

Ripening Room: Designing Social Media for Self-reflection in Self-expression

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ABSTRACT

This study proposed some considerations for designing social media to encourage self-reflection of users, referring to rationales of exemplary case, “Ripening Room”. Ripening Room provides ripening time, a delay period between the time of writing and sharing posts, and a ripening score to evaluate users’ self-reflection. To give insights for the design a preliminary exploration was conducted on university students about their perceptions and experience of self-reflection in social media. To evaluate the effect of Ripening Room’s design, an empirical study on Ripening Room was conducted. Participants mentioned that the features of Ripening Room inspired them to self-reflect upon their thoughts, emotions, and behaviors. From the findings of the empirical study, further implications were suggested.

Author Keywords

Social media; self-reflection; design for reflection

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Online communication through social media has become one of the most significant forms of expression and self-communication. Externalizing one’s attitudes, emotions, and opinions via Web media content helps users to reflect on themselves [26]. Furthermore, social media contributes to better self-reflection because of the vast social deliberation of the expressed self [12, 29]. For these reasons, social media provide a novel and effective kind of support for self-reflection among users.

On the other hand, negative effects of online communication such as regretful consequences [5, 27, 31], harassment and violence [32] seem to be caused by users’ inability to reflect

on their behaviors in online communication. These effects indicate that today’s social media designs do not adequately support users’ self-reflection. Moreover, certain characteristics of online communication – i.e., immediacy, anonymity, and convenience of use – make users unable to reflect while using social media [4]. Thus, new design strategies are needed in order to make people recognize the worth of social media in supporting self-reflection and to guide them in using social media toward such an end.

This study proposes some considerations for designing social media to encourage self-reflection among users, referring to an exemplary case called “Ripening Room” to elaborate on those recommendations. Ripening Room is an original social network micro-blogging website we designed, which offers users a few hours of “ripening time” to review their user-generated content (i.e., posts) before sharing it. The feature works a breakdown of media usage progress to give users the opportunity to reflect on their posts by themselves. Additionally, the website applies a scoring system to each post’s maturity, enabling collaborative evaluation of self-reflection among users.

The following empirical study investigated the effects of the Ripening Room’s design on users’ willingness to conduct self-reflection and on actual usage behavior. It explored whether the proposed design actually supported users’ self-reflection or not and in which ways it supported and influenced the users. In light of the findings from the empirical study and the limitations of Ripening Room, a few design implications are suggested which may help better support self-reflection among social media participants.

RELATED WORKS

Previously in the field of human-computer interaction design, there has been an abundance of debate concerning users’ reflection through system use and how to support reflection. The attempts to design for improved reflection can be classified into two categories according to type of reflection they are primarily interested in: i) reflection on collected data accumulated through system use, and ii) reflection occurring in the process of system use.

Design for reflection on collected data

Some of the accumulated data from system use reflects users themselves, e.g. their preference or patterns of behavior. This information provides an understanding of the users, insight which is not only useful for the system but valuable for the

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users themselves. In that sense, helping users to extract meaningful insight from collected data through system use – with the eventual goal of improving quality of life – is the fundamental objective of personal informatics [15]. For example, collected data showing users’ choices and consequences in system use can help users to make better decisions in the future [13].

Social media also have system structures that can accumulate data that helps to understand users. In social media, users produce content to express and share themselves [33], leaving traces while building their online social networks and visiting links throughout the networks [22]. Those piles of content and traces can be reliable references for understanding the users [33]. For example, records of users’ past experiences, which are stacked when they talk about themselves in social media, can be resources for reflecting on their past in order to achieve emotional values [10, 21] or to learn meaningful lessons from their experiences [8, 16].

However, the requirements for meaningful reflection from collected data is the accumulation of resourceful data [14]. It is important that social media encourage users to express their inner thoughts and emotions if they are to collect meaningful resources for self-reflection, because it is not always guaranteed that users’ activities will create meaningful resources.

Design for reflection in the process of experience

While using the network system, sometimes reflecting on one’s thoughts and behaviors is necessary. Such reflection is needed for gaining insight from one’s current experience [18] or for making better decisions in future stages of use [24].

Social media also demand some reflection of their users. Social media can affect users’ social images and intrude upon users’ privacy, forcing users to reflect on their online behavior and on their expressed selves [27, 31]. Users tend to think more before they take action online because they want to control further consequences of media use that may affect lives online, and also their lives in the real world; in other words, people want to avoid potential regret [27, 31]. Likewise, understanding and predicting the potential effects of one’s behavior on one’s privacy in social media is critical to protect an individual from unexpected self-exposure [28].

One strategy to support this kind of necessary reflection in system use is to increase awareness of reflection-requiring topics via the interface design [30]. For instance, more exposure of privacy controls in interface raises awareness of privacy, enhancing users’ management of privacy [2, 30].

