EMOJIS INFLUENCE EMOTION COMMUNICATION AND TRAIT PERCEPTIONS WHEN JUDGING OTHERS' ONLINE INTERACTIONS

MEGAN LEBLANC
BA, University of Ottawa, 2020

Thesis submitted to the University of Ottawa
in partial fulfillment of the requirements for the
Degree of Master of Arts in Experimental Psychology

School of Psychology
Faculty of Social Sciences
University of Ottawa

ABSTRACT

In face-to-face (FtF) communication, facial expressions provide information on the emotional state and personality traits of individuals. These effects are not only seen when interacting directly with another person but also when viewing others interacting with each other. We examined whether emojis play similar roles in text-based exchanges on digital platforms. Participants (N =177) viewed two people exchanging via text. Person A initiated the exchange, and Person B responded in either an agreeable or disagreeable manner. In half of the agreeable exchanges, Person B's messages were accompanied by a positive emoji, and in half of the disagreeable exchanges, Person B's messages were accompanied by a negative emoji. Exchanges were couched in a personal, professional, or romantic context. We measured trait perceptions of agreeableness and perceptions of the emotional state of Person B. Emojis magnified both perceptions of (dis)agreeableness and perceptions of the emotional state of Person B. Social context had no effect, suggesting that the effect of emojis is consistent across social contexts. We conclude that emojis play a similar role in digital communication as facial expressions do in FtF communication, though with some differences.

ACKNOWLEDGEMENTS

I would like to give a huge thank you to my co-supervisors, Dr. Charles Collin, and Dr. Isabelle Boutet, for their immense amount of support throughout this degree. Although this thesis is different than what I had anticipated, and I faced challenges getting here, with their support and guidance, I am ultimately very proud of it. I would also like to thank the members of my committee, Dr. Patrick Davidson, and Dr. Denis Cousineau for their encouragement and feedback throughout the course of my thesis. I am also deeply grateful for the support and feedback from Dr. Vanessa Taler. Thank you to my lab mates who sat through so many practice presentations of mine and who were so excited when I told them I was getting ready to submit the thesis. Although I am happy to be moving on to the next chapter, I will miss our little lab family.

From my personal life, I would like to thank my amazing husband, Joven, for his endless support through the ups and downs of this degree. From giving words of encouragement, to listening to my rambles, you never wavered in supporting and believing in me, even when I was questioning myself, and for that, I am forever grateful. Thank you to my family, especially my mom, for your ongoing love and support, for listening, and giving me advice as I navigated this path. Thank you to my friends, Jenna, Taryn, and Jeanette, who have been some of my biggest supporters, who always listened, and gave me validation when I needed it, and who were always there to talk or watch a movie and unwind. Finally, thank you to my best friend from the program, Adelaide, who has been there through every up and down, who understands the struggles of grad school life, and who I could always count on for a chatty coffee date.

Without the support from my colleagues, family, and friends, I would not have made it to where I am today.

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Overview

1.1.1 Non-Verbal Cues

Sharing of non-verbal social information is a vital part of face-to-face (FtF) interactions for both avoiding conflict and providing social support to our peers (Gonçalves et al., 2018). Facial expressions are a main source of non-verbal information, and contribute not only to emotional communication but also to the inferences we make about others' personality traits (Montepare & Dobish, 2003). In both FtF and digital interactions, observers can be actively engaged in exchanging non-verbal cues with a partner or passively viewing others exchanging non-verbal cues. Research in FtF communication suggests that we make inferences about personality traits when viewing others interacting in a situation we are not part of (Holleran et al., 2009). These judgements are made both when listening to conversation snippets (Holleran et al., 2009) and when observing static images of two individuals facing each other (B. C. Jones et al., 2011). For example, B.C. Jones et al. (2011) found that observers rated a man with an aggressive facial expression as more dominant when that man was "interacting" with another man with a fearful facial expression compared to when both men had aggressive facial expressions.

As far as we know, no computer-mediated communication (CMC) study has examined how users react to non-verbal cues when observing others interact. This is surprising given that this situation commonly occurs in various digital platforms such as personal and professional group chats. In personal group chats, for example, a few members of the chat tend to dominate and be the main protagonists of most exchanges such that other users are not the direct target of

their messages but rather observers of these exchanges (Seufert et al., 2016). Little is known about how group chat members react to exchanges between members of the chat. The overarching goal of the present study was to address this gap. We focused on how participants reacted to the presence of emojis when viewing exchanges between two other users. We also explored whether these reactions vary across different social contexts. Participants viewed mock text-based exchanges where a receiver responds in an agreeable or disagreeable manner to a sender's message. In half of the exchanges, emojis were added to the receiver's text. Moreover, the exchanges were couched in either a personal, professional, or romantic context. We measured participants' interpretation of the emotional state of the receiver and their perception of the receiver's personality. In the following sections, we review literature on emojis and social context and present the hypotheses tested.

1.1.2 Emojis and Emotional State

Unlike FtF communication, CMC relies heavily on exchanging verbal information, which may lead to misunderstandings and miscommunications (Derks et al., 2008; Kelly & Miller-Ott, 2018). Users spontaneously and informally developed paralinguistic cues such as capitalization and smileys to compensate for the lack of non-verbal cues in CMC. In recent years, emojis, and particularly emojis that depict facial expressions of emotions, have become the predominant source of non-verbal communication in text-based digital interactions[1]. Research to date suggests that emojis play similar communicative and interpersonal functions as non-verbal signals in FtF interactions. Emojis facilitate processing and understanding of the emotional tone and meaning

[1] In the remainder of this paper, we use the term 'emojis' to refer more specifically to emojis that mimic facial expressions of emotions.

of verbal messages (Boutet et al., 2021; Daniel & Camp, 2020; Gesselman et al., 2019; Herring & Dainas, 2020; Kaye et al., 2021; Kralj Novak et al., 2015; Rodrigues et al., 2017). Moreover, emojis intensify perceived emotional state of messages (Boutet et al., 2021; Filik et al., 2016; R. B. Harris & Paradice, 2007; Luor et al., 2010; Riordan, 2017), and in some cases, change the emotional interpretation of the message (Boutet et al., 2021). In the present study, we examined whether emojis had a similar influence when users passively observed two other users interacting. We predicted that:

H1: Emojis will intensify the emotional state interpretation of the receiver. Specifically, receivers will be perceived as more positive/negative when their agreeable/disagreeable responses are accompanied by an emoji compared to those without an emoji.

1.1.3 Emojis and Trait Perceptions

In FtF communication, non-verbal cues conveyed by faces and the body are used to make general trait perceptions about others (Frith & Frith, 1999; Hall et al., 2019; Willis & Todorov, 2006). For example, those who smile more tend to be perceived as more warm, and in turn may be more successful at initiating social interactions (Bayes, 1972; Wang et al., 2017). To date, research has focused on how personality traits are linked to one's own emoji use (Li et al., 2018; Liu & Sun, 2020; Marengo et al., 2017), rather than how using emojis impacts how others perceive these personality traits. For instance, Li et al. (2018) found that agreeableness is positively related to higher rates of emoji use, and that those high on agreeableness prefer using emojis which express "like" or "love". However, one study did examine warmth, a trait taken from the interpersonal circumplex (ICP) model and found that emojis impacted warmth ratings. Positive emojis enhanced warmth ratings, while negative emojis decreased warmth ratings (Boutet et al., 2021).

Agreeableness judgements dominate the impressions we form of others (Ames & Bianchi, 2008). Agreeableness is linked to warmth, cooperation, likeability, and a pleasant disposition (Graziano & Eisenberg, 1997; Vize et al., 2021), and is very important to interpersonal interactions as it plays a positive role in maintaining friendships (K. Harris & Vazire, 2016). Therefore, being perceived as having a high level of agreeableness may contribute to having successful social interactions, whereas those who are seen as low on agreeableness may be perceived as antagonistic (Vize et al., 2021). (Dis)agreeableness is also an important factor when judging related concepts such as hostility and friendliness (Argyle et al., 1971; A. L. Jones et al., 2019). Given the importance of agreeableness in interpersonal interactions, we designed our mock conversation such that the receiver adopted either an agreeable or disagreeable attitude when responding to the sender's text. In half of the exchanges, agreeable/disagreeable responses were accompanied by a congruent emoji (agreeable-smiling emoji; disagreeable-frowning emoji). Considering the aforementioned studies on emojis and social perceptions, we predicted that:

H2: Emojis will influence social perceptions of the receiver. Specifically, receivers will be perceived as more agreeable/disagreeable when their agreeable/disagreeable responses are accompanied by an emoji compared to those without an emoji.

1.1.4 Social Context

Social context is an important factor in FtF communication. For instance, certain forms of non-verbal information, such as facial expressions, body language, and tone of voice may be interpreted differently in the context of a friendly get-together than they would in a formal business meeting (Cheshin, 2020). In a professional setting, authentic displays of positive emotion (e.g. smiling) may be associated with better outcomes for the displayer, for example,

higher warmth perceptions, may lead to more positive interactions, which leads to a higher likelihood of being hired (Bonaccio et al., 2016; Wang et al., 2017). Moreover, in romantic relationships, non-verbal cues, both positive and negative, may have strong implications within the relationship, impacting judgements of the relationship, the partner, or themselves (Docan-Morgan et al., 2013).

Whether social context also influences how users react to non-verbal cues in CMC is unknown. As discussed above, several lines of research suggest that emojis intensify perceived emotional intensity of messages (Boutet et al., 2021; Filik et al., 2016; R. B. Harris & Paradice, 2007; Luor et al., 2010; Riordan, 2017), and in some cases, change the emotional interpretation of the message (Boutet et al., 2021) in a personal context. In a professional setting, some have found that perceptions of competence are decreased by the use of emojis (Aretz & Mierke, 2019; Glikson et al., 2018). Contrary to this, Ernst & Huschens (2019) found that competence is not impacted by emoticons. Moreover, perceptions of warmth, humor and friendliness may all be positively impacted by emoji/emoticon use (Aretz & Mierke, 2019; Ernst & Huschens, 2019). In a romantic context, including non-verbal cues in CMC is associated with better relationship outcomes, such as more favourable perceptions, fostering an intimate connection, and a greater desire to pursue a relationship (Gesselman et al., 2019; Kotlyar & Ariely, 2013). Further, emojis can impact the positivity and negativity of messages being sent between partners, improving and harming communication between them (Rodrigues et al., 2017).

