

Interpretation of Emoji-Only Messages by Message Producers and Receivers

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ABSTRACT

Emojis play a significant role in mutual communication. It was seen that emojis might carry different meanings depending on groups or cultures, although they are considered as a language valid for everyone. This study investigated how individuals responded to the questions directed to them using emojis, how they described the basic emotions, and what the individuals who read these messages understood. The study consisted of two stages. At the first stage, the participants were asked to respond to 10 questions, for which answers with concrete and abstract contents were sought, by using first emoji-only and then only text. Moreover, they were requested to express the eight basic emotions they were shown only with emojis. The participants also determined a satisfaction level for the emoji responses. At the second stage, a different group of participants scored the satisfaction levels by displaying the question. It was found that a message consisting of emojis might be evaluated by the receiver in a different way, even if it has been created with a high satisfaction level.

KEYWORDS

Basic Emotions, Emoji, Emoji-Only Messages, Text Messaging, Written Communication

1. INTRODUCTION

The ability of effective communication, one of the most robust characteristics of humans, has been shaped with different methods and tools over time. One of them, text messaging (or texting), has become a significant component of daily communication thanks to improvements in technology. Because synchronous communication methods like voice call require more spare time (preparing technical and individual manner, waiting for each other, etc.) than the duration of communication itself, they may not be preferred most of the time. Text messaging provides an opportunity to remain connected to any social network from any place or situation (Skierkowski & Wood, 2012). Moreover, texting has not been affected by environments in general. Light intensity or noise may affect a voice or video call but not texting. Furthermore, of course, it may provide confidentiality in both personal and professional manners.

Texting may provide significant advantages, but it is insufficient to state specific emotions (Zhou et al., 2017). This deficiency brings emoticons, which are some of the new concepts and behavior types brought via texting into daily communication. Emoticons are symbolic representations for facial expressions based on artificial combinations of keyboard symbols, which could contain alphanumeric, punctuation or other characters (Lu et al., 2016; Walther & D'Addario, 2001;

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Zhou et al., 2017). The usage of emoticons has grown in both individual messaging and online communication environments. With technical improvements, emoticons allowed the rise of emoji. Emoji, which comprise symbols used to express different statuses and emotions, appeared in 1999 and were standardized upon their acceptance with the Unicode Consortium in 2009 (Emoji Statistics, 2020). With the rise of emoji, individuals have begun to prefer emoji. In a study, which compared emoticons and emoji, it was shown that understanding of emoji messages was higher than those including emoticons (Rodrigues et al., 2018).

All new instruments used in written communication aim to provide inexpensive, effective, fast and meaningful communication. It is generally assumed that a message is created to transfer meaning. The producer of the message aims to give an idea, information or anything else to another person who is the message receiver. There are a few ways to do this in written communication. The first and most common is text. Still, although people are almost entirely adept in using communication with text, the meaning intended by the producer of the message may differ markedly from the meanings perceived by the interpreter (Graber, 1989). It is possible to perceive multiple meanings from a word or group of words.

Moreover, an emotional, psychological or instant situation may be affecting the perception of a message producer or receiver. Thus, how can one be sure that a message is understandable by all sides? On the other hand, it may not be about perception. Some words may have just one meaning, but still, there are many words which have multiple meanings.

Rise of emoji may be about the difficulty described above. In studies related to emoji, one usually encounters the “text + emoji” formula. People may be trying to reduce the number of the potential meanings of a message. An emoji can also give meaning alone. When a text message is used with an emoji, the meaning of the message must be an intersection of text and emoji. In a study, a participant stated that they had adopted emoji because text was not always sufficient. Many participants called text messages boring, dry and limited in the expressiveness they allowed (Zhou et al., 2017). The comment of the participant may show us that it is not only about meaning, but also the tone of the message. Das et al. (2019) stated that a positive emoji makes the message more positive, and a negative emoji makes it seem more negative. Emoji not just allow for expression of many emotional states but also enable users to decorate messages or replace words with visual stand-ins (Pohl et al., 2017). Even though the producer and receiver of the message meet at a point about meaning, emotions may be missing. Apparently, emoji have the mission to carry meaning that cannot be carried with text.

It may be stated that emoji are very helpful in written communication. However, they have a similar problem with text. The meaning of emoji may differ from person by person. It may be about culture, age, something about peers or even the operating system of a device. This issue may be unimportant when emoji are used with text, but the number of emoji-only messages is increasing. Nearly one billion emoji-only messages are sent every day on Facebook Messenger (Emojipedia.org, 2020). Because of ease of use, emoji-only messages are used in a widespread manner. Besides, usage of all-emoji combinations suggests that they are a novel figure alphabet.