Another strategy is to put moments of breakdown in the experience of system use [7]. Breakdown of experience shifts people’s mode of behavior from an experiential mode to an elective mode [7]. Accordingly, providing a pause in the flow of experience is a considerable strategy for promoting user reflection [1].

Overall, the review of related debates on personal informatics shows the value of social media as a tool for data accumulation, which can provide meaningful resources for

self-reflection. Meanwhile this research extends perspective on the role of social media for users’ self-reflection, characterizing social media not only as a reference for self-reflection after a set of experiences is over, but also as a coach for self-reflection during use. From this perspective, self-reflection can be merged with the activities of expressing and communicating one’s self within social media. While this perspective on social media respects the insights offered by previous attempts to evoke reflective thinking in the process of system use which were reviewed in the second half of related works, it also extends the viewpoints of those attempts, moving beyond reflective thinking as a practical value-driven process and toward the mental value-driven process of introspection and inner development.

PRELIMINARY EXPLORATION

Despite the potential of social media for self-reflection of users, there has been little insights in the design of social media to support such reflection. In view of this limitation, the present study aimed to conduct a preliminary exploration of users’ perceptions of self-reflection and their experiences of self-reflection in social media before applying any design strategies. Accordingly, a preliminary interview aimed to collect participants’ perceptions of self-reflection as well as any emotional or behavioral experiences of self-reflection in current social media. The records were interpreted so as to make design recommendations that would enable social media to better support and motivate reflective usage.

This preliminary interview involved fourteen female and nine male university undergraduate and graduate students, ages 21-28 ($M= 24.41$, $SD= 2.74$) in South Korea. These young people are “digital natives,” people who are almost constantly connected to a digital network and whose identities are strongly related to their online activities [19]. Accordingly, this age group is expected to have more familiarity in being reflective about their experience in social media on a daily basis. Therefore, observing this group of people was thought to be worthwhile for establishing our design considerations.

The interview asked about participants’ experience of self-reflection within social media use while generating posts in social media, specifically concerning the kind of content they reflected on – their thoughts, emotions, experiences, or sharing other information and content. Participants were asked to describe the reasons why self-reflection did or did not occur in their flow of social media use. Also, they were asked whether or not – and why or why not – they engaged in self-reflection through social media. Their responses were classified into several groups: causes of self-reflection, inhibitors of self-reflection, resultant experience of self-reflection, and the relationships among cause, inhibitor and experience of self-reflection. Those factors suggested certain design considerations for self-reflective social media. In the following sections, the findings are discussed with an eye toward the design considerations.

Gap between goals of self-reflection and those of social media use

The participants said that the purpose of social media is not self-reflection, but rather connecting to the online community. Although their inner thoughts and deep emotions can be expressed sometimes, it does not necessarily lead them toward conscious self-reflection.

The primary purpose of using social media relates to a desire to communicate within online communities. Therefore, though self-expression is valuable for self-reflection, it seems highly implausible that, without any lesson from the outside world, social media users see the value of self-reflection. That is to say, it is hard for users to always be aware of self-reflection in online spaces, in which the great majority of activities is simply chatting with others. Therefore, new design strategies are needed in order to increase awareness and support self-reflection among users. Only with the consideration, social media can utilize people's common desire to express and share themselves [25] to bring self-reflection to the realm of everyday life.

Negative experience from reflection in social media

Most of the participants regarded self-reflection in social media as a way to prevent possible damage to their self-image. Furthermore, such self-reflection seemed to raise hesitation and anxiety among users. The sources of this uneasiness were various. Some participants had personal experiences of being hurt because of uncontrolled privacy disclosure or from losing social respect and relationships. Other participants had learned lessons from others' negative experiences with social media, for example witnessing celebrity scandals caused by unpopular comments made on social networking sites.

As seen above, there are many potential and actual negative experiences in social media that can raise users' self-reflection, reminding them of possible damage to their self-image. Such experiences may bring about reflective thinking, yet the reflections work to constrict the use of social media rather than encourage an ongoing effort to improve one's use. Thus, such reflection cannot contribute to self-improvement.

Therefore, positive feedback for reflective thinking is necessary when designing social media to encourage self-reflection. For example, social media systems or other users from the network can compliment a user on the quality of his or her self-reflection, encouraging them to strive for even better self-reflection. Also, mediating critical communication among users should be delicately designed so that even critical feedback can work constructively in social media. An ideal system would prompt the sender to mitigate his or her insulting message, and it would help the receiver to appreciate the constructive value of critical feedback.

Barriers to self-expression in self-reflection

In general, the participants hesitated to express themselves online. They said that they worried that frank expression of thoughts and inner emotions could damage their social images. While such fear might be considered a cultural bias in self-presentation in South Korean society [6, 11], social

media can inflict actual harm regardless of particular cultural characteristics. It is the reason why revealing one's true self in social media is often considered carefully and may in fact prove dangerous.