From the research described above, it is unclear whether the impact of emoji use generalizes across three different social contexts. In some cases, for example, emoji's impacts on social perceptions of warmth and emotionality, results seem to converge (Aretz & Mierke, 2019; Boutet et al., 2021; Rodrigues et al., 2017) and positive emojis tend to positively impact social

and emotional perceptions. While in other instances, for example, emojis impact on perceptions of competence, it diverges (Ernst & Huschens, 2019; Glikson et al., 2018; Rodrigues et al., 2017). As far as we know, only Glikson et al. (2018) directly compared a personal and professional context within one study. They found that messages with smileys compared to those without had increased perceived warmth in the personal condition, but not the professional condition. As well, smileys decreased perceived competence in the professional condition, but not in the personal condition. This study suggests that more research is needed to clarify this phenomenon. The present study aimed to determine whether the impact of emojis differs across personal, professional, and romantic contexts. Given that past results vary substantially across studies, we did not form a specific hypothesis for this manipulation, and instead propose the following exploratory question:

Q 1: Will the effects of emojis differ across the three different social contexts?

1.2 Present Study

The present study was aimed at examining how participants reacted to the presence of emojis when viewing exchanges between two other users. We also explored whether these reactions varied across different social contexts. Participants viewed a series of mock text-based exchanges where the receiver responded in an agreeable or disagreeable manner to the sender. In half of the exchanges, congruent emojis were added to the receiver's responses (agreeable-smiling emoji; disagreeable-frowning emoji). This yielded four conditions: 1) agreeable conversation-positive emoji, 2) agreeable conversation-no emoji, 3) disagreeable conversation-negative emoji, and 4) disagreeable conversation-no emoji. Moreover, the exchanges were couched in either a personal, professional, or romantic context. We measured participants'

interpretation of the emotional state of the receiver and their perception of the receiver's personality.

The realism, agreeableness, and emotional valence of the exchanges was examined (see section 2. Methods and Supplementary Materials section 6.5 for details). To improve validity of the study, we used two emojis that had been previously shown to be consistently interpreted (Boutet et al., 2021; Jaeger et al., 2018).

2. METHODS

2.1 Stimulus Creation and Evaluation

The first step in this project was to create novel text conversations for use as stimuli (see Figure 1). We therefore generated a set of 60 such conversations, with half being agreeable and half being disagreeable. Each conversation consisted of an exchange of 3 or 5 short messages. In the 3-line text conversations, one statement was sent by Person B and two by Person A. In the 5-line conversations, two statements were sent by Person B and three by Person A. After an initial review of the stimuli, one pair was removed due to the structure varying slightly from the other stimuli.

To evaluate these novel stimuli and select among them, we went through several rounds of data collection, analysis, and elimination. First, two independent raters rated the conversations on agreeableness and realism for each social context (personal, professional, romantic). We used these ratings to narrow down our conversations from 58 total to 54 (See section 6.5.4.1 Independent Raters for details). After narrowing the conversations, we conducted a pilot study in which participants (n= 14) rated the remaining 54 conversations for agreeableness and emotional

intensity. Using this data, conversations were again narrowed down to a total of 48 conversations (24 agreeable, 24 disagreeable; See section 6.5.4.2 Pilot 1 for details).

Finally, further evaluation was carried out on the final set of selected conversations. Another sample of participants (n = 77) was asked to rate the emotional valence and realism of each conversation across the different social contexts. Participants were randomly assigned to one of the three social contexts. These results indicated that agreeable conversations were significantly more positive and more realistic than disagreeable conversations, however, these effects did not differ across social context (See section 6.5.4.3 Pilot 2 for details). We hypothesize that agreeable conversations were significantly more realistic because of the relative rarity of negative/disagreeable messages sent via CMC (Lenhart, 2015). The total number of conversations selected for the main study was 48 (24 agreeable, 24 disagreeable).

a) b)

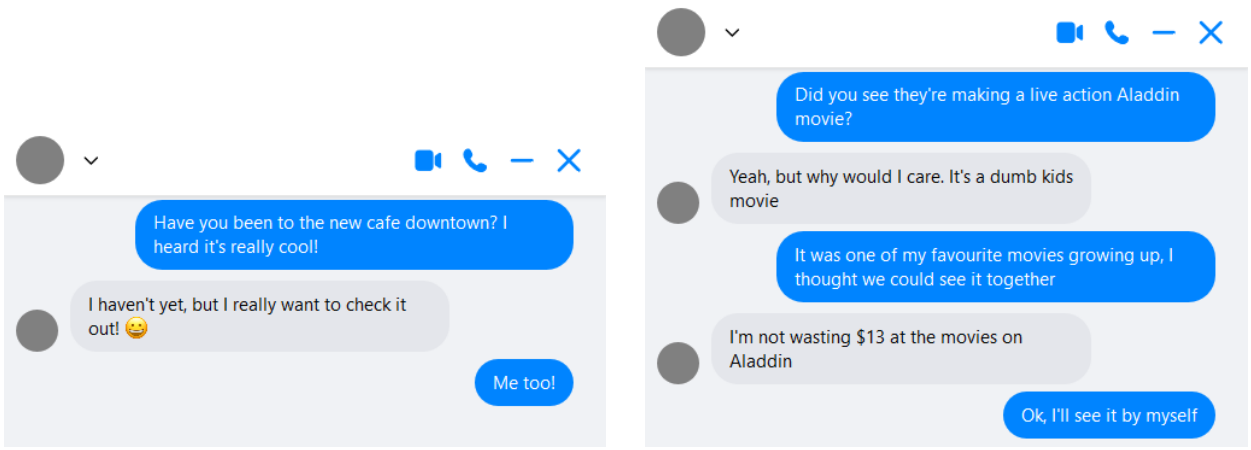


Fig. 1. *Sample Stimulus.* Panel a) a 3-line agreeable conversation with a congruent positive emoji included. Panel b) a 5-line disagreeable conversation with no emoji included. Participants were instructed to rate the emotional state and agreeableness of Person B, who was always shown on the left with grey speech bubbles.

2.2 Participants

The participants were N = 177 undergraduate students from the University of Ottawa (Male = 32, Female = 145) recruited from the Integrated System of Participation in Research

(ISPR). The mean age of participants was 18.95 (SD = 2.61). The total required sample size estimated with G-Power for *F*-test mixed design, repeated measures-independent groups interaction, a power of .80 and a small effect size of $f = .1$ was 246. After removing outliers and participants with incorrect engagement trial questions (see details below), a sensitivity analysis was run in G-Power. With our sample size of N = 177 we were able to detect an effect size of $f = .12$ with a power of .80, which is a small effect size, for the repeated measures-independent groups interaction. For our independent groups factor, we were able to detect an effect size of $f = .20$. For the repeated measures factor, we were able to detect an effect size of $f = .11$. This study was approved by the University of Ottawa Social Sciences and Humanities Research Ethics Board. Participants were compensated with course credit for their participation.

Participants were randomly assigned to one of three Context groups: Personal (n = 64), Professional (n = 58), or Romantic (n = 55). See section 2.4 Procedure for details.

2.3 Materials

To create stimuli for our emoji condition, we utilized one positive and one negative emoji. The emojis we used have been previously shown to be consistently interpreted as conveying a positive or negative emotional tone (Boutet et al., 2021; Jaeger et al., 2018). The participants in Jaeger et al., (2018) included men and women (51%), ranging in age from 18 to 60 years old (approximately evenly split between three age groups). The participants in Boutet et al. (2021) included men (n = 6) and women (n = 32), with a mean age of 18.62 (SD = 0.83). These emojis were iOS emojis, which are used on Apple products, of which previous research has shown high user rates (86.3%; L. L. Jones et al., 2020). Most of our participants (94.4%) were Apple users (see 6.5.1 Table S1), which suggests that they were familiar with these emojis.

A congruent emoji was included at the end of every text for "Person B" (grey message bubbles; see Figure 1). Only congruent emoji pairings were created. That is, smiling face emojis were either added or not to only agreeable conversations, whereas angry face emojis were either added or not to only disagreeable conversations. There were thus 96 total conversations included in the study. These were divided into four groups: 24 agreeable conversations with smiling face emojis, 24 agreeable conversations with no emojis, 24 disagreeable conversations with angry face emojis, and 24 disagreeable conversations with no emojis. To reduce the length of the study for each participant, the total stimuli were divided into two Stimulus Sets of 48 stimuli, with each participant seeing only one set. These two Stimulus Sets were also required because of the limited randomization capabilities of Qualtrics™. Qualtrics™ cannot do conditional randomization. We therefore opted to use a semi-randomized procedure in which participants were randomly assigned to one of the two stimulus sets, and within each set, presentation of stimuli was randomized. The Stimulus Sets were created by sorting agreeable conversations by their emotional valence and placing the highest and lowest rated conversations in the first group, the next highest and lowest into the second group, and going back and forth until all conversations were categorized. This served to equalize the perceived intensity of the conversations across stimulus sets. The corresponding disagreeable conversations were placed in the appropriate groups. Participants were randomly assigned to view one set of stimuli.

In addition to the text conversations, 4 questions were created to ensure that participants paid attention to the task at hand. These 'engagement' questions resembled our conversation stimuli and were randomly inserted into the stream of conversation stimuli. Two engagement questions appeared in the first half of the experiment and two in the second half. When an engagement question was presented, it instructed participants to select a specific answer on both

scales. For example, an engagement question might display “Do not rate this question. Click on answer -3.” This was done to evaluate whether participants were paying attention to the study.

Participants were also asked to fill out the Ten Item Personality Inventory (TIPI; Gosling et al., 2003) and a basic demographics questionnaire of our own design. The TIPI is a short measure of the Big 5 personality traits designed to be used as part of large surveys. Despite the limited number of items, it has shown good psychometric properties when compared to longer measures of the same constructs (Gosling et al., 2003). This measure of personality was included to explore previous findings linking personality factors to biases in evaluation of emotional faces (Knyazev et al., 2008). Similarly, we were interested in exploring how motivations for using emojis and one’s tendency to use specific emojis may be associated with personality traits of the participant (Li et al., 2018; Liu & Sun, 2020; Marengo et al., 2017; Thomson et al., 2018). Data related to these questionnaires is provided in section 6. Supplementary Materials (Table S1-S3).

