**Development of a Stressor Evaluation System with Image Conversation**

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**Abstract:** In this report, development of a stressor evaluation system with image conversation comparing our formerly developed system with onomatopoeia was described. It is thought that stress reduction is possible by grasping eustressors and by doing aggressive coping. By such a principle, we have already developed the system which grasped these eustressors. And it was revealed that continuation of the use of the system was important to take the coping action. By the way, "image conversation" is a communication style of the mobile phone using images such as "emoji (emoticon)" or "LINE's stamps". Before we assumed the character (onomatopoeia) input with the mobile phone in consideration of convenience, but, by the spread of so-called smartphones, we hypothesized that the communication using images was simpler and easier. The results showed this image conversation system was much better than the onomatopoeia system from the questionnaires of 17 volunteers (21.82±1.38Y of 15 male and 2 female) in 7 days trial.

**Keywords:** Stress, Stressor, Evaluation System, Onomatopoeia, Image Conversation

1. Introduction

According to the Hans Selye's stress theory, so-called bad stress is distress and so-called well stress is eustress. Distressors make distress and eustressors make eustress. And one of the compensational methods for distress is absolute decompression of it and the other is to get relative registration power for it. That is the eustress. Thus, eustressors evaluation is very important. But, the studies of eustress about what is eustressor and how it works are very poor.

That is, it is thought that stress reduction is possible by grasping eustressors and by doing aggressive coping. By such a principle, we have already developed the system which grasped these eustressors. And it was revealed that continuation of the use of the system was important to take the coping action.

By the way, "image conversation" is a communication style of the mobile phone using images such as "emoji (emoticon)" or "LINE's stamps". Before we assumed the character (onomatopoeia) input with the mobile phone in consideration of convenience, but, by the spread of so-called smartphones, we hypothesized that the communication using images was simpler and easier.

Therefore, in this report, further development of a stressor evaluation system with image conversation comparing our formerly developed system with onomatopoeia was described.

2. System

2.1 System overview

Fig. 1 shows this system's overview. This system is used by an end-user him/herself, remembering what he/she did today. He or she chooses an image of his/her emotionality with other additive information.

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**Fig.1 Stressor Evaluation System**

- **Web application**
  - Enter ID and Password (Confidential)
  - Login
  - System Top
  - Decision of stressor (Eustressor or Distressor) by Image Conversation
  - Anytime, Anywhere Available (Availability)
  - Input
  - Output
  - Past Data
  - Minimum Input Items (Concreteness, Usability)
  - Manage in Database (Conservation)
And the user can get a feedback image of eustress or distress state, respectively (Fig. 2).

The feedback information is also an image according the date, the behaviors, and better mood behaviors’ causes, that is, eustressors.

By this feedback the end-user will be able to evaluate the stress state easily.

The system user (system administrator) evaluates a lot of end-users’ stress state.

2.2 Specification and Design of the System

This system was developed on a server system with Linux • Apache • MySQL • PHP (so-called LAMP system).

The system functions were log-in interface, TOP interface, behavior selection interface, questionnaire interface, results viewer, history viewer, eustressor evaluation interface, and so on.

Stressor input interfaces were consisted of the function with feedback images according to the input images (Fig.3). That is, when input image was distress images of low control ability, feedback images were chosen as emotional-focused coping one. When input image was distress images of high control ability, feedback images were chosen as problem-solved coping one. The images of "へとへと"","くたくた" were recognized as physical distress and the images of "いらいら","びくびく","とぼとぼ" were recognized as psychological distress.

3. Materials and Methods

3.1 Subjects and experiment

The subjects were 17 healthy students (15 male and 2 female, average ages 21.82±1.38Y). They were asked to answer the memories of the today’s activity with stressors for 7days.

Remind mails to use the system were sent to them every night at 10PM.

3.2 Questionnaires

Following Table 1 shows the 5 classified 19 items questionnaires of this system, such as system utilization, images, and stress coping.

4. Results

The questionnaires results of evaluation were shown in Fig. 4. The average point of all items was 3.67/5.0 over than the goal point 3.0/5.0. All the item of system utilization and images were over than the goal point, but two items of stress coping were under than the goal, that is, "become possible to alive according to the stress information", "become possible to decompress distress by using this system ".

5. Discussion

As a result of having performed an evaluation of the usefulness of the image in the stressor evaluation system for stress reduction using the image conversation and an overall evaluation in this study, a high evaluation was obtained.

However, it is thought that the distress in the last output page needs improvements to show a more appropriate coping technique, which is not simple result outputs of avoiding distress but each different coping according to the distributed distress.

In addition, the system would be able to realize distress reduction by carrying out a long-term experiment more than seven days.

NO COI declaration.

Ethical committee permission No. is NUT H28-2.

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3. Materials and Methods

The subjects were 17 healthy students (15 male and 2 female, average ages 21.82±1.38Y). They were asked to answer the memories of the today's activity with stressors for 7 days.

The system user (system administrator) evaluates a lot of eustressors. By this feedback the end-user will be able to evaluate the usefulness of the image in the stressor evaluation system for distress by using this system. Using the system for several weeks, a reduction by carrying out a long-term experiment more than 2 weeks can be expected.

Table 1 shows the 5 classified 19 items stressful images and the questionnaire results of 17 students. The average point of all items was 3.67/5.0 over than the goal point, but two items of stress coping were point 3.0/5.0. All the item of system utilization and images were over than the goal point. The evaluation of the system utilization and images was very high.

The feedback information is also an image according to the stress information. By the system, we became possible to decompress stress information, become possible to decompress the stress information, and improve the stress by using this system.

The questionnaires results of evaluation were shown in Fig. 3. The two type distress images according to control ability. When input image was distress images of high control ability, feedback images were chosen as emotional-focused coping one. When input image was distress images of low control ability, feedback images were chosen as problem-solving coping one. The images of "びくびく", "くたくた", "とぼとぼ", "へとへと", "いらいら", "くたくたく", "へとへと", "とぼとぼ" were recognized as psychological distress. "くたくたく", "へとへと", "とぼとぼ" were recognized as psychological distress. "くたくたく", "へとへと", "とぼとぼ" were recognized as psychological distress.

Reference

3. 竹原 卓真, 栗林 克充: エモティコンによる感情表現, 日本認知心理学会発表論文集 2007,123-123.
4. 青山 慎, 山岸 隆, 三宅 仁: ストレス評価システムにおけるオノマトペの有用性, 12P1-3-13-G 第54回日本生体医学会大会講演論文集 P393-395, 2015

Fig. 3 Two type distress images according to control ability

Fig. 4 Evaluation results of the system