With respect to the value of self-reflection in daily behavior, preventing potential damage to one's social image requires self-reflection. It is therefore reasonable to lead users to reflect on their own behavior, so that they can predict possible negative consequences and mitigate actual damage in social media. An ideal system would furthermore provide users with some bumpers between them and any negative effects, letting users express themselves in safety and pushing them toward further self-reflection.

A few participants reported that they created their own ways and protocols for preventing possible damage and for increasing their own self-reflection. The cases might suggest a few insightful hints for designing social media for self-reflection. One participant said that he takes one or two days to change the privacy settings of any given post from private mode (accessible only by the author) to public mode (shared through the configured social network). This gives him enough time to review and revise his thoughts. He said that during this waiting period, he can reflect on his post, considering whether his expressions are poor or too excessive, and he can revise anything that might possibly harm his reputation. Also, posting in this way does not appear on users' timelines, making it invisible without others' intentionally review on his posts. He said he can expect sincere deliberation with others who really respect and care for him. Another participant described her protocol for writing in social media about her feelings. First she writes about her feelings using a word processing software; then she checks her spelling and grammar using a free online proofreading tool; and finally she shares the text via social media. She said that following the protocol helps to prevent the embarrassment of spelling or grammar errors, and also give some time to reflect on her expression and past feelings.

One common feature of these two strategies is having a few moments of solitude to reflect on their communication privately. These strategies add in a breakpoint between the expression of self and the communication of self, relieving participants from any anxiety about damaging their self-images and granting them ample opportunity to correct their behavior. This breakpoint can be a key bumper for encouraging self-reflection in social media.

DEVELOPMENT OF SYSTEM: RIPENING ROOM

Based on the insights of the preliminary exploration, Ripening Room, a website for microblogging and social networking, was developed. Both in name and in features, Ripening Room was inspired by the metaphor of *maturity of thoughts*. The website provides users 'ripening time' before sharing their posts, with the intent of giving some private moments to reflect on their writing. The website also has a scoring system which evaluates the level of maturity reflected by other posts among users. The ripening time is a strategic breakdown [1, 7] of experience flow that separates

post-writing from post-sharing. This interruption was intended to encourage users to reflect on their behavior and to engage in self-reflection with regard to their posts.

Basic Configuration

Ripening Room can be accessed through any web browser. Its view is optimized for Internet Explorer 10 and Chrome browsers (Figure 1).

A Ripening Room user account requires an e-mail address. The website provides a friendship-request function to organize the social network, and written posts are shared within a user’s social networks. Ripening Room’s post-writing interface consists of a text field, an image uploader and an interface to control the post’s ripening time (Figure 2). The site also allows comments for each post, and it informs users about changes in their Ripening Room, friendship requests and confirmations, completion of ripening time and comments on posts.

Users’ posts are presented in inverted chronological order (i.e., the most recent post at the top). The timeline (Figure 1.e) shows one’s own and friends’ posts as well as. Users can also visit other users’ individual timelines to see only that user’s posts. In a user’s individual timeline, the user’s greeting message and the number of posts currently ripening are presented. Posts which are still ripening appear in the timeline with a message that says “it is under ripening,” and the texts and images in the posts are hidden.

Finally, Ripening Room provides account settings for user customization. A user can upload an image for his or her profile, compose the greeting message, and set the default duration of ripening time.

Ripening posts as cue for reflection

Each post written in Ripening Room should go through ripening time. Ripening time is the pause between writing a post and sharing it, a period of time during which writers can



Figure 2. Post-writing interface of Ripening Room

privately review and revise their content. The duration of ripening time can be adjusted in the post-writing interface in increments of 10 minutes, from no ripening time to 48 hours.

Ripening time, even from the name of it, is designed to raise users’ awareness of self-reflection. The expression “ripening” – which is reminiscent of the common metaphorical concept of increasing the quality of something, in this case thoughts, over time – was expected to promote awareness of self-reflection among Ripening Room users with regard to their thoughts and emotions.

Also, the process of deciding the ripening time for each post was expected to raise the question in users’ minds of how long each post requires before it is ready or adequately mature. In that process of reviewing one’s expressed self in the post, considering one’s maturity of thoughts, and deciding the appropriate ripening time, users may be stimulated toward self-reflection.

Ripening posts as breakdown of experience for reflection

Unlike today’s common social media, in Ripening Room the flow of experience from writing to sharing posts is interrupted by a breakdown moment [1]: the ripening time. This breakdown moment helps users to step back from the flow of experience and reflect on themselves. During this breakpoint, users are expected to have a moment of solitude [1] away from the online community, a chance to pursue the internal value of self-reflection rather than communicative pleasures.