2.4 Procedure

The study was conducted online via the Qualtrics™ platform. Participants provided informed consent, and were instructed to read each conversation, and rate the receiver (Person B). They were instructed to rate them on agreeableness and emotional state. Participants were also warned that engagement trials would appear to ensure they were paying attention to the task at hand. The next page described the relationship between the two conversation partners (friends, co-workers, or partners dating; see section 6.2 Appendix II: Instructions). Participants viewed the conversations one at a time and were instructed to read them and click a “next” button to proceed to the ratings. On the ratings page, participants rated how agreeable Person B was on a 7-point Likert scale from -3 (very disagreeable) to 3 (very agreeable) with 0 being neutral. They also rated the emotional state of Person B on a 7-point Likert scale from -3 (very negative) to 3 (very

positive) with 0 being neutral. Each point on the Likert scale was given a descriptor (e.g., somewhat negative). The conversation image stayed on screen for participants to refer to if needed. The stimuli were divided into two groups to provide participants a break halfway through. Which group of stimuli were presented first was counter-balanced. Each group contained 24 stimuli, for a total of 48 stimuli viewed. Each participant viewed 12 agreeable conversations with no emoji, 12 agreeable conversations with a congruent emoji, 12 disagreeable conversations with no emoji, and 12 disagreeable conversations with a congruent emoji. Participants never saw the same conversation twice, however, they did see both the agreeable and disagreeable versions of the conversations. After rating all conversations, participants were asked to fill out a demographics questionnaire and the TIPI. Finally, they were asked to provide any general comments or feedback to the researchers before exiting the study.

2.5 Data Analysis

Before any analysis occurred, 21 participants who signed into the study twice were removed. As well, 14 participants who did not complete the survey were removed. 16 participants who indicated that they needed corrective lenses but were not wearing them were removed. As this was a reading task, 4 participants who identified as having dyslexia were also removed. Next, outliers were removed based on several criteria. First, a participant's data was removed if the time they took to complete the survey fell outside of the group mean -/+3 SD. Second, a participant's data was removed if they selected the wrong answer on 2 or more scales on engagement question trials. Third, outliers were removed or Winsorized. Outliers were defined as participants who had more than 2 mean scores falling outside the group mean -/+2.5 SD (analysis was done separately by social context). Participants with only 1 outlying mean score had that score Winsorized. Two participants were removed based on outlying duration, 35

participants were removed based on incorrect engagement questions, and 8 were removed based on outlying means, with 12 participants having scores Winsorized, resulting in a final sample size of N = 177.

Following outlier analysis, a 2x2x3x3 mixed-design ANOVA was run with Conversation Agreeableness (Agreeable or Disagreeable), and Emoji Presence (Emojis Present or Emojis Absent) as repeated-measures variables, and Stimulus Set[2] (Set 1 or Set 2) and Social Context (Personal, Professional or Romantic) as independent-groups variables. The dependent variables were emotional state and agreeableness. There was no main effect of Stimulus Set for either emotional state rating or agreeableness rating, however, for the emotional state rating, there was a significant 3-way interaction between Stimulus Set, Conversation Agreeableness and Emoji Presence. Follow-up analyses showed that this was due to the two-way interaction between Conversation Agreeableness and Emoji Presence being slightly stronger in Set 2 than Set 1. Because the interaction pattern was the same across the two sets, we opted to collapse across stimulus sets for further analyses. See section 6.5.5 for full analysis and discussion.

Data was next analyzed using 2x2x3 mixed measured ANOVA with Conversation Agreeableness (Agreeable or Disagreeable), and Emoji Presence (Emojis Present or Emojis Absent) as repeated measures variables and Social Context (Personal, Professional or Romantic) as an independent groups variable. The dependent variables were emotional state and agreeableness. Post-hoc paired comparisons were run to explore significant main effects and interactions.

[2]Stimulus Set refers to the two sets of stimuli created to reduce the length of the study for participants, as well as to account for the limited randomization abilities of Qualtrics™.

3. RESULTS

3.1 Perceived Emotional State of the Receiver

For perceived emotional state of the receiver, the main effects of Conversation Agreeableness [$F(1, 174) = 9846.75$, $p < .001$, $\eta^2 = .98$] and Emoji Presence [$F(1, 174) = 48.37$, $p < .001$, $\eta^2 = .22$] were significant. The main effect of Context was not significant [$p = .16$]. The interaction between Conversation Agreeableness and Emoji Presence was significant [$F(1, 174) = 372.54$, $p < .001$, $\eta^2 = .68$]. Paired post hoc *t*-tests revealed that Emoji Presence intensified the ratings of emotional state of the receiver [agreeable conversation: $t(176) = 15.84$, $p < .001$, $d = 1.19$; disagreeable conversation: $t(176) = 13.56$, $p < .001$, $d = 1.02$]. No other effects were significant ($p > .05$). That is, as predicted by our first hypothesis (H1), smiling face emojis made the receiver seem more positive in agreeable conversations and angry face emojis made the receiver seem more negative in disagreeable conversations. For emotional state, the results suggest that the effect of emojis generalizes across the three social contexts (Q1).

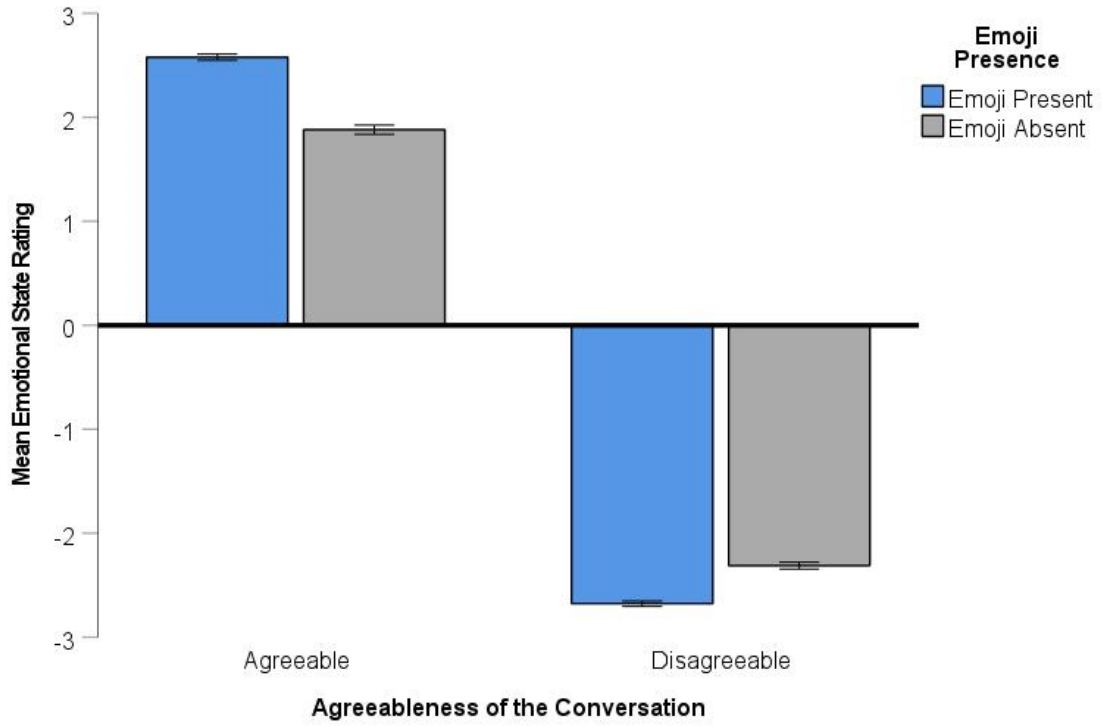


Fig. 2. *Perceived emotional State of Person B.* Mean perceived emotional state of Person B. Participants were asked "Please rate how positive or negative you perceive the emotional state of Person B to be" and provided their answers on a 7-point Likert scale ranging from -3 (very negative) to 3 (very positive) for all conversations. Error bars represent ±1 SE.

3.2 Perceived Agreeableness of the Receiver

For perceived agreeableness of the receiver, the main effects of Conversation Agreeableness [$F(1, 174) = 10258.94$, $p < .001$, $\eta^2 = .98$] and Emoji Presence [$F(1, 174) = 5.88$, $p = .016$, $\eta^2 = .03$] were significant. The main effect of Context was not significant [$p = .80$]. The interaction between Conversation Agreeableness and Emoji Presence was significant [$F(1, 174) = 213.24$, $p < .001$, $\eta^2 = .55$]. Paired post hoc *t*-tests revealed that Emoji Presence intensified the ratings of perceived agreeableness of the receiver [agreeable conversation: $t(176) = 11.28$, $p < .001$, $d = .85$; disagreeable conversation: $t(176) = 9.18$, $p < .001$, $d = .69$]. No other effects were significant ($p > .05$). That is, as predicted by our second hypothesis (H2), smiling face emojis made the receiver seem more agreeable in agreeable conversations and the angry face emojis

made the receiver seem more disagreeable in disagreeable conversations. For agreeableness, the results suggest again that the effect of emojis generalizes across the three social contexts (Q1).

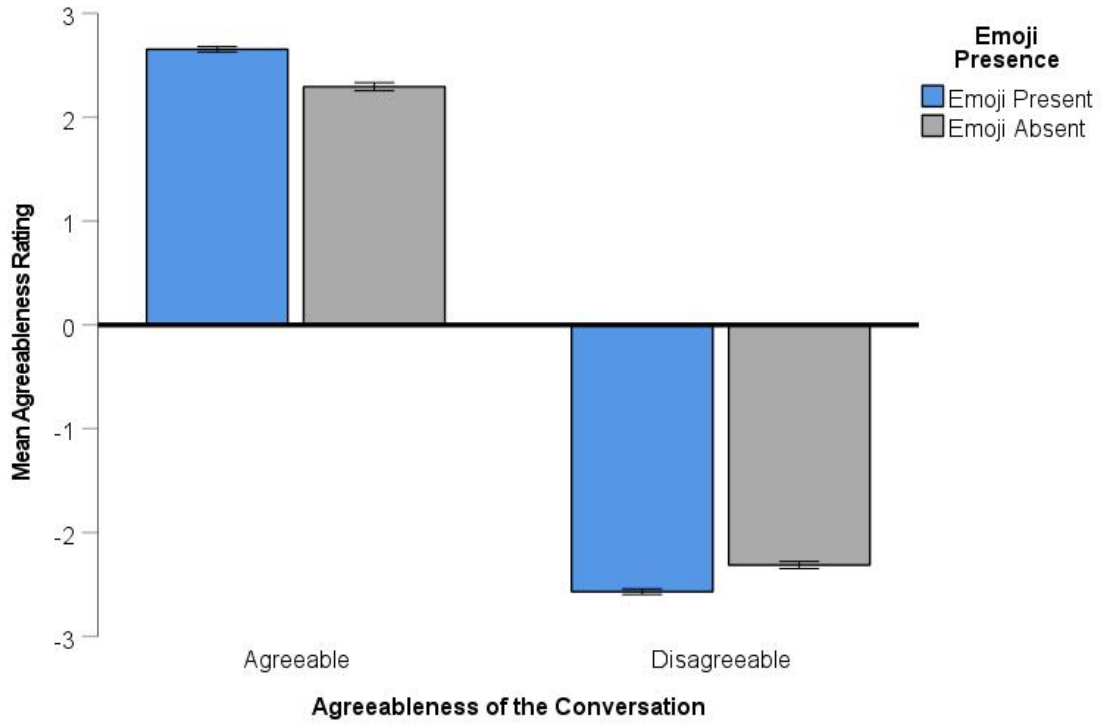


Fig. 3. *Perceived agreeableness of Person B.* Mean perceived agreeableness of Person B. Participants were asked "Please rate Person B on how agreeable or disagreeable they seem" and provided their answers on a 7-point Likert scale ranging from -3 (very disagreeable) to 3 (very agreeable) for all conversations. Error bars represent ±1 SE.

