

Monetary Reward on Knowledge Community - Understanding How Motivation and Other User's Behavior Affect Donation Decisions

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ABSTRACT

Subjective knowledge communities like Quora are getting popular nowadays. Voluntary monetary reward (donation) from the readers to the content creators is one of the most powerful novel features supporting the interaction between content contributors and consumers in those communities. However, the underlying mechanism of user's reward behavior is unclear. In this project, we conducted an interview and two experiments to examine how people's motivation and other user's behavior affect their donation decisions, and our key findings are as follows: 1) Our interview results show that user's behavior are driven by both intrinsic motivation (looking for enjoyment) and extrinsic motivation (looking for usefulness). We also found that observing other user's behavior also affected their decision on donation. 2) Experiments 1 shows that other user's donation to the content creators may positively affect readers' donation amount. However, results we found were not statistically significant. 3) Experiment 2 shows that listing the donation from one's friends along with comments result in the significantly higher amount of money reward from the user compared with the baseline, where the user does not see any friends or comments. Finally, we found that users' motivation (perception of usefulness and enjoyment) can predict their donation amount, while they can be affected by other people's comments and rewards. We further build a theoretical model to explain user's monetary reward behavior and provide design implications based on our findings.

Keywords

Motivation, Money Reward, Knowledge Sharing Communities, Social Proximity, Word-of-Mouth Communication

1. INTRODUCTION

Knowledge sharing happens every day in our world nowadays. Since the introduction of the Internet, knowledge has become more fluid and common than ever. Before, knowledge were luxuries, as only chosen few could have the privilege of education. But the time has changed now, and today we suffer from the overabundance of knowledge, rather than a lack of it.

With such change, many people and organizations are focusing on the question of how to sort through the knowledge that is useful, and that is not, and multitudes of methods from various contexts have been attempted already. Subject knowledge community is

one of the most successful attempts. This kind of knowledge communities allows users with domain expertise to share their knowledge with others. There are many forms of sharing on those communities, for example, Question-and-Answer (Q & A), original article posting, and live lectures. The most famous community for Q&A in the U.S. is Quora. Also, in China, a platform called Zhihu combines all the forms of knowledge sharing in one community. Furthermore, some popular social networking and communication applications such as WeChat also support knowledge sharing forms as original article posting and live lectures.

Academic research on this domain is focusing on UGC (user-generated contents) platforms. Feng et al. [1] discuss how the interaction between contributors and users affect the productivity and quality of the content on those platforms. Those interactions are addressed by interaction design features. As those knowledge communities went popular, more features that support the interaction between users and encourage contributions occurred. In fact, the interactions on that knowledge sharing systems on subject knowledge communities in real life have been developed quickly and beyond the academic research. One of the most interesting features is money reward from readers to the contributors. In China, users can donate money to the content creator after they have full access to the content (Figure 1).

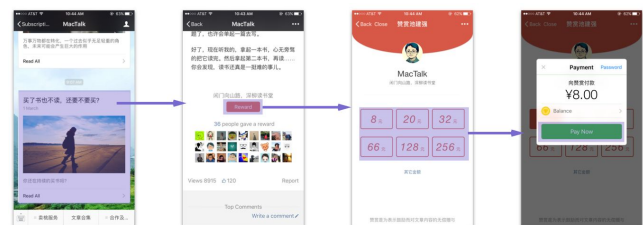


Fig 1. Money reward feature in Wechat gets popular

Money reward feature is so popular that people can even live their life on it. However, it is also counterintuitive since people volunteer to pay after they get the full access to those content. Within the vast subject area of UGC platform, particularly, knowledge sharing community, our research focuses on what factors affect the amount of donations made by the users and why they reward the content creators.

In our research, we looked at people's donation behavior with

respect to different social features each implying a different level of social exposure, and measured how the modified perception of an article through hypothetical social interactions presented in forms of: likes, comments, and donations, of other and a friend's, influences people's donation behavior, measured in terms of donations quantities. We also built a model to explain how social interactions factor into a content consumer's intrinsic and extrinsic motivations, which potentially lead her to exhibit a 'rewarding behavior.'

As a result, we found that the number of likes and comments correlate positively with people's perception of 'usefulness' of an article which further affects their extrinsic motivation positively, and hence make them more likely to donate to the content contributor. We also found the observability of an individual in a close social group (i.e. a friend) to be a crucial factor that affects people's donation amount positively, especially in combination with a higher number of comments. Finally, based on our findings, we provide design suggestions to add new features that offer new social interactions, particularly to allow users to provide feedback on a content quality, to let them be engaged in social interactions through comments, and to prompt more reaction from users by presenting more individually relatable information originating from other individuals within a close social proximity.

2. RELATED WORK

2.1 Motivation

Previous research found the people's behavior on online communities is affected by their intrinsic and extrinsic motivation[2]. Researchers found that people's intrinsic motivation can be represented by enjoyment. Users driven by intrinsic motivation are looking for content that they enjoy the community can care about their emotional feelings. On the contrary, users driven by extrinsic motivation are looking for the usefulness of the content.

Regarding UGC community and knowledge sharing, related research is focusing on the motivation of contributors and how monetary incentive affect the quality of the community[1]. Although those studies are from contributors' perspective not the reader's' perspective, it can also be relevant to our project since it addresses the effect of money reward on the community and the necessity of examining design features related to this topic.

Feng et al. propose a theoretical model to study the relationship of the monetary incentive on UGC contribution. They classify contributors into four groups depending on whether a contributor is intrinsically motivated and whether a contributor is "production efficient." Further, Feng et al. differentiate markets into multiple types based on 1) how a contributors' intrinsic motivation within a market is modified given a small or large amount of monetary incentive, 2) whether the market is initially in a no-money-incentive (NMI) condition or not, and 3) how the quality of contents are managed--whether a content management is strict or not.

