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The characteristics of facial emotions expressed in Memojis

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ABSTRACT

Memoji represents humans in online communications, and their emotional conveyance is attracting much attention. Despite this, there is a lack of studies exploring the emotional conveyance level of Memoji using various methods. In this study, we examined the emotional quality of Memojis and compared them with photography using the 5-Likert questionnaire and an AI- driven method. An online survey was conducted to collect user assessments of emotional expressions in Memojis. Twenty-eight photographs from the Japanese and Caucasian Facial Expressions of Emotion (JACFEE) database depicting seven emotions were employed. Memojis of these photographs were made with an iPhone using iOS 15.2. The emotional content of individual Memojis was evaluated and compared with those of the photographs. We confirmed each emotion with an AI-driven prediction and analyzed it with human assessment. In general, Memojis were less efficient in communicating emotions than photography. Happiness and sadness showed robust results, while fear and contempt were relatively inaccurately perceived. When partic-ipants were less confident with a Memoji's facial expression, they tended to prefer photography even more. The tendency was coherent between human judgments and AI-supported predictions. We also discuss the limitations and challenges of the proper use of Memojis for improved figure-based and non-verbal communication.

1. Introduction

As human facial expressions are a universal nonverbal communication channel to convey emotions (Ekman, 1993, 2004; Russell, 1994), "emojis" or "emoticons" are increasingly being used in daily computer-mediated communication (Derks et al., 2008a; Kaye et al., 2016). Most social media platforms have actively adopted them to assist users to enhance emotional communication. These cartoon-like illustrations of human faces showing emotions can protect users' identity in social media (Ayalon & Toch, 2021), and operating systems now support most of them. Studies have examined how people perceive and change their moods during social media conversations to confirm their effect. For example, Smith found that emoticons were effective in relaxing a hostile atmosphere by weakening tension during conversations (Smith, 2015), and Das reported that emojis influence users' cognitive behaviors, such as their purchase intentions (Das et al., 2019).

Designers and researchers are working on the development of emojis. For example, Cherbonnier designed new emoticons and compared them with photography to examine the quality of recognition of emotions. This result showed that some emotions are better expressed with emoticons than photographs (Cherbonnier & Michinov, 2021). Their efforts resulted in avatars that represent the facial features and emotions of the users themselves. Among the avatar platforms, "Memojis," designed by Apple, have shown high-performance replication of facial expressions (Suda & Oka, 2021). Memojis are expected to have higher emotional conveyance than actual photographs. However, few studies have demonstrated whether these Memojis convey emotions, and insignificant evidence is available.

In this study, we aim to analyze the accuracy and reliability of Memoji's emotional conveyance compared with photographs. First, we investigate whether Memojis fairly or more effectively deliver emotions across emotion categories. We conducted an online survey to collect user assessments to determine the emotional conveyance of Memojis. For the emotional norms of facial expressions, we used photographs from the Japanese and Caucasian Facial Expressions of Emotion (JACFEE) (Matsumoto, 1988) database to generate the Memojis in this study. For the examinations, we used three approaches, including assessments of the Memojis, comparative judgments between photography and the Memojis, and interpretations of emotions by a deep learning-based API solution.

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2. Facial expression in virtual

Previously, researchers indicated that virtual and in-person emotional communication are similar, and even computer-mediated communication (CMC) shows more frequent and explicit emotional communication than face to face (F2F) (Derks et al., 2008b). Dewall states, "Facial expressions serve as rich nonverbal cues that can powerfully communicate important interpersonal intentions and motives" (DeWall et al., 2009). Based on prior research, facial expressions in virtual figure-based graphics have been designed, such as emoticons, text arranged to be seen as faces, and emojis, an image mapped to a Unicode character (Kimura-Thollander & Kumar, 2019).

These are fixed graphics that do not move. Since iOS 8, Apple supported emojis in graphical interface format (GIF) (Eppink, 2014; Miltner & Highfield, 2017) which repeats the process of affective transformation (Stark & Crawford, 2015), and the application of facial illustrations has expanded to avatars, computer-generated characters that represent the self in symbolized forms in interactions (Nowak & Fox, 2018).