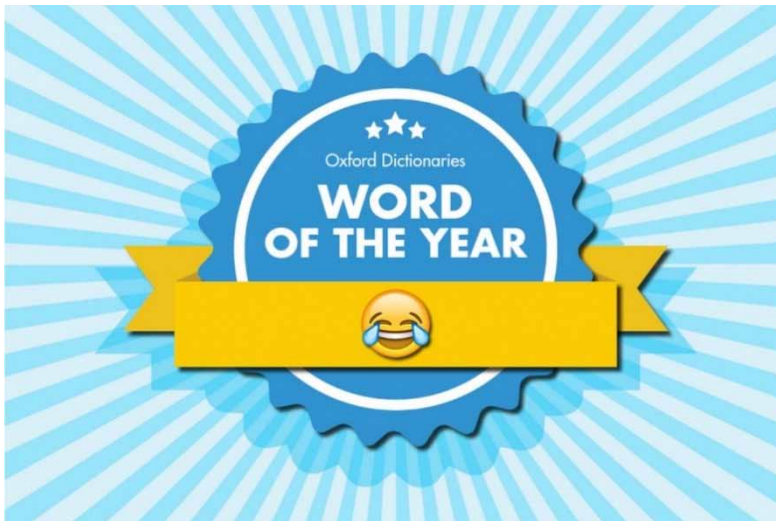
In this study, we tried to evaluate the understandability of emoji-only messages by the producer and the receiver. The next section is about the rise of emoji. The third section includes the interpretation of emoji. In the fourth section, we argue about emoji being a “ubiquitous language”. We present the related works in the fifth section. The sixth section demonstrates our data collection and analysis method. Sections 7, 8 and 9 include findings that are descriptive and those about the perceptions of the message producer and receiver, respectively. Section 10 is about the comparison of the findings and discussion. In the eleventh section, we conclude.

2. RISE OF EMOJI

It has been observed that the popularization rate of emoji is also quite high apart from the effect of the authorities. In the 21st century, emoji have been popularized quickly and turned into a significant

factor in human-computer interaction alongside the increase in computer-mediated communication and the use of social media (Kimura-Thollander & Kumar, 2019). According to the data obtained from Emojipedia, a statistical provider website, 5 billion emoji are sent via the instant communication application called Facebook Messenger every day, and half of the comments are made on the application Instagram since the second half of 2015 have contained emoji (Emoji Statistics, 2020). July 17 has been determined as the World Emoji Day. Besides, in 2015, an emoji was selected as the word of the year by the Oxford Dictionaries (Figure 1). Emoji are rapidly penetrating our daily communication practices (Zhou et al., 2017).

Figure 1. The word of the year was selected by the Oxford Dictionaries for 2015 (Oxford Languages, 2015).



Even though emoji is defined as “the graphic demonstration of the symbols that resemble facial expressions” by Walther and D’Addorio (2001), more statuses and emotions can be expressed through the diversity of emoji today. According to the current records, there are 3304 emoji with Unicode support. However, it is seen that most of them are not facial expressions. Distribution of emoji by category is as 151 of smileys and emotions, 1837 of people and body, 9 of components, 140 of animals and nature, 129 of food and drinks, 215 of travel and places, 84 of activities, 250 of objects, 220 of symbols and 269 of flags (Unicode, 2020).

The emergence of the first emoji as facial expressions and their popularization with a quick adoption process may be attributed to the convenience resulting from digitalization of the type of communication people had been accustomed to. Emoji provide people with the opportunity to carry on their behaviors in daily life on digital media without causing people to have a new difficulty in learning and preventing them from being considered as “new phenomena”. Besides, using an appropriate emoji instead of more than one word on digital media enables both convenience of use and healthy communication. It is also known that facial expressions provide information about the emotions of people to others (Ekman et al., 1987). Another prominent reason for the prevalence of emoji is that people are being influenced by each other. Zhou et al. (2017) reported on what inspired people’s adoption of emoji for the first time. They started to discover that people had been introduced to it by their friends in their chats. Such an effortless adoption toward emoji indicates that there is a requirement to improve the effectiveness of text. At this point, the concept of emoji may be considered to provide that people have 3304 new letters among which each one can be used instead of a few words.

Pohl et al. (2017) divided emoji usage types into five groups. These are decorative, stand-in, emotional, reaction and stand-alone. For the decorative type, the aim is to support the text in terms of decorativeness. For this type, emoji is not a requirement but a pretty factor. One may encounter this type emoji in the description of users on a social media profile page. Stand-in usage means that an emoji is used instead of a word. For example, to show an action prohibited like smoking. Emotional usage is the essential type to change the tone of the message. If text is not enough to express the emotion of the producer, one or more emotional emoji may support the meaning. Another type of emoji usage is reaction usage, which may be considered as an answer type. With these emoji, the message producer can show a reaction to the situation or answer a question like the emoji 👍 (thumbs up). The last type is stand-alone. This is a message type which includes emoji-only to express the message producers themselves. The last two types are essential to show a reaction for any situation without text. This type of message may be seen in crowded instant message groups or where answers are prepared rashly.

While the increase in the usage of emoji causes an increase in the number of emoji, the opposite situation is also possible. In any case, the number of emoji is increasing rapidly. With the Unicode 13.0 which is the latest Unicode standard, added 230 new emoji over Unicode 12.0, which was released one year before. The variety of emoji provides simplicity to express ourselves. Admittedly, it brings a disadvantage along. With our limited letters, which can fit half of a screen of a mobile device, we can produce a message. Nevertheless, to fit 3304 emoji on any screen is not easy. Popular keyboard applications include a tab to show emoji. Furthermore, some of them show emoji with sub-tabs by dividing them into categories. This may be causing difficulty in choosing the right emoji. There are studies and initiatives about developing new emoji keyboards and emoji recommendation algorithms based on text (Kim et al., 2019; Swiftkey, 2020). By using them, we are giving the decision of selecting emoji to such algorithms.