Based on their model, the authors suggest that an introduction of a money incentive to a UGC platform or increase in the monetary incentive can cause different market equilibria to emerge, through competition crowd-in/out and motivation crowd-in/out effects. It

can also potentially improve the quality of content on the community. Although this article's perspective is different from ours as it looks at the relationship between the content contributors and money incentives, we find their finding that the provision of a sufficient money incentives to a community with an appropriate quality control mechanism can be beneficial, as the overall content of the quality will be higher with less motivated contributors are crowded out while more motivated contributors are crowded in, even though the quality of the contents may remain unaffected.

2.2 Social Proximity

Social proximity originally means the tendency for individuals to form interpersonal relations with those who are close by[3]. In recent years, researchers discovered that social proximity principle does not only applies to people's relationship with the physical world but also affect people's relationship and behaviors on social networks online. People who are close to you, such as your friends, will have more influences to a user in the online community [4].

Researchers have found that social proximity and word-of-mouth communications work together to affect people's decision making online, especially for online purchasing. Harvir and Peter found that Word-of-Mouth Communication had a greater effect when the conversation happened between people who have strong social ties or interpersonal forces. Strong ties bear greater influence on the receiver's behavior than weaker ties due to the frequency and perceived importance of social contact among strong-tie individuals [5].

There is extensive research on how motivation, social proximity, and word-of-mouth communication affect people's behavior online. However, there is few studies on people's rewarding behavior on online knowledge community and how those factors affect their decision making. One of the reason is that knowledge community has been popularized just for a few years and the reward feature was just introduced two years ago and exclusive to China. We lack the basic understanding of the users of those communities and their experience with reward features.

Thus, in our research, we start with qualitative research that helps us understand the users as well as examine their motivations for rewarding the content creator. We also want to know whether their behavior is affected by other factors such as social proximity and word-of-mouth communication. Those questions were explored in our interviews.

After the qualitative research, we used quantitative research to uncover how people's behavior are affected by those factors. We use experiments to examine the relationship between those factors and people's reward decision.

2.3 "Word-of-Mouth"

Word of mouth(WOM) communication refers to passing of information from person to person by informal communication. Researchers found that word of mouth communication is a major part of online communication. It especially has a high influence on people's decision-making on purchase[6]. For example, researchers found that book review on Amazon is related to the sales of the book, and an improvement in a book's reviews leads to

an increase in relative sales at that site [7].

3. METHODS

3.1 Interview

3.1.1 Interviewee Selection

We interviewed six people to learn the patterns of people who are members of UGC platforms and have had some experience interacting with donation features in those platforms. Interviewees we targeted were mostly from China, who were heavy users of Zhihu or WeChat, the two most famous UGC platforms in China. The whole interview protocol we used is included in Appendices.

3.1.2 Coding Interview Data

We coded the raw data collected from interviews such that it 1) contains all the information that is relevant to our research questions and 2) can be used as individual data pieces to reorganize and illustrate teachers' needs in a hierarchy. We sorted through approximately 30 notes for each interview. An example of a good note is a note that: 1) has real concrete data, 2) makes sense by itself, 3) includes some insight or implication, and 4) is the basis for a design idea.

3.1.3 Affinity Diagram

We used an affinity diagram to group all notes in a hierarchical fashion. Through this bottom-up data analysis procedure, we were able to gain some insights into knowledge sharing system users' motivations and perspective on current donation features. We analyzed the interview data by clustering individual interpretation notes and extracting user patterns from individual interview notes. To describe the process of building an affinity diagram we went through more in detail, steps we have taken are as follows:

Step 0. Make notes from individual responses gathered in a spreadsheet.

Step 1. Detach each note from the spreadsheet and mix all the notes into a big pile.

Step 2. Define initial groupings; we randomly picked about 15 notes and read through all of them together. Then we started discussing noticeable patterns in the notes. When some pattern was discovered, we grouped the notes and put them on the affinity wall. Otherwise, we kept reading the notes until new grouping ideas were raised by any team member. Then we posted blue notes above each group to summarize the essence/pattern/concept of that group.

Step 3. Each person worked individually to put the rest of the notes on the wall, discussing with others if necessary. We also gathered aside the notes that did not belong to any group, either because a note was not informative enough, irrelevant to our research question, or simply unable to be comprehended (bad data).

Step 4. After we had finished grouping notes, our team worked in pairs to analyze the groups and make any changes if necessary.

Step 5. After rewording blue notes with more general terms, we moved groups around to gather blue note groups sharing similar concepts and posted pink notes above each group of blue notes to identify the most prominent issues.

Step 6. Finally, we reorganized groups under pink notes into groups that share similar ideas under purple notes. We used simple words and phrases for purple notes to convey the highest level ideas/categories for our affinity diagram succinctly.

3.2 Interview Results



Figure 1. Affinity Diagram

We interpreted our interview data by making an affinity diagram (Figure 1). Here are the key findings from our interpretation procedure:

Result 1: *Users donate to free knowledge because they want to improve the content quality.*

We found that community members value the quality of the content a lot. While there are other ways of displaying appreciation to contributors, people consider monetary rewards to be the most useful and direct method that would motivate content creators to provide higher quality contents and benefit the community as a whole.

Result 2: *Users' decisions are influenced by observing others' behaviors.*

It is easy for people to follow others' behaviors, or change their initial thoughts because of the influence of other people in the community.

Result 3: *Users donate to the contents they like, which could be categorized as intrinsic motivation: Enjoyment[2].*

We defined enjoyment to be the most important intrinsic motivational factor that drives people to donate. The enjoyment or pleasure of reading the content makes people think that it is good to give something to the content creators in exchange for the knowledge they gained.