Avatars have been shown to influence a variety of contexts (Nowak & Fox, 2018), such as group communication (Van Der Land et al., 2015), non-verbal communication (Bente & Krämer, 2011, pp. 176–209; Heyselaar et al., 2017), organizational communication (Park & Lee, 2013), and advertising (Ahn & Bailenson, 2011) (Jin & Bolebruch, 2009). Avatars have especially stunning facial expressions that help people to communicate ideas and emotions in emotional contexts (Antonijevic, 2008; Koda et al., 2009; Martey et al., 2015; Yee & Bailenson, 2007). Additionally, Suda made an avatar and confirmed the effect of mimicking facial expressions in both avatar–avatar and human–avatar environments (Suda & Oka, 2021).

Considering this effectiveness, many companies have made their avatars in various forms. Memojis by Apple(https://support.apple.com/en-us/HT 208986), Facebook Avatar by Facebook (https://www.facebook.com/hel p/278747370042382), LINE Avatar by LINE (https://linecorp.com/ja/pr/news/ja/2020/3427), Bitmoji by Snap (https://www.bitmoji.com/), MetaHuman by Epic Games (http://www.makehumancommunity.org/), Reality (https://reality.app), and open-source software MakeHuman (https://www.live2d.com/) are a few examples (Suda & Oka, 2021).

Therefore, the avatar is a unique communication channel to express the users' facial expressions, and assessing avatars' ability to deliver facial expressions is worth exploring.

3. Memoji

Among the avatar platforms, "Memoji" is Apple's animated avatar and is expected to effectively convey emotions. Indeed, Memojis have demonstrated high-performance replication of facial expressions (Suda & Oka, 2021). Memoji originated with the "Animoji," one of Apple's early object icons mainly generated from animals. Since the launch of iOS 12, a Memoji-making tool has been included as one of the essential services. The tool generates customized figures from one's own facial images (https://support.apple.com/en-us/HT208986).

Features of Memojis widen the communication context into video communication from social media and texting platforms. Memojis can help users in real-time. Studies have examined how Memojis are effective in streaming video. Polen observed that eight-year-olds used Memojis to express their emotions and responses in a Zoom chat room (Polen, 2021). Additionally, Ogawa found that Memojis improved the content delivery of video-based lectures (Ogawa et al., 2020). Along with the growth in users and contents of Memojis, studies about figure-based messages have pursued better representations. The concerns include accurate resemblance (Wall et al., 2016), ethnicity issues (Kimura-Thollander & Kumar, 2019), and graphic style depending on the software (Tigwell & Flatla, 2016).

Furthermore, beyond resemblance, Memoji users expect Memojis to reflect their personality and mood state when shared while communicating (Herring et al., 2020; Zhu et al., 2021). Considering this, we conducted an online survey to measure how accurately and effectively Memojis express facial emotions. We compared the performance of the JACFEE norm data set with that of the Memojis.

4. Study goal

Our study aims to confirm Memoji's emotional conveyance in aspects of accuracy and reliability by answering the following research questions.

- (Session A) Can humans effectively perceive the intended emotions through Memojis?
- (Session B) Compared to human facial expressions, what is the current level of emotional conveyance with Memojis?
- (Session C) How does artificial intelligence evaluate the emotional conveyance level of a Memoji?

We conducted a session for each research question: Session A, Session B, and Session C.

5. Online survey

5.1. Method

5.1.1. Materials: JACFEE

For the emotional norms of facial expressions, we used photographs from the Japanese and Caucasian Facial Expressions of Emotion (JACFEE) (Matsumoto, 1988) database. It contains photographs of 28 Japanese and 28 Caucasian men and women displaying seven categories of facial emotions: anger, contempt, disgust, fear, happiness, sadness, and surprise. To reduce the duration of the survey, we selected only 28 photographs: seven Japanese men, seven Japanese women, seven Caucasian men, and seven Caucasian women, and each face represented a different emotion category. According to percent judgments of intended emotion for each photograph in the JACFEE, the accuracy ranged between 26.72% (fear) and 100% (happy). Among the seven emotions, happiness achieved the highest accuracy, followed by surprise, sadness, anger, disgust, fear, and contempt. Except for contempt, both US-born Americans and Japanese Americans identified the intended emotion expressed by Caucasian faces more correctly than those expressed by Japanese faces (Biehl et al., 1997). Hence, we planned to analyze whether this trend appears coherently when the participants evaluate the Memojis generated from the JACFEE photography.