4. DISCUSSION

4.1 Summary

The goal of the present study was to examine the impact of emojis on emotional and social perceptions when viewing others interact in an online text conversation. Participants were shown text message conversations under 4 different conditions: 1) Agreeable conversation with happy face emojis, 2) Agreeable conversation with no emojis, 3) Disagreeable conversation with angry face emojis, 4) Disagreeable conversation with no emojis. In addition, participants were divided into one of three social context groups: Personal, Professional, or Romantic. Hereunder

we reiterate the hypotheses that this study was designed to address and discuss the implications of our findings for each of them.

4.2 Emojis and Emotional State

H1: *Emojis will intensify the emotional state interpretation of the receiver. Specifically, receivers will be perceived as more positive/negative when their agreeable/disagreeable responses are accompanied by an emoji compared to those without an emoji.*

Results support H1 for both agreeable and disagreeable conversations, however the effect was slightly stronger for agreeable ones. The presence of smiling face emojis increased the perceived positive emotional state of the receiver in agreeable conversations and the presence of angry face emojis had the effect of making the receiver's emotional state seem more negative in disagreeable conversations.

In FtF communication, non-verbal displays of emotion can help to soften or strengthen the verbal message (Boutet et al., 2021). We also make judgements of others both when actively engaged with them, or when passively viewing or listening to individuals interacting (B.C. Jones et al., 2011; Holleran et al., 2009). As our study focused on congruent emojis vs no emojis, our results indicate that emojis may help to strengthen the emotional tone of verbal messages. This is consistent with past research (Boutet et al., 2021; Derks et al., 2008; Filik et al., 2016; Hall et al., 2019; Huang et al., 2008; Lo, 2008) which showed that congruent emojis strengthen the emotional tone of text messages. More importantly, our results extend this research to a situation where a third-party is viewing two other users conversing. We therefore suggest that users should employ positive emojis to enhance positivity in online social interactions, while avoiding negative emojis as they enhance the negativity of messages.

4.3 Emojis and Agreeableness

H2: *Emojis will influence social perceptions of the receiver. Specifically, receivers will be perceived as more agreeable/disagreeable when their agreeable/disagreeable responses are accompanied by an emoji compared to those without an emoji.*

Results support H2 for both agreeable and disagreeable conversations: presence of a congruent emoji increased ratings for agreeable conversations and decreased ratings for disagreeable conversations. Our results further support the idea that we make judgements of others even when we are not actively engaged with them. These findings support the idea that emojis influence trait perceptions of text message users (Boutet et al., 2021; Byron & Baldridge, 2007; Coyle & Carmichael, 2019; Glikson et al., 2018; Hsieh & Tseng, 2017; Marengo et al., 2017; Nexø & Strandell, 2020; Wall et al., 2016). As Boutet et al. (2021) found, emojis do seem to impact personality perceptions. While they did not focus specifically on personality perceptions, they examined warmth, which is from the ICP, and may be part of the broader trait of agreeableness (Graziano & Eisenberg, 1997; Vize et al., 2021). We therefore suggest that users employ positive emojis to enhance positive trait perceptions in online conversations. Moreover, users should avoid negative emojis as they result in more negative trait perceptions, which in turn, may lead to less future interactions with the same individuals. In FtF research, initial judgements of agreeableness may persist and feel correct even when they are not. One reason for this is that when one judges someone as disagreeable, they are less likely to seek further interaction with that person, and so they are unlikely to re-evaluate that judgement. Another reason is that after judging someone as agreeable, we have an expectation that in future interactions, they will be agreeable, whether or not this is the case (Ames & Bianchi, 2008).

4.4 Emojis and Social Context

Q1: *Will the effects of emojis differ across the three different social contexts?*

We found no significant difference in how emojis impacted agreeableness or emotional state ratings between social contexts. Thus, it is possible that emojis' impact does in fact generalize across different social contexts. This is in line with some previous studies which, when compared, suggest that across personal, professional, and romantic contexts, emojis effect on perceptions of emotions and social traits are similar (Aretz & Mierke, 2019; Boutet et al., 2021; Rodrigues et al., 2017). This is, however, contrary to some past research, namely Glikson et al. (2018), which found that emojis impacted two trait perceptions differently in a personal vs. professional context. This is also in contrast to FtF research, which posits that emotional display rules are different for different social contexts (Cheshin, 2020). Our results suggest, however, that in a digital context, the same display rules may not apply. In FtF research, while anger may be advantageous in a professional context and disadvantageous in a personal context (Cheshin, 2020), in CMC, this does not seem to be the case. Negative displays of emotion were consistently perceived more poorly than positive displays of emotion across social contexts, with no benefit in the professional context. Therefore, we suggest that users should focus on positive and agreeable displays of emotion across social contexts when communicating via CMC, unlike in FtF communication, where negative displays of emotion may be beneficial in certain contexts.

4.5 Limitations

Our conclusion that emojis have a similar impact across different social contexts is based on a null-finding for this manipulation. One must always be cautious when interpreting a null result. If there is an effect of context, there are a few reasons we may not have found one. First, our context manipulation may not have been salient enough, therefore participants may not have

kept the context in mind when giving their ratings. Specifically, it is possible that participants read the context but did not apply it to every conversation they read. In future research, more detailed vignettes outlining the different social contexts should be used to increase the saliency and to keep the social context present in the participants' minds throughout testing. While our study did include a sentence reminding participants of the relationship between the conversation partners before each rating, it is possible participants stopped reading it, as it was repeated so many times. As well, our sample size may have limited our ability to detect an effect. G-power estimated needing a sample of 246 to detect a small effect size of $f = .1$ for the repeated measures-independent groups interaction. We were, however, still able to detect a small effect size of $f = .12$ with our sample of 177. Moreover, different versions of the conversations should be created to better reflect the social context. Our conversations may have been too personal in nature, so even though we identified that the partners had different social relationships, the conversations themselves may have impacted the ratings. Future studies may also benefit from including a question after all stimuli have been presented asking participants to identify the context in which the messages were being sent. If participants answer this question incorrectly, it may demonstrate that they did not keep social context in mind throughout testing.

The large proportion of women participants in our study also limits generalizations to other genders. This is particularly relevant, as some research has shown a gender difference between men and women in emotion recognition (Kret & De Gelder, 2012; McClure, 2000; Montagne et al., 2005) and emoji usage (Daniel & Camp, 2018; L. L. Jones et al., 2020; Langlois, 2019). Moreover, context could interact with gender, whereby men participants are impacted more strongly by context than women. Some research suggests that men and women

use emojis and text messaging for different purposes (L. L. Jones et al., 2020). We could not include gender as a variable because of the large ratio of women to men (approximately 4.5:1).

Our sample also was almost entirely young adults, which limits generalizations to older adults. It has been shown that there are age differences in emotion recognition (Kessels et al., 2014; Orgeta & Phillips, 2007; Sullivan & Ruffman, 2004) and emoji usage (An et al., 2018; Herring & Dainas, 2020). Future research should examine how the impact of emojis on emotion and trait ratings varies across age groups.

Results showed that there may have been compression of our rating scale at both the positive and negative extremes. While the differences between the emoji present and emoji absent conditions were significant, the mean differences were quite small. A larger scale may distinguish finer differences. Moreover, the overtly agreeable and disagreeable conversations may have contributed to the small mean differences between emoji and no emoji conditions. Future research should examine more subtle (dis)agreeableness in conversations.

This study did not examine how incongruent emojis impact perceptions of agreeableness and emotional state. Past research has shown that incongruent emojis may impact the intensity of ratings (Boutet et al., 2021; Riordan, 2017), and in the case of negative emojis and positive sentences, switch the perceived valence of the text from positive to negative (Boutet et al., 2021). Sarcasm may show similar effects of reducing the emotional intensity of messages (Filik et al., 2016; González-Ibánez et al., 2011), and so future research may benefit from examining how incongruent text-emoji pairings relate to perceptions of agreeableness. By including incongruent text-emoji pairings, it could extend the results of this study and past research as to whether emojis are the driving force of emotional and trait perceptions in CMC.

Finally, only one user's texts in the conversation had emojis. Some research has shown that when emoji use of conversation partners does not converge, it feels awkward and wrong (Nexø & Strandell, 2020). Research is therefore needed to examine how differing uses of emojis by conversation partners impacts social perceptions of senders.

4.6 Conclusion

Our research shows that we make emotional state and trait judgements of others in online conversations, even when we are not actively engaged with them. Our results suggest that emojis can be effective in enhancing the trait and emotional state perceptions of individuals engaged in online conversations. Emojis can enhance digital interactions by conveying emotion cues and can be used to express oneself. Overall, effects of emojis on sender perceptions were quite large, suggesting that they are not redundant to the verbal message, but can be used in conjunction with it to convey information more clearly. While more research is needed to confirm our findings, we encourage users to employ positive, congruent emojis as replacements for non-verbal cues in CMC when they want to enhance the emotional message or make a positive impression. Users may also benefit from avoiding negative, congruent emojis, as these may magnify negative effects of a disagreeable message. By magnifying disagreeableness, users may reduce the likelihood of interacting with the same individual in the future. However, there are still, of course, many questions remaining surrounding context. While positive emojis seem to be beneficial, and negative emojis seem to be detrimental overall, we did not find varying effects based on context. Users should therefore be cautious when employing emojis across different social contexts, as their specific effects are still unclear.

