

Receiver Interpretations of Emoji Functions: A Gender Perspective

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Abstract

Previous studies have reported gender differences in emoji use and attitudes toward emoji. Here we ask whether, and if so, to what extent, females and males also interpret emoji use differently. We conducted an online survey to assess how different genders interpret the pragmatic functions of emoji in their local discourse contexts, based on [HD17's] taxonomy of functions. Responses (N=523; 352 females, 121 males, 50 'other') showed few overall differences in how females and males interpreted emoji functions, but the 'other' gender differed from the females and males. Based on responses to demographic and social media use questions, these differences appear related to platform norms (e.g., Facebook vs. Tumblr). We conclude by discussing the implications of these findings for automating emoji interpretation.

1 Introduction

A picture may be worth a thousand words, but graphical systems are not a universal language. Research has shown that users often disagree about the interpretations of emoji, regardless of whether the emoji are presented to subjects in isolation or with some context [MKTTH17; MTCJTH16]. The resultant differences in interpretation have been attributed to several factors, including emoji renderings that differ across platforms, inherently ambiguous forms (such as the grimace face emoji), and the receiver's familiarity with the sender and the culture of the social media platform where emoji are used [MTCJTH16; MKTTH17; Tig16]. One factor that has received little consideration thus far, however, is the receiver's gender. An exception is [JXLHBA17], who found no overall differences in the ability of different gender and age groups to describe and discriminate the dominant emotion conveyed by different emoji in a web survey. However, their study examined these interpretations in isolation and considered only emotion, whereas emoji serve many other communicative functions [HD17], and their interpretation is highly dependent on context [CJT16].

This paucity of research is surprising, given that gender differences have been reported in attitudes toward, and usage of, emoji and their antecedents, emoticons. These graphical icons are perceived as cute, feminine, and, in some cultures [e.g., Sug15], inappropriate for males to use. Consistent with these attitudes, females produce emoji and emoticons more frequently than males do [CLSAWLM17; Wol00]. Moreover, the two genders preferentially use different icons [CLSAWLM17; Wol00] and use them for different pragmatic purposes [Sug15]. Given these findings, it is natural to ask whether, and if so to what extent, females and males also understand emoji use differently.

2 Related Works

The majority of previous research on emoji has focused on their semantic functions. In one of the key studies in this area, [MTCJTH16] examined how people interpret the sentiment and semantics of 22 of the most used emoji as rendered by multiple platforms. Mechanical Turk participants were shown an emoji rendering in isolation and were asked to describe the emoji's meaning in their own words and to rate its sentiment. The authors found within and across platform disagreement on both the sentiment and semantic meaning of the emoji. [MKTTH17] followed up on these findings to see if putting emoji in context would decrease the rate of disagreement. The authors took the 10 emoji that [MTCJTH16] found to be most prone to misinterpretation¹ and collected 200 naturally occurring tweets containing one of these emoji. Contrary to their expectations, [MKTTH17] found that emoji read in the context of the tweet did not become less ambiguous, and that text can even potentially increase the ambiguity of emoji sentiment. Some emoji are more difficult to interpret than others, such as the grimacing face [MTCJTH16]. Similarly, [JA17] found that their Mainland Chinese participants agreed on a single mood/emotion for emoji (shown in isolation) such as the face throwing [sic] a kiss, the loudly crying face, the winking face, the stuck-out tongue, and the heart eyes, while at the other extreme, emoji such as the tears of joy face, the blushing face, and the grimacing face were associated with multiple unrelated moods/emotions.

Emoji do not only function on the semantic level, however, and the reasons for their use do not derive solely from their semantics. Context shapes emoji meaning; thus it is also important to consider their pragmatic functions in social media discourse. This level has received relatively little attention in the literature, but there are some

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¹ Smiling face with open mouth and tightly-closed eyes, grinning face with smiling eyes, person raising both hands in celebration, smiling face with open mouth and cold sweat, relieved face, see-no-evil monkey, person with folded hands, smirking face, face screaming in fear, and face with tears of joy.

exceptions. Qualitative studies of pragmatic emoji functions report that emoji serve as a social tool that can be used to add personal identity expression or playfulness to a message [Gul16; KW15; CJT16; Sug15], to manage the conversation [KW15; CJT16], and to maintain relationships [KW15; CJT16]. More concretely, emoji, like emoticons before them, have been noted to modify the tone of the text they accompany [WD01; CJT16; Gul16; HD17; NPM17]. Further, [HD17] found that emoji can also function as performative virtual actions, emotional reactions, mentions (as compared with uses), riffs, and narrative sequences [see also CJT16; NPM17].