Result 4: *Users donate to the contents which they find useful for themselves, which could be categorized as extrinsic motivation: Usefulness[2].*

People reward to authors who provide useful information to them. This motivation is more related to free markets theory where users choose the amount of money they are willing to give up in exchange for the useful content.

3.3 Interview Discussions

During the exploratory interview, we were able to discover

motivations that cause people to donate to knowledge, which they have already have access for free. In research synthesis stage, two main reasons for donation caught our eyes; one is that users thought the knowledge is useful, another is that user thought the knowledge is enjoyable. According to Lin[2], we categorized these two factors into two different types of motivations: intrinsic motivation and extrinsic motivation. In our study, extrinsic motivation refers to a factor that causes a person to make donations, particularly about the perceived usefulness in consuming the knowledge, while intrinsic motivation refers when people make donations due to their personal interest in the knowledge itself.

We also found that people’s donation activities in online knowledge community might be highly affected by other people’s activities. One of our participants mentioned, “There is a list of people who already donated [and] this motivated me to donate.” We thought this phenomenon is related to social theories such as Conformity[8], Proximity[3,4,9] and Word of Mouth[5,6]. So we decided to further explore this phenomenon in our following research.

3.4 Experiment 1

3.4.1 Overview

From our user interviews and literature review, we learned that the amount people donate to contents contributors will be affected by other people’s behavior as well as their internal evaluation of the content quality. Through our first experiment, we addressed following two questions:

1. How other people’s reaction to the content will affect their reward behavior?
2. How their evaluation of the content quality will affect their reward behavior?

Our hypothesis for experiment 1 are:

1. Users’ rewarding behavior would be affected positively by other people’s reward & likes.
2. Users’ evaluation of content quality would be affected positively by other people’s reward & likes.
3. Friends would a larger positive impact towards the mount of money reward than others.

In experiment 1, we examined how other people’s reaction to contents affect users’ donation behavior and their evaluation of content quality. We conducted our experiment 1 with both undergraduate and graduate students from Carnegie Mellon University. Subjects were asked to read six articles and each article was matched with a varied condition of other people’s reaction to the content, regarding likes and donations. After reading each article, subjects were asked to choose a certain amount of money to donate to content contributors and evaluate the quality of the contents. More detailed description of our experiment methods is given in following sections. Most of our subjects did the experiment with pen and paper. Due to the limitation that not all of our subject can be reached physically, some subject participated in the experiment remotely.

3.4.2 Experiment Material and Experiment Design

3.4.2.1 Experiment Material

We used articles that are related to social science, cognitive science, and technology. In two ways we ensured that the selection of those articles does not affect the experiment result. First we used random control and we will discuss this in details with the experiment design later. Second, we prescreened articles and controlled their lengths, subject areas, and writing styles of the articles as ‘similar’ as possible in terms of their perceived quality. All six articles were from Scientific American(Mind) and were about 250 words long. Due to the limited time, we did not conduct a preliminary study to screen the article. Nevertheless, our team member has read through all the article and ensured their quality beforehand.

3.4.2.2 Experiment Design

Design: In experiment 1, we used 2 (High-likes, Low-likes) * 3 (High reward number, Low reward number, Friend’s reward), hence 6 different designs in total (Figure.2).

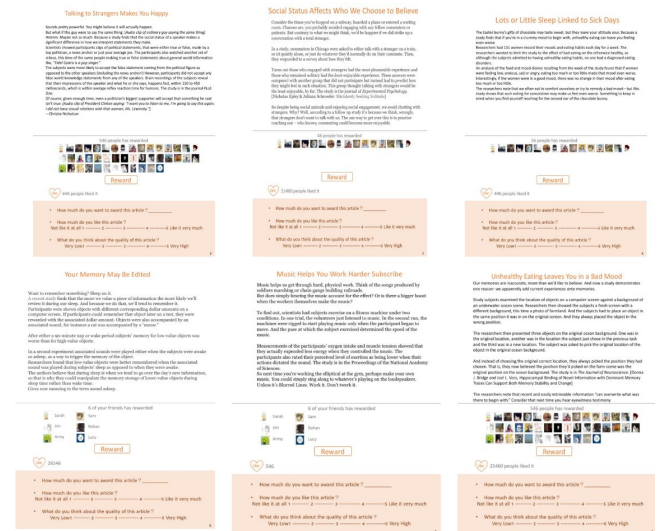


Figure 2. six experimental conditions

Variables: Independent variables were number of people’s likes and rewards.

For “likes”, we had two conditions; “High-likes” condition showed a number of likes greater than 20000 while “low-likes” condition showed a number of likes smaller than 1000.

For “Reward numbers”, we had three conditions; “High reward numbers” showed a higher number of people (around 500) who have rewarded the author with more donors’ photos (around 40) compared with the “low reward numbers” condition (around 50 people with 15 listed profile photos).

For “Friends” condition, we listed 6 of their fake friends with profile photos and names in the donor list. Combining the two variables, we have six experimental conditions in total as shown below in the figure. Dependent variables are people’s reward amount and evaluation of content quality.

Subjects were told to assume that they have 20 dollars initially in

budget to reward the authors. After reading each article, they were asked to assign a reward to the author in the range of 1-20 dollars. We also asked how they evaluate qualities of contents on a 5-point likert scale after they assigned reward amount (Figure.3).

Randomization: All the articles and experiment conditions were randomly matched and displayed in a random order for each subject.

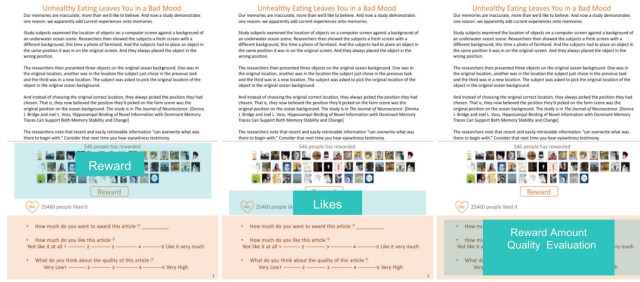


Figure 3. Sample layout of one experiment conditions

3.4.3 Subject

Due to the time and resource limitation, we have 16 subjects in total. All of our subjects are university students and 12 of them are from CMU. All subject volunteered to attend the research and completed the experiment.

