# Understanding Textual Interpretations with and without Emoji

MILA KASTEEL, University of Twente, The Netherlands

To date, several studies have been conducted on the interpretations of emoji in isolation or context [9] [10] [14]. However, the analysis of the combination of the two is lacking. This study examines how emoji could change the meaning with which people interpret a certain message. Next to that, the relationship between gender or ASD (ASD or ASD within the family) and the interpretation of these messages is examined. A sample of 48 participants (aged between 18 to 25 years) were asked for their interpretation in a survey which contained 10 made-up sentences. Research showed that the use of emoji change the valence with which people interpret a certain message. Regarding gender and ASD, no main effect occurred. The results emphasize the importance of using emoji during online conversations as it can contribute to a better understanding of a message and therefore avoid communication challenges.

Additional Key Words and Phrases: emoji, emoticon, ambiguity, interpretation, computer-mediated communication (CMC), face-to-face (F2F)

## 1 INTRODUCTION

During a conversation, one can see the facial expressions of the other person. Words can sometimes be very ambiguous and therefore seeing someone's face while having a talk can make a big difference in the interpretation of the talk. For example, saying "I hate you" where the eyebrows are drawn down and together, the eyes glare, and the mouth corners are narrowed can be interpreted as someone being hateful. The interpretation can be totally different when the eyebrows are neutral, the eyes doing an eye roll and the head shakes a bit. This will be understood as a playful reaction. Moreover, some people have difficulties reading facial expressions and gauging the emotional states of those with whom they interact [7]. These people often have an autism spectrum disorder (ASD) and therefore have a hard time interpreting a conversation.

With the rise of social media in the 21st century, conversations started to also take place in a computer-mediated communication (CMC) environment. Individuals started texting each other and commenting on each other posts. But there is a difference between talking face-to-face (F2F) and online, namely the facial expressions. With the evolution of social media, facial expressions began to disappear as one could not see someone's face through a screen. The consequence of this is interpreting a text differently than what is meant by the sender. As social media is now a major daily practice in everyone's life, understanding the correct connotation is crucial.

As nonverbal communication cues were lacking, internet users have created and learnt through time to employ emoticons to help them communicate [8]. These emoticons are sideways-appearing typographic symbols that resemble face emotions that are being used by CMC users, for example :). They help to perceive the correct mood, attitude, or attention intents and therefore perform a nonverbal communication function.

In 2010, emoji became very popular around the world. An emoji is a text-based smiley that is being used in electronic messages and online sites, for example 😉. They fill a para-linguistic role in digital written language [15] and can be seen as "visible acts of meaning" [1]. Emoji are often described as the successor of emoticons [11]. One could say that they are a more advanced emoticon.

With these new popular emoji, a new communication conflict occurred. According to recent studies, different people read emoji characters differently, which may lead to miscommunication [10]. However, the study of Miller et al. looked at emoji across platforms in isolation, without taking into account any context. Although emoji can be used alone on occasion, they are most often accompanied by text. A second study from Miller et al. investigated how individuals interpreted emoji in isolation as well as in numerous textual settings [9]. They concluded that when emoji are understood in textual contexts, the risk of misinterpretation of the emoji in isolation and textual contents is similar. But what about people with ASD? The study of Hand et al. shows the same conclusion as above but there may be more ambiguity/divergence in the views of people with ASD [3].

Taking another point of view, emoji are used by the sender to explain their emotional state regarding the message sent. They use emoji to clarify the interpretation of their message. But is that true? As words can be ambiguous, text can have multiple interpretations. Does an emoji help clarify the interpretation of a text or does it make it even vaguer? In other words, does the meaning of the text become clearer when an emoji is added or does it give a whole other meaning to the text? These questions can be formulated into the following research question:

> To what extent does the use of emoji change the meaning in which people interpret a certain message?

Within the research question we want to examine the following sub-research question:

> To what extent does gender, age, social media usage, ASD, or ASD within the family has an impact on the interpretations of certain messages?

The aim of this research is to extend the literature on emoji interpretation and its relationship to emoji-related miscommunication.

## 2 RELATED WORK

Regarding the aim of this study - to examine the extent to which an emoji can change the meaning in which people interpret a certain message - it is important to know previous studies in the field of CMC vs F2F emotional conversations and interpretations of emoji in text or isolation. Firstly, how online and F2F conversations differ from each other is addressed in the study of Kafetsios et al., which showed no significant differences when it comes down to those two [6]. Emotional communication is remarkably similar online and offline, and if distinctions are identified, they demonstrate that CMC has more frequent and explicit emotional communication than F2F. The reason for this is that people - especially young adults - talk about their emotions more openly and are less shy than when talking with someone in real life.