In [NPM17], the authors attempted to train a supervised classifier to identify possible functions of emoji in tweets, including the function “Multimodal,” which aligns with pragmatic emoji functions such as tone modification and gesture. However, their classifier struggled with this particular classification because there was such low agreement among coders and a small amount of training data. While there has been some research on interpretation of emoji and emoticons by humans, that work mainly focuses on how these graphicons [HD17] change or do not change the meaning of the text with which they appear, e.g., [TF96; WD01].

Researchers have found that factors influencing differences in emoji interpretation include variation in emoji rendering across platforms [MTCJTH16; MKTTH17], intrinsically ambiguous forms [JA17; MTCJTH16], variation in cultural emoji usage norms across communities, and the receiver’s familiarity with the sender [BKRS16; Tig16]. However, the gender of the receiver has received little attention in the emoji interpretation literature so far. This is despite reported gender differences in usage of emoji and emoticons, as well as in attitudes toward their use. These graphicons are reportedly perceived as cute and feminine [Ma16; Su15]. [Su15] reports that among Japanese teens, emoji are considered key to girls’ online performance of kawai (‘cute’) identities. A number of studies have found that females produce emoji and emoticons more frequently than males do [CLSAWLM17; Wol00]. Furthermore, the two genders preferentially use different icons [CLSAWLM17; Wol00] and use them for different pragmatic purposes [Sug15]. For example, in a study of English language newsgroups [Wol00], females used more varied emoticons and used them (especially smiles) to express solidarity, support, positive feelings, and thanks, whereas males used emoticons more to express sarcasm and teasing. These findings are consistent with societal stereotypes and expectations that women express more emotion, especially positive emotion, than men [SGDH06]. However, in [CLSAWLM17]’s international corpus,² although females preferentially used all face-related emoji (indicating a social orientation), males preferred heart-related emoji (indicating positive emotion).

Given such differences, we ask whether, and if so to what extent, females and males also understand emoji use differently. The only study we are aware of that addresses this is [JXLHBA17], who designed an online survey study to assess the dominant prospective consumer interpretations of the emotion expressed by facial emoji presented in isolation on a website. The authors found no overall differences in the ability of different gender and age groups in Mainland China to discriminate the dominant emotion conveyed by different emoji. However, as noted above, emoji do not function solely to indicate emotion. The present study thus investigates gender differences in receiver interpretation of emoji function in their discourse context.

3 Method

We created an online survey to assess how internet users of different genders interpret the pragmatic functions of emoji in their local discourse contexts. We collected the emoji together with the message in which each occurred³ and the previous message(s) to which it responded from 14 graphicon and media focused public Facebook groups.⁴ These groups were sampled because of their relatively high density of graphicon content as compared with other public Facebook groups. Initial items for the survey were selected based on cases that the authors found challenging to code in previous research involving these data [e.g. HD17]. Further items were chosen to expand the selection of emoji types and pragmatic functions represented. Two to five examples for each emoji type were included. The included emoji represent 13 of the most common emoji types, which were rendered in the survey to match the emoji that appeared in the original Facebook messages. These emoji did not render consistently across examples. Thus in the survey, to preserve the original context, we used a combination of Apple iOS 10 renderings and screenshots of the emoji as they appeared on Facebook.⁵ See Table 1.

We anonymized and simplified these messages for the survey. The survey itself consisted of 12 items drawn from a pool of 46 messages. Four versions of the survey were created, for a total of 48 examples (two examples were repeated). We designed each block of the survey such that each included at least two examples of all 13 emoji types and had a similar progression from easier to code items to more difficult ones, as determined by the researchers. Assignment of respondents to the blocks was random.

Respondents selected the best interpretation of the use of each emoji from a list of functions adapted from those identified in [HD17], i.e., *tone modification*, *virtual action*, *reaction*, and *illustration/mention*. To these we added the options *softening*, *decoration*, *physical action*, *multiple functions*, *other*, and “*I don’t know*”. These 10 options were reworded and defined near the beginning of the survey to make them more accessible to laypersons. Figure 1 illustrates one of the survey items.

² Principally users from Brazil, Indonesia, Mexico, and the U.S.

³ We selected messages that contained a single emoji in most cases. In a few messages, the same emoji was repeated two or three times, and two messages included two different emoji. In the latter case, the survey instructions directed the respondents to focus only on one of the emoji. Emoji reduplication is not considered further in this study.

⁴ The Facebook groups that provided examples were: EmojiXpress, CatGIFs, AnimeGIFs, Nihilist Memes, Grumpy Cat Memes, Smiley, Stickers, StickersFB, Rise of the Guardians, The Chronicles of Narnia, Star Wars, Percy Jackson, Jared Padalecki, Selena Gomez.

⁵ Some emoji appeared different (or not at all) to us as Mac and PC users; we used the images as they appeared on the first author’s Mac for the screenshots, as they were more complete.