3.4.4 Experiment Procedure

The experiment took 15-20 min for each subject. The experiment was conducted by following procedure:

1. The researcher randomly matched the articles with experiment conditions and print out the experiment materials.
2. The subject read the introduction for the experiment (see appendix).
3. The subject completed the six articles (trials). After reading each article, they have to reward the author with amount of money they choose and evaluate the content quality.
4. The subject could make changes after they finish all the articles.
5. The researcher collected the experiment data.

3.5 Data Analysis and Results

We analyze the data with MATLAB and Excel. Repeated anova showed that there is no significant main effect of both likes and reward numbers, neither significant interactions. This experiment is only a part of our preliminary research and explorations. Due to the time constraint, we only had limited subjects. It is hard to perform significance test on our dataset. However, some of our finding are interesting and insightful for our future research.

Likes and Reward Numbers



Figure 4. Reward amount in each experiment condition

Figure 4 shows that average amount of reward for each experiment condition. Although there are no significant differences, observations from our descriptive analysis indicate that likes have no effect on user's reward behavior. However, the number of other people's reward might positively correlate to the amount of donation. Moreover, listing the reward record of one's friends leads to the highest donation amount from users, suggesting that users are more likely to be affected by people they are close to.

Quality

Another interesting finding is that people's evaluation of content quality is less affected by other people's behavior. Repeated anova shows that there is no difference in the evaluation of quality between experiment conditions. Also, from our observation on the descriptive analysis, it seems that perceived content quality does not contribute to their reward amount.



Figure 5. Comparison between perceived quality and reward amount

3.6 Experiment 1 Discussions

We found that there were no significant differences between the experimental conditions as well as people's evaluation of the content quality. One of the potential cause is that we don't have enough subjects for anova analysis. Another cause might be that we did not use the actual friends of the subjects in the experiment. Although we notified that the reward came from their friends, they might not take it seriously since the name and profile photos. However, we do find the tendency that people will reward more when they found that their friends are rewarding the author. This finding is in align with the social proximity theory [3,5] which suggest that people are more affected by the behavior conducted

from whom they are close to.

3.7 Experiment 2

3.7.1 Overview

In experiment 1, we found that people's rewarding behavior will not be affected by other people's likes, however, is likely to be affected by other people's reward to the content creator, especially the reward from their friends. In this experiment, we further analyzed the how other people's reward behavior affect the amount of reward. We have two major changes in this experiment:

- Based on the feedback we received from the first experiment, we add some modifications to make the experiment pages look more "real". We will discuss details in experiment material session.
- Previously, we only listed the profile photo of the donors. In this experiment, introduced a new variable based on "work of month" theory. Specifically, we are interested in how the comments along with reward from other people can affect users' rewarding behavior.
- We are also interested in the mechanism of rewarding. Specifically, how motivation associated with users' reward and how other people's behavior interplay with motivation to affect people's behavior.

Our hypothesis for experiment 2 are:

Hypothesis 1: Users' reward amount may affected by comments and friends' reward positively.

Hypothesis 2: Those impacts work on different type of motivation to change people's behavior.

In experiment 2, we examined how other people's reward behavior affect users' donation amount. Also, we analyzed the role that motivation plays in the rewarding decision making. We conducted our experiment with both undergraduate and graduate students, with a majority of our subjects from Carnegie Mellon University. As we did in experiment 1, subjects were asked to read six articles and each article was matched with a varied condition of other people's reaction to the content. After reading each article, subjects were asked to choose a certain amount of money to donate to content contributors and evaluate the quality of the contents. Also, we also ask subjects to evaluate the usefulness and enjoyment of the content, which are associated with their extrinsic and intrinsic motivation. More detailed description of our experiment methods is given in following sections. We developed a website for the experiment and all the data are collected with our computers.

3.7.2 Experiment Material and Design

3.7.2.1 Experiment Material

Articles: Feedback from experiment 1 showed that we should choose contents from actual contributors on online community rather than professional writers.

In experiment 2, we choose six articles from Quaro, a well known subjective knowledge community. All the articles are related to technology. As we did in experiment 1, we also controlled the length and quality of the articles.

3.7.2.2 Experiment Design

Design: In experiment 2, we used 2 (Friends, No Friends) * 2 (Comments, No Comments) within subject design plus a baseline, hence 5 different conditions in total.

Variables: Independent variables were other donors' identity and comments. For donors' identity, we had two conditions; "Friends" condition showed the one picture of user's friend in addition to strangers' photo in the donors' list. Feedback from experiment 1 showed that the friend should be real. So we personalized the experiment and used a photo of people that a given subject is familiar with. Also, feedback from experiment 1 showed that listing the amount of money that other people have donated to the contributor will make the experiment more authentic. So we added the amount of money reward next to the donor's photos.

For "Comments," we had two conditions; "Comments" condition showed short comments from the donor in addition to their pictures while "No comments" condition just showed the donor's pictures. (Figure 6).