Secondly, what is already known about emoji interpretation in text or isolation? As of now, there are hundreds of emoji and one could say that the interpretation of these smileys is clear, but no. In the first study by Miller et al. [10] and a study by Tigwell et al. [14], exploration was done on whether discrepancies in emoji representations or platform differences lead to different emoji interpretations. Disagreements were found in terms of sentiment and semantics, and these differences became even more pronounced when considering platform representations. A study by Butterworth et al. [2] even showed that gender and emoji choice influence perceptions, and that people should think about how emoji choice might affect how their message is received. But as the context can affect the emoji interpretation, a second study by Miller et al. was conducted where participants interpreted emoji both in isolation and in a variety of literary situations [9]. In this study, little support was found for their hypothesis. In reality, text can enhance as well as lessen emoji ambiguity. The study of Van-yip et al. [12] investigated if the opposite is also true: if an emoji can enhance as well as lessen text ambiguity. The study examines whether inconsistencies in emoji and text valences in texting encourage readers to make more negative inferences. Only the participants' response times and the messages' perceived valence were recorded on sentences extracted from instant messages and social media platforms. The goal of the present study is to look at how the meaning changes between messages with and without emoji. Therefore, this present study will be an addition to the study of Van-yip et al.

## 3 PRESENT STUDY

The first aim of this study was to examine the extent to which an emoji can change the meaning in which people interpret a certain message. We expected sentences without emoji to show less change in meaning of interpretations than sentences with emoji [12] [15] [1]. Second, we aimed to examine the relationship between gender, age, social media usage, ASD (ASD or ASD within the family) and the interpretations of the sentences. Previous research has already given evidence that a message's perceptions can be affected by gender [2] [4]. The study by Herring et al. [4] also showed that older people will frequently misunderstand the functions of the emoji as where younger people perceive them in the traditional ways which could lead to different interpretations. From this can be concluded

that the frequency of using social media decreases with age, which is shown in the study of Hysa et al. [5]. Regarding ASD, we saw that people with this neurological and developmental disorder have difficulty determining emotions [7]. This disorder is genetically transferable which could lead to also different interpretations from the participant [13].

## 4 METHODOLOGY

### 4.1 Procedure

Prior to the data collection, the university's ethics approval was obtained. On May 25th, the Ethics Committee of the University of Twente approved this study. The application can be found under reference number RP 2022-88.

To gather data regarding the interpretations with and without emoji of the participants from the target group, descriptive research was done to give a snapshot of the current situation. An online survey was created in the survey software Google Forms to collect primary data focused on participants aged between 18 to 25 who use social media and networking on a regular basis. A sample of 48 people was recruited by using social media, emailing the track chair, and posting the research on the Canvas page 'Participant Recruitment for HCI Research'. Initially, a total of 51 people were approached. Yet, 3 people were outside the age range of this study, leaving a final sample of 48 participants used for the data analyses.

### 4.2 Material

The survey consisted of three sections. The first section was the general information section. This is the first page the participant saw when opening the survey. On this page, the research is explained next to the task description and the rights of the participant.

Secondly, the background information section. On this page, some background information from the participants was asked. This included gender, age, and the following three questions: "How often do you use social media?", "Are you diagnosed with autism?" and "Is one of your family members diagnosed with autism?". The first question could be answered by using a 5-point Likert scale (1 = Never, 5 = Often), the other two questions could be answered by choosing between 'Yes' and 'No'.

Lastly, the survey consisted of a task with questions. The task contained 10 made-up sentences. These sentences were intended to be neutral in order not to give an interpretation. Therefore, the sentences were tested at neutrality with two people in my direct environment and adjusted where needed. To refer to these sentences, we call this the control condition. After this stage, frequently used emoji were added that would give the sentence a totally different interpretation. This again was tested with people in my direct environment and adjusted where needed. This created the experimental condition. In the survey, the sentences were shown in random order to ensure that the participant did not see the same sentence (without and with emoji) directly after one another. This was done to ensure that the participant no longer knew which interpretation they gave for a certain sentence and could not base their new interpretation on the old one. For each sentence, participants could choose from a list of words to describe their interpretation of the sentence as best

as possible (Q1). This list consisted of: 'Happy', 'Joke', 'Sarcasm', 'Neutral', 'Angry', and 'Sad'. If they thought the best option was not on the list, they could describe in a few words what is meant (Q2). Besides that, there was a 3-point Likert scale, where 1 is negative, 2 is neutral, and 3 is positive. The participant's job was to show their interpretation in the form of a number on this scale (Q3). All the sentences that were in the survey are listed in Appendix A.

