but feedback itself that positively contributes to posting behavior. In other words, it could be that feedback represents attention. Thus we ran a final model where the data was recoded to see if the lack of feedback had any effect on posting behavior. For individuals who did not receive any feedback, this variable was coded as “1” and for anyone who received at least one type of feedback (regardless of valence), this variable was coded as “0”.

The model (Table 2, Model 5) showed a significant effect of lack of response ($\beta$= -3.88, Wald $\chi^2$= 8.91, *p*=.003) in the proposed direction. In other words, individuals who did not receive any feedback were less likely to post more. There was no main effect of habit ($\beta$= .04, Wald $\chi^2$= .116, *p*= .73) and no statistically significant interaction between lack of response and habit ($\beta$= .48, Wald $\chi^2$= 2.80, *p*= .09).

**Table 2. Summary of Results**

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| Alternative feedback measurements | Ratio of positive to negative (a) | No. of positive feedback (b) | No. of total feedback (c) | No. of negative feedback (d) | Lack of feedback |
| Feedback | -.07 | .01** | .01*** | .08* | -3.88*** |
| Habit | -.31 | .84 | .18 | .26** | .04 |
| Feedback x Habit | .03 | -.01* | -.001* | -.01 | .48 |
| Likelihood ratio Chi-square | 2.89 *(n.s.)* | 55.0*** | 56.43*** | 44.56** | 22.59*** |

*$p$<.05, **$p$<.01, ***$p$<.001

## 7 Discussion

This study tested the moderating role of habit strength on effects of positive and negative feedback in explaining posting behavior in an online, user generated content community. We examined statistical relationships between users' posting behavior and different types of feedback, which, in the context of this social media system, were positive ratings, negative ratings, and lack of response, to users' posts.

### 7.1 **Interpreting Feedback**

Feedback with positive valence was associated with higher number of posts. However, feedback with negative valence was also associated with higher number of posts. Downvotes, which were hypothesized to diminish behavior, rather contributed positively to behavior, as was seen in results that looked at Downvotes separately (d) and cumulatively with Upvotes and Cools (c). Results also showed that getting any kind of feedback—whether that was positive or negative—acted as a positive reinforcer (Table 2, Model 5).

These results suggested that the valences associated with feedback in this particular community may not have the same communicative value as the "mm-hmm's" and "huh-uh's" used in early communication research (Greenspoon, 1955; Moos, 1963), because those signals of approval and disapproval took on positive and negative valences, respectively.

There could be different explanations for why this occurs. The first is an attention perspective. Early studies on feedback were conducted in a face-to-face environment where attention on the individual was very salient and constant due to the immediacy of the feedback; it may be that when attention is constant, the individual begins processing positive and negative valences, but when the attention is not constant—as is in an asynchronous mediated environment—the individual craves the attention and cares less about the valence of the feedback. For example, in online education, lack of feedback from the instructor is the "most cited reason for withdrawing from online courses" (Ertmer et al., 2007).

The desire for attention and interpretation of disapproval as being a positive feedback may be even more salient because the content on Everything2 is mostly creative in nature. Some prior studies suggest that creative content producers crave the attention more than the nuance of the feedback as inattention in a social environment could be disappointing to the writer of the article (Cheshire & Antin, 2008; Lampe & Johnston, 2005).

A second explanation is a social approval perspective—the notion that people continue engaging in behavior to gain more social approval. In his work on content contribution in a P2P music-swapping system, Cheshire (2007) found that people were more likely to contribute even if they were told that only a low percentage of people liked their content. He explained this phenomenon from a social approval perspective—in other words, people who received a low approval continued to contribute to raise their reputation among other users. While low approval is certainly different from disapproval, it could be that the same mechanism is at play.

Further investigation through experiments may give us more insight into explaining these differences—especially in regard to potential differences between creative content and informational content contribution.

### 7.2 **Interpreting Habit**

The moderating effect of habit was present when looking at relationships between positive feedback and posting behavior, but it was not present in relationships between negative feedback and posting behavior. This suggests that the positive effect of positive feedback "fades" as the user develops

a habit of being on the site. However, negative feedback does not have that fading effect, which signals that negative feedback triggers more conscious thought. Conscious thinking, which takes place in the prefrontal cortex area of the brain (Graybiel, 2008), prevents habit from being activated, so this may mean that people may become sensitized to positive feedback, but not to negative feedback.

These results, however, are a little bit surprising because there is literature linking habits to ego depletion. For example, studies found that ego depletion leads to lack of self-control (Baumeister, 2002), which have been considered by some to be a component of habit (Verplanken & Orbell, 2003). Because negative moods are strongly correlated with ego depletion (Hagger, Wood, Stiff, & Chatzisarantis, 2010), one could hypothesize that negative feedback would induce a stronger habit—this was not supported, however, in the current data.