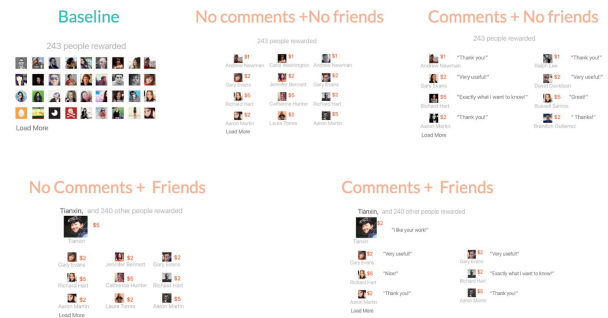


Figure 6. Experiment conditions

We also considered the amount of money reward as a variable in the pilot test and added one condition with high money reward, comments, and friends. However, our preliminary data test showed that the amount of money had no effect on people's reward amount, so we deleted this condition and averaged the data with "Friends + Comments" condition.

Randomization: All the articles and experiment conditions were randomly matched and displayed in a random order for each subject.

subject.

3.7.3 Subject

In experiment 2, we had 44 subjects in total. All of our subjects are university students and most of them are from CMU. All subject volunteered to attend the research and completed the experiment. We did not record gender and age since they are irrelevant to the experiment.

3.7.4 Experiment Procedure

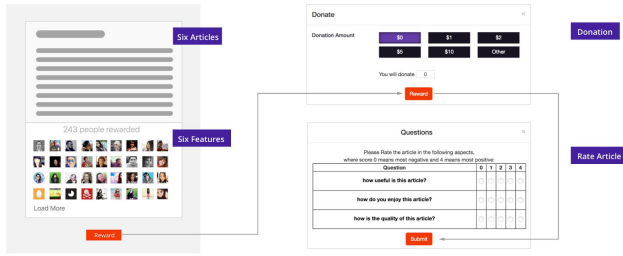


Figure 7. Experimental Procedures

The experiment took 15-20 min for each subject. The experiment was conducted by following procedure:

1. Researcher explain the experiment to the subject and open the webpage of experiment for the subject.
2. The subject read the introduction for the experiment (see appendix).
3. The subject completed all the articles (trials). After reading each article, they have to reward the author with amount of money they choose.
4. The subject evaluate the quality, enjoyment, and usefulness of the article.
5. The researcher collected the experiment data.

3.8 Experiment 2 Results

Finding 1: Effect of friends and comments on reward amount.

Repeated ANOVA shows there is no significant difference between experiment conditions. However paired T-test shows that the “Friends+Comments” condition results in significant higher reward amount compared with baseline, indicating that comments along with friends’ reward behavior will significantly contribute to user’s reward amount to the content creator, $t(43)=2.21$, $p=0.032$.

Based on our observation on the descriptive analysis, there seems to be a positive interaction between two independent variables, which means that the combination of those two features will result in greater effects on the reward amount. However, this interaction is not statistically significant.



Figure 8. Effect of friends and comments on reward amount

Finding 2: Effect of friends and comments on evaluation of content quality and motivation (usefulness and enjoyment)

We performed repeated ANOVA to find the effect of comments and friends on subjects’ evaluation of content quality, usefulness, and enjoyment. The result shows that there is no significant

difference between experiment conditions on content quality and level of enjoyment. However, we do find a marginally significant main effect of comments on the evaluation of usefulness, $F(1,43)=3.53$, $P=0.067$. Based on our observation on the descriptive analysis, variable “Friends” also positively associated with usefulness, however, the effect is not significant (Figure 9).

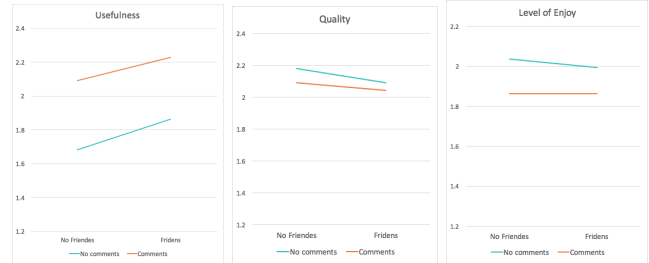


Figure 9. Effect of friends and comments on evaluation of content quality and motivation

Finding 3: Using user’s motivation to predict reward amount

To understand how people’s evaluation of content quality, enjoyment, and usefulness affect their reward behavior, we performed a linear regression:

$$\text{Reward} = -0.194 + 0.699 * \text{Enjoyment} + 0.303 * \text{Usefulness} \quad (R=0.632)$$

The model shows that content quality does not contribute to the reward amount, which is by our findings in Experiment 1. Interestingly, both enjoyment and usefulness significantly contribute to reward amount, with a slightly higher weight on enjoyment. The model reveals that both people’s intrinsic motivation and extrinsic motivation can predict their reward behavior. The result is also accordance with our interview findings.

3.9 Experiment 2 Discussion

Experiment 2 has three main findings:

1. Comments combined with friends’ reward can result in a significantly higher amount of donation.
2. Comments have marginal significant effect on people’s perception of content usefulness, which is associated with extrinsic motivation. On the other hand, observing other people’s behavior does not affect people’s perception of enjoyment and content quality.
3. Both usefulness and enjoyment correlate positively with people’s donation amount.

Those findings are by previous research on motivation, social proximity, and the word-of-mouth theory. We also find the tendency that observing friends affect people’s perception of the usefulness of content. The insignificant result may be due to the lack of subjects. Abovementioned findings can serve as a basis for our theoretical model on people’s reward behavior, with regards to knowledge community especially, and the underlying mechanism which factors in different forms of social interactions we discussed so far.

