# Factors Influencing Emoji Usage in Smartphone Mediated Communications

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**Abstract.** Emojis have become more and more popular in text-based online communication to express emotions. This indicates a potential to utilize emojis in sentiment analysis and emotion measurements. However, many factors could affect people's emoji usage and need to be examined. Among them, age, gender, and relationship types may result in different interpretations of the same emoji due to the ambiguity of the iconic expression. In this paper, we aim to explore how these factors may affect the frequency, type, and sentiment of people's emoji usage in communications. After analyzing 6,821 Wechat chatting messages from 158 participants, we found people between 26–35 had lowest frequency of emoji usage; younger and elder groups showed different sentiment levels for the same emojis; people chose emoji types based on relationships. These findings shed light on how people use emojis as a communication tool.

**Keywords:** Emoji usage · Factors · Smartphone mediated communication

## 1 Introduction and Related Research

Emojis, "picture" (e) + "characters" (moji)", are pictures used in online text-based communications. The emoji "face with tears of joy" (😂) was chosen as "the word of the year" in 2015 by Oxford Dictionaries. People interpret emoji sentiment (from strongly positive to strongly negative) differently within or across platforms [1], while they seem to agree on the general attitude of emotions (positive, neutral, and negative) expressed through emojis [2]. Research on emoticon (a pictorial representation of a facial expression using texts, such as ":-)") found that factors such as knowledge background [3], culture [4] and gender [5] could affect the position, frequency, and sentiments of emoticons in Instant Massaging (IM). These factors may have similar effects on emoji usage.

The popularity of computer-mediated communication has prompt the need for nonverbal cues to express emotions [6–8]. People first use emoticons, typographic symbols that appear sideways as resembling facial expressions [9], for emphasis, assuagement, conversion and addition [10]. In late 1990s, emoji was introduced into instant messaging, which represent more emotions [11] and various objects, and gradually replace emoticons [6, 7].

Research found that people use emojis in different frequencies [6, 12], types [12] and may interpret the same emojis differently [1, 8, 13–15]. However, relatively less is


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known about the factors influencing the interpretation of emojis. Research found that emoji styles in different platforms [1, 15], gender [6], countries and areas [12, 13] could affect people's emoji usage. Even in the same culture background and platform, people could interpret emoji differently [1, 8]. In general, people could understand an emoji's overall positive or negative attitudes [2], Barbieri et al. reported that the overall semantics of emoji did not largely vary across four countries. Prior research revealed many potential factors that might affect emoji usage such as the context surrounding emojis [1, 8, 14], shared knowledge between communicators [15], familiarity with emojis, social-demographic and behavior factors [14]. Emojis could be rich resources for sentiment analysis and emotion measurement [2, 11], and used to improve user experience [16] and so on.

In this research, we analyzed messages from users of Wechat, a popular social networking and IM APP in China, aiming to understand the differences in frequency, type, and sentiment of emoji usage in smart-phone mediated communications. We aim to explore the influences of factors including age, gender, and relationship types.

## 2 Methods

### 2.1 Data Collection

We recruited 31 participants and asked them to collect the latest 50 chatting messages from 4–6 Wechat contacts of various relationship types. A total of 6,821 chatting messages from 127 communications were collected. All participants are Chinese. Table 1 summarizes their characteristics.

**Table 1.** Participant characteristics.

| | | 16–25 | 26–35 | 36–50 | >50 | M | SD | Total |
|---|---|---|---|---|---|---|---|---|
| Participants | Male | 7 | 0 | 1 | 2 | 30.20 | 14.65 | 10 |
| | Female | 13 | 4 | 2 | 2 | 27.43 | 10.84 | 21 |
| Communication counterparts | Male | 16 | 10 | 7 | 2 | 30.74 | 11.12 | 35 |
| | Female | 32 | 24 | 24 | 12 | 34.61 | 13.79 | 92 |
| Total | | 68 | 38 | 34 | 18 | 32.52 | 13.09 | 158 |

In addition to demographic background information, we also asked participants to identify the age differences in the same vs. different generations. In average, participants think that people belong to the same generation if their age difference is within 11.7 (SD = 10.5, SK = 2.5, K = 6.9) years, whereas they belong to different generations if their age difference is over 15.6 years (SD = 7.7, SK = 3.0, K = 13.0).

### 2.2 Data Analysis

We analyzed WeChat's emojis that are both available and same-styled in Android and IOS platforms. After anonymizing personal information, we counted the types and

frequencies of emojis in all 127 communications. We examined the sentiments of five most frequent emojis. Two researchers separately coded the sentiments of each occurrence of the emojis on a 7-likert scale ranging from −3 (very negative) to 3 (very positive). They reached moderate consistency when considering three categories (negative, neutral, and positive) (Kappa = .38, P = .04), one coder rates all emojis more negatively than the other. We calculated the average sentiment score for each emoji occurrence, then conducted statistic tests to compare the types and frequency of emoji usage, and sentiment levels expressed by the emojis across different age, gender, and relationship types. We divided the relationship types by two dimensions:

**Primary vs. secondary.** Primary groups (such as families) "tend to be in small size, informal, intimate and enduring", while secondary groups (such as colleagues) tend to be larger, formal, less personal and temporary [17].

**Same-generation vs. cross-generation.** People in same generations have similar age and cultural identification to each other [18].