5.1.2. Materials:Memojis from JACFEE

For objectivity, we generated the Memojis from the pictures in the JACFEE dataset. Three design researchers first configured the facial features and styles, imitating each JACFEE photo. We followed an iterating process to generate Memojis that resembled the JACFEE photos. Then, we generated the facial expressions of Memojis through the JACFEE photo, which had already confirmed its emotional accuracy. Finally, we prepared materials for the survey: a total of 28 Memojis and 28 pairs of Memoji-photos. All the Memojis were made with iPhone 11 operated with iOS 15.2. Appendix A presents all the images used in the survey.

5.1.3. Participants

We recruited 82 participants aged between 18 and 26 years old (mean = 20.95, standard deviation = 2.49), consisting of 43 men and 39 women. All participants were Korean native university students who use smartphones and have experience with Memojis. They were paid 5 dollars for voluntary participation.

5.1.4. Questionnaires

The survey began with Session A, followed by Sessions B and C. As

shown in Fig. 1, in Session A, we presented one out of 14 Memojis asking participants to rate emotional intensity with regard to the seven emotions using a 5-point (1–5) scale, labeled strongly disagree (−2), disagree (−1), neutral (0), agree (+1), and strongly agree (+2). Through these questions, we analyzed the accuracy of the Memoji's emotional conveyance. Fourteen Memojis paired with their source photographs were displayed in Session B. Participants compared the emotional intensity between two images. In Session B, we analyzed the reliability of Memojis in conveying emotion compared to the photographs. Lastly, in Session C, we examined the deep learning-based emotion prediction interpretated by an API service provided by Microsoft(https://docs.microsoft.com/ko-kr/xamarin/xamarin-forms/data-cloud/azure-cognitive-services/emotion-recognition) and confirmed their reliability in AI.

5.2. Procedure

To proceed with the survey while keeping the participants' attention, we limited the stimuli to 14 of the 28 JACFEE images and matching Memojis. The Memoji materials (Session A) and the photo-Memoji pairs (Session B, Session C) were selected randomly, making 82 evaluations for each. Participants joined the survey remotely, and their responses were collected via a web-based survey platform(moaform.com). The average survey completion time for the survey was 8 min 5 s.

6. Results and analysis

6.1. Session A: Emotional assessments of Memojis

Based on the assessments, we summarized the central tendency across the seven emotions. Each Memoji was according to the seven emotions, and we analyzed whether the intended emotion was generally conveyed. The summarized results shown in Table 1 are the averaged assessments of the four categories: Caucasian men, Caucasian women, Japanese men, and Japanese women. The assessment scores confirmed that happiness, sadness, and disgust were assessed as intended, with agreement scores equal to or greater than 0.8, between −2 (strongly disagree) and +2 (strongly agree). Furthermore, the scores for happiness, sadness, and disgust were distinctively higher than those for different emotions. This indicates that Memojis convey happy, sad, and disgusted faces accurately.

However, a different tendency was found regarding the remaining four

emotions: surprise, fear, anger, and contempt. In the case of the surprised expression, participants confused fear and surprise, showing that the scores on both emotions were equally 1.30. Also, the score for fear was the highest but merely 0.10 on average, indicating that the Memojis failed to convey fearful expressions. Furthermore, angry and contemptuous faces were mostly seen as disgusted, which clearly shows that Memojis may cause inaccurate delivery of intended emotions. Finally, these results imply that Memojis might inaccurately communicate emotions unless they illustrate happy, sad, or disgusted faces.

6.2. Session B: Comparative judgments between photographs and Memojis

To determine the reliability of Memoji's emotional conveyance, we asked participants to select between −2 and +2, corresponding to: "Photography is more reliable to convey each emotion(-2)" and "Memoji is more reliable to convey each emotion(+2)." "0" was set as the target value indicating that the Memoji was perceived as similar to the photograph. We performed a one-sample *t*-test to determine if the average assessment was statistically different from 0 for each photo-Memoji pair(Table 2).