Table 1: Emoji Types and Emoji Included in the Survey

[Prompt: "New Stickers! Rilakkuma by Sanrio" above an image of a series of stickers involving bears and chicks]

Song Song B: hi there,I cannot add or remove stickers for a long time.may I ask for help here or do you know where I should ask pls? 😊

The emoji shows that Song Song B is...

- (Virtually) saying “ ... may I ask for help here or do you where I should ask pls?”, and then smiling
- (Virtually) smiling in response to the prompt, not necessarily related to the text of their comment
- Illustrating the text of their comment
- Associating a positive (or some related) tone with their comment
- Softening their comment
- Literally (physically) smiling while typing their comment
- Just using the emoji as decoration
- More than one function is equally plausible (Specify/Explain your choices)
- Other (Explain)
- I have no idea

Label	Emoji	Label	Emoji
“meh”	😞	Heart Eyes	😍
Big Smile	😄	Kiss	😘
Blush	😊 😳 😊	Smile	😊
Crying	😭 😞 😞	Tears of Joy	😂
Frown	😞 😞	Tongue Out	😜 😝
Grimace	😬	Wink	😏 😊
Heart	❤️		

Figure 1: Example from the Survey

Each participant was also asked to provide information about their gender (female, male, or other), age, native language, country of residence, and social media usage.

Between January 11 and February 20, 2018, we shared the survey with students and colleagues at our university as well as with friends, family, and strangers via social media (Facebook, Tumblr, Reddit, and Ravelry). A total of 658 surveys were collected, and 628 people reported their gender (413 female, 152 male, and 63 other). As not all

respondents completed the survey, in order to maximize the amount of data available for analysis, we included all surveys in which respondents reported their gender and chose a function code for at least one emoji example.⁶ In total, 523 surveys met this criterion (352 female; Mean age: 28.9, Range: 18-70+; 121 male; Mean age: 31.8, Range: 18-68; 50 ‘other,’ Mean age: 25.2, Range: 18-70+).

In the sample of 523, 74.2% of the respondents were native English speakers (F: 74.4%, M: 74.4%, O: 72%), followed by German (5.5%), and 75% reported being based in the U.S. (F: 72.73%, M: 85.12%, O: 66.00%), followed by Canada (4.4%), Germany (4.2%), and the U.K. (2.7%).

We analyzed the function codes the respondents selected by gender overall, as well as broken down by emoji type. Normalized results are presented in charts. Where relevant, the results of Chi squared tests are presented as p values.

4 Findings

Consistent with previous studies, females and males reported different amounts of emoji use: 92% of the female respondents reported using emoji, compared to 78% of the males and 79% of the ‘others’. Females more often said they used emoji on Facebook ‘often’ (30%) and ‘in every message,’ (2%) whereas males reported using them ‘sometimes,’ (38%) ‘rarely,’ (17%) or ‘never’ (13%) more than females (32%, 16%, 6%). More females also reported that they were ‘very confident’ that they understood the intended meaning of emoji when they saw them in social media (58%) as compared with males (47%). Males were more likely to report being ‘somewhat confident’ (43%) – and, in several cases, ‘not at all confident’ (10%) – than females (38%, 4%). Respondents who chose “other” for their gender patterned similarly to females, mostly being very (56%) or somewhat (42%) confident in their understanding of the meaning of emoji.

Despite these expected differences in usage and attitude, we found few overall differences in how females and males interpreted emoji function. Both genders chose *tone* as their default interpretation slightly more than half the time (F: 51.1%, M: 51.8%). Female respondents tended to say that the emoji were functioning as *reactions* (p=0.0731) or expressing *multiple functions* (p=0.0452) more than males. In contrast, males chose the “I don’t know” option more often than females (p=0.006). Figure 2 shows the breakdown of the functions (excluding *tone* to display the results for the other functions more clearly) by gender overall.

The ‘other’ gender category – comprising 50 people and 584 function codes – differed from the self-identified males and females in its preference for two code options, *multiple functions* (p=.0007) and *other* (p=.087). In addition, the ‘other’ genders were somewhat less likely to choose *tone* (46%; p=.0829 compared to M), and instead selected a wider variety of codes – especially *softening*, *action*, and *mention* – although these preferences were not statistically significant.

⁶ The average dropout rate after answering at least one question was 11% (F: 11%, M: 13%, O: 4%), ranging from 8% to 15% in the four blocks.