5. REFERENCES

Ames, D. R., & Bianchi, E. C. (2008). The Agreeableness Asymmetry in First Impressions: Perceivers' Impulse to (Mis)judge Agreeableness and How It Is Moderated by Power. *Personality and Social Psychology Bulletin*, *34*(12), 1719–1736. https://doi.org/10.1177/0146167208323932

An, J., li, T., Teng, Y., & Zhang, P. (2018). *Factors Influencing Emoji Usage in Smartphone Mediated Communications* (pp. 423–428). https://doi.org/10.1007/978-3-319-78105-1_46

Aretz, W., & Mierke, K. (2019). Seriously?! Prevalence and motives of using emojis in job-related communication and their effect on perceived executive characteristics. *Journal of Business and Media Psychology*, *10*(1), 43–48.

Argyle, M., Alkema, F., & Gilmour, R. (1971). The communication of friendly and hostile attitudes by verbal and non-verbal signals. *European Journal of Social Psychology*, *1*(3), 385–402. https://doi.org/10.1002/ejsp.2420010307

Bayes, M. A. (1972). Behavioral cues of interpersonal warmth. *Journal of Consulting and Clinical Psychology*, *39*(2), 333–339. https://doi.org/10.1037/h0033367

Bonaccio, S., O'Reilly, J., O'Sullivan, S. L., & Chiocchio, F. (2016). Nonverbal Behavior and Communication in the Workplace: A Review and an Agenda for Research. *Journal of Management*, *42*(5), 1044–1074. https://doi.org/10.1177/0149206315621146

Boutet, I., LeBlanc, M., Chamberland, J. A., & Collin, C. A. (2021). Emojis influence emotional communication, social attributions, and information processing. *Computers in Human Behavior*, *119*, 106722. https://doi.org/10.1016/j.chb.2021.106722

Byron, K., & Baldridge, D. C. (2007). E-Mail Recipients' Impressions of Senders' Likability: The Interactive Effect of Nonverbal Cues and Recipients' Personality. *The Journal of*

Business Communication (1973), *44*(2), 137–160. https://doi.org/10.1177/0021943606297902

Cheshin, A. (2020). The Impact of Non-normative Displays of Emotion in the Workplace: How Inappropriateness Shapes the Interpersonal Outcomes of Emotional Displays. *Frontiers in Psychology*, *11*, 6. https://doi.org/10.3389/fpsyg.2020.00006

Coyle, M. A., & Carmichael, C. L. (2019). Perceived responsiveness in text messaging: The role of emoji use. *Computers in Human Behavior, 99*, 181–189. https://doi.org/10.1016/j.chb.2019.05.023

Daniel, T. A., & Camp, A. L. (2018). Emojis affect processing fluency on social media. *Psychology of Popular Media Culture, 9*(2), 208-213. http://dx.doi.org/10.1037/ppm0000219

Derks, D., Bos, A. E. R., & von Grumbkow, J. (2008). Emoticons and Online Message Interpretation. *Social Science Computer Review*, *26*(3), 379–388. https://doi.org/10.1177/0894439307311611

Docan-Morgan, T., Manusov, V., & Harvey, J. (2013). When a Small Thing Means so Much: Nonverbal Cues as Turning Points in Relationships. *Interpersona: An International Journal on Personal Relationships*, *7*(1), 110–124. https://doi.org/10.5964/ijpr.v7i1.119

Ernst, C.-P., & Huschens, M. (2019). Friendly, Humorous, Incompetent? On the Influence of emoticons on interpersonal perception in the workplace. *Proceedings of the 52nd Hawaii International Conference on System Sciences.*

Filik, R., Țurcan, A., Thompson, D., Harvey, N., Davies, H., & Turner, A. (2016). Sarcasm and emoticons: Comprehension and emotional impact. *The Quarterly Journal of*

Experimental Psychology, *69*(11), 2130–2146. https://doi.org/10.1080/17470218.2015.1106566

Frith, C. D., & Frith, U. (1999). Interacting Minds—A Biological Basis. *Science*, *286*(5445), 1692–1695. https://doi.org/10.1126/science.286.5445.1692

Gesselman, A. N., Ta, V. P., & Garcia, J. R. (2019). Worth a thousand interpersonal words: Emoji as affective signals for relationship-oriented digital communication. *PLOS ONE*, *14*(8), e0221297. https://doi.org/10.1371/journal.pone.0221297

Glikson, E., Cheshin, A., & Kleef, G. A. van. (2018). The dark side of a smiley: Effects of smiling emoticons on virtual first impressions. *Social Psychological and Personality Science*, *9*(5), 614–625. https://doi.org/10.1177/1948550617720269

Gonçalves, A. R., Fernandes, C., Pasion, R., Ferreira-Santos, F., Barbosa, F., & Marques-Teixeira, J. (2018). Effects of age on the identification of emotions in facial expressions: A meta-analysis. *PeerJ*, *6*, e5278. https://doi.org/10.7717/peerj.5278

González-Ibánez, R., Muresan, S., & Wacholder, N. (2011). Identifying sarcasm in Twitter: A closer look. *Proceedings of the 49th Annual Meeting of the Association for Computational Linguistics: Human Language Technologies: Short Papers-Volume 2*, 581–586. https://www.aclweb.org/anthology/P11-2102.pdf

Gosling, S. D., Rentfrow, P. J., & Swann Jr., W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, *37*(6), 504–528. https://doi.org/10.1016/S0092-6566(03)00046-1

Graziano, W. G., & Eisenberg, N. (1997). Agreeableness: A dimension of personality. In J. Johnson & R. Hogan (Eds.), *Handbook of Personality Psychology* (pp. 795–824). Academic Press. doi: 10.1016/b978-012134645-4/50031-7

Hall, J. A., Horgan, T. G., & Murphy, N. A. (2019). Nonverbal communication. *Annual Review of Psychology, 70*(1), 271–294. https://doi.org/10.1146/annurev-psych-010418-103145

Harris, K., & Vazire, S. (2016). On friendship development and the Big Five personality traits. *Social and Personality Psychology Compass, 10*(11), 647–667. https://doi.org/10.1111/spc3.12287

Harris, R. B., & Paradice, D. (2007). An Investigation of the Computer-mediated Communication of Emotions. *Journal of Applied Sciences Research*, *3*(12), 2081–2090.

Herring, S. C., & Dainas, A. R. (2020). Gender and Age Influences on Interpretation of Emoji Functions. *ACM Transactions on Social Computing*, *3*(2), 1-26. https://doi.org/10.1145/3375629

Holleran, S. E., Mehl, M. R., & Levitt, S. (2009). Eavesdropping on social life: The accuracy of stranger ratings of daily behavior from thin slices of natural conversations. *Journal of Research in Personality, 43*(4), 660–672. https://doi.org/10.1016/j.jrp.2009.03.017

Hsieh, S. H., & Tseng, T. H. (2017). Playfulness in mobile instant messaging: Examining the influence of emoticons and text messaging on social interaction. *Computers in Human Behavior*, *69*, 405–414. https://doi.org/10.1016/j.chb.2016.12.052

Huang, A. H., Yen, D. C., & Zhang, X. (2008). Exploring the potential effects of emoticons. *Information & Management, 45*(7), 466–473. https://doi.org/10.1016/j.im.2008.07.001

Jaeger, S. R., Xia, Y., Lee, P.-Y., Hunter, D. C., Beresford, M. K., & Ares, G. (2018). Emoji questionnaires can be used with a range of population segments: Findings relating to age, gender and frequency of emoji/emoticon use. *Food Quality and Preference*, *68*, 397–410. https://doi.org/10.1016/j.foodqual.2017.12.011

Jones, A. L., Tree, J. J., & Ward, R. (2019). Personality in faces: Implicit associations between appearance and personality. *European Journal of Social Psychology, 49*(3), 658–669. https://doi.org/10.1002/ejsp.2534

Jones, B. C., DeBruine, L. M., Little, A. C., Watkins, C. D., & Feinberg, D. R. (2011). 'Eavesdropping' and perceived male dominance rank in humans. *Animal Behaviour, 81*(6), 1203–1208. https://doi.org/10.1016/j.anbehav.2011.03.003

Jones, L. L., Wurm, L. H., Norville, G. A., & Mullins, K. L. (2020). Sex differences in emoji use, familiarity, and valence. *Computers in Human Behavior*, *108*, 1–10. https://doi.org/10.1016/j.chb.2020.106305

Kaye, L. K., Rodriguez-Cuadrado, S., Malone, S. A., Wall, H. J., Gaunt, E., Mulvey, A. L., & Graham, C. (2021). How emotional are emoji?: Exploring the effect of emotional valence on the processing of emoji stimuli. *Computers in Human Behavior, 116*, 106648. https://doi.org/10.1016/j.chb.2020.106648

Kelly, L., & Miller-Ott, A. E. (2018). Perceived miscommunication in friends' and romantic partners' texted conversations. *Southern Communication Journal*, *83*(4), 267–280. https://doi.org/10.1080/1041794X.2018.1488271

Kessels, R. P. C., Montagne, B., Hendriks, A. W., Perrett, D. I., & Haan, E. H. F. de. (2014). Assessment of perception of morphed facial expressions using the Emotion Recognition Task: Normative data from healthy participants aged 8–75. *Journal of Neuropsychology, 8*(1), 75-93. https://doi.org/10.1111/jnp.12009

Knyazev, G. G., Bocharov, A. V., Slobodskaya, H. R., & Ryabichenko, T. I. (2008). Personality-linked biases in perception of emotional facial expressions. *Personality and Individual Differences, 44*(5), 1093–1104. https://doi.org/10.1016/j.paid.2007.11.001

Kotlyar, I., & Ariely, D. (2013). The effect of nonverbal cues on relationship formation. *Computers in Human Behavior*, *29*(3), 544–551. https://doi.org/10.1016/j.chb.2012.11.020

Kralj Novak, P., Smailović, J., Sluban, B., & Mozetič, I. (2015). Sentiment of Emojis. *PLOS ONE*, *10*(12), e0144296. https://doi.org/10.1371/journal.pone.0144296

Kret, M. E., & De Gelder, B. (2012). A review on sex differences in processing emotional signals. *Neuropsychologia*, *50*(7), 1211–1221. https://doi.org/10.1016/j.neuropsychologia.2011.12.022

Langlois, O. (2019). *L'impact des émojis sur la perception affective des messages texte*. https://doi.org/10.20381/ruor-23871