4. General Discussion and Design

4.1 Theoretical Model of the Rewarding Behavior

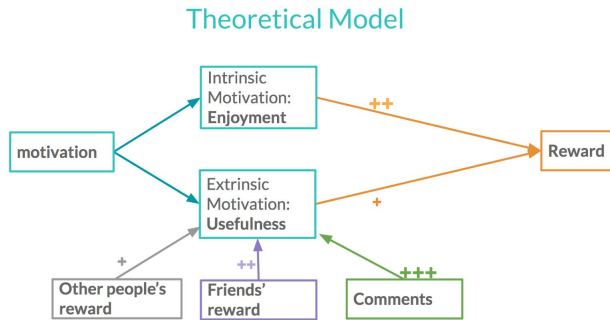


Figure. 10 Theoretical model from our research findings

This model explains how two different motivational factors work together with the influences of other people's behavior to contribute to the users' donation to the content creator on knowledge communities. We further explain the model and present related findings in the literature in the following table:

Findings in the Model	Our research	Others' research
User's reward to content creators on knowledge communities is driven by their intrinsic motivation (perception of enjoyment) and extrinsic motivation (perception of usefulness).	Interview Result Experiment 2 (finding 3: Regression Model)	Lin et al. on motivation on social networking[2]
User's intrinsic motivation, namely, perception of enjoyment, is not affected by other people's rewarding behavior.	Experiment 2 (Finding 2)	Ryan et al. on how intrinsic motivation is less affected by others[10].
User's extrinsic motivation, namely, perception of usefulness, is affected by other people's rewarding behavior. Comments contribute the most, followed by friends' reward, and then the reward from other users.	Experiment 1 (finding 1) Experiment 2 (finding 1) Experiment 2 (finding 2)	Theories on social proximity[3,4,5] and "Word-of-Mouth" Communication[5,6,7].

4.2 Design Implications

4.2.1 Feedback on Content Quality

Facilitating the communication about content quality between readers and contributors is critical to the online knowledge ecosystem. Contributors rely on the feedback to improve their contribution, while readers use feedback and donation to express their support for contributors. However, during our research, we found that contributors of online knowledge communities could not get quantitative feedback on content quality. They can only have some hints about the quality of knowledge they share from donation amount and comments for their articles. It could be helpful if online communities could add functions that allow viewers provide qualitative feedback to contributors, such as rating function.

4.2.2 Comments

Based on our research, we concluded that users' behavior would be influenced by others' comments. Users tend to make donations if they can see comments from other donors. We think this can be explained by "word-of-mouth," which means oral or written recommendation by a satisfied customer to the prospective customers of a good or service. In this scenario, other people's comments act as recommendations by donors and convince prospective donors to donate money.

Therefore, we propose that social-web-based donation functions could show comments from other donors to increase the chances people donate money. One example could be Facebook Fundraiser. In Facebook Fundraiser, users could initiate a fund raising for organizations or personal events (Figure 11). Currently, among all the features we tested in experiment, users can only see names of donors and their friends who have donated. Based on our result, adding friends' donation comments or selecting comments from non-friend donors could increase the chance of donation.

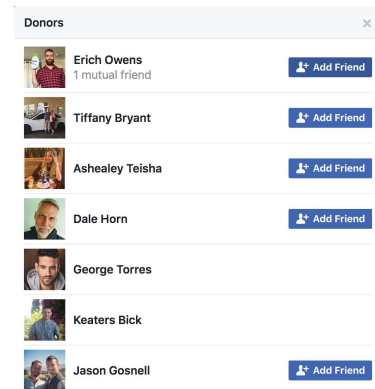


Figure 11. Use of "Word-of-Mouth"

4.2.3 Social Proximity and Trust

Our research also found that users' behaviors can be affected by other users' donation activities. When showing donation activities from their friends, users are more likely to donate money. Social proximity could be the main reason for this phenomenon.

Online knowledge communities could show more activities of users' friends to increase user engagement. For example, WeChat's donation function for articles only shows profile pictures of random donors. Showing their friends' donation information, such as how much they donated and what comment

they gave, could encourage users to make a donation.

4.2.4 Ethical Issue

While analyzing our final results, an ethical issue raised. Adopting the design features we proposed would involve manipulation of information, such as displaying selected information to change users' behaviors. We doubt if it's ethical to manipulate information. Therefore, we want to leave this decision to designers and let them make the trade-off.

4.3 Limitation and Future Direction

There are some limitations in our research. First, due to the time and resource constraint, experiment 1 was not a complete experimental design and the sample size is too small for many significance tests. Also, lack subject and time constraint our possibility to build a statistic model instead of the theoretical model. Second, we only include the variables that we are using in the theoretical model. There might be other factors works as moderator or mediator in the model. For example, how the privacy concern affect people's money reward to an unknown contributor in public? How people's socio-economic status affect their reward amount? Those factors can be considered in the future studies.

Although there are many limitations of this project, it innovatively integrated user-centered research methods such as interviews with complete experiments. It also shows how data could be used to drive design and as well as reflect the possible consequences of design. We hope to explore more in this field and make our research result valuable for both researchers and designers in the field.

5. ACKNOWLEDGMENTS

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7. APPENDICES

7.1 Interview Protocol

Interviewee Demographics:

- Contributors (Content creators)
- Users (Content readers)

Guiding questions:

Why people want to pay for knowledge that they can get online? -- Audience

What do the contributor feel about these knowledge capitalization features?

What impact do these knowledge capitalization features have on the quality of content and amount of activity in knowledge community?

Demographics :

- Education level / Fields
- Users' previous experience with knowledge communities
 - What platform are you using ? Since then?

Experience and workflow with knowledge communities

- How many times do you use Zhihu / WeChat(view public) / Quora during the past three days?
- What do you usually do with these platform?
 - Can you describe your last experience in details?
- What are you looking for at these platform? How do you find those information?
- To what extent you feel that this platform is useful? In terms of ?

Posting / Creating

- Have you ever created content on the platform?
 - What are those contents about?
 - Have you received any upvotes or reward (monetary) for your content? How do you feel about them different?
- What's your motivation for creating content? What makes you feel rewarding?
- Do you think that the "reward" feature or Zhihu Live motivated you to create more high quality content?