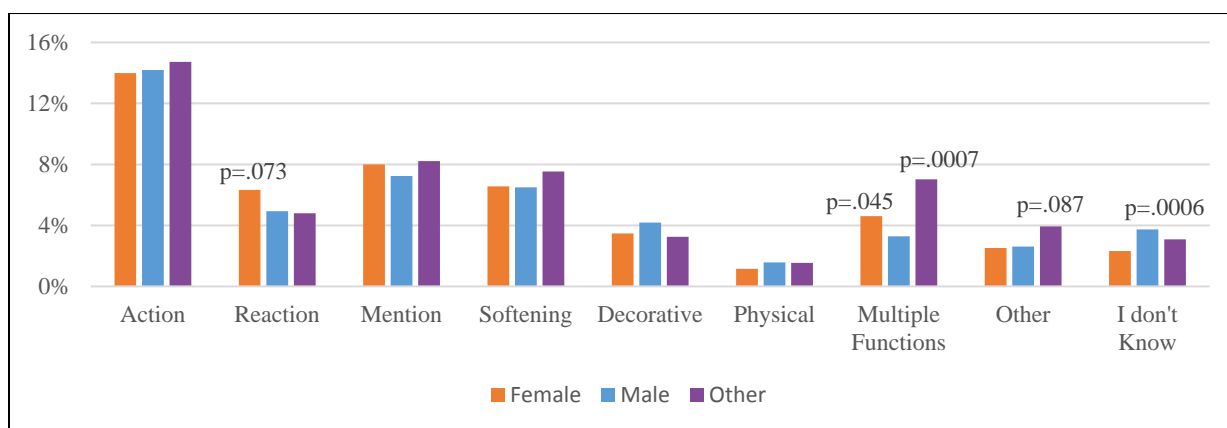


Figure 2. Functions Selected in the Survey (except for *Tone*) by Gender (+p ≤ .1, *p ≤ .05, **p ≤ .01, ***p ≤ .001)

In Figures 3-12, the function results are broken down by type of emoji. Each function has a distinctive emoji profile: Hearts and kisses were especially interpreted as expressing virtual *actions* (Figure 4); smiles and winks as *softening* the force of a message (Figure 5); grimaces and tears of joy as *reactions* to a prompt (Figure 6); and kisses and hearts (especially) as *mentions* that illustrate message content (Figure 7). Even *tone marking*, which is the function the respondents selected most often for emoji use overall, is associated more with certain emoji (tongue out, crying, frown) and less with others (e.g., grimace, kiss) (Figure 3). As for the additional “function” options that we included to supplement [HD17’s] taxonomy, big smiles and hearts were interpreted as *decorative* by some respondents (Figure 8), and some respondents (especially males) interpreted the heart eyes emoji as describing a *physical action* (described in the survey as “looking adoringly” at one’s computer screen) (Figure 9). Finally, the results for *multiple functions*, *other*, and *I don’t know* point to emoji examples for which the respondents were either not satisfied with the specific options provided in the survey or which were especially difficult to interpret functionally. For example, the tears of joy emoji was said by several respondents to have *other* functions (e.g., laughing in a mocking way) (Figure 11), and the grimace emoji, which is known to be ambiguous [MTCJTH16], received the most “*I don’t know*” responses (Figure 12).

Figures 3-12 also show more gender variation than the overall results in Figure 2. Self-identified females and males differed significantly in only two interpretations, i.e., females interpreted both frowns (p=.0105) and smiles (p=.0394) as having *multiple functions* more often than males did. We also observed a slight gendered tendency in the emoji they interpreted as softening (smiles were slightly preferred in this function by females and winks by males), although these differences were not significant. In contrast, the ‘other’ gender deviates from the females and males in more interpretations. For example, the ‘others’ were significantly less likely to interpret smiles as *tone modification* than males (p=.0344) or females (p=.0493), and they were also less likely to interpret the tears of joy emoji as *tone* (p=.072, compared to M). Instead, the ‘other’ gender interpreted the tears of joy emoji as *actions*

(p=.0430) and *mentions* (p=.0499) more than males did. The ‘others’ were also more likely to interpret the blush emoji as having *multiple functions* (p=.0127), and frowns (p=.0809) and kisses (p=.0452, compared to M) as having *other* functions. These findings are consistent with the tendency noted above for the ‘other’ gender respondents to offer more varied interpretations of the functions of the emoji in the survey than the female and male respondents, and to reject the simple function options provided in the survey in favor of multiple and alternative interpretations.

Next we examined the degree to which each gender agreed among itself on its most-preferred (most frequently-chosen) functions. Table 2 shows the percent agreement of each gender on their first choice of pragmatic function by emoji type. Table 3 shows the number of questions for which respondents of each gender chose *tone*, *action*, *mention*, *softening*, or *multiple function* as their most frequent choice.⁷ The highest rates of agreement for all genders were for the tongue out, frown, and “meh” emojis and for *tone*, which was the most preferred function for those emoji. However, ‘other’ gender respondents tended to agree among themselves more (have higher percentages) than females and males for both emoji types and pragmatic functions, except for blush and tears of joy (Table 2) and *action* (Table 3). The ‘others’ even agreed more on *tone*, although they chose it less often. They also had higher agreement than females and males on *reaction*, *mention*, and *softening*, and they were the only gender to prefer *multiple functions* for one example.

