

The Effect of Feedback Style and Individual Difference on the Computer-Based Task

Jiyeun Lee, Minkyoungh Shin, and Kwanghee Han

Cognitive Engineering Lab, Yonsei University, Seoul, Korea
{Amethystljy, gold7439}@gmail.com, khan@yonsei.ac.kr

Abstract. Although objectively same, feedback can be processed differently because of individual difference. The purpose of this study was to investigate how demographic factor (gender) and other individual difference (regulatory focus) influence afterward performances in computer-based situation. In the experiment, participants performed two phases of task with computer. Each task phase included two task types: cognitive task and creative task. After the first task phase, participants received feedback about their performance. Feedback was presented in two valence conditions: positive and negative. After the feedback, participants performed the second task phase. The participants' performance was measured by difference between the first and the second phase. As a result, the main effects of feedback valence were non-significant on both task types. However, in creative task, there was an interaction between valence and regulatory focus. Participants having prevention focus performed well after receiving negative feedback. On the other hand, people having promotion focus showed better performance after the positive feedback. Also, the interaction between valence of feedback and gender was marginally significant in creative task. Although, males' performances were almost same regardless of the feedback valence, females showed better performance after receiving negative feedback. No interaction effects were significant in cognitive task. This study was valuable in that we could reveal how individual differences and valence of feedback affect the performance of creative task on computers.

Keywords: feedback, valence, gender, regulatory focus.

1 Introduction

People often get a feedback such as a test result, a quiz result and GPA after their performance. These kinds of feedback are important not only as an outcome itself, but also as an objective assessment of current state. It also can be a trigger-point to lead a change in afterward performance. For these reasons, psychological, educational and industrial researchers continuously have paid attention to the feedback and its aftereffect.

Reviewing the literature about feedback studies, there were lots of studies about relationship between feedback style and performance. For instance, the absolute and relative feedback styles can make different effect on performer. Relative feedback has

more strong impact on performers' subsequent behavior because people have a tendency to compare themselves with others and they are familiar with this comparison (Klein, 1997) [1]. Some researchers insist that valence of feedback is quite important. In other words, positive feedback and negative feedback have different effect on performer. Brett & Atwater (2001) showed that positive feedback is more easily accepted and regarded as desirable thing by performer than negative feedback [2]. Negative feedback, on the other hand, can decrease the intrinsic motivation and be regarded as an inaccurate result by feedback receiver (Anseel & Lievens, 2006) [3]. Sometimes, however, negative feedback can improve the following performance by informing the gap between one's current performance and the goal (Carver & Scheier, 1998) [4].

In this context, we tested the feedback effect in computer using situation. Recently the prevalence of personal computer makes an online education and training more accessible. Also, feedback which comes from computer is generated frequently. But the scientific researches about computer-based feedback effect have been done little. In this article, we conducted experiment to investigate how feedback generated by computer influences the way people react.

In addition, we regarded that same information can be processed and remembered in different ways according to individual difference (Kelley & McLaughlin, 2012; Santesso et al., 2011) [5~6]. So, this study additionally investigates how individual differences influence performer's reaction when the feedback was presented. We focused on the two individual difference factors. One is gender. Male and female have different information processing style when facing emotional event (Hamann & Canli, 2004), so it makes sense that positive and negative feedback can be processed differently according to gender [7].

The other is regulatory focus. Regulatory focus is the cognitive style which refers to one's point of view toward positive and negative outcome. People who tend to promotion focus endeavor to achieve an ideal goal. So they are sensitive to presence or absence of positive outcomes. On the other hand, people who tend to have prevention focus want to avoid failure, so they are sensitive to presence or absence of negative outcomes (Higgins, 1998) [8]. So we thought that positive and negative feedback can be moderated by regulatory focus (promotion focus or prevention focus).

2 Experiment

2.1 Participants

78 undergraduate students in Yonsei University participated (mean age = 21.15 years; 42 males, 36 females). They took part in this experiment for their course credit. They didn't know the purpose and hypothesis of the experiment because we used deception to prevent demand characteristics. They knew the purpose of experiment is to find an average cognitive level of undergraduate student. They were randomly assigned to the positive feedback condition ($n = 38$) or the negative feedback condition ($n = 41$).