Rewarding:

- Have you ever upvoted, commented, or sent money to the contributors on Zhihu answers, article and WeChat article?
 - Under what condition will you do that?
 - How do you feel differently on each of the behaviors?
 - How do you like those features?
 - What makes feel bad / reluctant when you reward money to the contributor?
 - What makes feel good / comfortable when you reward money to the contributor?
- Have you ever attend a Zhihu Live?
 - Under what condition will you do that?
 - How do you like this feature?
 - What makes feel bad / reluctant when you pay for Zhihu Live?
 - What makes feel good / comfortable when you pay for Zhihu Live?

7.2 Interview Notes

<https://drive.google.com/open?id=1gUTa12sMeRi4IUC8q6GXJgf2b5l51-695oyascILYWY>

7.3 Experiment 1 Materials

Instruction

You will read 6 blogs in the following pages.

Assuming that you have 20 dollars in your account. After reading, you can choose to award the author with a small amount of money. You don't have to spend all your money on these articles. However, the total amount of money reward can not exceed 20 dollars. It is OK if you don't want to reward a article, just put "0" in the blank.

Below each article, you can see how many people have already rewarded the author, and how many likes this article has received.

After you reward the author, please answer the follow up questions on 0-5 scale.

Music Helps You Work Harder Subscribe

Music helps us get through hard, physical work. Think of the songs produced by soldiers marching or chain gangs building railroads. But does simply hearing the music account for the effect? Or is there a bigger boost when the workers themselves make the music?

To find out, scientists had subjects exercise on a fitness machine under two conditions. In one trial, the volunteers just listened to music. In the second run, the machines were rigged to start playing music only when the participant began to move. And the pace at which the subject exercised determined the speed of the music.

Measurements of the participants' oxygen intake and muscle tension showed that they actually expended less energy when they controlled the music. The participants also rated their perceived level of exertion as being lower when their actions dictated the sound. The study is in the Proceedings of the National Academy of Sciences.

So next time you're working the elliptical at the gym, perhaps make your own music. You could simply sing along to whatever's playing on the loudspeakers. Unless it's Blurred Lines. Work it. Don't twerk it.

46 people has rewarded



Reward



21460 people liked it

- How much do you want to award this article ? _____
- How much do you like this article ?
Not like it at all 1 ----- 2 ----- 3 ----- 4 ----- 5 Like it very much
- What do you think about the quality of this article ?
Very Low 1 ----- 2 ----- 3 ----- 4 ----- 5 Very High

2

Your Memory May Be Edited

Our memories are inaccurate, more than we'd like to believe. And now a study demonstrates one reason: we apparently add current experiences onto memories.

Study subjects examined the location of objects on a computer screen against a background of an underwater ocean scene. Researchers then showed the subjects a fresh screen with a different background, this time a photo of farmland. And the subjects had to place an object in the same position it was in on the original screen. And they always placed the object in the wrong position.

The researchers then presented three objects on the original ocean background. One was in the original location, another was in the location the subject just chose in the previous task and the third was in a new location. The subject was asked to pick the original location of the object in the original ocean background.

And instead of choosing the original correct location, they always picked the position they had chosen. That is, they now believed the position they'd picked on the farm scene was the original position on the ocean background. The study is in *The Journal of Neuroscience*. [Donna J. Bridge and Joel L. Voss, Hippocampal Binding of Novel Information with Dominant Memory Traces Can Support Both Memory Stability and Change]

The researchers note that recent and easily retrievable information "can overwrite what was there to begin with." Consider that next time you hear eyewitness testimony.

546 people has rewarded



Reward



25460 people liked it

- How much do you want to award this article ? _____
- How much do you like this article ?
Not like it at all 1 ----- 2 ----- 3 ----- 4 ----- 5 Like it very much
- What do you think about the quality of this article ?
Very Low 1 ----- 2 ----- 3 ----- 4 ----- 5 Very High

1

Talking to Strangers Makes You Happy

Consider the times you've hopped on a subway, boarded a plane or entered a waiting room. Chances are, you probably avoided engaging with any fellow commuters or patients. But contrary to what we might think, we'd be happier if we did strike up a conversation with a total stranger.

In a study, commuters in Chicago were asked to either talk with a stranger on a train, or sit quietly alone, or just do whatever they'd normally do on their commute. Then, they responded to a survey about how they felt.

Turns out those who engaged with strangers had the *most* pleasurable experience and those who remained solitary had the *least* enjoyable experience. These answers were compared with another group that did not participate but instead had to *predict* how they might feel in each situation. This group thought talking with strangers would be the least enjoyable, by far. The study is the journal of *Experimental Psychology*. [Nicholas Epley & Juliana Schroeder: Mistakenly Seeking Solitude]

So despite being social animals and enjoying social engagement, we avoid chatting with strangers. Why? Well, according to a follow up study it's because we think, wrongly, that strangers don't want to talk with us. The one way to get over this is to practice reaching out – who knows, commuting could become more enjoyable.

56 people has rewarded



Reward



446 people liked it

- How much do you want to award this article ? _____
- How much do you like this article ?
Not like it at all 1 ----- 2 ----- 3 ----- 4 ----- 5 Like it very much
- What do you think about the quality of this article ?
Very Low 1 ----- 2 ----- 3 ----- 4 ----- 5 Very High

4

Unhealthy Eating Leaves You in a Bad Mood

The Easter bunny's gifts of chocolate may taste sweet, but they leave your attitude sour. Because a study finds that if you're in a crummy mood to begin with, unhealthy eating can leave you feeling even worse.

Researchers had 131 women record their moods and eating habits each day for a week. The researchers wanted to limit the study to the effect of bad eating on the otherwise healthy, so although the subjects admitted to having unhealthy eating habits, no one had a diagnosed eating disorders.

An analysis of the food and mood diaries resulting from the week of the study found that if women were feeling low, anxious, sad or angry, eating too much or too little made that mood even worse. Interestingly, if the women were in a good mood, there was no change in their mood after eating too much or too little.