We also calculated the degree to which the survey respondents agreed with our own code assignments for the items in the survey. It should be borne in mind that the items were chosen in the first place because we found them challenging to code, so our code assignments might not be accurate. Respondents agreed with us in their most preferred function codes for 60.4% of the survey items (F: 66%, M: 50.9%, O: 64.2%). Because they chose *tone* as the default for most items, we also took into consideration their second most-frequent choice. This increased their overall agreement rate with our codes to 83%. These results are broken down by gender in Table 4. Females and ‘others’ had higher rates of agreement with our interpretations than males did.

Further evidence of the tendency of the ‘other’ gender to assign multifaceted interpretations to emoji comes from the

⁷ The other pragmatic functions were never chosen as the most preferred function for any item and thus are excluded from Table 3.

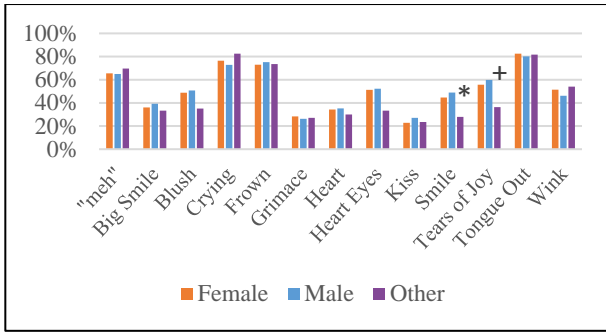


Figure 3: Tone

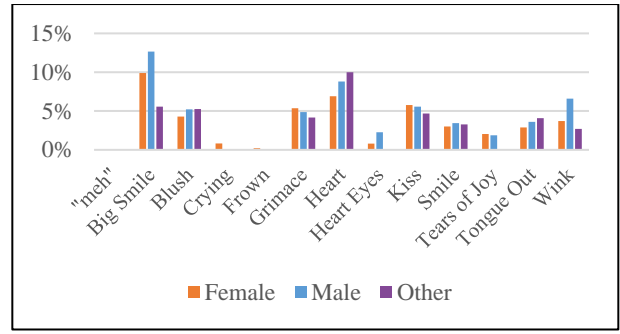


Figure 8: Decorative

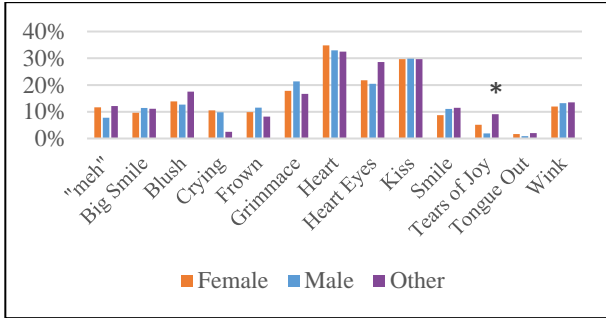


Figure 4: Virtual Action

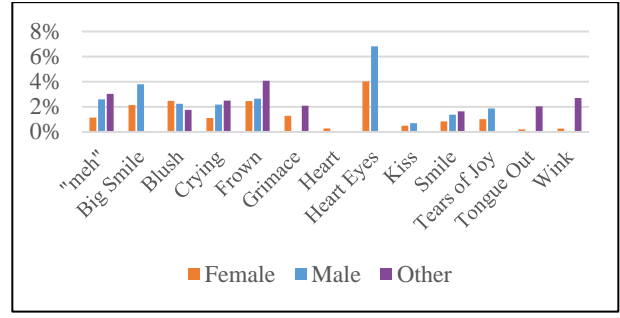


Figure 9: Physical Action

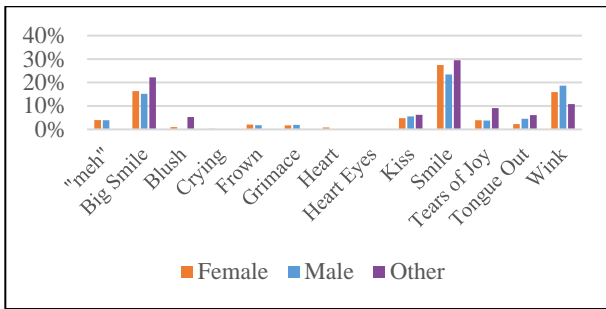


Figure 5: Softening

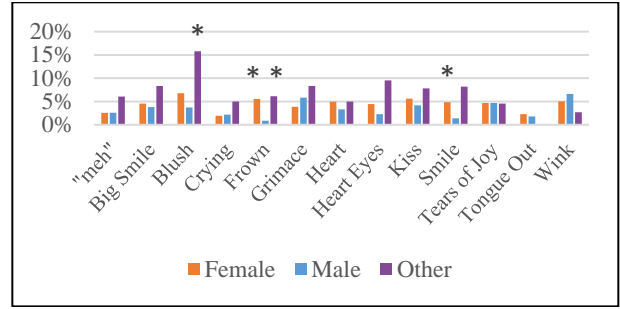


Figure 10: Multiple Functions

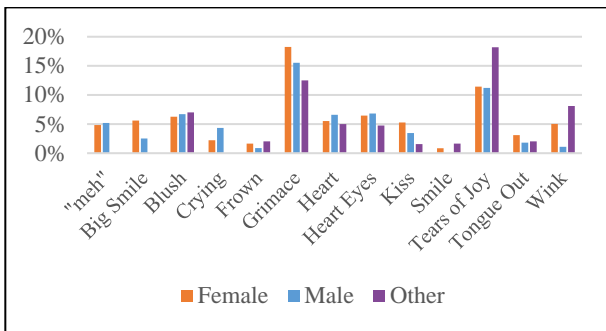


Figure 6: Reaction