The most probable explanation here is that the sub-components of habit—which include dimensions such as lack of control, lack of self-observation, and self-identity (Gardner, Abraham, Lally, & de Bruijn, 2012; LaRose, 2010)—which have, until now, rarely been separated when examining the construct of habit, may work differently against each other in very specific contexts. While the comprehensive concept of habit, which has been tested and validated in dozens of studies, has been used for this study, further examination of these subcomponents may be able to provide a more nuanced explanation of the interactions we see between habit and feedback.

### 7.3 Implications for Design

This study informs the understanding of sustainability in a social media system, as habit has been found to be the strongest predictor of how much time an active member spends on a site (Wohn et al., 2012). Knowing how social communication factors, such as negative and positive feedback, influence users of differing levels of habit strength can provide further insight into how to design socio-technical systems to encourage people to continue usage.

For example, results of this study would suggest that for new users or those who have not developed habit strength, positive feedback has a strong influence on behavior. Thus making positive feedback features more salient, such as providing noticeable alerts to the user when their post receives feedback, or highlighting the total number of feedback, may contribute to retention of new users (those who have not yet developed a habit) in the community. Results would also suggest that positive feedback mechanisms that are offered through the design of the system do not affect users whose use is more habitual; thus different strategies may need to be employed when catering to different types of users within the community. Since no moderating effect of habit was found on negative feedback, designers may want to "save" negative feedback for more seasoned users, since prior research has also found that repetitive negative feedback at the beginning of one's membership can strongly discourage users from staying on the site for a long time (Sarkar et al., 2012).

Although the results show a strong positive effect of feedback, it is also important to consider what that feedback truly means. If the underlying mechanism of feedback is attention, then there may be alternative ways of providing more attention to the user that are not necessarily feedback from other users.

### 7.4 Limitations and Future Research

One limitation of this study was that self-reported habit was based on users' general habit strength regarding usage of the site, rather than asking about their habit strength in relation to posting. For future studies, researchers may want to further explicate measurement of media habits to focus on very specific affordances depending on the complexity of the media.

This study was limited to measurement of recordable behavior; this behavioral trace data does not tell us the meaning of the behavior such as its magnitude or significance—only the time and frequency of its occurrence. Also, there are other types of behavior not included in this study that are strong aspects of online community usage, but unrecorded by the server—such as reading. Future studies may want to determine alternative methods of how to assess the user's presence on the site; using click data, for example, may be a proxy of active usage, although it may not be suitable in online communities that have large quantities of text data, as text requires time to read.

Although this limitation could be addressed by examining users' initial behavior on the site, it also raises of question about what exactly is "new" behavior in an online environment, a problem of conceptual generalization. Unlike other types of behavior, such as exercising or taking a vitamin every day, media usage, especially that which takes place online, is somewhat similar across different services such that for adult users, it may be difficult to identify "true" new behavior. Even for users who just started Everything2, it could be that they already had a similar experience at another online community. For

future research, scholars may want to identify and isolate users whose use of a certain system is truly new in order to test the effects of feedback—these people could be found in much younger or older populations—or assess some level of prior experience to use as a grouping factor when conducting analyses.

Another limitation is that we only studied users of Everything2. Although we used the site to test theory rather than assess generalizability of the population, every community has its own social norms, thus results should be interpreted with caution when applying to other forms of social media. As the main content of the site is creative writing or personal anecdotes written by users, it could be that this kind of content draws a type of person who is more vulnerable to social feedback. Conducting similar research in other types of online communities with different types of content may enable researchers to make broader conclusions about the roles of habit strength and feedback in predicting user behavior. The study is also correlational: longitudinal panel data is needed to investigate causality.

## 8 Conclusion

This study found that in an online user-generated content site, getting feedback on their posts from other users—whether it is negative or positive—was associated with more posting behavior. Results showed strong support for the moderating effect of habit on positive feedback, but not for negative feedback.

This study builds on prior studies examining the effect of feedback, but makes a novel contribution by introducing the concept of habit. These findings indicate that the psychological factors that influence weak vs. strong habitual users can differ. Understanding the differences between these two groups of users is particularly important in designing social media systems that rely on user-generated content for sustainability. Especially now that many social media systems are mature, we must go beyond studies of initial use and early users and take into consideration the characteristics and desires of users who have already developed a strong habit in order to deploy comprehensive retention strategies.

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## 10 Appendix

### Self-report Index of Habit Strength (Adapted)

How much do you agree with the following statements? "Using everything2.com is something…"

1. I do automatically
2. I do without having to consciously remember
3. That makes me feel weird if I do not do it
4. I do without thinking
5. That would require effort not to do it
6. I start doing before I realize I'm doing it
7. I would find hard not to do
8. I have no need to think about doing

*Response Options: Scale of 1 to 7 from "Strongly disagree" to "Strongly agree"*