3. INTERPRETATION OF EMOJI MESSAGES

Emoji may represent the meaning of a couple of words or more. Because it is an emerging form of emoji, we can express emotions. It may not be easy to express an emotion with a text message, even if it is a common one. For example, how would one interpret the emoji 🤫 (face with hand over mouth)? The more important question is that does it have the same meaning and effect as its counterpart in a text message? Anybody can use the emoji 😎 (smiling face with sunglasses) in the meaning of “I am feeling very cool,” but using the sentence could probably not make the same impact on the receiver.

Nevertheless, facial expressions are most straightforward to meaning because facial expressions in real life are seen to have a similar effect on digital media. In this context, various studies have been conducted in the field of social neurology to examine the neural reactions of people at emoji and real facial expressions. The study conducted by Gantiva et al. (2019) revealed that using emoji faces in computer-mediated communication demonstrated similar neural responses to those in face-to-face communication. This gap opened in happy, neutral and angry facial expressions, and real expressions were found to create a higher effect than emoji.

The emoji 🍕 (pizza) may be seen as easily understandable, but the emoji is used for the meaning of love between some peers (Wiseman & Gould, 2018). While emoji might be used instead of text more, effectively, there is a risk about the meaning of them. People may differently interpret an emoji as 🙌. This emoji is used for both “hopefully” and “high-five” (Emojipedia, 2016). The meaning of an emoji may be beyond its definition in the Unicode Standard (Cramer et al., 2016).

To give different meanings to an emoji causes a barrier between the message producer and the receiver. A message producer may pick an emoji to express themselves quickly by making a prediction on how the message would be interpreted by the receiver (Cramer et al., 2016). However, the interpretation of the emoji message may be ambiguous (Rodrigues et al., 2018). If the message intended by the preparers of accounting disclosures is to be successfully conveyed, the receiver must be

able both to read and understand it (Taffler, 1992). The receiver of the message would infer meaning from the emoji message. If the used format for the message is “text + emoji,” two parts support each other in terms of meaning. If the format is emoji-only, the producer and receiver of the message must be on the same parallel. Various emoji studies are interested in the “text + emoji” formula of a message. In computer-mediated communication, emoji are the elements mostly used with texts, and they affect the sending and reception of a message in various aspects. Using emoji without facial expressions were observed to be more successful than the effect of an additional written explanation alone in decreasing the obscurity of the message in texts, which are thought to have partially higher emotional content by users. In other words, in written communication of emotional contents, the “text + emoji without facial expression” formula was observed to be more understandable for the receiver than the text-only formula (Riordan, 2017b). Emoji may be helpful in creating a message which provides a holistic meaning containing emotions. In another study, it was discovered that the “text + emoji without facial expression” formula increased the positive effect of users compared to the “text + text” formula. However, it did not turn a harmful content into a positive one (Riordan, 2017a). According to the literature review, we do not know the difference in the meaning of emoji-only messages by message producer and receiver.

There are studies indicating variation in the usage and interpretation of emoji for different groups such as gender, culture and age groups. There are many emoji used universally, but their meanings change from culture to culture. Thus, emoji assume an essential role in setting forth the cultural identities of people, and they may eliminate language differences (Kimura-Thollander & Kumar, 2019). Additionally, the meanings of emoji may differ from their universal meanings, and they may be used for explanation of several emotions and statuses. On the other hand, the use of emoji also changes between genders. In studies, it was discovered that there were perceptions regarding the higher use of emoji with emotional content by women than men, and the use of emoji with emotional content by men received more positive reactions compared to women (Butterworth et al., 2019).

As seen in any kind of communication method, there is also a risk in communication with emoji that the producer and the receiver of the message might not achieve their intentions. The purpose of this study is to measure the interpretation of messages created with emoji by both the producer and the receiver of the message as expected. Thanks to the research method explained in detail under the title of Data Collection and Analysis Methods, it is discussed how the use of emoji is evaluated by the sender and the receiver of a message in responding to questions that require abstract and concrete responses and in expressing the basic emotions.

4. THE DILEMMA OF UBIQUITOUS LANGUAGE

Used billions of times a day, emoji are defined as a ubiquitous language (Lu et al., 2016; Wiseman & Gould, 2018). While the word ubiquitous means “seeming to be everywhere” by the Cambridge Dictionary, the word may also mean that people from every part of the world can understand each other by using emoji when they are used with the words of the language. We may advocate that emoji deserve the title of “Ubiquitous Language” because of its feature of understandability by people across the world. Such a language can build a new level of international communication. People can communicate with each other easily. Emoji may reduce ambiguity, enhance meaning, strengthen and support the message (Hasan, 2018). Inasmuch that traditional languages may have lost their popularity. Emoji exist and have been used for a while, but languages exist as well. We also do not argue the question “Will emoji become more popular than all of the traditional languages?” If the answer to the question is no, why could a ubiquitous language not be more popular than traditional and local ones? Although the usage rate of emoji is so high by the language, they are being used with text in most cases. Why do emoji, defined as a ubiquitous language and have 3304 letters, require a traditional language? Emoji being a ubiquitous language may not be realistic. If a language could be used across the world with ease, it would probably be used.