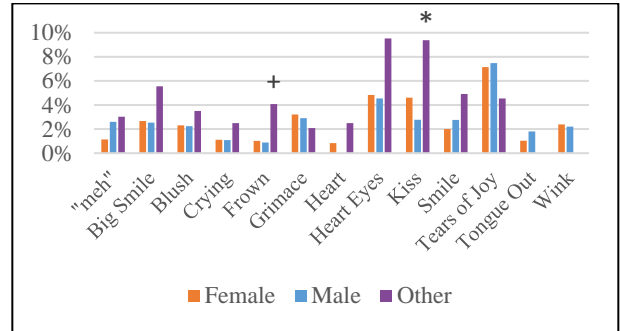


Figure 11: Other

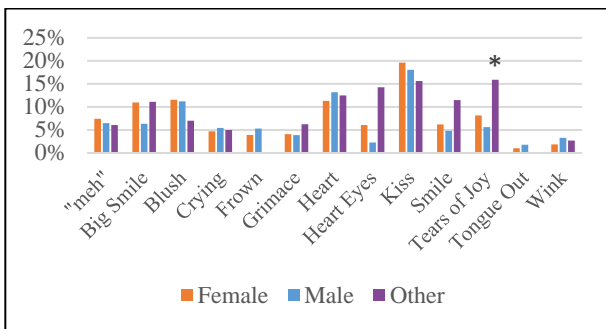


Figure 7: Mention

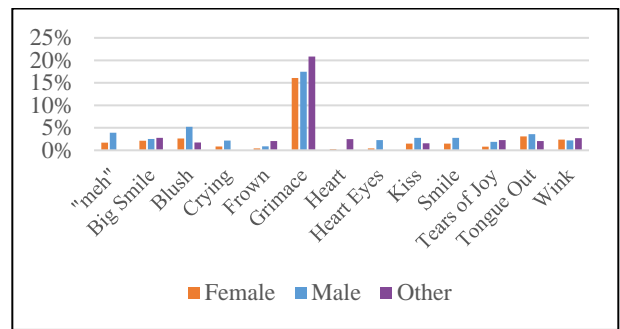


Figure 12: "I don't know"

Table 2: Within-gender percent agreement on most-frequent choice of pragmatic function by emoji type (with number of survey items for each emoji type).

	"meh"	Big Smile	Blush	Crying	Frown	Grim.	Heart	Heart Eyes	Kiss	Smile	Tears of Joy	Tongue Out	Wink	Avg.
F	65.3%	39.5%	50.9%	77.2%	72.3%	36.6%	43.1%	52.8%	45.3%	55.9%	59.8%	83.3%	57.0%	56.9%
M	68.9%	38.5%	51.1%	71.0%	75.3%	35.4%	39.8%	51.1%	46.7%	52.3%	64.8%	80.5%	46.4%	55.5%
O	70.5%	50.5%	46.4%	82.1%	72.2%	48.5%	47.5%	44.2%	46.6%	56.9%	55.8%	82.3%	55.6%	58.4%
#	3	3	3	3	4	5	3	2	5	7	4	4	3	3.8 ⁸

Table 3: Number of questions for which respondents of each gender chose *tone*, *action*, *mention*, *softening*, or *multiple function* as their most frequent choice, and their within-gender percent agreement.

	<i>Tone</i>		<i>Action</i>		<i>Reaction</i>		<i>Mention</i>		<i>Softening</i>		<i>Multiple</i>		Avg.
	#	%	#	%	#	%	#	%	#	%	#	%	%
F	35	61%	4	44%	3	33%	3	40%	5	43%	n/a	n/a	56.9%
M	40	57%	3	56%	2	33%	2	42%	2	44%	n/a	n/a	55.5%
O	29	64%	5	48%	4	39%	6	48%	4	53%	1	46%	58.4%

Table 4: Number and percentage of questions for which respondents of each gender agreed in their first- or second-most-frequent choice with the authors' code assignments for *tone*, *action*, *reaction*, *mention*, and *softening*.