All responses obtained via the survey were stored anonymously. No name, IP address, location data, or other contact information were collected, so responses cannot be linked back to an identified person. To participate in the survey was not obligatory, and participants could withdraw from the survey at any time. There was no penalty if they chose not to participate or withdraw from the survey at any point.

## 4.3 Statistical Analyses

The survey responses were transferred to IBM SPSS version 28.0. All statistical analyses were conducted with this software.

In the control condition, most answers included 'neutral' causing lack of variation in answers. Therefore, the responses of Q1 and Q2 were disregarded as a floor effect occurred. Only the responses of Q3 were used during the analyse.

To address the research question, we examined if there were a difference between the control condition - sentences without emoji - and the experimental condition - sentences with emoji - using a Paired Sample T-Test. This was done by re-coding the values of Q3 where neutral got a value of 0 and positive/negative a value of 1. Scales have been made per condition by adding all the responses of Q3 for the 10 sentences. Participants received an average score per scale, per condition (min 0 - max 1). These two scores were compared using a Paired Sample T-Test.
To examine the effects of age, gender, ASD diagnoses and social media usage, MANOVA tests were performed. The variable gender was coded 'Men' 0 and 'Female' 1. The variables ASD and ASD within the family also were coded, were 'No' 0 and 'Yes' 1. A new variable ASD2 was created by adding all values containing 1 of ASD and ASD within the family. This variable contained one person who both had ASD but also had a family member with ASD and therefore received a value of 2. This was re-coded to a value of 1.

*4.3.1 Missing Values.* During statistical analyses, missing values were noticed. For Q3 there were 4 missing values. By calculating the mean instead of adding all scores, correction was made for the number of missing values per participant.

## 5 RESULTS

## 5.1 Research Question

To examine the extent to which sentences with emoji were scored with different value compared to the neutral sentences without emoji, a Paired Sample T-Test was performed. Table 1 shows the frequencies of Q3 within the control and experimental condition (left and right column respectively). The labels can be found back in Appendix A. In the control condition, one can see that most

sentences were scored neutral but we also see in the experimental condition some neutral scores. A possible cause for this can be the use of a neutral emoji with the sentence.

| | Control condition | | | Experimental condition | | |
|---|---|---|---|---|---|---|
| | **Negative** | **Neutral** | **Positive** | **Negative** | **Neutral** | **Positive** |
| **S10 - S1** | 3 | 43 | 2 | 45 | 3 | 0 |
| **S2 - S5** | 1 | 45 | 2 | 0 | 4 | 44 |
| **S3 - S9** | 15 | 30 | 1 | 41 | 7 | 0 |
| **S4 - S17** | 0 | 43 | 5 | 35 | 12 | 1 |
| **S12 - S6** | 7 | 40 | 1 | 1 | 30 | 17 |
| **S7 - S20** | 27 | 19 | 1 | 5 | 16 | 27 |
| **S8 - S19** | 2 | 42 | 4 | 2 | 14 | 31 |
| **S11 - S14** | 1 | 29 | 18 | 0 | 2 | 46 |
| **S16 - S13** | 1 | 41 | 6 | 1 | 7 | 40 |
| **S15 - S18** | 2 | 41 | 5 | 42 | 6 | 0 |

Table 1. Frequency table of Q3.

The Paired Sample T-Test revealed that the experimental condition has more valence than the control condition, $(t(47) = -18.05, p = <.001)$.