On the other hand, emoji are defined as a type of textual paralanguage (Das et al., 2019). With the help of this definition, emoji may be called as a “ubiquitous auxiliary language.” This means emoji can only be used with a language. Nevertheless, in a study, 36.2% of the participants chose to create an emoji message without any text (Kim et al., 2019). We have limited knowledge about emoji-only messages in the literature. It has been proven that emoji help the meaning of a text message in terms of intention and emotion. However, there is no study on the effect of emoji-only messages on the producer and the receiver. Emoji-only messages are frequently used. Insomuch that there used to be an emoji-only social-network named Emojli, which has been closed because of a local data protection law issue (Gray & Scott, 2020; Stark & Crawford, 2015). Meaning of an emoji-only message is an important issue. There are two perspectives to be handled in the study. The first one is the message producer’s perspective. Anybody can create a message using emoji, but it is not sure to be as they wanted. With an emoji message, it is mostly not possible to describe details. Using more emoji would not be equal to using more words. On the other side, the receiver of the message must understand the message composed without text. The receiver can interpret the message differently from what has been intended by the message producer depending on their cultural, physiological, mental, experiential, current status, or any factor else.

With the study, we aimed to reveal the satisfaction level of an emoji-only message in terms of the producer and receiver of the message. In the next section, we describe our data collection and analysis method.

5. RELATED WORKS

In the literature review, we encountered a few studies similar to our study. We summarize the studies below and discuss the outstanding aspect of our study.

Holtgraves and Robinson (2020) performed a study about the interpretation of indirect messages which include emoji. They inspected three categories of the message: Opinion, disclosure and request refusal. The findings of the study showed that the performance of only-emoji messages were higher than the performance of those only-text. Emoji also provided a lower reaction time for the categories of opinion and disclosure.

Berengueres and Castro (2017) collected employers’ satisfaction data about the workplace. The data included scores and comments which could include emoji. They examined the relationship between emoji usage and satisfaction. They founded that employers used emoji in their comments when they had a high satisfaction level. The emoji they most frequently used were (clapping hands) and 🦾 (flexed biceps).

Different rendering of emoji for different platforms has been a serious issue. Rendering of emoji has a potential to lead to a miscommunication (Hillberg et al., 2018). The issue has been a subject to many studies. According to a study, individuals may think an emoji has lost the meaning of the message when they see it used on a different platform. Moreover, they may give up on posting the message because of concerns of losing the meaning (Hillberg et al., 2018). Tigwell and Flatla (2016) suggested generating emoji models for each user. Thus, a more approximate image may be shown on another platform instead of differently rendered but not similar emoji.

Walther and D’addario (2001) investigated emoticons’ effect on the meaning of a message. They used smile, frown and wing emoticons in messages, and they revealed that these emoticons changed the meaning of the message.

The perspective of the sender has also been inspected. Cramer et al. (2016) stated that emoji are used for addition of a meaning, amplifying the tone and as a social tool. They also reported that methods of emoji usage are to repeat the text, to support the meaning or to use them instead of word(s).

Rosenberg (2018) emphasized that, because of the size and tiny details of emoji, it is easy to misidentify them. Surely, one may state that misidentification can cause misunderstand the message itself.

The effect of gender is one of the studied topics about emoji. Nevertheless, studies are not on the same line. Butterworth et al. (2019) analyzed the gender effect by using emoji in two types: friendly and affectionate. While they found a gender effect in the understanding of the message, Rodrigues et al. (2018) did not find a gender effect in their findings.

Cha et al. (2018) examined stickers which are images or animation objects. Although they could convey richer meaning than emoji, the findings showed us that they may be misinterpreted, too. The researchers determined different interpretations of stickers by senders and receivers.

Besides all, misinterpretation of emoji is vital in terms of law. Because emoji are an important part of communication, the usage and interpretation of them must be discussed in terms of law. We may see that the law side knows that they cannot trust emoji yet (Goldman, 2018).

This study aims to reveal whether or not an emoji-only message carries the same meaning for the producer and receiver of the message. Although previous works have been on the same road with the study in terms of the topics of miscommunication and misinterpretation, this study introduces novel findings with a larger scope and perspective. In the study, emoji-only messages were in focus, and they were examined using 10 questions and 8 emotions which may be encountered in daily life.

6. DATA COLLECTION AND ANALYSIS METHODS

The data collection process consisted of two stages. At the first stage, the participants were evaluated as message producers. At this stage, they were directed ten questions (Table 1), which needed to be answered abstractly and concretely, and they were asked to respond only by using emoji. The participants were not prohibited about which emoji they could not use. They could use one or more emoji of 3304 with a sequence or not. Afterwards, they were requested to enter the response they wanted to give as text. Thus, we recorded the intent of the message producer and handled the “translation” of the emoji-only message to text. Moreover, they were shown eight basic emotions (fear, anger, sadness, joy, disgust, surprise, trust, anticipation) defined by Ekman (1987) and Plutchik (1980) and asked to express these emotions with emoji. Following the responses given by the participants with emoji, they were also asked to score how satisfactory these responses were (1: lowest, 7: highest). The demographic information about the participants was also collected. Thus, the messages to be created only by using emoji were obtained.