Except for the "sadness" emotion, the result showed that photography conveys emotions more accurately than Memojis. The comparative central tendency of the balance leans more towards photography across the entire emotion set. In particular, except for the "sad" emotion, the differences were statistically different at an alpha level of 0.05.

The photography for fear received the strongest assessment (−1.37) followed by disgust (−0.73), happiness (−0.51), anger (−0.46), surprise (-0.41), and contempt (−0.35). None of the emotions received positive average scores towards Memojis, indicating that photography generally conveys emotional expression more effectively than Memojis. Fig. 2 displays the judgments of the 82 participants along the seven emotions.

In Session A, sadness was one of the robust emotions accurately expressed in Memojis. The results of Session B support this tendency, showing that the participants found that sadness Memojis are as equally expressive as photography. This indicates that Memojis with a sad emotion will be correctly perceived, and their impact is as powerful as the photography. Also, the Memoji's poor delivery of the fear emotion is confirmed in Session B. The fearful photography was more effective than its Memoji pair at expressing fearful emotion. The average score reached −1.37, indicating that participants strongly advocated photography to convey fearful emotion.

In general, the Memojis were less convincing than photography. Memojis with sad faces may be able to replace photography; however, in general, Memojis are still insufficient at delivering the intended emotion using facial expressions compared to photographs.

6.3. Session C: Comparison with the facial emotion prediction by AI

Next, we confirmed the algorithm-based emotion prediction using an open API. We facilitated the Face Analysis app service based on the API offered by Microsoft at azure.microsoft.com. This is an open API that predicts emotional quantity based on a facial image. We uploaded

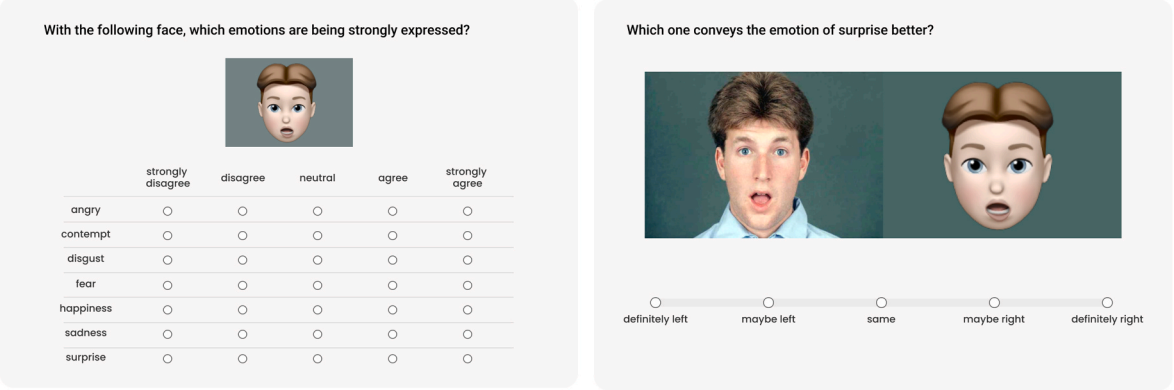

Fig. 1. Online surveys. (Left) Session A: Judgements of facial expressions of emotion from the Memojis. The emotional intensity was assessed in aspects of seven emotions. (Right) Session B: A comparison between a photograph and its Memoji regarding emotion conveyance.

Table 1
Emotional assessments of Memojis (Session A) (N = 82): The averaged assessments are horizontally displayed regarding the seven intended emotions arrayed vertically. The strongest agreement is in underlined bold text.

Intended Emotion				Aspect Emotion			
	anger	contempt	disgust	fear	happiness	Sadness	surprise
anger	0.52(1.25)	−1.08(1.00)	**1.10(1.07)**	−1.30(0.92)	−1.00(0.96)	−1.30(0.94)	−1.50(0.77)
contempt	0.21(1.28)	0.07(1.44)	**0.70(1.19)**	−1.00(1.04)	−1.00(1.25)	−0.60(1.34)	−1.30(0.90)
disgust	0.04(1.25)	−0.76(1.18)	**0.80(1.06)**	−0.80(1.12)	−1.00(1.03)	−0.70(1.21)	−1.20(0.94)
fear	−1.11(1.08)	−1.57(0.69)	−1.30(0.97)	**0.10(1.25)**	−2.00(0.79)	−0.80(1.19)	−0.80(1.25)
happiness	−1.81(0.46)	−0.04(1.17)	−1.50(0.87)	−1.60(0.65)	**1.00(0.84)**	−1.80(0.54)	−0.90(1.17)
sadness	0.03(1.47)	−1.43(0.85)	−1.20(1.00)	−0.7(1.18)	−2.00(0.71)	**1.30(1.09)**	−1.50(0.81)
surprise	−1.38(0.92)	−1.53(0.80)	−1.10(1.04)	**1.30(0.99)**	−1.00(0.91)	−1.30(0.94)	**1.30(1.02)**