2.2 Stimuli and Procedure

The experiment was between-subject design. The external factor of this experiment was valence of feedback: positive and negative. After a first task phase, positive feedback condition was received high-score to their performance and negative feedback condition was received low-score to their performance. The inner factors factors were individual difference which is represented with gender and regulatory focus. The dependent variable was participants' performance of task.

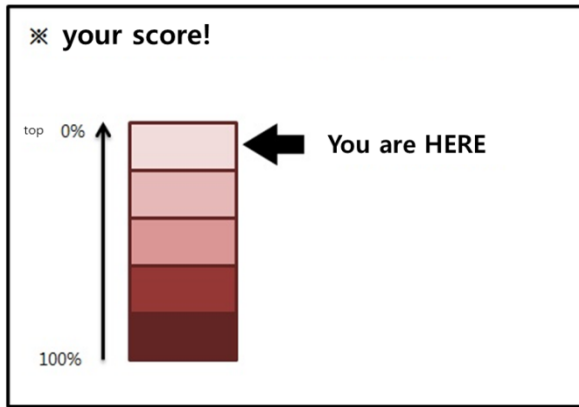


Fig. 1. The screen which positive feedback condition was received

In the experiment, participants answered some questionnaire and performed two task phases with online survey tool. First, they filled in the demographic information about their age and gender. Next, they completed a set of questionnaire measuring the level of regulatory focus (Elliot & Thrash, 2010) [9]. After that, participants met the two task phases. Each task phase consisted of two types of tasks: cognitive task and creative task. The reason we presented two different types of tasks was that the some kind of feedback can be more appropriate depending on task type [10].

After performing the first task phase (pre-feedback task phase), participants were given feedback on the computer screen. Positive and negative feedback were presented according to their predetermined condition. After feedback was presented, the second phase (post-feedback task phase) started. It was designed to have similar level of difficulty with the first task phase. The influence of feedback on participants was measured by calculating differences between pre-feedback and post-feedback task performance.

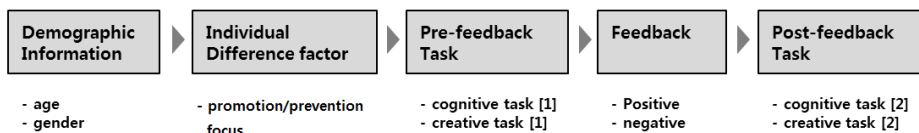


Fig. 2. Experiment procedure

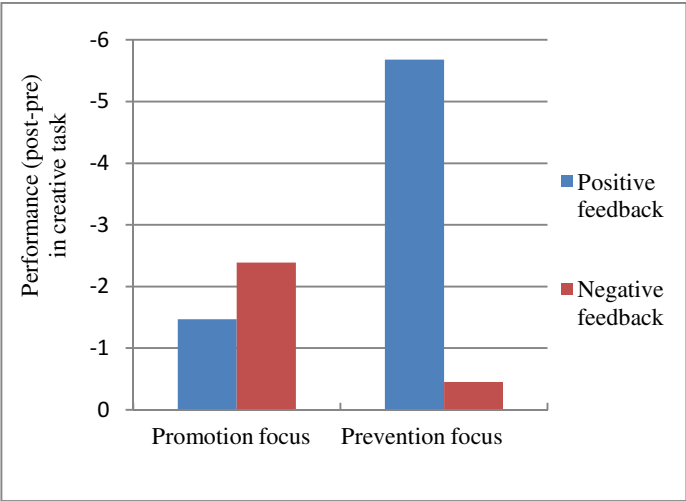
2.3 Result

The effect of independent variables on participants’ performance was analyzed by using SPSS. First of all, the main effect of external factor represented by feedback valence was confirmed. Then, individual differences which could influence the way of reaction were considered. Due to the limitation of online circumstance, we were not able to keep time people spent same. Especially, the time difference between pre and post-feedback tasks needed to be controlled. Therefore, we put the time difference as a covariate.