## 5.2 Sub-Research Question

To examine the extent to which there were relationships between gender, age, social media usage, ASD or ASD within the family and the interpretations of messages, MANOVA tests were performed. In Table 2 one can find the mean and standard deviation scores of sex and ASD within the control and experimental condition. The variables age and social media usage were not taken into account as the age group were too small and a ceiling effect occurred for the social media usage variable.

| | | Condition | |
|---|---|---|---|
| | | **Control** | **Experimental** |
| **sex** | **Female** (N = 26) | 0.20 (0.15) | 0.80 (0.14) |
| | **Male** (N = 22) | 0.24 (0.18) | 0.78 (0.13) |
| **ASD** | **ASD** (N = 11) | 0.18 (0.14) | 0.76 (0.14) |
| | **Not ASD** (N = 37) | 0.23 (0.17) | 0.8 (0.14) |
| | **Total** | 0.22 | 0.79 |

Table 2. Mean scores and standard deviation of sex and ASD.

The first analysis of variance showed no main effect for sex, $(F(1,46) = 0.10, p = 0.756)$, but a main effect for emoji, $(F(1,46) = 320.98, p = .000)$. Additionally, no main effect for ASD occurred either $(F(1,46) = 1.40, p = 0.243)$. The results for the emoji were again significant, $(F(1,46) = 228.24, p = .000)$.

## 6 CONCLUSION

This study aimed to examine the extent to which the meaning of interpretation of sentences with emoji differs from sentences without emoji. Words can be very ambiguous sometimes, so it is very hard

to gain the correct interpretation. Facial expressions help in narrowing down this broad range of interpretations but in the online world, this is difficult, as there are no real facial expressions. Emoji configure as facial expressions in this online world and our findings showed that the use of emoji does change the valence in which people interpret a certain message which is in accordance with our expectations. Furthermore, we examined if gender, age, social media usage, ASD or ASD within the family moderate the interpretation of certain messages. We already discussed that age and social media usage were not taken into account as the age group ended up being too small and a ceiling effect occurred for social media usage. Outcomes showed that there was no relationship between gender or ASD and the interpretation of certain messages, which means that gender or ASD does not have any influence on how people interpret.

Our expectations for the relationship between gender or ASD and the interpretation of certain messages differed from the actual results. Based on the research of Butterworth et al. [2] and Herring et al. [4] we saw that perceptions of a message can be affected by gender. In our research, this was not the case. Regarding ASD, we expected to see a relationship as determining emotions is a difficult thing to do for autistic people. Emoji could help make things a bit easier, but this seemed unnecessary as people with or without autism identified the valence of the items to the same extent.

## 6.1 Limitations and Future Research

This study aimed to add to current knowledge on emoji interpretation and its relationship to emoji-related miscommunication. Specifically, research on this relation between emoji and interpretation of the text is scarce. As social media plays a big role for everyone, it is important to understand how conversations online with emoji link to different interpretations. Nevertheless, there are some limitations of this study that should be mentioned. First, we only used Q3 during the statistical analysis to answer the research question. Most survey answered included 'neutral' causing barely variation in answers. At this stage, Q1 was not testable as a floor effect occurred. Future research could look into the different kinds of emotions participants answered for the different sentences with and without emoji.
Second, we noticed missing values during the statistical analyses. By making the survey questions required to fill in, this would be prevented.
Third, the sentences in the survey were made up. Future research could examine the study with more diverse sentences.
Fourth, the variables ages and social media usage were not taken into account during the statistical analyses as the age group was too small and there occurred a ceiling effect for social media usage. Future work could examine a bigger diverse sample size of participants. Regarding social media usage, nowadays everyone uses social media. To still test this variable, the group could contain people of all ages, especially older people as they have trouble using social media.

In conclusion, we can say that emoji play a big role in the interpretation of certain messages. They give a certain meaning to it. Therefore, during online conversations, it is important to use emoji

as it can contribute to a better understanding of a message and therefore avoid communication challenges.

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APPENDIX A. SURVEY SENTENCES

| Label | Sentence |
|-------|----------|
| S1 | I just saw Erika 😤 |
| S2 | I just got off the phone |
| S3 | Did you not receive my e-mail? |
| S4 | I have training tonight |
| S5 | I just got off the phone 😌 |
| S6 | I forgot to do it 😂 |
| S7 | It is okay if you do not like me |
| S8 | I will not stay until too late |
| S9 | Did you not receive my e-mail? 😡 |
| S10 | I just saw Erika |
| S11 | See you next time |
| S12 | I forgot to do it |
| S13 | When will you come over? 😉 |
| S14 | See you next time 😊 |
| S15 | I will be present |
| S16 | When will you come over? |
| S17 | I have training tonight 🥺 |
| S18 | I will be present 😏 |
| S19 | I will not stay until too late 😏 |
| S20 | It is okay if you do not like me |