Table 1. Questions directed to participants

Order	Question
1	How are you feeling today?
2	What would you like to do today?
3	What is your profession?
4	What do you feel about your job?
5	What did you want to do most when you were a child?
6	How do you prefer to spend your holiday?
7	What do you think about technological innovations?
8	What was the topic of the last film you watched?
9	How active are you on social media?
10	What do you feel about using emoji?

The second stage was based on the evaluation of the message receivers. The participants at this stage were selected entirely differently from the previous stage. One of the records collected at the previous stage was selected randomly, anonymized and shown to each participant. At this stage, first, the question was presented, and the prediction of the response was requested upon showing the emoji response given by the previous participant. The collected predicted responses were considered dummy data. The aim was to provide time for thinking about the answer by the receiver instead of replying instantly. Then, the response which the participant actually wanted to give and stated as a text was also shown, and the participant was asked to score how much the emoji response reflected the response desired in reality (1: lowest, 7: highest). The same process was carried out for the basic emotions as well.

Because we collected the emoji-only messages in the text format also, we could record the intent of the producer. At the second stage, if the receivers saw just emoji-only messages, they were not able to assess the producer. Nevertheless, because they saw both emoji-only and text messages, we may argue that their assessments were reliable. On the other hand, as a limitation, we did not collect the platform information. Thus, we do not know the effect of the different platforms used by the producer and receiver of the messages. Nevertheless, we may interpret that the platform effect was low thanks to the low standard deviation levels.

We used quantitative methods to reveal statistically significant differences. Because our dataset was not suitable for assumptions of parametric tests, we had to apply non-parametric tests. The “p-value”, which is an indicator placed in the findings, shows the significance levels. We accepted the limit of significance as 5 percent. Thus, a lower p-value than 0.05 indicated a significant difference in the statistical sense. For the statistical analysis of the differences of the collected data, t-test, which is a parametric test, was first selected. However, as a result of the Kolmogorov-Smirnov and Jarque-Bera normality tests, which had been applied, the number of units was inadequate, and it was found that the data did not have a normal distribution ($p < .05$). For this reason, Wilcoxon Signed-Rank Test, a non-parametric test, was applied. The hypotheses that were tested are defined below. Satisfaction levels depended on the variables in the tests.

H_0 There is no significant difference between the satisfaction levels of message producers and receivers.

H_1 There is a significant difference between the satisfaction levels of message producers and receivers.

We also examined the hypotheses below for the 8 basic emotions.

H_2 There is no significant difference between the satisfaction levels of message producers and receivers for a given emotion.

H_3 There is a significant difference between the satisfaction levels of message producers and receivers for a given emotion.

The population of the study consisted of individuals who made use of electronic communication. To represent the population, 31 participants were reached out for the first stage, and 132 participants were included for the second stage. The participants were selected mostly among active social media users via the random sampling method.

The data collection steps were followed through a website prepared specially for this research. The PHP internet software language, the MySQL database and the Laravel library were used on the server. Besides, for the page design, the HTML, CSS and JavaScript technologies were also used. The computer used for the analyses had an i7-2600 3.40 GHz processor and 28 GB of RAM. On Microsoft Windows 10 (Version 1809), the R language (version: 3.5.2) and the RStudio editor (version: 1.1.463) were used.

7. DESCRIPTIVE ANALYSIS AND GENDER EFFECT

This study used ten questions directed to the participants and the expressions of 8 emotions to investigate how satisfactory the communication of the sender and the receiver of a message with emoji was for both sides. The results of the analyses conducted on the obtained data are presented in tables.

The first stage of the research was implemented with 31 participants. Of the participants, 71% were women, and 29% were men. In terms of educational status, the number of the participants who received undergraduate education constituted the majority by 80.6%. At the second stage, data were collected from a total of 132 participants. Among the participants, the number of female individuals was dominant by 84%. Similar to the first stage, the rate of the participants who received undergraduate education was quite high (95.3%). The research was realized in Turkey and with Turkish citizens. The demographic information about the participants is presented in Table 2 in detail.

Table 2. Demographic characteristics of the participants in the study

Stage	Number of Response	Gender		Education Status			
		Female	Male	Secondary Education and Earlier	Associate Degree	Under-graduate	Post-graduate
1	31	71%	29%	6.5%	9.17%	80.6%	3.2%
2	132	84%	16%	0.8%	2.3%	95.3%	1.6%

As stated before, we selected the participants randomly by announcing the study via social media posts. However, interestingly, women constituted most of the participants. Although the probabilities of access to participants with the same numbers of men and women were close, women were more willing to attend the study. When studies on emoji were examined with a literature review, it was seen that the attendance rate of women has been mostly higher (Pohl et al., 2017; Skierkowski & Wood, 2012). Therefore, there are results to indicate that women have been willing to use emoji more than men (Emojipedia.org, 2020). We performed a statistical test to be sure about the accuracy of the findings of the study, and the unbalanced count of the participants' genders did not affect the results badly. For each question, we compared the satisfaction levels of the male and female participants separately in terms of the message producer and receiver. Differences were searched with ANOVA, and the results are given in Table 3.

