Evaluation of a Tactile Device for Augmentation of Audiovisual Experiences with a Pseudo Heartbeat

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1. INTRODUCTION

The impression that the viewer has of characters is an important factor affecting the viewer's opinion of audiovisual media, such as movies, television and video games. In particular, when we feel affection toward characters, we sometimes go so far as to identify ourselves as one of them, leading to extreme immersion in the content of the media. Therefore, there is the possibility that content technology can control affective feelings towards characters and create an immersive environment. We propose a device that can be used to facilitate the affection of the user by controlling their positive feelings toward characters in the media content. Previous studies have shown that emotional or physiological states can be altered by the visual and auditory presentation of false heartbeats [1, 2, 3]. However, if these techniques are applied to audiovisual media such as movies, television, or video games, the audio and visual heartbeat cues may interfere with and pollute the audiovisual content.

2. PROPOSAL

We have previously proposed the presentation of false heartbeats with tactile cues that do not interfere with audiovisual content [4]. Furthermore, the false heartbeat can be presented independently to each user. In our previous work [4], we confirmed that evaluations of nude photographs improved when false heartbeats were presented with the photographs and that the frequency of the presented vibrations increased. Based on these findings, we first developed a heartbeat device that was embedded in a cushion.

3. DEVICE

Figure 1 shows the overview of our device. The speaker was embedded in a cushion held the users. In our previous studies, we did not measure the participant's heartbeat but told them that the presented vibrations were their own heartbeat. This time we measured the participants' heartbeat rates, which we used as the base frequency of the presented pseudo heartbeat.

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Figure 1. Left: Cushion and speaker, Right: User holding the cushion

4. EXPERIMENT AND RESULT

We performed an experiment to validate the effectiveness of our device. As visual stimuli, we used photographs of males and females. Male photographs were presented to female participants and female photographs were presented to male participants.

Figure 5 shows the overall results of the experiment. The vertical axis shows the average of the probability of choosing a photograph, and the horizontal axis gives the condition. The averages of the probability of choosing a photograph under the increased heart rate, not presented and neutral heart rate conditions were 52.4%, 41.7%, and 56.0%, respectively.

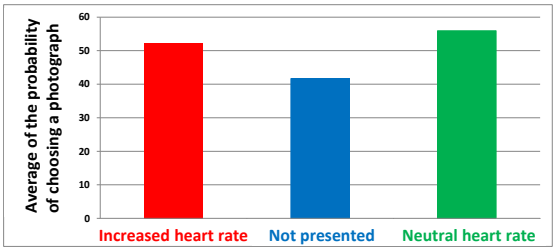

Figure 5. Results of the experiments

In this study, we verified that affective feelings toward photographs could be controlled by presenting a pseudo heartbeat and we were able to develop a device that could control attractiveness toward characters in audiovisual media. There were two important findings. The first was that a pseudo heartbeat could be embedded in a common object, and it did not inhibit the viewing of the media. The second was that frequency modulation was not required, as simply presenting a random heartbeat was as effective. According to these findings, we will embed the device in a mobile phone in future work.

5. REFERENCES

[1] SLOVAK, P.et al., Understanding Heart Rate Sharing: Towards Unpacking Physiosocial Space, *Proceedings of the ACM SIGCHI*, 2012, ACM press, 859-868.

[2] VALINS, S. 1966. Cognitive effects of false heart-rate feedback, *Journal of Personality and Social Psychology*, 4, 400-408.

[3] NAKAMURA, K., KATAYAMA, K., TERADA, T., AND TSUKAMOTO, M. 2011. Evaluation on effect of presenting false information for biological information visualization systems, *IPSJ SIG Technical Report 2011-UBI-30*, 1, 1-8. (In Japanese)

[4] NISHIMURA, N.et al., Facilitation of Affection by Tactile Feedback of False Heartbeat, *Ext. Abstracts of the ACM SIGCHI* ,2012, ACM Press, 2321-2326