Lenhart, A. (2015, August 6). Chapter 5: Conflict, Friendships and Technology. *Pew Research Center: Internet, Science & Tech*. https://www.pewresearch.org/internet/2015/08/06/chapter-5-conflict-friendships-and-technology/

Li, W., Chen, Y., Hu, T., & Luo, J. (2018). Mining the Relationship between Emoji Usage Patterns and Personality. *Proceedings of the International AAAI Conference on Web and Social Media*, *12*(1). https://ojs.aaai.org/index.php/ICWSM/article/view/15054

Liu, S., & Sun, R. (2020). To Express or to End? Personality Traits Are Associated With the Reasons and Patterns for Using Emojis and Stickers. *Frontiers in Psychology*, *11*, 1–11. https://dx-doi-org.proxy.bib.uottawa.ca/10.3389/fpsyg.2020.01076

Lo, S.-K. (2008). The nonverbal communication functions of emoticons in computer-mediated communication. *CyberPsychology & Behavior*, *11*(5), 595–597. https://doi.org/10.1089/cpb.2007.0132

Luor, T., Ted, Wu, L., Lu, H.-P., & Tao, Y.-H. (2010). The effect of emoticons in simplex and complex task-oriented communication: An empirical study of instant messaging. *Computers in Human Behavior*, *26*(5), 889–895. https://doi.org/10.1016/j.chb.2010.02.003

Marengo, D., Giannotta, F., & Settanni, M. (2017). Assessing personality using emoji: An exploratory study. *Personality and Individual Differences*, *112*, 74–78. https://doi.org/10.1016/j.paid.2017.02.037

McClure, E. B. (2000). A meta-analytic review of sex differences in facial expression processing and their development in infants, children, and adolescents. *Psychological Bulletin*, *126*(3), 424–453. https://doi.org/10.1037/0033-2909.126.3.424

Montagne, B., Kessels, R. P., Frigerio, E., de Haan, E. H., & Perrett, D. I. (2005). Sex differences in the perception of affective facial expressions: Do men really lack emotional sensitivity? *Cognitive Processing*, *6*(2), 136–141. https://doi.org/10.1007/s10339-005-0050-6

Montepare, J. M., & Dobish, H. (2003). The Contribution of Emotion Perceptions and Their Overgeneralizations to Trait Impressions. *JOURNAL OF NONVERBAL BEHAVIOR*, *27*(4), 237-254. https://dx-doi-org.proxy.bib.uottawa.ca/10.1023/A:1027332800296

Nexø, L. A., & Strandell, J. (2020). Testing, filtering, and insinuating: Matching and attunement of emoji use patterns as non-verbal flirting in online dating. *Poetics*, *83*, 101477. https://doi.org/10.1016/j.poetic.2020.101477

Orgeta, V., & Phillips, L. H. (2007). Effects of Age and Emotional Intensity on the Recognition of Facial Emotion. *Experimental Aging Research*, *34*(1), 63–79. https://doi.org/10.1080/03610730701762047

Riordan, M. A. (2017). Emojis as tools for emotion work: Communicating affect in text messages. *Journal of Language and Social Psychology*, *36*(5), 549–567. https://doi.org/10.1177/0261927X17704238

Rodrigues, D., Lopes, D., Prada, M., Thompson, D., & Garrido, M. V. (2017). A frown emoji can be worth a thousand words: Perceptions of emoji use in text messages exchanged between romantic partners. *Telematics & Informatics*, *34*(8), 1532–1543. https://doi.org/10.1016/j.tele.2017.07.001

Seufert, M., Hosfeld, T., Schwind, A., Burger, V., & Tran-Gia, P. (2016). Group-based communication in WhatsApp. *2016 IFIP Networking Conference (IFIP Networking) and Workshops*, 536–541. https://doi.org/10.1109/IFIPNetworking.2016.7497256

Sullivan, S., & Ruffman, T. (2004). EMOTION RECOGNITION DEFICITS IN THE ELDERLY. *International Journal of Neuroscience*, *114*(3), 403–432. https://doi.org/10.1080/00207450490270901

Thomson, S., Kluftinger, E., & Wentland, J. (2018). Are you fluent in sexual emoji?: Exploring the use of emoji in romantic and sexual contexts. *Journal of Human Sexuality*, *27*(3), 226–234. https://www.muse.jhu.edu/article/711716

Vize, C. E., Miller, J. D., & Lynam, D. R. (2021). Examining the conceptual and empirical distinctiveness of Agreeableness and "dark" personality items. *Journal of Personality*, *89*(3), 594–612. https://doi.org/10.1111/jopy.12601

Wall, H. J., Kaye, L. K., & Malone, S. A. (2016). An exploration of psychological factors on emoticon usage and implications for judgement accuracy. *Computers in Human Behavior*, *62*, 70–78. https://doi.org/10.1016/j.chb.2016.03.040

Wang, Z., Mao, H., Li, Y. J., & Liu, F. (2017). Smile big or not? Effects of smile intensity on perceptions of warmth and competence. *Journal of Consumer Research*, *43*(5), 787–805. https://doi.org/10.1093/jcr/ucw062

Willis, J., & Todorov, A. (2006). First impressions: Making up your mind after a 100-ms exposure to a face. *Psychological Science*, *17*(7), 592–598. https://dx-doi-org.proxy.bib.uottawa.ca/10.1111/j.1467-9280.2006.01750.x

6. APPENDICES

6.1 Appendix I: Consent Form

uOttawa

Université d'Ottawa
École de psychologie

University of Ottawa
School of Psychology

Consent Form

Assessing whether emojis can be used to effectively communicate socially-relevant information

Researchers

Investigators:

Isabelle Boutet[1]

Charles Collin

Co-Investigators:

Justin Chamberland[2]
Maud Chouinard[3]
Joëlle Guay[3]
Megan Leblanc[4]

[1]Research supervisor and principal investigator
[2]Research-assistant under the supervision of Isabelle Boutet
[3]Student-researcher under the supervision of Isabelle Boutet
[4]Student-researcher under the supervision of Charles Collin

Affiliation: School of Psychology, Faculty of Social Sciences, University of Ottawa.

Funding: Social sciences and humanities research council

Invitation to Participate: I am invited to participate in the abovementioned research study conducted by the researchers listed above.

Exclusion Criteria: None.

Purpose of the Study: The purpose of the study is to better understand how we interpret emojis.

Participation: My participation will consist of participating in an online study lasting less than 2 hours. I will be asked to view various emojis, sometimes accompanied by text messages, on a computer monitor and asked to provide responses on the keyboard. The task I will be asked to do will be to indicate my interpretation of these stimuli. I will also be asked to answer questions about my current mood, personality as well as smartphone and cellphone use.

Risks: My participation in this study will entail no risks except possible fatigue and boredom from judging many stimuli. I understand that I will be provided one break of two minutes during the study to minimize these potentially negative effects. I understand that I am free to discontinue participation if I experience any discomfort as a result of my participant in this study.

Benefits: My participation in this study will help expand our knowledge of human behaviour, particularly in the realm of digital communication.

Confidentiality and anonymity: I have received assurance from the researcher that the information I will share will remain strictly confidential. I understand that the information may be used only for an undergraduate student's thesis, for publication in a scientific journal and/or for presentation in scholarly media. My confidentiality will be protected by having the data stored on a secured research platform and a password protected computer that only the researchers have access to. I understand that the data collected might be analyzed and used for student theses. In order to minimize the risk of security breaches and to help ensure your confidentiality, we recommend that you use standard safety measures such as signing out of your account, closing your browser, and locking your screen or device when you have completed the study. Anonymity will be protected in the following manner: Only grouped data will be published and a code number will be used in place of my name on all data reports.

Conservation of data: The collected data—consisting of recorded responses and reaction times—will be kept in a secure manner. The data will first be saved on a secured research platform and then transferred and stored in a secured manner on a cloud drive managed by the University of Ottawa. Only the researchers will have access to it. This data will be kept for a period of 5 years before being securely deleted.

Compensation: I understand that as part of the University of Ottawa's Integrated System of Participation in Research (ISPR), I will receive course credits for participating in this research in accordance with the rules of the ISPR. That is, I will receive 1 credit for a maximum of 1 hour or

less of participation. I understand that I may withdraw from the study at any time and nonetheless receive this credit in full.

Voluntary Participation: I understand that I am under no obligation to participate and that if I choose to participate, I can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw from the study or to leave the study before the end, all my data gathered until the time of withdrawal will be deleted.

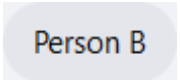
Acceptance: (consent will be obtained via a check box positioned besides following text.) I agree to participate in the above research study conducted by the researchers listed at the beginning of this document. I understand that these researchers are affiliated with the School of Psychology, Faculty of Social Sciences, University of Ottawa and that the research is being done under the supervision of Professor Isabelle Boutet. I understand that by responding to the questions and by submitting my responses, I provide consent to participate in the study.

If I have any questions about the study, I can contact the Principal Investigator Isabelle Boutet, before or after participating in the study.

If I have any questions regarding the ethical conduct of this study, I may contact the Protocol Officer for Ethics in Research.

We ask that you print or save a copy of this consent form.

6.2 Appendix II: Instructions

You will be shown text message conversations. After reading each conversation, click to go to the next page where you will be asked to rate how agreeable you perceive one of the people in the conversation to be. This person will simply be referred to as Person B, and their messages will appear like this: 

. Person B's messages will always appear on the left of the image. Rate how agreeable you perceive Person B to be on a scale from -3 (very disagreeable) to 3 (very agreeable), with 0 being neutral. An agreeable person is someone who is getting along with others, supporting other's opinions, and is generally "on the same side" as their conversational partner. A disagreeable person is someone who is not getting along with others, is of differing opinions of others, and is generally "on the opposite side" to their conversational partner.
After rating how agreeable Person B is, you will be asked to also rate their emotional state. Rate Person B's emotional state on a scale from -3 (very negative) to 3 (very positive) with 0 being neutral. Please try to use the entire rating scale when giving your responses.
The conversation will stay on screen below the questions for you to refer back to if need be.
Be sure to read each conversation carefully.
To ensure that you are paying close attention, a few of the text messages will tell you which rating to give instead of containing an actual conversation. For instance, a text message might say "Do not rate this conversation. Instead, simply click on answer 3". For these trials, please ignore the usual instructions and instead click on the response indicated in the conversation.

Personal Context Manipulation

The conversations you will be shown are between Person A and Person B, they met in kindergarten and are still best friends to this day.

