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ORIGINAL PAPER

Smile Back at Me, But Only Once: Social Norms of Appropriate Nonverbal Intensity and Reciprocity Apply to Emoji Use

Jan-Philipp Stein[1]

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Abstract
In computer-mediated communication, small graphical icons (*emojis*) can be used to compensate for the lack of nonverbal cues such as facial expressions or hand gestures. Accordingly, literature suggests that the use of emojis may also be subject to social norms—similar to nonverbal behavior in face-to-face interactions. However, actual empirical investigations into this assumption remain lacking. To remedy this research gap, I explored whether traditional norms of appropriate emotional intensity and reciprocity also apply to emoji usage. A first online experiment ($N = 188$) revealed that excessive emoji use in a first-contact scenario leads to diminished interpersonal outcomes, corresponding to the drawbacks of overly intense nonverbal displays in natural interactions. Proceeding to a different communicative stage, Experiment 2 ($N = 242$) explored nonverbal reciprocity with acquainted interaction partners. Inviting participants to reply to fictitious text messages (at varying levels of interpersonal intimacy), it was observed that stimulus messages containing more emojis also evoke stronger emoji use in return—indicating that principles of nonverbal attunement are in full effect during text-based online interactions.

Keywords Emoji · Nonverbal communication · Social norms · Display rules · Accommodation

Introduction

Misunderstanding a text message can be quite easy: Without the possibility to hear the other person's intonation or to see their face, a crucial piece of information may get lost on the way. While this limitation of written speech is all but new to the digital age, the ongoing triumph of online communication technologies has facilitated new creative ways of inserting nonverbal cues into text-based interactions. Among the developed innovations, a particularly impactful tool has emerged in the form of *emojis*, which allow users to enrich

✉ Jan-Philipp Stein
jan-philipp.stein@uni-wuerzburg.de

[1] University of Würzburg, Würzburg, Germany

their chat messages, e-mails, and social media posts with expressive smiley faces, lively gestures, and other visual symbols.

Since emojis have taken on the role of facial and bodily signals in many forms of computer-mediated communication, it has been argued that people might also uphold certain norms regarding their 'proper' use (e.g., Ahn et al., 2011; Zhu, 2015)—similar to the many social rules that are applied to nonverbal displays face-to-face (e.g., Patterson, 2012; Zaalberg et al., 2004). Yet, despite the immense popularity of emojis in many people's lives, there is little scientific insight about the applicability of traditional communication norms to the use of the graphical icons. Likewise, the consequences of potential norm violations in terms of *misusing* emojis have received only sparse academic attention. Addressing these research gaps, I present two experimental studies that examine well-established principles of nonverbal communication to the context of digital text messaging. In particular, the current work focuses on social norms that govern the appropriate emotional *intensity* during first online encounters (Experiment 1), as well as the desirable nonverbal *reciprocity* when texting with already established communication partners (Experiment 2).

Traditional Norms of Nonverbal Communication

In face-to-face interactions, human communication typically involves two central components: Explicit verbal content and a substantial amount of unspoken (i.e., *nonverbal*) information. To convey the latter, several communication channels may be used, ranging from facial expressions and hand gestures to voice characteristics, body poses, and interpersonal touch. Both consciously and unconsciously, these means of communication all transmit important information from one interlocutor to another. For successful social interactions to occur, this means that people need to be able to not only decode nonverbal cues by others, but also to understand which behavior may be appropriate or desirable in different situations—i.e., to acquire *social norms* that guide their nonverbal expressions (e.g., Cialdini & Trost, 1998; Rimal & Lapinski, 2015). Also known as *display rules*, these norms may be understood as culturally shared standards that specify the conditions of well-accepted nonverbal cues in different situations (Matsumoto, 1990). Specifically, display rules have been shown to govern both the suitability as well as the desirable intensity of specific cues—or, in other words, the appropriate *quality* and *quantity* of emotional displays in different contexts (Cheshin, 2020; Shields, 2005).