## 3 Results

### 3.1 Overall Emoji Usage

A total of 1,103 emojis (72 emoji types) were used in the 6,821 messages, one out of six messages had an emoji in it. However, only a few emoji types were frequently used, and 15 types of emojis had only one occurrence (Fig. 1).

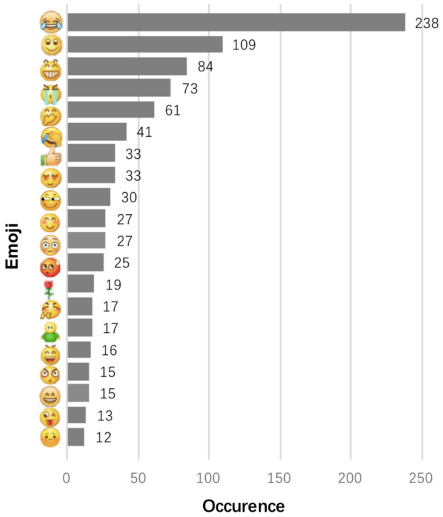


**Fig. 1.** Most frequently used 20 emojis (# of occurrences ≥ 12).

### 3.2 Emoji Frequency

People of different age used different number of emojis in their communications. K-Wallis Test shows significant difference among age groups ($\chi^2 = 17.2$, $p < .01$). Table 2 shows that participants between 16–25 and 36–50 had similarly high average emoji frequencies; elder participants (over 50) used the least number of emojis. Surprisingly, participants between 26–35 used less emojis; perhaps because their conversations were more serious than other age groups. Gender and relationship types have no effect on number of emojis used.

**Table 2.** Average emoji occurrences in different age groups.

| | 16–25 | 26–35 | 36–50 | >50 | Total |
|---|---|---|---|---|---|
| Mean | 5.68 | 3.02 | 5.56 | 1.54 | 4.54 |
| N | 68.00 | 38.00 | 34.00 | 18.00 | 158.00 |
| SD | 5.87 | 4.28 | 7.78 | 2.17 | 5.88 |
| Median | 3.63 | 1.00 | 3.00 | 0.88 | 2.75 |

### 3.3 Emoji Type

Analysis show that participants of different age groups used different types of emojis (K-Wallis Test, $p < .05$). Elder people used more positive emojis (such as "thumbs up" (👍) and "hug" (🤗)), while younger people used more emojis expressing complex feelings (such as "facepalm" (🤦) and "face with tears of joy" (😂)).

Participants also used different emojis based on their relationships (see Table 3, *$p < .05$). We compared same vs. cross generations, and primary vs. secondary relationship types. When chatting with friends in cross generation or secondary relationships, they used more emojis expressing simple and positive meanings, with less risk of misunderstanding. There is no significant difference in frequency and types of emoji among male and female users.

**Table 3.** Average occurrences of emojis among different relationship types. (*p<0.05)

| | Same-generation | Cross- generation | Secondary | Primary |
|---|---|---|---|---|
| 😂 | 2.89* | 0.77* | 2.69 | 1.12 |
| 🤦 | 0.61* | 0.02* | 0.26 | 0.38 |
| 🧐 | 0.21* | 0.02* | 0.13 | 0.11 |
| 👍 | 0.08* | 0.46* | 0.31 | 0.21 |
| 😻 | 0.2* | 0.3* | 0.31 | 0.21 |
| 😎 | 0* | 0.11* | 0.07 | 0.05 |
| 🤔 | 0.26 | 0.72 | 0.69* | 0.29* |
| 😉 | 0.11 | 0.10 | 0.18* | 0.03* |

### 3.4 Emoji Sentiment

We chose five types of emojis that occur more than 30 times and compared their average sentiment scores (see Table 4, *p < .05). We found that younger people used some emojis with different emotional connotations comparing to the elderly. For example, T-test (p < .01) shows that people in 16–25 age group expressed negative or neutral sentiment with "smile" (🙂) (Mean sentiment = −.2), while people in 36–50 group expressed positive sentiment (Mean = .9). This could be a result of generation gap.

**Table 4.** Average sentiment scores of emojis in different age groups. (*p<0.05)

| | 16-25 | 26-35 | 36-50 | >50 |
|---|---|---|---|---|
| 😁 | 1.55 | 1.33 | 1.75 | 1.80 |
| 🤗 | 1.50 | 1.32 | 1.61 | 1.08 |
| 😂 | 0.32 | -0.25 | - | - |
| 🙂 | -0.20* | 0.38* | 0.85* | - |
| 😭 | -2.33 | -1.71 | -1.33 | -1.00 |

## 4 Conclusion and Discussion

This paper presents exploratory results of how age and relationship could affect people's emoji usage:

(1) People chose emojis having simple and positive meanings when chatting with friends in secondary or cross-generation relationships. They use more emojis chatting with secondary ones, perhaps using emojis as a way to bind them closer.
(2) For some emojis such as "smile" (🙂), elders expressed positive sentiments, while young people expressed negative ones, perhaps picking up the unhappy connotation of looking downward [19].
(3) Gender has no effect on emoji usage, which is different from previous research [6]. It could be a result of cultural difference or difference in communication contexts.

This exploratory study provides some initial insights into factors influencing peoples' emoji use and the nuanced differences in emoji sentiments, and may have implications for improving user experience in emoji design, and using emojis for sentiment analysis. Future research can verify these results in larger samples, different cultural backgrounds and communication contexts. By observing emoji using behavior for a prolonged period, future research can reveal that how emoji using habits change over time due to social interaction with a particular person.

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