The researchers note that we often eat to comfort ourselves or try to remedy a bad mood—but this study shows that such eating for consolation may make us feel even worse. Something to keep in mind when you find yourself reaching for the second ear of the chocolate bunny.

Lots or Little Sleep Linked to Sick Days

Want to remember something? Sleep on it.

A recent study finds that the more we value a piece of information the more likely we'll review it during our sleep. And because we do that, we'll tend to remember it.

Participants were shown objects with different corresponding dollar amounts on a computer screen. If participants could remember that object later on a test, they were rewarded with the associated dollar amount. Objects were also accompanied by an associated sound, for instance a cat was accompanied by a "meow."

After either a 90-minute nap or wake period subjects' memory for low-value objects was worse than for high-value objects.

In a second experiment associated sounds were played either when the subjects were awake or asleep, as a way to trigger the memory of the object.

Researchers found that low-value objects were better remembered when the associated sound was played during subjects' sleep as opposed to when they were awake.

The authors believe that during sleep is when we tend to go over the day's new information, so that is why they could manipulate the memory storage of lower-value objects during sleep time rather than wake time.

Gives new meaning to the term sound asleep.

—Christie Nicholson

546 people has rewarded



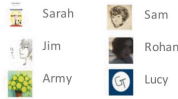
Reward

like 646 people liked it

- How much do you want to award this article ? _____
- How much do you like this article ?
Not like it at all 1 ----- 2 ----- 3 ----- 4 ----- 5 Like it very much
- What do you think about the quality of this article ?
Very Low 1 ----- 2 ----- 3 ----- 4 ----- 5 Very High

3

6 of your friends has rewarded



Reward

like 26546

- How much do you want to award this article ? _____
- How much do you like this article ?
Not like it at all 1 ----- 2 ----- 3 ----- 4 ----- 5 Like it very much
- What do you think about the quality of this article ?
Very Low 1 ----- 2 ----- 3 ----- 4 ----- 5 Very High

6

Social Status Affects Who We Choose to Believe

Sounds pretty powerful. You might believe it will actually happen.

But what if this guy were to say the same thing: *[Audio clip of ordinary guy saying the same thing]*

Hmmm. Maybe not so much. Because a study finds that the social status of a speaker makes a significant difference in how we interpret statements they make.

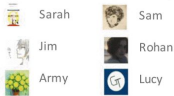
Scientists showed participants clips of political statements, that were either true or false, made by a top politician, a news anchor or just your average joe. The participants also watched another set of videos, this time of the same people making true or false statements about general world information like, "Fidel Castro is a pop singer."

The subjects were more likely to accept the false statement coming from the political figure as opposed to the other speakers (including the news anchor!) However, participants did not accept any false world knowledge statements from any of the speakers. Brain recordings of the subjects reveal that their impressions of the speaker and what he or she says, happens fast, within 150 to 450 milliseconds, which is within average reflex reaction time for humans. The study is in the journal *PLoS One*.

Of course, given enough time, even a politician's biggest supporter will accept that something he said isn't true: *[Audio clip of President Clinton saying: "I want you to listen to me, I'm going to say this again. I did not have sexual relations with that woman, Ms. Lewinsky"]*

—Christie Nicholson

6 of your friends has rewarded



Reward

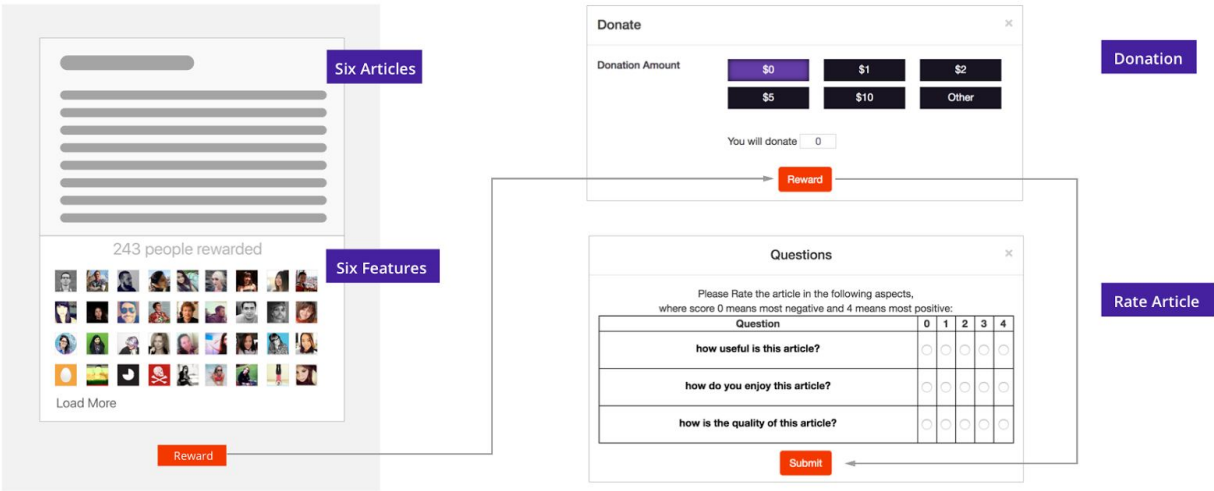
like 546

- How much do you want to award this article ? _____
- How much do you like this article ?
Not like it at all 1 ----- 2 ----- 3 ----- 4 ----- 5 Like it very much
- What do you think about the quality of this article ?
Very Low 1 ----- 2 ----- 3 ----- 4 ----- 5 Very High

5

7.4 Experiment 2 Materials

User flow of experiment 2



Link of experiment 2:
<http://chaoyali.com/other/test/index.html> (currently only works on Chrome)