	<i>Tone</i>		<i>Action</i>		<i>Reaction</i>		<i>Mention</i>		<i>Softening</i>		All Agreements	
	#	%	#	%	#	%	#	%	#	%	#	%
Female	23	100	6	100	4	50	7	100	6	67	46	87
Male	23	100	5	83	3	38	5	71	6	67	42	79
Other	20	87	6	100	4	50	7	100	7	100	44	83
Authors	23	–	6	–	8	–	7	–	9	–	53	–

responses to an open-ended question in the survey: “Do you have any other comments about emoji use in social media?” The ‘others’ provided proportionately more answers to this question (40% of ‘other’ vs. 29% of males and 22% of females), and their comments tended to be longer and to focus on nuances of emoji interpretation. For example, one ‘other’ gender respondent commented:

“Emojis are useful as shortcuts, not just in a one-to-one way (eg, a thumbs up emoji meaning that a person agrees with what the other person suggested) but also more ambiguously. a heart emoji can be used to express support and care to a friend. it's that i dont know the words to say to you right now, but i love you and i care about you, and all the other things i dont know how to say right now bc wow is that overwhelming.”

Typical male comments, in contrast, included:

“It is a very interesting development in linguistics”
 “Many overuse it [emoji] for no reason which at times is irritating”

Comments by females were more varied, and resembled ‘other’ comments more than male comments.

Finally, the ‘other’ group differed in its responses to the demographic and social media usage questions. It was younger; 80% of the ‘other’ respondents were between the ages of 18 and 29, and 40% were between 18 and 22 years old. The ‘others’ reported being more confident in their survey answers (36%) compared with females (30%) and

males (26%). They also found the survey “very easy” or “somewhat easy” (64%) more often than the females (59%) and males (52%) did. In terms of their social media use, they were also less likely to have a Facebook account (61% compared with 85% F and 93% M) and more likely to have an account on the micro-blogging site Tumblr.com (32%, compared with 19% F and 13% M).

We discuss these demographic differences below, together with the finding that the ‘other’ genders often differ in their emoji interpretations compared to the females and males.

5 Discussion

The analysis of our survey data in response to actual (anonymized) Facebook group messages revealed two main findings:

1. Self-identified females and males mostly agreed in their interpretations of the 13 emoji types represented in the survey.
2. The ‘other’ gender respondents differed more from the females and males than the females and males differed from each other.

The lack of gender differences in female and male interpretations of emoji functions is surprising in light of the considerable evidence that females and males use emoji differently. At the same time, people can often understand language that they do not themselves produce, as in the case of language learners. Moreover, our findings are in line with the findings from [JXLHBA17] regarding the interpretation of emoji sentiment, and suggest that females and males have

⁸ The total is 49, because several of the survey items had multiple versions depending on, e.g., which part of a message the respondent interpreted the emoji as associated with.

similar mental representations of emoji. The differences in female and male emoji usage reported in the literature are thus presumably social in nature, e.g., emoji play a role in identity performances, as suggested by [Sug15; Wol00]. Performing gender via emoji can be a double edged sword, however, as one female respondent noted at the end of the survey:

“I don’t really like using them. I’m female and I feel that if I didn’t use enough positive emojis, it would be perceived as rude, unenthusiastic, or apathetic by my acquaintances or friends. This is sort of a pain because I want men who see me on social media to take my ideas seriously, and I’m pretty sure that the more emojis I use, the dumber I’ll be perceived by men.”

A systematic investigation of gender differences in use vs. interpretation of emoji would be a useful future study.

As for the ‘other’ genders, it is tempting to conclude that they resist simple interpretations of emoji functions in the same way that they resist binary gender norms. However, we lack specific information about the make-up of the ‘other’ gender. The category could include internet users who identify as non-binary, gender-fluid, or who otherwise reject the gender binary, but it could also include people who identify as female or male but for whatever reason prefer not to provide that information in an online survey. Still, clues as to why the ‘other’ gender respondents differ in their understanding of emoji functions can be inferred from their age and patterns of social media use. They are young, and they are less likely to have a Facebook account and more likely to have a Tumblr account than the other survey respondents. Consistent with this, Tumblr users skew young, and the platform has many LGBTQ users [BR17]. This suggests that there are different norms of emoji interpretation associated with different social media platforms (e.g., Facebook vs. Tumblr). Interestingly, emoticons and GIFs are more common than emoji on Tumblr, suggesting that the ‘other’ genders encounter emoji elsewhere (79% of the ‘other’ respondents who finished the survey indicated that they use emoji), or possibly that the other graphicons on Tumblr influence their perception of emoji. (Cf. [HD17], who suggest that the different graphicon types interact as a system.) Unfortunately, the number of ‘other’ gender respondents in our survey is too small to allow for reliable examination of differences in their makeup on variables such as platform use and age. There is a need for further research on this interesting category, perhaps incorporating one-on-one interviews.