Chance to revise privately to encourage self-expression

In Ripening Room, users can revise their content during ripening time by clicking on the posts to enter editing mode. After the ripening time is expired, however, it is impossible to edit or delete posts. This limitation was intended to encourage users to revise their posts more actively during ripening time. This feature was expected to support users’ self-reflection in two aspects. First, since the chance to revise would relieve any fear of exposing one’s self in the Ripening Room, the ripening feature was meant to encourage users to express their thoughts and emotions more actively. With more opportunity for externalizing internal thoughts and emotions, it was expected that there would be more chances for self-reflection. Second, users would be able to engage in

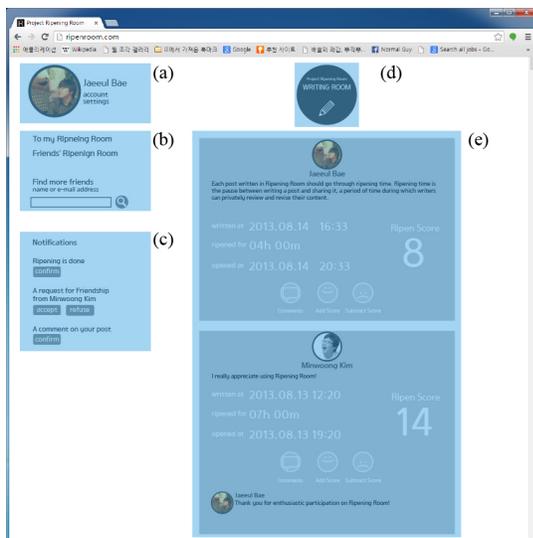


Figure 1. The Ripening Room view in internet browser: (a) user profile, (b) navigation for individual Ripening Rooms and search for user, (c) notifications (d) button to unfold post-writing interface, and (e) timeline.

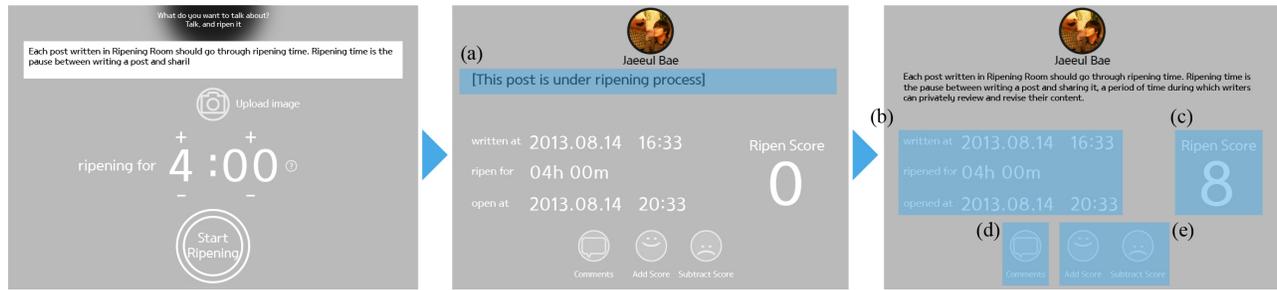


Figure 3. Process of writing and sharing a post in Ripening Room: (Left) User write a post and decide the duration of ripening time. (Center) The post goes through ripening and the contents are hidden (a) during the ripening time. (Right) After the ripening is completed, users can see the post and its ripen score (c), make comment (d) and evaluate the posts with scoring buttons (e).

self-reflection in the act of revising their posts. By recording the internal changes brought on by self-reflection, users were expected to conduct reflective thinking more explicitly and to better understand the changes they made to increase the quality of self-reflection.

Ripen score for positive experience of reflection

Ripening Room’s scoring system, the Ripen score, measures each post’s level of maturity. The Ripen score evaluates each post using Ripening Room’s scoring algorithm and user participation. Ripening Room evaluates the basic score primarily based on the duration of ripening time and the number of edits made on a post. After a post’s ripening time is done, users regard the post’s Ripen score and the writer’s level of maturity to add or subtract points from the post (Table 1). Adding and subtracting points is done anonymously so as to encourage users to use the scoring system more actively and without social pressure.

Criteria	Method
Score given by Ripening Room system	
Duration of ripening	(hour x 2) points
Number of edits	(edit count x 4) points
Score given by user evaluation (repeated add and subtract for a post by a user are possible)	
Add score	(count of add-button click x 4) points
Subtract score	(count of subtract-button click x -4) points

Table 1. The method of scoring ripen score for a post

In addition, to provide a reference for users to evaluate posts’ ripeness, each post presents certain information about the ripening process (Figure 3.b in right): when the post was written (when ripening started), the duration of ripening time, and the time when ripening is done (when the post became public in Ripening Room). Users are expected to refer to both the ripening information and the content of each post when evaluating the quality of a writer’s self-reflection.

The Ripen score was designed to motivate users to use Ripening Room with reflective attitude, rather than to provide legitimate measure of the level or quality of users’ reflective mental process. The scoring activities were

expected to motivate users to earn higher points, and an increase in score would give positive feedback, resulting in a sense of achievement in the social media context [20]. Furthermore, exchanging scores was expected to mediate critical deliberation among users and to reduce social pressure [3], thus encouraging users to collaborate on one another’s self-reflection.

