

Title	眉と連動する可動耳型デバイスによる表情拡張の印象 評価と影響調査
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# A Study on the Effects of Facial Expression Enhancement Using a Movable Ear-Type Device Linked to Eyebrows Using Facial Expression Analysis and Impact Study

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The expression of emotions is important in face-to-face communication, and even nonverbal expressions such as gestures, facial expressions, and a person's mood can carry emotions. We sometimes read emotions from the facial expressions of the other person, but there are differences in facial expressions according to each individual, and some people have rich facial expressions while others have poor facial expressions. Since it is difficult to understand the facial expressions of the other person, some people may not be able to understand the emotions from the facial expressions of the other person and may not be able to convey the intentions of the other person.

In response to the above outline, previous research has shown that an eyeglass-type device with pseudo eyebrows equipped with a panel that displays eyebrows according to emotions can change the thickness and angle of the eyebrows, making it easier to convey one's own emotions to others. However, the device was too heavy to extend the eyebrows, and the panel could not be attached directly to the skin, so it was floating off the face.

In another previous research, there is a device that expresses emotions by transmitting brain waves obtained from the skin potential of the head to cat-shaped ears attached to the top of the head and a digital display. In the cat shaped ear devices, the brain waves are analyzed and divided into joy, anger, sadness, and anger states. In addition, a digital display device records the happy moment by taking a 60 seconds video from the same position as your eyes. The video is recorded the moment people are judged to be happy as a result of brain wave analysis. However, the measurement of brain waves by skin potential is noisy and it is difficult to measure accurate data.

In addition, a device which can acquire brain waves accurately by EEG, can be worn on the head and connected to a tablet device to present the EEG-derived emotional information on the tablet as joy, anger, sadness, and happiness marks. However, this device only acquires emotional information from the device and expresses emotions only on the tablet screen.

In order to solve the problem of the existing methods, this study attempts to extend facial expressions only by eyebrow movements by modifying an inexpensive, lightweight, and

powerless device called SUGO-MIMI developed by Sugoi-Lab. SUGO-MIMI is a powerless device that is operated by simple up and down movements of eyebrows. The eyebrows are connected by wires to a rounded triangular plate made of thin plastic that mimics the shape of cat ears, and the upward and downward movements of the eyebrows are linked to the ear-shaped plate to extend the vertical movement of the eyebrows. In this way, the facial emotions of joy, anger, and sorrow are emphasized by monotonous movements.

In order to analyze the psychological state and faces of the subjects, we used a psychological questionnaire for impression evaluation and the Microsoft Face API to analyze the faces of the subjects who saw the experimenter wearing the SUGO-MIMI.

In the experiment, the experimenter performed four facial expressions of normal, anger, sorrow, and joy for 30 seconds each for three patterns: without SUGO-MIMI, with SUGO-MIMI (dynamic Mimi), and with static Mimi. A total of 12 video patterns were used. After showing the 30-second videos to the subjects, we took 60 seconds for a psychological questionnaire, and the experiment lasted 18 minutes. During the experiment, we recorded the changes in facial expressions of the subjects while they watched the video. The psychological questionnaire consisted of 12 questions on a 7-point scale. We conducted an analysis of variance to investigate the questionnaire, and a significant difference was set at 0.05. We also analyzed the facial expressions of the subjects who watched the videos using the Microsoft Face API with respect to the ratio of the emotions of anger, contempt, disgust, fear, happiness, neutral, sadness, and surprise at around 5, 15, and 25 seconds.

In the psychological questionnaire and facial analysis, women tended to have more positive impressions of SUGO-MIMI than men.

On the other hand, men felt negatively about it. This difference is due to the characteristics of gender differences.