Another finding of this study is that different emoji types specialize to some extent in expressing different pragmatic functions. Although *tone modification* was the most common interpretation assigned to the emoji examples overall, and all of the emoji were interpreted by at least some respondents as indicating *tone*, the blowing a kiss emoji, for example, was more often interpreted as an *action* or *mention* (illustration of the accompanying text), and the grimace emoji was often interpreted as a *reaction*. This finding, if supported by further research, offers a more nuanced understanding of emoji function than in previous studies.

Last, the survey results validate [HD17]’s functional categories, in that all those functions were selected as

interpretations for emoji use, and each was selected by the majority of respondents for at least some of the examples. Of the additional function options that we included, *softening* was also selected quite often by the survey respondents, which suggests that it should be added to the taxonomy of emoji functions. Of the other functions we added, all were chosen by some respondents for some items; however, the *physical action* function was chosen only rarely, and the *decoration* function was selected only slightly more. These do not appear to be major emoji functions, at least in Facebook groups. At the same time, the results showed that *tone modification*, in addition to being a very common function for which emoji are used [HD17; CJT16; Gull16; NPM17; WD01], was also the default interpretation that the receivers assigned to most of the emoji.

The limitations of the study should be acknowledged. The survey instrument contained only two to five examples of each of the 13 emoji types, and the emoji were not always rendered in the same way within the survey, but rather were rendered according to how they appeared in the source Facebook messages (Table 1). This was done to preserve the authenticity of the context, but it also introduced an element of variability that was not controlled for in our analysis. Still, for the four cases where emoji types were rendered variably (blush, crying, frown, and tongue out), respondents generally agreed on the pragmatic functions across cases, except for one blush item where the ‘others’ disagreed with the females and males. A fine-grained analysis at the level of the individual example was not feasible for this study due to insufficient data. Future gender-based research should include multiple examples of a function associated with a particular emoji (e.g., a big smile serving as *softening*).

It is also likely that the respondents’ interpretations were influenced by the specific examples we included. For example, the three items containing heart emoji each had a different code that was favored by all three genders (i.e., *action*, *mention*, and *tone*). The included examples were not necessarily representative; some were chosen because they posed challenges when we coded them in earlier studies [e.g., HD17]. Moreover, there are many emoji that we could not include in the survey, given the need to keep the survey to a reasonable length. Future research should investigate what functions are associated with other emoji, and whether and if so how the interpretations of those functions vary.

Another limitation concerns the ‘other’ gender category. No information was available about why respondents selected that category; some people may just not have wanted to share their gender information, while others may be gender nonconforming. That uncertainty coupled with the relatively small population of ‘others’ (N=50; 584 function codes) makes the ‘other’ gender results less reliable and more challenging to interpret than those for self-identified females and males. Nonetheless, a number of indicators suggest that the ‘other’ category possesses internal coherence, such as the fact that its members tended to agree with each other on their emoji interpretations. In future research, users of different social media platforms could be interviewed to gain further insight into their norms of emoji use and interpretation.

Finally, the findings of this study are limited in their generalizability in certain respects. The survey items included challenging instances of emoji use drawn from particular Facebook groups where graphicon use is common, and the

survey respondents were not randomly or systematically selected. The ways in which emoji function on other social media platforms may differ. However, the findings should generalize to other similar Facebook contexts, and since Facebook is extremely popular, many people likely have encountered the kinds of emoji instances used in our survey, which may make the findings more generally applicable. Finally, despite the survey including difficult-to-interpret examples, respondents mostly agreed among themselves and with the researchers' interpretations. Agreement on other, less challenging emoji uses should be even higher.

6 Conclusion

This study found that female and male social media users did not differ appreciably in their interpretations of emoji functions in Facebook messages. This suggests that researchers and designers need not be unduly concerned about misunderstandings of emoji due to user gender; both females and males appear to understand (or misunderstand) emoji in similar ways. However, research findings for one platform do not necessarily transfer to other platforms. The norms of graphicon usage on different social media platforms need to be taken into account in research on emoji interpretation.

The findings of this study have implications for automating emoji interpretation. Identifying pragmatic usage is a challenging task in Natural Language Processing [LID98]. We propose that some version of the emoji function taxonomy could be used to train a classifier to recognize emoji functions in public Facebook groups. The associations found in this study between emoji types and functions, if validated by further research, could assist greatly in identifying those functions.

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