EMPIRICAL STUDY ON RIPENING ROOM

To evaluate the effect of Ripening Room’s design on users’ self-reflection, and to suggest further design implications for other social media, an empirical study on Ripening Room was conducted. The study observed users’ behavior in Ripening Room and collected user evaluations concerning the design of the website.

Methods and Procedure

The study consisted of a two-week period of system followed by participant interviews. The participants were recruited from undergraduate and graduate students in their twenties. These selection criteria were chosen because communication occupies a great part of their daily lives, making them significant users of systems such as Ripening Room [22].

Users have to occupy a certain size of the social network to share their posts while using Ripening Room. However, Ripening Room could not provide any support for users to expand their social network such as by friend recommendations. Therefore, this empirical study recruited the participants in consideration of their existing social relationships. Accordingly, eleven females and five males ages 20-27 (M= 24.38, SD= 2.47) were recruited from the undergraduate and graduate schools of a university. The subjects are coded according to their gender and random order hereafter (F1, F2 ..., F11, and M1, M2 ..., M5).

At the beginning of the study, the participants were informed about the features (i.e., ripening time, post revision, and ripening score) of Ripening Room. However, in order to avoid predetermining their modes of system use and self-reflection, the intention behind the features was not explained to them. The goal was to give participants a greater chance of having meaning-making experiences through using and interpreting the given features of Ripening Room [29]. Therefore, the participants could only infer the intention of Ripening Room’s design from the names of the features. Furthermore, the exact weighted value of ripening duration, number of edits, and other users’ scoring in relation

to the total Ripen score was not explained to the participants; this way, we could observe how the participants perceived the scoring system and how this perception affected their behavior in Ripening Room.

The participants then used Ripening Room for two weeks. All of the participants started using Ripening Room on the same day. On that first day, participants visited the laboratory to provide basic personal information, receive an overview of how to use Ripening Room, and schedule a follow-up interview. Each participant looked over the other participants' profiles and Ripening Room accounts in order to make friends in Ripening Room. The participants thus made Ripening Room friendships based on pre-existing acquaintances in their school. Nonetheless, participants were allowed to invite other people to Ripening Room or expand their Ripening Room friendships beyond pre-existing relationships.

RESULTS

To apprehend the effect of Ripening Room's design on users, follow-up interviews were conducted to collect the evaluations and experiences of the participants. The participants revisited the laboratory to interview about their impressions and experiences after the two-week-long use of Ripening Room. In addition, the action logs of all participants in Ripening Room were collected and analyzed alongside the participants' explanations concerning their rationales for their behavior. The analysis of the data were qualitative, iterative process [17]. The preliminary analysis suggested the several classifications of the participants' behavioral, emotional responses and motivations aroused while using Ripening Room. Then the researchers searched for conceptual patterns of correlation among the users' responses and the characteristics of Ripening Room system, and further conducted mutual verification of the suggested models.

Effects of Ripening Room's design on awareness and motivation of self-reflection

In the first part of the interviews, the participants were asked to comment on what they described in their posts and the reasons for their activities. Then, they were asked to explain their rationale for choosing the ripening time for each post and to describe how they spent those moments of ripening time outside of Ripening Room. They were also asked to describe how they interpreted the ripen score and whether the scoring system affected their behaviors or not, and, if so, how their behaviors changed throughout their experiences in Ripening Room.

Ripening time and motivation of self-reflection

The participants reported that Ripening Room's ripening feature helped them to express thoughts and emotions which require self-reflection.

"I usually do not write sentimental things on SNS, but I could on this website (Ripening Room)." – F1

"I used it (Ripening Room) to note and collect thoughts which suddenly struck me, to further compose thoughts. I

wrote very rough thoughts anyhow, and expected that I could revise rough expressions to organize my thoughts." – M2

F4, F5, M1, M3 mentioned that they were encouraged to express their negative feelings with less pressure in Ripening Room than in other social media, since ripening time provided them the opportunity to revise their expressions and adjust the level of sentiment in their posts.

"(Though) I had some negative experiences with expressing sentiments on other SNSs, I felt relieved in this website (Ripening Room), because I can revise overly excessive expressions after just writing down my feelings as they are. And somehow writing down my feelings does help with my depressed mood..." – M3

Meanwhile, deciding the ripening duration led to participants' self-reflection. F1, F2, F10, M2, M6 mentioned that they had to reflect on the emotional content of their posts before deciding the ripening duration. Those participants especially reflected on their posts in consideration of their expected changes during ripening time; they wanted to secure enough time that they could revise according to their changes in mood. Notably, F2 and F11 mentioned that they perceived a gap between their moods during the day and their moods at night, so they wrote sentimental posts at night and chose a ripen duration that would last until the next morning or afternoon.