In the table, the message producers and receivers are shown separately. The satisfaction levels for each question and emotion were inspected in terms of differences by the genders of the participants. We determined a significant difference ($p < .05$) for five questions and one emotion on the side of the producer, but none on the side of the receiver. This means that the participants were differently satisfied for six situations out of 36 based on gender. For 5 of 6 situations, the men had a higher satisfaction level than the women. When we inspect the answers which were significantly different, it was seen that the mean and standard deviation values of the satisfaction levels were similar in the two gender groups. Additionally, because most situations did not differ statistically significantly, we assumed to ignore the gender effect on the findings of the study.

8. MESSAGE PRODUCER PERSPECTIVE

The test environment was designed by the producer and the receiver separately in terms of application and participants. At the first stage, which evaluated the message producers, after collecting emoji-only answers to the given questions, we asked the participants to provide a satisfaction score. The mean

Table 3. Differences between the satisfaction rate of women and men

Q or E	Message Producer					Message Receiver				
	Women		Men		sig.	Women		Men		sig.
	M	SD	M	SD		M	SD	M	SD	
Q1	5.02	1.34	5.69	1.26	.01	4.26	1.81	4.43	1.91	.71
Q2	5.96	1.31	5.17	1.86	.01	5.17	1.81	4.52	1.91	.14
Q3	5.52	1.35	5.45	1.31	.79	4.25	1.93	4.05	2.38	.68
Q4	5.64	1.14	5.64	1.82	.99	4.81	1.76	4.71	1.65	.81
Q5	5.25	1.76	5.93	1.45	.03	4.92	2.11	4.95	2.04	.95
Q6	5.33	1.67	6.55	.63	0	5.57	1.73	5.52	2.34	.92
Q7	4.36	1.91	5.5	1.52	0	4.5	2.04	4.43	2.29	.89
Q8	4.88	1.69	4.79	2.24	.8	4.76	2.06	4.62	1.88	.76
Q9	4.37	1.78	4.6	1.15	.46	4.8	2.19	4.14	2.03	.21
Q10	5.25	1.45	5.19	1.69	.85	5.06	1.89	4.9	1.73	.73
E1	5.98	1.11	6.05	0.91	.72	4.79	1.83	4.95	1.24	.71
E2	6.15	1.07	6.1	0.73	.77	6.2	1.44	5.57	1.91	.09
E3	6.6	0.61	6.55	0.8	.66	5.87	1.43	5.86	1.31	.96
E4	6.57	0.63	6.67	0.48	.37	5.63	1.57	5.95	1.07	.37
E5	4.79	1.53	4.76	1.49	.92	4.83	2.1	4.62	2.27	.67
E6	6.49	0.96	6.67	0.61	.29	5.27	1.86	5.43	1.94	.73
E7	5.59	1.19	6.02	.98	.05	3.54	1.92	3.48	2.18	.89
E8	4.56	1.42	5.07	1.4	.06	3.08	1.76	3.14	2.1	.88

Q: Question, E: Emotion, M: Mean, SD: Standard Deviation, sig.: Significance level (p-value)

score was calculated as 5.26 (standard deviation: 1.63, median: 5) out of 7 for the first ten questions. The calculated mean satisfaction score was not as high considering the score given by the producer of the message. The designers of the research expected to obtain a mean score of over 6 with a lower standard deviation. The message producers were not restricted with any rule, and they were able to provide any response with a limitless count of emoji. Nevertheless, they were not satisfied with their emoji-only messages enough.

On the other hand, we examined the satisfaction levels of the emotions separately. The calculated satisfaction scores were 6 (SD: 1.04) for fear, 6.13 (SD: .97) for anger, 6.59 (SD: .68) for sadness, 6.6 (SD: .58) for joy, 4.78 (SD: 1.51) for disgust, 6.55 (SD: .86) for surprise, 5.74 (SD: 1.14) for trust and 4.73 (SD: 1.43) for anticipation. Most of them were higher than 6, and the most satisfying emotion was joy. Therewithal, the most similar answers were received in relation to joy also because of its standard deviation (.58). Anticipation had the lowest satisfaction level. That is, when we asked the message producers to express the emotion of anticipation, they answered with a combination of emoji, but they were not satisfied with their emoji answer.

9. MESSAGE RECEIVER PERSPECTIVE

At the second stage of the study, we showed the participants emoji answers collected from the message producers, asked them to guess the meaning of the emoji answer and show the answer in text format.

After that, we asked the receivers to give a satisfaction score on how much their text answer reflected the same meaning with the emoji answer. For the first question, the mean of the scores was 4.78 (standard deviation: 1.98, median: 5) out of 7. The score is low in comparison to the producers' scores as expected by the researchers. Moreover, the higher standard deviations indicated that the message receivers had more diversity of responses than the producers.

We also examined the satisfaction scores for the emotions one by one. The calculated satisfaction scores were 4.82 (SD: 1.74) for fear, 6.09 (SD: 1.54) for anger, 5.85 (SD: 1.41) for sadness, 5.68 (SD: 1.5) for joy, 4.8 (SD: 2.12) for disgust, 5.3 (SD: 1.87) for surprise, 3.53 (SD: 1.96) for trust and 3.09 (SD: 1.82) for anticipation. The receivers of the message gave a very high score to the emoji-only messages includes anger. Thus, it may be stated that the most understandable answer was anger. Anticipation had the lowest satisfaction level as in the case of the producer. Diversity may also be seen as high because of the standard deviations of the measurements. This means the receivers may understand an emoji-only message differently from each other.