Table 2
The mean and standard deviation of photographs and Memojis emotion conveyance (Session B) (N = 82).

Emotion	Mean	Std. Deviation	Mean difference (Memojis-Photographs)	cohen's d	t
anger	−0.46	1.03	−0.46	−0.47	−5.69*
contempt	−0.35	1.13	−0.35	−0.31	−4.01*
disgust	−0.73	1.13	−0.73	−0.65	−8.25*
fear	−1.37	.92	−1.37	−1.49	−19.07*
happiness	−0.51	1.12	−0.51	−0.46	−5.88*
sadness	−0.05	1.07	−0.05	−0.5	−0.58
surprise	−0.41	0.98	−0.41	−0.42	−5.35*

t scores from a one-sample *t*-test to statistically examine the mean difference with 0.
* $p < 0.05$.

photographs and corresponding Memoji images and obtained predicted scores in eight emotion categories, including neutrality. We applied the AI-driven prediction for photography and Memojis and received the prediction results as likelihood ratios across the eight emotions. We performed a *t*-test on the paired samples to examine whether the AI judges the emotional intensity of the photography and Memojis statistically differently based on the ratio data. All 28 pairs were entered for the paired-samples *t*-test, and the tests were carried out regarding the eight emotions.

Table 3 displays the results. The average and standard deviation are dis played horizontally, and the seven intended emotions are arranged vertically. This comparison indicates that, except for happiness, Memojis are inadequate at reliably conveying emotion compared to the photographs.

In the case of happiness, the Memoji is also indicated as 100 at happiness emotion. However, because the AI algorithm was trained with human photography (Zhao et al., 2003), the Memojis may have been inadequate for the analysis.

7. General discussion

The three phases of studies aimed to determine how people predict emotion when viewing Memojis compared with photographs of human faces. Based on the survey assessments and AI-driven prediction, we concluded the following findings. In session A, the participants