Professional Context Manipulation

The conversations you will be shown are between Person A and Person B, they have been working together at their part-time job for 1 year now.

Romantic Context Manipulation

The conversations you will be shown are between Person A and Person B, they have been dating for one year and are considering moving in together.

6.3 Appendix III: Demographics Questionnaire

1. Gender
    a. Male
    b. Female
    c. Prefer not to say
    d. You don't have an option that applies to me. I identify as (please specify):
2. Age (text entry)
3. Years in university (text entry)
4. Do you need corrective lenses?
    a. Yes
    b. No
5. If so, are you wearing your corrective lenses?
    a. Yes
    b. No
6. Have you ever been diagnosed with dyslexia?
    a. Yes
    b. No
7. What type of smartphone do you have?
    a. Apple
    b. Android
    c. Other (please specify): (text entry)
    d. I don't own a smartphone
8. How often do you use your smartphone?
    a. Never
    b. Once a month
    c. Several times a month
    d. Once a week
    e. Several times a week
    f. Once a day
    g. Several times a day
    h. Once an hour
    i. Several times an hour
    j. All the time
9. How often do you use Facebook?
    a. Never
    b. Once a month
    c. Several times a month
    d. Once a week
    e. Several times a week
    f. Once a day
    g. Several times a day
    h. Once an hour

i. Several times an hour
j. All the time

6.4 Appendix IV: Ten Item Personality Inventory (TIPI)

Here are a number of personality traits that may or may not apply to you. Please select an answer below each statement to indicate the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.

I see myself as:

1. Extraverted, enthusiastic
    a. Disagree strongly
    b. Disagree moderately
    c. Disagree a little
    d. Neither agree nor disagree
    e. Agree a little
    f. Agree moderately
    g. Agree strongly
2. Critical, quarrelsome
    a. Disagree strongly
    b. Disagree moderately
    c. Disagree a little
    d. Neither agree nor disagree
    e. Agree a little
    f. Agree moderately
    g. Agree strongly
3. Dependable, self-disciplined
    a. Disagree strongly
    b. Disagree moderately
    c. Disagree a little
    d. Neither agree nor disagree
    e. Agree a little
    f. Agree moderately
    g. Agree strongly
4. Anxious, easily upset
    a. Disagree strongly
    b. Disagree moderately
    c. Disagree a little
    d. Neither agree nor disagree
    e. Agree a little
    f. Agree moderately
    g. Agree strongly
5. Open to new experiences, complex
    a. Disagree strongly
    b. Disagree moderately

    c. Disagree a little
    d. Neither agree nor disagree
    e. Agree a little
    f. Agree moderately
    g. Agree strongly
6. Reserved, quiet
    a. Disagree strongly
    b. Disagree moderately
    c. Disagree a little
    d. Neither agree nor disagree
    e. Agree a little
    f. Agree moderately
    g. Agree strongly
7. Sympathetic, warm
    a. Disagree strongly
    b. Disagree moderately
    c. Disagree a little
    d. Neither agree nor disagree
    e. Agree a little
    f. Agree moderately
    g. Agree strongly
8. Disorganized, careless
    a. Disagree strongly
    b. Disagree moderately
    c. Disagree a little
    d. Neither agree nor disagree
    e. Agree a little
    f. Agree moderately
    g. Agree strongly
9. Calm, emotionally stable
    a. Disagree strongly
    b. Disagree moderately
    c. Disagree a little
    d. Neither agree nor disagree
    e. Agree a little
    f. Agree moderately
    g. Agree strongly
10. Conventional, uncreative
    a. Disagree strongly
    b. Disagree moderately
    c. Disagree a little
    d. Neither agree nor disagree
    e. Agree a little

f. Agree moderately
g. Agree strongly

6.5 Appendix V: Supplementary Materials

6.5.1 Table S1

Demographic characteristics of participants

Characteristic	Frequency	Proportion (%)
Type of smartphone		
Apple	160	90.4
Android	16	9.0
Other	1	0.6
Does not own a smartphone	0	0
Use of smartphone		
Never	0	0
Once a month	0	0
Several times a month	0	0
Once a week	0	0
Several times a week	1	0.6
Once a day	1	0.6
Several times a day	43	24.3
Once an hour	17	9.6
Several times an hour	69	39.0
All the time	46	26.0
Use of Facebook		
Never	42	23.7
Once a month	31	17.5
Several times a month	11	6.2
Once a week	19	10.7
Several times a week	26	14.7
Once a day	18	10.2
Several times a day	21	11.9
Once an hour	3	1.7
Several times an hour	4	2.3
All the time	2	1.1

Note. N = 177.

6.5.2 Table S2

Descriptive statistics for TIPI scores.

TIPI Subscale	M	SD
Extraversion	4.22	1.59
Agreeableness	5.14	1.15
Conscientiousness	5.81	1.14
Emotional Stability	4.06	1.44
Openness	5.31	1.09

Note. Mean (M), standard deviation (SD). Characteristics were rated on a scale from 1 (Disagree Strongly) to 7 (Agree Strongly). Two items were rated for each subscale (one normally scored, and one reverse scored), the average was calculated to create a composite for each subscale.

6.5.3 Table S3

Spearman's Rho matrix

Variable Name	TIPI Extraversion	TIPI Agreeableness	TIPI Conscientiousness	TIPI Emotional Stability	TIPI Openness	Agreeable Conversation with Emoji AR	Agreeable Conversation with Emoji ESR	Disagreeable Conversation with Emoji AR	Disagreeable Conversation with Emoji ESR	Agreeable Conversation w/o Emoji AR	Agreeable Conversation w/o Emoji ESR	Disagreeable Conversation w/o Emoji AR	Disagreeable Conversation w/o Emoji ESR
TIPI Extraversion		-.05	.05	.14	.23**	-.01	-.01	.11	-.05	-.04	.05	.06	-.09
TIPI Agreeableness	-.05		.02	.17*	.22**	.04	.05	-.08	-.01	.06	.03	-.17*	-.09
TIPI Conscientiousness	.05	.02		.31**	.11	.15*	.08	-.05	.04	.02	.07	.01	.03
TIPI Emotional Stability	.14	.17*	.31**		.03	0.00	0.00	-.04	.05	.05	-.02	.03	.06
TIPI Openness	.23**	.22**	.11	.03		-.01	-.04	.04	.01	.05	.03	-.01	-.05
Agreeable Conversation with Emoji AR	-.01	.04	.15*	0.00	-.01		.70**	-.41**	-.33**	.54**	.40**	-.31**	-.26**
Agreeable Conversation with Emoji ESR	-.01	.05	.08	0.00	-.04	.70**		-.32**	-.40**	.39**	.37**	-.20**	-.28**
Disagreeable Conversation with Emoji AR	.11	-.08	-.05	-.04	.04	-.41**	-.32**		.68**	-.36**	-.23**	.56**	.43**
Disagreeable Conversation with Emoji ESR	-.05	-.01	.04	.05	.01	-.33**	-.40**	.68**		-.33**	-.27**	.36**	.54**
Agreeable Conversation w/o Emoji AR	-.04	.06	.02	.05	.05	.54**	.39**	-.36**	-.33**		.65**	-.32**	-.29**
Agreeable Conversation w/o Emoji ESR	.05	.03	.07	-.02	.03	.40**	.37**	-.23**	-.27**	.65**		-.14	-.33**
Disagreeable Conversation w/o Emoji AR	.06	-.17*	.01	.03	-.01	-.31**	-.20**	.56**	.36**	-.32**	-.14		.67**
Disagreeable Conversation w/o Emoji ESR	-.09	-.09	.03	.06	-.05	-.26**	-.28**	.43**	.54**	-.29**	-.33**	.67**	

Note. AR: agreeableness rating; ESR: emotional state rating; *: $p < .05$; **: $p < .01$.

6.5.4 Additional Information on Stimulus Preparation and Validation

6.5.4.1 Independent Raters

We first had two independent raters rate each of the 58 conversations on agreeableness and realism for each social Context (Personal, Professional, Romantic). Each were measured on a 5-point Likert scale, 1 (Very non-agreeable) to 5 (Very agreeable) and 1 (Very unrealistic) to 5 (Very realistic), respectively. An absolute disagreement score was calculated for each conversation. This was calculated by taking the absolute difference between both raters, for each of the four ratings (overall agreeableness, and realism for each of the three social contexts) and summing those values. Using the summed value, the two most disagreed upon conversations and their counterparts were removed from the stimulus set.

6.5.4.2 Pilot 1

Using the remaining 54 conversations, we conducted a pilot study (Pilot 1). Pilot 1 was run on Qualtrics™. n = 18 participants recruited via ISPR were shown all conversations one after another in a random order. Participants were asked to rate each for agreeableness and emotional intensity on a 7-point scale. The scales ranged from -3 (very disagreeable) to 3 (very agreeable), with 0 being neutral and -3 (very negative) to 3 (very positive), with 0 being neutral, respectively. To select our final set of stimuli, we analyzed whether the 54 conversations at this point were perceived as intended (agreeable vs. disagreeable) and were similar in absolute intensity. First, we conducted an outlier analysis using z = +/-1.96 as our cut-off, in which participants with 10% or more outlying scores were removed from the dataset. This resulted in 4 participants being removed. Participants with less than 10% outlying scores had those outlying scores Winsorized. For the remaining 14 participants, one sample *t*-tests were run comparing mean agreeableness and mean emotional valence ratings to neutral (i.e., a value of 0 on our scale) to test whether conversations were perceived as intended. All tests were significant at $p <$ .001 (Cohen's d ranging from 5.69 to 14.27). This indicates that the conversations were

perceived as intended: agreeable conversations as agreeable and positive, and disagreeable conversations as disagreeable and negative.

Additional paired samples *t*-tests were run to see: 1) Whether the disagreeable and agreeable stimulus sets were equivalent in the degree to which they were perceived as emotionally positive vs. negative, 2) Whether the disagreeable and agreeable stimulus sets were equivalent in the degree to which they were perceived as agreeable vs. disagreeable. These *t*-tests were run using the absolute values of mean participant ratings for agreeable vs. disagreeable ratings, and positive vs. negative ratings for all stimuli (i.e., we evaluated the distance of the mean ratings from a neutral rating of 0).