"When I reviewed my posts the next day, I reflected on yesterday and realized that my temper was not that serious (as my temper had been gone). It helped me to reflect on myself, my emotion" – F11

In two weeks of Ripening Room use, the 16 users generated 167 posts, including texts and pictures. Accordingly, each participant made an average of 10.44 posts during the two weeks (SD= 5.93), or 0.75 posts a day. F1 wrote the most posts (19), and F10 wrote the least number of posts (1) over the two-week period. However, F1 and F10 both mentioned that they wrote in Ripening Room when they had "some thoughts or emotions which demanded further thinking on them." F10 explained that she wrote just one post because she "was struck with temper only once during the two weeks" and because she "usually [does] not enjoy writing on social media." However, she also said, "I wanted to confess my sentiment, and had motivation to describe the feelings finally through ripening time and revision chances." In addition, F10 left revision logs on the posts, assuring that F10's behaviors and motivations were not led by the researcher's intentions. The records of participants' use of Ripening Room shows that, even for users who are not enthusiastic about using social media the website can facilitate a higher quality of self-reflection with explicit self-reviews and revisions on expressed self.

The effect of ripen score

For the majority of the participants, the Ripen score did not appear to motivate them to self-reflection. Most participants could understand that longer ripening duration and more edits raised their posts' Ripen score; however, they did not

mention its motivational effect while talking about their Ripening Room experiences. Because participants lacked a notion of the exact weights given to the evaluation criteria, the scores meant little to them. They also tended to disagree with the idea of numerically measuring the maturity level of posts, which they found to be a somewhat inconsiderate way of discussing internal maturity and quality of self-reflection.

“I don’t think higher ripen score indicates the writer’s better self-reflection. The value and quality of self-reflection cannot be measured.” – F2

Some participants, however, agreed that the Ripen score can work to encourage and give positive feedback for reflective thinking in Ripening Room. M4 mentioned that the Ripen score can reflect whether one’s self-reflection achieved a sufficient level, and F1 and F5 answered that an increase in the Ripen score gave them a sense of accomplishment, as they considered it a compliment from other users on their level of self-reflection.

Finally, a few participants suggested that being able to visualize the Ripen score would support a more meaningful interpretation of the score. For example, F5 said that it was difficult to recognize changes over time. She said if others’ feedback is shown explicitly, and that it would be more motivational to visualize the change in Ripen score over time. Likewise, F7 suggested using a graphical representation of the Ripen scores to augment users’ emotional inspiration for self-reflection.

“Changes of ripen score made by people will be more inspirational for me rather than a basic score given by the system. If the scores decrease at times, I could notice that I’m not self-reflecting well from others’ point of view.” – F5

“I would have something emotional to inspire self-reflection through Ripening Room. Maybe maturity of a post can be represented as cooking progress of fermented food” – F7

Effects of the self-reflective features on self-reflective use of the Ripening Room

In the second half of the interviews, the participants reviewed their actions logs in the Ripening Room with the researcher. The actions logs in the Ripening Room collected the time the written, contents, duration of ripening, and revision history of every post. It also recorded how many time the participants added or subtracted the ripen scores on posts, and the participants explained why they added to or subtracted from ripen scores. Their actions and rationales were expected to show whether the Ripening Room’s designs are substantially effective at supporting the users’ self-reflection during social media use. In addition, the participants were asked to explain why their behaviors did not match their preliminary motivations in the Ripening Room design, revealing the limitations of the Ripening Room’s current design.

Reflection within ripening time

Firstly, the differences between the original content and the changes to revised posts were analyzed based on the histories of the posts’ revisions during the ripening time. In addition,

the participants were asked about their experiences of and rationales behind their revising activities.

Users F1, F3, F5, F9, F10, and M1 were shown to use the revising function significantly in their revision histories. They revised their posts a total of thirteen times. The purposes of revisions were classified into three types according to the difference made by the revision and the participant’s intention for the revision (Table 2).

Purpose of Revision	Number of Cases	Users	Explanations
Adding details	3	F5, F9	Adding explanations about their thoughts or their experiences
Recording reflection	4	F5	Adding descriptions of reflections
Censorship	6	F1, F3, F9, F10, M1	Deleting or altering the contents of the posts

Table 2. Classification, number, and users of revised posts

The first type of revision is adding more details to the original post. For example, F5 initially posted a self-criticism on her obsession with smart phone or online connections: *“...I’ve tried to get away from smart phones and computers, and focused on reading books. But in 10 minutes, my hand got impatient to touch my phone! It was 40 minutes of endless pain.”* She later added some details, as follows: *“... It was 40 minutes of endless pain. I found myself ridiculous, planning what to do after those 40 minutes during [the] 40 minutes with [my] whole mind, doing nothing. At last, I helplessly clicked on whole bookmarks, and now [I’m] writing this post...”* F5 said that she reviewed her posts during the ripening time and felt the impulse to add some more details to them.