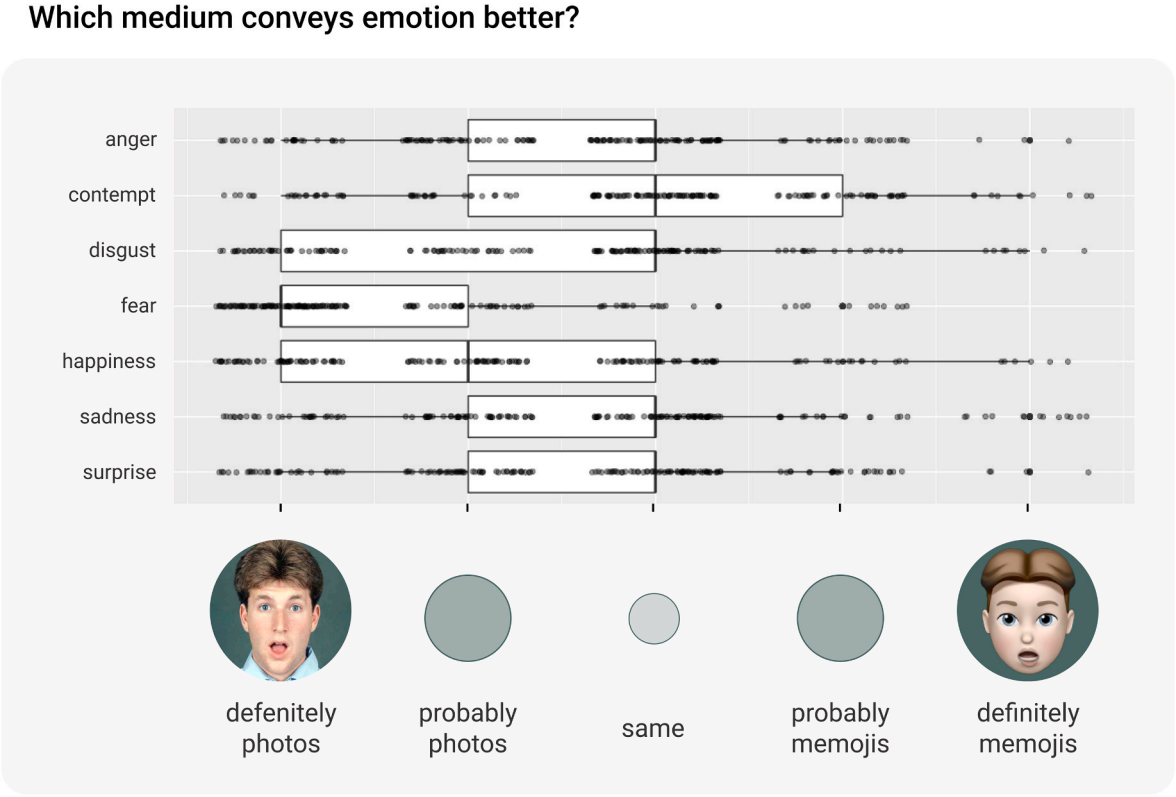

Fig. 2. Box plot of Memoji and photograph comparison over the seven intended emotions. For an explanation of the box plot, refer to Table 2 (Session B) (N = 82).

Table 3
The mean and standard deviation of comparison data by AI (Session C). The intended emotion is arranged horizontally, while the estimation on each emotion is shown vertically.

	anger		contempt		disgust		fear	
	photo	Memoji	photo	Memoji	photo	Memoji	photo	Memoji
anger	45.35(22.57)	0.55(0.85)	12.03(10.02)	1.55(0.77)	5.90(11.00)	0.03(0.05)	0.15(0.24)	0.00(0)
contempt	0.00(0)	0.00(0)	31.85(11.83)	2.48(3.12)	0.00(0)	0.00(0)	0.00(0)	0.00(0)
disgust	7.83(8.92)	0.13(0.19)	0.18(0.15)	0.03(0.05)	89.92(9.00)	0.03(0.05)	0.00(0)	0.00(0)
fear	0.05(0.06)	0.00(0)	0.18(0.15)	0.55(0.64)	2.18(3.75)	0.03(0.05)	61.43(38.29)	0.05(0.10)
happiness	0.00(0)	0.00(0)	0.00(0)	0.00(0)	0.00(0)	0.00(0)	0.00(0)	0.00(0)
sadness	0.00(0)	0.00(0)	0.20(0.14)	0.18(0.29)	0.00(0)	0.00(0)	0.00(0)	0.00(0)
surprise	0.00(0)	0.00(0)	0.00(0)	0.00(0)	0.00(0)	0.00(0)	0.00(0)	0.00(0)
	happiness		sadness		surprises		neutral	
	photo	*Memoji*	*photo*	*Memoji*	*photo*	*Memoji*	*photo*	*Memoji*
anger	0.00(0)	0.50(0.10)	20.13(21.86)	31.65(35.93)	0.43(0.78)	0.00(0)	15.98(13.68)	66.13(36.67)
contempt	34.25(23.77)	22.78(18.33)	0.08(0.05)	0.05(0.10)	0.00(0)	0.00(0)	33.70(16.25)	74.70(15.88)
disgust	1.38(1.25)	34.90(46.62)	0.25(0.44)	0.00(0)	0.00(0)	0.00(0)	0.68(0.73)	64.95(46.61)
fear	0.00(0)	0.05(0.10)	3.53(3.70)	49.08(46.51)	25.70(29.32)	0.93(1.85)	6.95(8.06)	49.33(46.51)
happiness	100.00(0)	100.00(0.00)	0.00(0)	0.00(0)	0.00(0)	0.00(0)	0.00(0)	0.00(0)
sadness	24.93(49.85)	0.00(0)	47.58(37.83)	46.50(49.09)	0.00(0)	0.03(0.05)	27.38(27.57)	53.28(48.89)
surprise	0.25(0.50)	0.10(0.20)	0.00(0)	0.45(0.83)	97.90(3.56)	21.10(21.02)	1.85(3.70)	78.33(20.84)