There was a significant difference between agreeable and disagreeable conversations [$t(13) = 5.00$, $p < .001$, $d = 1.34$] for mean absolute agreeableness rating. This indicated that the mean absolute value of disagreeable conversations was significantly larger than the mean absolute value of agreeable ones. A similar analysis showed no significant differences between the intensity of the emotional valence ratings [$t(13) = 1.88$, $p = .083$], suggesting that the intensities of the valences are equivalent. In an attempt to equalize the agreeableness of the conversations, an absolute difference score for agreeableness was calculated for each conversation pair. That is, we subtracted the agreeableness rating for the agreeable conversation in each pair from the agreeableness rating of its disagreeable counterpart. A similar score was calculated regarding the emotional valence ratings given to each conversation pair. Those pairs with the largest absolute difference score were removed from the stimulus set, resulting in the final 24 pairs of conversations (48 conversations total) used in this study.

t-tests were again run on this final stimulus set [agreeableness: $t(13) = 4.98$, $p < .001$, $d = 1.33$; emotional valence: $t(13) = 1.70$, $p = .113$]. These results indicate that our set of agreeable

and disagreeable conversations remained unequal in agreeableness intensity but became more equivalent in emotional valence intensity. We believe this difference in perceived agreeableness intensity is due to the relative rarity of disagreeable conversations in real-world settings. Few users report conflict resulting from something that happened online or over text messaging (Lenhart, 2015). We opted not to try to further equalize the stimuli, as we felt this would lead to unrealistically mild disagreeable conversations and/or unrealistically positive agreeable conversations.

Finally, one sample *t*-tests were run on the final stimulus set to ensure that the agreeable conversations were perceived as agreeable and positive, and disagreeable conversations were perceived as disagreeable and negative. This was done by comparing the mean agreeableness and emotion ratings to the neutral rating (i.e., a 4 on our scales). All *t*-test were significant at $p <$ .001 (Cohen's d ranging from 6.49 to 14.83), indicating that the stimuli were perceived as intended. That is, agreeable conversations were rated as significantly more agreeable and emotionally positive than the neutral value and disagreeable conversations were rated as significantly more disagreeable and emotionally negative than the neutral value.

6.5.4.3 Pilot 2

In addition to the above, a further validation study was carried out (Pilot 2). n = 77 participants recruited via ISPR were asked to rate the emotional valence and realism of the conversations in a Personal, Professional, and Romantic Context. This data was analyzed using a 3x2 mixed measures ANOVA with Context as an independent groups factor and Conversation Agreeableness as a repeated measures factor. The main effect of Conversation Agreeableness was significant for both the question on emotional valence and realism [emotional valence: $F(1, 74) = 1827.39$, $p < .001$, $\eta^2 = .96$; realism: $F(1, 74) = 507.10$, $p < .001$, $\eta^2 = .87$]. Pairwise

comparisons revealed that agreeable conversations were perceived as significantly more positive than disagreeable conversations [$t(76) = 42.60$, $p < .001$, $d = 4.86$] and as significantly more realistic than disagreeable conversations [$t(76) = 22.55$, $p < .001$, $d = 2.57$]. All other effects of the ANOVA were not statistically significant ($p > .05$). The absolute difference from neutral for agreeable and disagreeable conversations was calculated, and a 3x2 mixed measures ANOVA was run. No effects were significant ($p > .05$), indicating that the stimuli were equal in intensity across all three contexts. In summary, our final set of 48 conversations (24 agreeable, 24 disagreeable) were perceived as intended across the three social contexts. Although realism for disagreeable conversations was not ideal.

6.5.5 Analysis of Stimulus Set Differences

For the purposes of our research design, our 48 pairs of stimuli were broken up into two sets, labelled Set 1 and Set 2, each containing 24 pairs of conversations (i.e., each set had 24 agreeable conversation and 24 disagreeable conversations, half paired with congruent emojis). For the first analysis (2x2x3x2), the goal was to determine if Stimulus Set had an impact on the results, and so only effects containing Stimulus Set are discussed here. Because the study was run on Qualtrics™, which has limited randomization abilities, two groups of stimuli were created. This shortened the study for participants, and also allowed us to fully randomize the order of presentation of conversations within each Stimulus Set. The main effect of Stimulus Set was not significant for either agreeableness [$F(1,171) = 1.10$, $p = .30$] or emotional state [$F(1.,171) = .24$, $p = .62$], but the 2-way interaction between Emoji Presence and Stimulus Set was significant for emotional state, albeit with a small effect size [$F(1,171) = 8.16$, $p = .005$, $\eta^2 = .05$]. Pairwise comparisons revealed that Emoji Presence increased ratings of positivity for both stimulus sets [Stimulus Set 1: $t(176) = 2.63$, $p = .009$, $d = .20$; Stimulus Set 2: $t(176) = 7.06$, $p < .001$, $d = .53$], but for Stimulus Set 2, the effect was larger.

The 3-way interaction between Conversation Agreeableness, Emoji Presence, and Stimulus Set was significant for emotional state [$F(1, 171) = 66.22$, $p < .001$, $\eta^2 = .28$]. After splitting the file by Stimulus Set, both 2-way interactions between Conversation Agreeableness and Emoji Presence within Stimulus Sets were significant [Stimulus Set 1: $F(1, 78) = 87.96$, $p < .001$, $\eta^2 = .53$; Stimulus Set 2: $F(1,93) = 144.04$, $p < .001$, $\eta^2 = .84$]. Paired *t*-tests revealed that Emoji Presence intensified perceived emotional state [Stimulus Set 1: agreeable conversation: $t(80) = 7.80$, $p < .001$, $d = .87$; disagreeable conversation: $t(80) = 6.10$, $p < .001$, $d = .68$; Stimulus Set 2: agreeable conversation: $t(95) = 16.78$, $p < .001$, $d = 1.71$; disagreeable conversation: $t(95) = 13.85$, $p < .001$, $d = 1.41$]. Since both interactions in the 3-way interaction

are significant, and both *t*-tests in the 2-way interactions are significant, this effect of Stimulus Set was interpreted as being due to one effect being stronger than the other. Because the two-way interactions between agreeableness and emoji presence had the same form in both stimulus sets, we opted to collapse across this factor in further analyses.

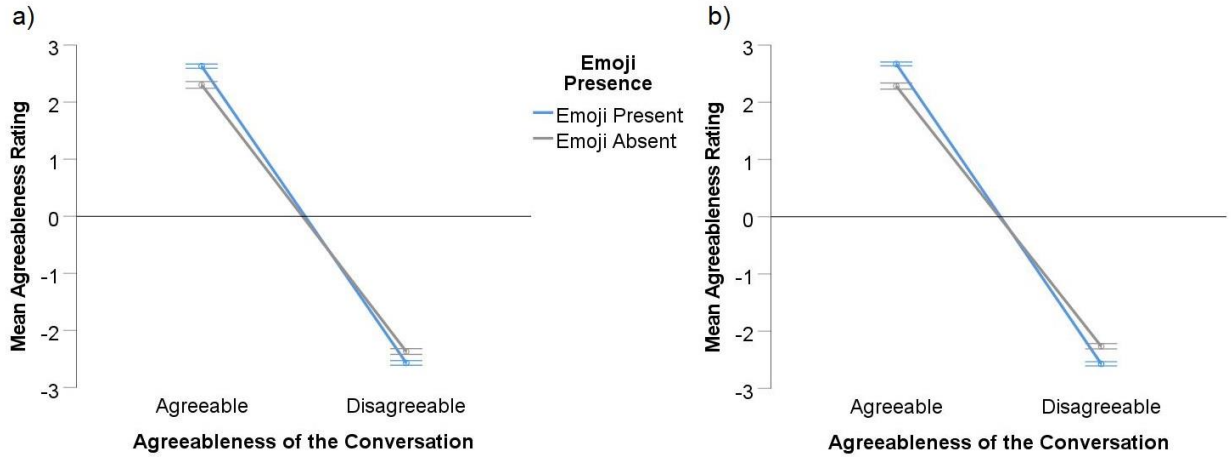


Fig. S1. *Mean perceived agreeableness of Person B.* Panel a: Perceive Agreeableness of Person B in Stimulus Set 1. Panel b: Perceived Agreeableness of Person B in Stimulus Set 2. Participants were asked "Please rate Person B on how agreeable or disagreeable they seem" and provided their answers on a 7-point Likert scale ranging from -3 (very disagreeable) to 3 (very agreeable) for all conversations. Error bars represent ±1 SE.

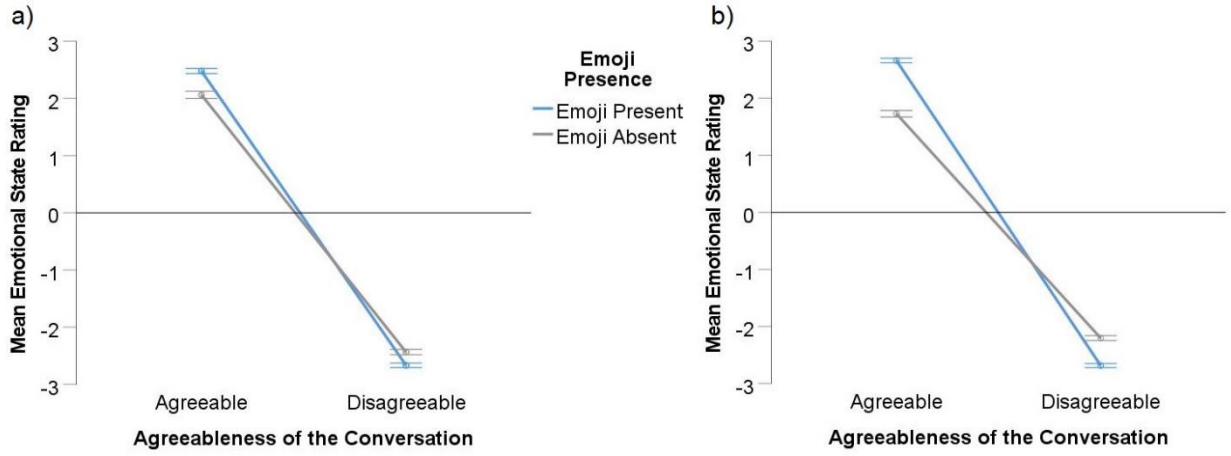


Fig. S2. *Mean perceived emotional state of Person B.* Panel a: Perceive Emotional State of Person B in Stimulus Set 1. Panel b: Perceived Emotional State of Person B in Stimulus Set 2. Participants were asked "Please rate Person B on how agreeable or disagreeable they seem" and provided their answers on a 7-point Likert scale ranging from -3 (very disagreeable) to 3 (very agreeable) for all conversations. Error bars represent ±1 SE.