The second type of revision is adding reflections to thoughts and emotions, which F5 made in four cases. F5 used her posts to present her thought process by mentioning her own reflections. For example, she complained about the operation and management of the school dormitory: *“So hard moving into my dorm room. What a senseless admin! Do they even think of students with a lot of stuff, without any vehicle, [having] to move far during this weekend?”* Afterward, she added to her reflection: *“My reflection: well... I should have considered and [understood that] the admins are also helpless. I’m sorry for complaining thoughtlessly.”* She mentioned that the revisions helped her to be aware of the growth of her thoughts. Moreover, sharing those scenes of inner growth satisfied her, because the communications through Ripening Room seemed meaningful, which, in turn, motivated her to be reflective, as well.

The rest of the revisions made on the posts censor inappropriate utterances. In those cases, the participants eliminated details of the sources of their sentiment or complaints, e.g., blurring the details of an annoying person, mitigating excessive sentiments, or replacing the original content with different content. For such cases, the participants mentioned that their extreme sentiments abated

over time, which motivated them to censor inappropriate expressions.

“During ripening time, my anger became relieved. Then I became reasonable, and didn’t want to show my temper to others.” – F1

Those three types of revisions show that the participants reflected on their thoughts and changed their behavior in the Ripening Room while they had the opportunity to revisit their posts. However, the number of cases of significant revisions is too small for the total posts collected during the two weeks (13 posts out of a total 167 posts, 7.78%). Such an infrequent occurrence seems due to the users’ lack of awareness of the progress of the ripening time of their posts. In fact, many participants mentioned that they missed most of their chances to revisit the Ripening Room and revise their posts even though they tried to set reasonable ripening times for their posts.

“Many times, I just wrote down pieces of thoughts and wanted to revise them the next day. But I always missed visiting Ripening Room again in time. It made me embarrassed, sharing unmade, impulsive thoughts.” – M1

Communication with the ripen score

The participants clicked a total of 600 times to add to someone’s ripen score and 77 times to subtract from someone’s ripen score. From the gap between those numbers, it can be assumed that the participants were more familiar and comfortable with expressing their “likes” than delivering any critical messages in social media. Actually, the majority of the participants said that they wanted to express their favorable attitudes toward others’ ripened posts rather than critical attitudes, because they didn’t dare to risk harming their social face (i.e., self-image and reputation) [3] to evaluate others’ feelings and thoughts. Accordingly, the expressions of disagreement among users, which is significant for learning in social media [9], seem suppressed by the pressure of relationship in the Ripening Room.

However, the 77 subtractions show that some of the participants tried to utilize the ripen score to deliver critical messages to other users. A total of eight participants subtracted from the ripen score of any post, and five of them (F1, F3, F4, M1, and M2) mentioned that they had the clear intention of delivering critical insights to others with their subtractions. These eight participants were asked to explain their reasoning from two perspectives: firstly, whether they agreed with the decision of ripening time in consideration of the quality of a post and, secondly, whether they agreed with the thoughts and opinions expressed in a post.

“When I saw others’ posts, sometimes I felt that the post is reflecting better profundity of thoughts. Then I gave some ripen scores. However, when I saw a meaningless journal in the Ripening Room, and it had been ripening for 10 hours, the writer seemed mindless. Then I took some points out of the current score” – F1

“I saw my friend [F5] had written words like ‘busy rather than annoy’ and knew that she had some troubles with her

boss. Though I understand her feelings because I know her situation, I thought a positive attitude would help her better than a sarcastic attitude. And I wanted to send a message to change her attitude toward the situation.” – F4

At this point, F4 mentioned that the anonymized quality of ripen score communication helped her to use the ripen score to deliver critical feedback. The mental supports that the Ripening Room gives to users to express their critical attitudes toward others suggest some hints for the design of a medium of critical communication among people. She also said that the anonymized circumstance of the ripen score exchange helped her to use the ripen score in a critical way.

“When I clicked the subtract button repeatedly to make notable change in a ripen score, anonymity helped me act in that way. If it is not anonymized, subtracting a score, even it is repeated, might be considered a personal attack.” – F4

So far, the effects of the Ripening Room’s design on the participants’ motivations for self-reflection and their behavior in the Ripening Room were analyzed. In the evaluation of the Ripening Room, the participants answered that they were inspired to reflect upon their thoughts, emotions, and behaviors while using the Ripening Room. However, only a few cases show the participants’ self-reflection. This result shows the limitations of the Ripening Room’s design. Yet there were also some insightful cases of actual Ripening Room use and suggestions for additional design considerations that indicate how to develop the Ripening Room’s features for better support of self-reflection. From the findings and limitations, this research suggests further social media designs to support self-reflection.

DESIGN IMPLICATIONS

Visualizing the progress of reflection

The results of the empirical study indicate the necessity that support users be aware of the ripening progress of their posts so that they can reflect continuously. If the system continuously informed users of the ripening progress of their posts while the participants were not accessing the Ripening Room, then the participants could reflect more on their posts and take actions to record their change in thoughts and emotions to have better self-reflection. For example, the Ripening Room could have helped its users to pay attention to their posts under the ripening progress with mobile messages, e-mail, or push from a mobile phone application for delivering information about ripening progress.