10. COMPARISON AND DISCUSSION

Wilcoxon Signed-Rank Test was applied to examine whether there was a statistically significant difference between the satisfaction scores of the participants who produced the message for the directed 10 questions in Table 1 at the first stage and the satisfaction scores based on the evaluation of the message by the receivers at the second stage. The results are presented in Table 3. Accordingly, the mean satisfaction level of the participants who created the message was observed as 5.26 (SD: 1.63), whereas the mean satisfaction level of the participants who received the message was 4.78 (SD: 1.98). The p-value was calculated as approximately 0 as a result of the Wilcoxon Signed-Rank Test. Thereby, the hypothesis was rejected, and was accepted. Accordingly, a significant difference was detected between the satisfaction levels of the two groups. Moreover, the fact that the message receivers had a lower satisfaction level indicated that, for the receiver, the message did not have a quality desired and hoped by the sender, and the increase in the standard deviation indicated that the received meaning may vary from person to person.

Table 4. The satisfaction levels of the senders and receivers regarding the responses, which they gave to the ten questions directed to them and they received

Satisfaction level of the sender (Range: 1-7)			Satisfaction level of the receiver (Range: 1-7)			p-value	Effect Size
Mean	Median	Standard Deviation	Mean	Median	Standard Deviation	0	.296
5.26	5	1.63	4.78	5	1.98		

The difference between the satisfaction levels of the producers and receivers of the messages for eight emotions the participants were asked to express was investigated for statistical significance, and the findings are presented in Table 4.

As seen in Table 4, different results appeared according to the emotion addressed. In the expression of “anger” and “disgust”, no statistically significant difference was found between the related emoji message satisfaction scores of the message senders and receivers ($p(\text{anger}) = 0.056$, $p(\text{disgust}) = 0.321$). The hypothesis was not rejected for the emotions of anger and disgust, but it was rejected for the other emotions, and was accepted for these emotions. For anger, the mean satisfaction score of the message creators was calculated as 6.13 (SD: 0.97), and the mean satisfaction score of the receivers

Table 5. The satisfaction levels of the senders and receivers regarding the responses, which they gave to the eight basic emotions directed to them and they received

Emotion	Satisfaction level of the producer			Satisfaction level of the receiver			p-value	Effect Size
	Mean	Median	SD	Mean	Median	SD		
Fear	6	6	1.04	4.82	5	1.74	0	.392
Anger	6	6	.97	6.09	7	1.54	.965	.003
Sadness	6.59	7	.68	5.85	6	1.41	0	.294
Joy	6.6	7	.58	5.68	6	1.5	0	.355
Disgust	4.78	5	1.51	4.8	5	2.12	.918	.007
Surprise	6.55	7	.86	5.3	6	1.87	0	.359
Trust	5.74	6	1.14	3.53	4	1.96	0	.529
Anticipation	4.73	5	1.43	3.09	3	1.82	0	.424

was 6.09 (SD: 1.54). For disgust, the mean satisfaction score of the message creators was calculated as 4.78 (SD: 1.51), and the mean satisfaction score of the receivers was 4.8 (SD: 2.12). This showed that the message referred to the same meaning for the sender and the receiver when anger and disgust were expressed only with emoji.

A significant difference was observed between the satisfaction scores of the message creators and receivers for fear, sadness, joy, surprise, trust and anticipation, which were the other six basic emotions. This indicated that the related emoji message may refer to different meanings for both sides.

The overall satisfaction score was defined within the range of 1-7 of the scale. The emotions are shown in Figure 2 from high to low scores according to the satisfaction scores of the message creators and receivers. It may be seen that the emotions of anger and disgust were almost on the same line for the sides of the producer and receiver of the message. This showed that the emotions of anger and disgust were meaningful with the same degree for the producer and receiver of the message.

Figure 2. The ranking of the emotions according to the satisfaction scores of the message producers and receivers.

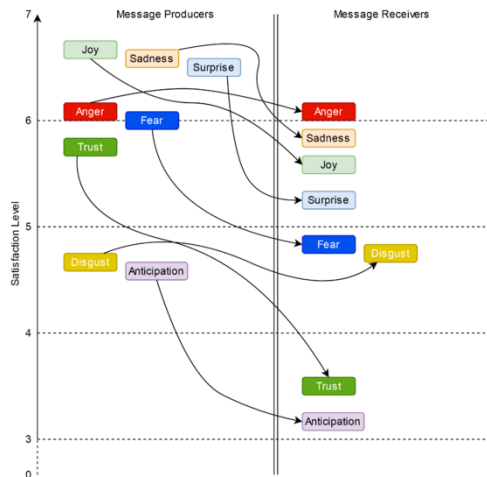


Figure 2 was generated by using the mean of satisfaction levels of the message producers and receivers. As stated before, we asked the participants to give a satisfaction score between 1 and 7. Figure 2 shows the orders of the emotions by their scale vertically for the two groups for the producers and receivers. As seen in the figure, the message receivers had a lower satisfaction score than the message creators in general. Furthermore, the same emotions were highlighted with the same background color, and the change in the ranking is visualized in the figure. The satisfaction score ranking of the emotions was the same for both groups of participants, and it draws attention that “anger” was selected by the participants who evaluated the message as the most distinctive emotion expressed with emoji. The emotion of anticipation had the lowest satisfaction score in terms of both the message creator and the message receiver. This makes it possible to interpret that this emotion is not suitable for expression with emoji.

