Suggestion for a Dependency Diagnosis Support System Focused on a Change in Expression

(表情変化に着目した依存診断支援システムの提案)

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Abstract We attempted to find common expression changes for people with addictive tendencies when they come into contact with addictive substances. We discovered a specific index from a person's change in expression in line with the addictive tendencies and suggest a technique to calculate the degree of addiction. This paper investigates the relationship between facial expressions and dependency. In earlier studies, we found a tendency among addicted subjects to experience changes in desire when coming into contact with something associated with the addictive object. At the same time, their expressions changed as their desired changed. Therefore, we applied a dependency diagnosis support method to these changes in expression. As a result, dependency was able to be detected with an accuracy of more than 75% using the suggested experimental evaluation method. It was shown that the proposed method was effective at diagnosing dependency.

Key words: Expression change, Desire change, Dependency, Game addiction, Internet addiction

1. Introduction

In recent years, the number of cases of dependency on e-mail and online games that have developed as a result of the spread of the Internet and of stress within a diversified society have increased. It is a necessary development of the system by which we can self-evaluate our tendency towards addiction, because it often happens that we cause a retardation in our social life when we develop dependency. It is suggested that various addiction objects are born of each person's domestic environment. People tend to neglect their social life when they develop these dependencies. We think it necessary to develop a system whereby each person can investigate by themselves any tendency towards addiction in such a situation. Research has been undertaken to judge emotion from expressions and to develop a checksheet for the diagnosis of online Internet addiction. However, no research has found that human expressions are connected with dependency. Therefore we thought that a common change in human expression will occur when a person with a tendency towards addiction makes contact with the addiction object. This paper suggests a

technique to calculate the degree of addiction. Furthermore, we discover a specific index of addiction from the change in human expression.

2. Background

2.1 Addiction

Addiction is a disease that entails stimulation by a chemical substance or a certain pleasant activity. Various actions are factors in causing addiction for each person¹⁾. This research is necessary to measure the change in the desire subjectivity in order to discover the relevance of the tendency to addiction and the human expression for a specific act involving the presumed addiction object.

2.2 Online Internet addiction

In this experiment, we focus on online Internet addiction and a game similar to an Internet game. This game easily makes a person's environment more pleasurable and can readily relieve stress. However, it has the possibility of becoming addictive through excessive playing. Even a minor will risk the possibility of becoming addicted, and therefore there may be reports of weakening health via excessive playing that influences school and work. In the worst case, it may also cause death.

Within such a situation, online Internet gaming is recognized as a new addiction object. However, a clear diagnosis method and a diagnosis standard have not been

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discovered for such a tendency. Online addiction involves various factors, including connection time, which make it difficult to establish a diagnosis standard.

2.3 Tendency towards addiction and a change in desire

Suppose that a subject with a tendency towards addiction is associated with the addiction object when he discovers another person engaging with that addiction object. This causes the subject to experience a very big increase in desire.

In the case of a normal person, an interest and an increase in desire may be observable reactions to this object, but the extent of the increase in desire is greater in the subject with a tendency towards addiction than in the normal person. Consequently, we suppose that the increase in subjective desire is greater in the case of a person with a tendency towards addiction than in a normal person. Therefore, we thought that the increase in desire might exert an influence on other parts of the human body.

3. Experiment

3.1 Summary of the experiment

We found from earlier studies a tendency among addictive subjects to experience a change in desire when associated with the addictive object²⁾. At the same time, the expression changes with the change in desire upon association with the addictive object. Therefore we suggest a dependency diagnosis support method to apply to this change in expression.

This experiment involved sixteen adults. We prepared games for each experimental subject. In addition, we carried out an Internet Addiction Test (IAT) before the experiment in order to calculate the quantitative addiction for each experimental subject. Further, we categorized all subjects into an addiction group and a non-addiction group, and performed the comparison subsequently. In addition, we photographed the experimental subjects from the front of the game console screen at the time of game enforcement in order to observe any change in expression.

3.2 Internet Addiction Test

We classified the level of addiction using a checklist prior to the experiment. We used the IAT to measure the tendency towards addiction³⁾. The IAT was developed by Dr. Kimberly Young (University of Pittsburgh at Bradford). Professor refer to DSM 4 (Diagnostic and Statistical Manual of Mental Disorders 4). [Remark 1]An IAT self-check is now possible at the Centre

Fig. 1 Experiment processing.

for Online and Internet Addiction, which I established in 1995. This include 20 questions with each adding between 1-5 points to a cumulative answer. According to the IAT, an experimental subject is defined as having an Internet addiction if the subject scores more than 50 points. We categorized our experimental group into five addiction subjects and five non-addiction subjects, according to the IAT(Six person middle point is excluded).

3.3 Method of experimental evaluation

We proved that there was a change in expression when a subject implemented or approached the addiction object²⁾. Therefore we found that the change in expression was caused in addiction subjects by association with the addiction object. We suggest a method to detect a tendency towards addiction from this change in expression. In our experiment, we found that the principal changes are to the mouth and eyes²⁾. From this result, we can measure quantitatively the changes in two places at the time of an approach to the addiction object. This method detects the tendency towards addiction from the presence of a change in expression when approaching and enforcing the addictive object in the same environment as the experiment already reported.

Fig. 1 shows the flow of the experiment processing. We detect 10 perioperative seconds at the beginning of a demonstration environment and a game enforcement using an animation. First, we detect the colour information for each pixel and exchange an RGB ingredient for the YCrCb ingredient.

Second, the range specifications for the mouth and eyes form a dynamic picture image. We compare the two picture frames superimposed on a time axis. Then we compare the two picture frames, namely the first 10-second frame and the time-axis frame.

We defined the difference in the Y ingredient as the degree of colour information, and it was supposed that this degree increased as the change in expression oc-

Fig. 2 An application example of method Non addictive subject.

Fig. 3 An application example of method Addictive subject.

Table 1 Experiment of method evaluation.

IAT Result[%]	subject group	
	Addiction	NON Addiction
Demonstration	62.5	100
Enforcement	87.5	75
Average	75	87.5

curred. Then, we define the method for detecting the tendency towards addiction from the extent of transition of mouth and eyes. We use the format of a dynamic picture image, DV-AVI 640×480 [pixels]. The frame rate is 30 [fps], and we can edit each frame unit.

The extent of the change in the graphs for eyes and mouth was detected in the examples for both groups using the above method. The demonstration screen and a sound start after five seconds. **Fig. 2** and **Fig. 3** show application example of subject.

The result is shown in **Table 1** judging by the threshold processing based on the amount of the average change between frames. Dependency detection was enabled with a probability of more than 75% using the suggested method of experimental evaluation. It was shown that there was a constant effect in the proposed method for the diagnosis of dependency.

4. Conclusions

We researched the tendency towards addiction involving a change in expression from the viewpoint of a game. We investigated online game dependence in this article and proved that there was a big emotional change in cases when a person with a tendency towards dependence watched and listened to a dependency object. In addition, there was a change in expression at the same time when there was a change in emotion. We suggest a technique for dependency diagnosis based on how we observed a change in expression during the above-mentioned experiment. Dependency detection was enabled with a probability of more than 75% using the proposed method of experimental evaluation.

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