In addition, an explicit visualization of the ripening progress of posts can help users to self-reflect better by reflecting their internal changes on the changes of their own posts. For further design, some visual images can be applied to present the degree of the posts’ maturity (e.g., cooking progress), and thus users could compare their internal state with the visual presentation of their posts for better inspiration for self-reflection.

Revisiting past records of reflection

In a few cases, the participant F5 used Ripening Room’s revision function to record her changes in thoughts through

self-reflection. Although only a few data were collected, the cases show that social media for self-reflection can also collect meaningful data from users' reflective use of media. Such records can be an insightful resource for further self-reflection to understand internal changes.

Users will naturally accumulate the records of their self-reflection through social media use if they have appropriate consideration for self-reflection. The Ripening Room somehow elicited this behavior from participant F5. The resources describing their history of self-reflection will be another meaningful reference for understanding the self and for self-improvement. Thus, the system can encourage a user to revisit such past records of reflection privately in order to understand the self.

Mitigating the pressure of critical communication

One advantageous, distinguished characteristic of self-reflection through social media is social feedback from other users, which can be a meaningful resource and can evoke self-reflection. However, social pressure from online and real-world relationships discourages people from expressing their opinions of others' feelings and thoughts. Therefore, social deliberation upon individuals' feelings and thoughts are inhibited in current social media.

Yet the way some participants used the ripen score system, especially the subtracting score feature to deliver critical messages provides hints for overcoming social pressure and encouraging critical communication. In the empirical research, a few participants used the subtract ripen score feature to mediate critical messages toward other users' thoughts and behavior in the Ripening Room, and they tried to mediate their critical attitude toward others' use of the Ripening Room by subtracting ripen scores. The cases indicate that the Ripening Room users demanded a feature to mediate their criticism indirectly

The indirect mediation of criticism can take various forms. For example, more criticisms on a post can extend the duration of the ripening time and give the poster more time to consider the maturity of contents. In this approach, the users express their critical attitudes indirectly, while receivers can also mitigate their embarrassment, which might have been more intense under direct attack or disagreement.

LIMITATIONS AND DISCUSSION

As this research deals with expression of thoughts and emotions, cultural differences may affect communication. There are differences in the purposes, behavior, and content of social media use that may be affected by cultural factors [11]. In this research, both the preliminary study on self-reflection in social media and the empirical study of the Ripening Room were conducted with university students in South Korea. These students have been raised in a culture where humility and self-moderation have been considered important virtues. Thus, there might be some differences if similar studies were done with students from cultures where self-expression and self-confidence are considered more important.

Also, the participants' communications about themselves took place in a much smaller social network than in media

such as Facebook or Twitter. Therefore, it is possible that a smaller audience affected the participants' behavior in the Ripening Room. Anyhow, the bigger social networks exert greater social pressure on users. It is possible that great social pressure may inhibit users' expressions of inner thoughts and emotions regardless of the design of the social media to enhance self-reflection.

This limitation lead us to a doubt whether it is possible to sufficiently encourage users to be self-reflective in social media use on a daily basis. Current popular social media are designed to 'connect people' and somehow provide purposeless connectedness and the hedonic pleasures of gossip, not to support the pursuit of the mental value of self-reflection. Will users' desire to use social media on a daily basis be sustained when design considerations for self-reflection are applied? These doubts raise necessity of further investigation on users' reflection in the Ripening Room with improved features to support users' social networking.

The concept of a ripening time which was suggested in the development of the Ripening Room is very unlike the common designs of communication systems nowadays. It suggests that the Ripening Room doesn't meet people's common expectations of social media. However, as the awareness of importance of the mental aspects of life quality is raised in modern lifestyles, there may be more demands for pioneering explorations of alternative design solutions for reflection instead of for connectedness and speed [23]. Thus is worthy of research attention that explores alternative designs for a better quality of life.

CONCLUSION AND FUTURE WORK

This research proposed a design of social media for self-reflection, to promote expression of one's emotions and thoughts in social media and to support reflection on self with expressed self in social media. The features of Ripening Room, ripening time and ripen score, seemed to encourage users to self-reflect throughout their use of social media, according to the users' self-reports on their own motivation of the Ripening Room use. However, with a few remarkable exceptions, the behavior in the Ripening Room showed that its current design isn't sufficient to support users' self-reflection. In consideration of the limitations and of users' suggestions for design improvements, designs that better support self-reflection in social media could be implemented.

Self-reflection is an important source of individual's self-improvement. However, betterment of the inner self is neither observable nor achievable in a short period of practice. Therefore, the two week-long empirical study conducted on the users of Ripening Room didn't last long enough to observe users' internal changes, which might have been the strongest evidence of the worth of Ripening Room's design. In future work, there are two worthwhile improvements that can be made in this model. One is to improve Ripening Room's design to better support self-reflection. The other is to conduct long-term observation to gauge changes in users' behavior. Finally, self-improvement may be achieved through Ripening Room use.

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