Considering the transference of the emotions, for all the emotions except for “anger” and “disgust”, the receiver was found to have a satisfaction score which was significantly different than that of the sender, as a result of their expression only with emoji. Therefore, the meaning attributed to the emoji message by the individual who created the message could not be interpreted on the same level by the individual who received the message. In the expression of the emotions “anger” and “disgust”, for which there was no statistically significant difference between the satisfaction scores of the sender and the receiver, the “anger” emoji, which is generally expressed by a facial expression in red color, and the “disgust” emoji, which is generally expressed by facial expression in green color, were effective.

The findings of the study unveiled an important issue. While using an emoji message, individuals have an expectation in terms of the meaning of the message. They make a prediction on how someone will understand the message (Cramer et al., 2016). The most important point is that even though the producer of the message feels certain of the meaning of the message, it may not be valid still. We collected the satisfaction levels of both the producer and receiver of messages and analyzed the difference between them. The difference was about the perceptions of the producer and the receiver. It differed a little from the meaning an emoji. Here, the producer ascribed a meaning to an emoji-only message. However, the receiver disagreed with the producer. If there is not an auxiliary communication tool, this could most likely cause miscommunication.

There are some previous studies similar to this study. They have some limitations like targeted groups, message types, comparison of existing or absent emoji in a message, rendering emoji in different platforms, or the gender effect. Thanks to the novel findings, we have an opinion on how to consider the same emoji-only message by its producer and receiver. The common point of the study with previous works was that emoji messages may cause miscommunication, and they must be supported with other communication tools, at least text.

Another critical point was the loss of meaning. Emoji-only messages not only cause a disagreement between the producer and the receiver but also lead to a loss in meaning in general. Considering the ten questions and eight emotions, while the satisfaction level of the producer was 5.26 (SD: 1.63), the same value for the receiver was 4.78 (SD: 1.98) over 7 (Table 4). Both the low satisfaction level and high standard deviation showed a loss in the meaning of the emoji-only message and confusion.

11. CONCLUSION

Emoji are an effective and popular method of communication today. Emoji, which can be used together with or without text, was first used instead of facial expressions, and over time, diversified for hundreds of different meanings.

In this study, the message producers and receivers were inspected as two separate groups in their communication with emoji, and the effect of messaging with emoji was researched. The participants were asked to answer ten different questions, which required abstract and concrete responses, only with emoji, and they were also requested to express 8 basic emotions defined by Ekman (1987) and

Plutchik (1980) only with emoji, without any limitation on the maximum or minimum number, type or sequence of emoji.

The study investigated how communicable and understandable the sentences formed only with emoji and the emotions to be transferred could be. According to the findings, it was seen that the sentences formed only with emoji could be evaluated in more different meanings by the receiver, although they were generated with a high satisfaction level by the sender. This means emoji-only messages do not carry the exact meaning ascribed by the producer. Apparently, losing the meaning can cause misinterpretation, thereby miscommunication. As a future study, a comparison may be performed by using the same methodology in this study, between emoji-emoji and text-text communication to see the difference in the miscommunication levels of emoji.

This study revealed that the use of emoji may not be effective alone in communication in terms of understandability. Thus, defining emoji as a ubiquitous language is not exactly correct. It may be discussed as a ubiquitous auxiliary language. Similarly, Das et al. (2019) defined emoji as a textual paralanguage. In any way, we may argue that emoji are not enough to be a language alone. On the other hand, because the receiver's satisfaction level was not low, emoji, which are composed of symbols, have a big potential. Their current usage rate in daily life also contributes to their potential.

The study had several limitations. They are described as a list below.

- The number of potential emoji was a limitation that was inevitable for the study. We did not restrict the participants about emoji types, but their variety probably caused confusion. As a future research subject, increasing the number of emoji must be taken under control. In the study, the participants did have 3304 options of emoji. This number of symbols for an alphabet is higher than those of many traditional languages.
- Emoji are rendered differently on different platforms. This difference may cause different interpretation in terms of meaning or satisfaction. We did not collect platform data in our test process. Our suggestion is to collect platform data in further studies to see the effect of rendering.
- The last limitation was about the background of participants. The study was performed in Turkey and with Turkish people. Because emoji usage is related to cultural effects, our findings may be considered as a Turkish approach. The age and gender effects were also not considered. We used random sampling, but it caused imbalance in the distribution of the participants.

In future studies, researching the type, color and other similar characteristics of emoji may provide new findings. Studies in the literature are seen to be very limited in terms of messages containing only emoji. It is recommended that emoji-only communication, which is often preferred in daily communication, should also be discussed rather than the message + emoji format. Additionally, because emoji may look different on different systems, the meaning of emoji on different systems may be inspected (Pohl et al., 2017). Because emoji are beyond symbols and close to figures, subjective approaches are very influential on their meaning.

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