The Effect of Feedback Valence. To measure the difference between two feedback groups, we tried to find out the effect of the types of feedback valence (positive, negative). The influence of feedback on performance was measured by subtracting post-feedback score from pre-feedback score. As a result, the main effects of feedback valence on both creative, and cognitive tasks were not significant, $F(1, 75) = 2.93, p = .91$; $F(1, 75) = .51, p = .48$. In other words, feedback valence did not affect the performance.

The Interaction Effects between Individual Differences and Feedback Valence. Although the effect caused by feedback valence was insignificant, it is hard to say that these two variables didn’t have any influence on participants’ performance. There could be other factors which influenced the way people reacted to the feedback, especially individual differences. The individual differences we focused were gender and regulatory focus. As a result, the interaction between individual difference and feedback valence was significant only in creative task condition.

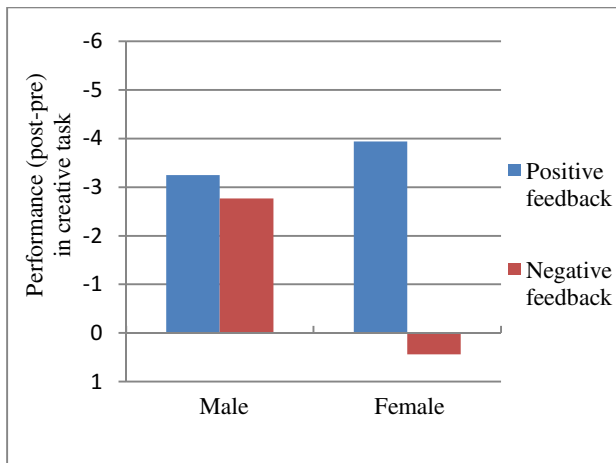
Table 1. Interaction effect between regulatory focus and feedback valence



In creative task, there was an interaction between valence and regulatory focus, $F(1, 69) = 7.28, p < .05$. Participants having prevention focus performed well after receiving negative feedback ($M = -.45, SD = 6.49$) than positive feedback ($M = -5.68, SD = 4.44$), whereas people having promotion focus showed better performance after the positive feedback ($M = -1.47, SD = 5.33$) than negative feedback ($M = -2.39, SD = 4.20$).

In addition, the interaction between valence of feedback and gender in creative task was marginally significant, $F(1, 69) = 3.19, p = .078$. Although, males' performances were almost same regardless of the type of feedback valence, females showed better performance after receiving negative feedback ($M = .44, SD = 6.63$) than positive one ($M = -3.94, SD = 5.84$).

Table 2. Interaction effect between gender and feedback valence (marginally significant)



3 Discussion

This study reveals that valence of feedback cannot determine people's performance by itself in computer based situation. The more important variables which can change the effect feedback valence are individual differences. In this study, the effect of feedback valence on people's creative task performance differs because of the individual's innate differences like gender and regulatory focus. Specifically, men's performance did not differ by the type of feedback valence. However, women showed better score when they received negative feedback. There was also a significant interaction between regulatory focus and feedback valence. Participants with prevention focus performed well after receiving negative feedback, whereas people having promotion focus showed increased performance after the positive feedback. From these results, we can ascertain that people need appropriate feedback depending on their individual characteristics.

This study is distinct from former feedback studies in that the presented feedback was objective. There was no supervisor, so feedback didn't contain any emotional factor like face expression and voice tone. It means that how much people concentrate on task was totally dependent on each individual's ability. However, it is difficult to keep focusing on the given tasks. Therefore, it is more important to know individual differences when people learn through their computers, so that we can help people to keep optimal level of motivation.

Although this study is valuable when it comes to considering learning environment, still there are several problems. First, the creative task we provided was a word generation task which needs linguistic ability. Therefore, there is a possibility that only people who already knew a lot of words could get high scores. In the future study, it is necessary to verify whether the result is same even if the creative task does not contain linguistic ability. Second, people showed worse performance in post-feedback phase although it contained the same type of tasks with pre-feedback phase. The decline of performance can be explained by difficulty of concentrating. However, we did not check the concentration level in this study. Therefore, difference of concentration level should be considered to understand the reason in detail.

Nowadays, it is common to listen to online lectures. People also take examinations through computers. Therefore, understanding people's individual characteristics is getting significant to assist people when they study alone in the computer based situations.

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