recognized the intended emotion from the Memojis with **happy, sad, or disgusted emotions**. The remaining four emotions remain challenging. Surprised Memojis were interpreted as both surprise and fear emotions. The fearful Memojis failed to deliver any distinctive emotional accuracy. Also, angry and contemptuous Memojis were perceived as disgusted faces. Results from session B, the analysis elaborates on the comparative performance between Memojis and photography in detail. Although happy, sad, and disgusted emotions were reasonably well perceived in Memojis, participants showed that photography expresses happy and disgusted emotions better. Except for sadness, every emotion category received a preference for photography. Finally, in session C, the results agreed with the participants' subjective judgments, Session A. This lead the conclusion that Memojis can express happy, sad, and disgusted emotions as efficiently as photography. However, we found Memojis vague in conveying surprised, fearful, angry, and contemptuous facial expressions. This can cause a misunderstanding when conveying emotion with computer-mediated communication using Memojis.

Taken together, all of the sessions demonstrate that the Memoji is still unable to convey emotion effectively that inaccurate or vague communication. Perhaps this is caused by Memojis' typical features: cartoonist style and systemic problem. Compare to photographs, Memojis have bigger eyes, flawless skin, or round facial contours. Such graphical characteristics might have hindered, biased, or exaggerated actual human faces, which we are more familiar with. Memojis also do not have necks or shoulders. Part of the emotion is conveyed by the body posters, especially the angle between the chin and shoulder, which is lost in the Memoji (Campos et al., 2013; Tracy & Robins, 2007). The Memojis might have a friendly appearance but potentially deliver incorrect messages. A possible explanation for the Memoji's systemic problem is that facial detecting system directly mimics facial expressions rather than understanding them. Memoji

by Apple is a high-performance facial expression replicator that precisely maps facial expressions with facial features (Suda & Oka, 2021) and avatars with emotional mimicry are known as increasing the communication (Hasler et al., 2014; Hoegen et al., 2018). Although this can sometimes cause users to exaggerate their facial expressions, our research indicates that exact mapping still has a low level of accuracy. Moreover, the result implies that the user would be burdened with generating exaggerated facial expressions due to the exact mapping. Oh also emphasized that enhancing one's avatar's smile can result in more positive outcomes than using a smile that is accurately mapped (Oh et al., 2016).

These studies have some limitations. The Memoji materials given was consisted with diverse of race and gender, the survey was limited to Korean participants. As Hess asserted, in general, people judge facial expressions more accurately within the same ethnicity (Hess et al., 2000). Thus, a future online survey could invite diverse ethnic groups to derive a more robust conclusion. Moreover, because the study used the JACFEE data set for external validity, the Memojis had different styles and facial features with particular style memojis. These differences can sometimes cause a distinction in conveying emotion. Hence for future research, Memojis with the same style and character expressing other emotions with common style of memoji would be needed. The study was tested by a small group of participants, which means a more substantial sample should be required in future research.

Nonetheless, we analyzed the emotional conveyance of the Memoji system and confirmed that they do not reliably express emotion. This analysis leads us to identify a problem with Memojis to prevent misunderstandings between senders and receivers due to the miscommunication of emotions. Through this, we motivate designers to improve the Memoji system and correct the direction of the Memoji design. A thorough study of human facial expressions is necessary to generate the Memoji expressions properly. The empirical evidence of this study can be utilized to advance emotional communication in computer-mediated communication.

8. Conclusion

This study highlights how people understand emotional expression when viewing Memojis in comparison to photographs as well as the quality of Memoji's ability to convey emotional expression.In particular, we analyzed whether the intended emotions were effectively perceived through Memojis (Session A), how reliable they are in relation to the source photography (Session B), and whether humans judge differently from the AI algorithm (Session C). We conducted an online survey with two sets of 14 photographs and their Memoji pairs, and the photography was selected from the JACFEE data set. A total of 82 participants assessed one of the survey sets. Their responses were statistically analyzed, resulting in three major findings. First, Memojis convey happy, sad, and disgusted emotions as intended. However, they might inaccurately deliver the emotion of surprise. Also, the fearful emotion is difficult to express using Memojis. Both angry and contemptuous Memojis might be perceived as disgusted. Second, Memojis are still insufficient to convey emotion compared to photography in general. Lastly, the participants' judgments were overall coherent with the AI solution for emotion recognition. We discussed the cause of Memojis' typical problems as cartoonist style and systemic issues. Memojis' graphical characteristics might mislead the intended emotions without

body posters. Exact mapping of facial expressions without understanding emotion would burden Avatar users and limit emotional perceptions. In our future study, we plan to explore what essentially affects the Avatar to convey intended emotion and suggest the guideline for better computer-mediated communication.

Data availability

Data will be made available on request.

Appendix A. Every image used in the survey

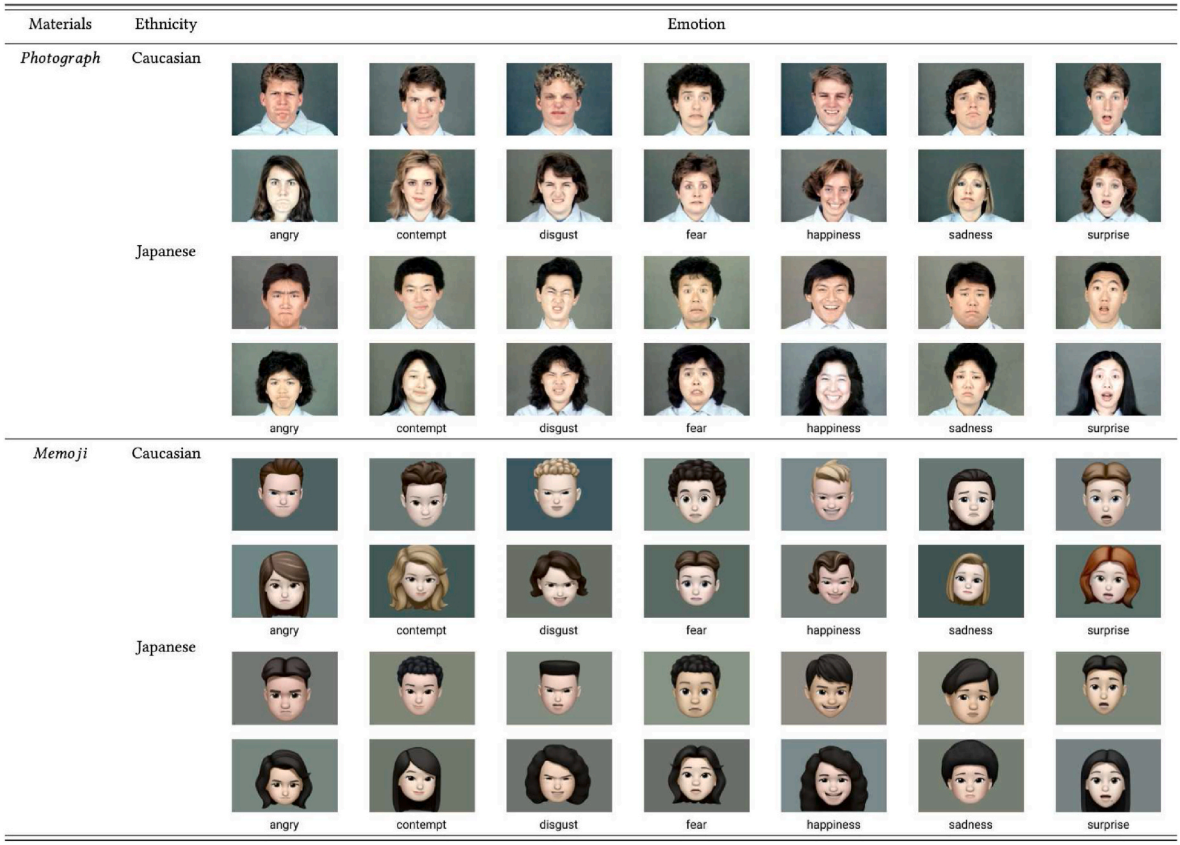

Fig. A. Left to right, images signify anger, contempt, disgust, fear, happiness, sadness, and surprise.

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