While the exact nature of each person's internalized display rules may depend on various individual factors such as age (e.g., Underwood et al., 1992), gender (e.g., Hall & Gunnery, 2013), or cultural background (e.g., Matsumoto et al., 2008), scientific evidence suggests that certain principles of nonverbal communication are shared by most people, irrespective of their background. For example, it has been shown that individuals from many different demographic groups hold a similar understanding about the appropriate display strength in various daily-life situations—with a moderate level of emotional expressivity often considered the most suitable option in both private and professional contexts (e.g., Leathers & Eaves, 2016; Trees, 2000). Conversely, by failing to stay within socially acceptable "margins of too much and too little emotion" (Shields, 2005, p. 11), individuals may experience various negative outcomes, not least regarding the successful formation and maintenance of social relationships. While these margins may vary from setting to setting, research has examined clear impropriety thresholds both at the lower and the upper end of the expressivity spectrum for most daily-life situations (Cheshin, 2020).

Proceeding to another universally shared principle of successful communication, numerous studies have shown that the 'mirroring' of other people's nonverbal displays constitutes a fundamental prerequisite of establishing positive relationships (Chartrand & Bargh, 1999; Prochazkova & Kret, 2017; Seibt et al., 2015). Just as different disciplines have developed different terms to describe this mechanism (e.g., *nonverbal reciprocity*, *mimicry* or *chameleon effect*), it can be found at the center of numerous influential communication theories—including *Interaction Adaptation Theory* (Burgoon et al., 1995) and *Communication Accommodation Theory* (CAT; Giles & Smith, 1979; see also Giles & Ogay, 2007). For instance, CAT postulates that in most daily-life situations, individuals tend to adjust their communication behavior to fellow speakers, especially if they perceive mutual similarities or a growing emotional bond. The theory further states that although people might also intentionally choose to underaccomodate their communication partners, a moderate-to-high level of nonverbal attunement is usually considered the best choice (Giles & Ogay, 2007; Soliz & Giles, 2014).

From a psychological perspective, this perfectly encapsulates the high relevance of empathy in human communication: Individuals need to demonstrate their ability to take each other's perspective if they want to form and maintain social bonds (e.g., Anderson & Keltner, 2002). Accordingly, nonverbal mimicry is typically seen as a behavior of high cross-cultural generalizability (e.g., Lakin et al., 2003; Nielsen & Tomaselli, 2010), even though its specifics might, again, be modulated by several contextual and sociocultural factors (e.g., Leighton et al., 2010; van Baaren et al., 2009).

Emojis as Digital Substitutes for Nonverbal Cues

With the rise of computer-mediated forms of communication, it soon became evident that many of the developed technologies (such as e-mail or discussion boards) were strongly limited by their lack of nonverbal communication channels (Walther, 2006). In response to this, innovators quickly proposed new ideas to incorporate nonverbal information into written online communication. Starting with so-called *emoticons*—combinations of regular typographic symbols (e.g., ";-P" or ":D") that were used as early as the 1980s—technological developments eventually paved the way for *emojis*, i.e., fully graphical icons that can be inserted into digital text messages in order to convey nonverbal cues. Due to their high ease-of-use and ever-growing diversity, emojis have successively turned into a crucial part of nearly any form of online communication, from instant messaging (e.g., WhatsApp, WeChat, Telegram) to the use of social media (e.g., Twitter, Instagram, TikTok).

From a functional perspective, emojis are generally considered a unique form of paralanguage that directly replaces facial and bodily displays in text-based communication (Bai et al., 2019; Erle et al., 2022). Based on this understanding, it is reasonable to assume that they are subject to similar display rules as face-to-face nonverbal behavior. Research suggests that when encountering mediated social cues, people are likely to fall back on the same scripts and behavioral guidelines that they know from previous social experience (Nass et al., 1994; Reeves & Nass, 1996). According to the *Panksepp-Jakobson hypothesis* (Panksepp, 1998; Jacobs, 2015), this may ultimately be explained by the fact that human evolution did not yet have sufficient time to adapt to the existence of artistic and mediated representations—so that graphical stimuli still prompt similar neurological responses as their real-world counterparts. With "new media engag[ing] old brains" (Reeves & Nass, 1996; p. 12), it can therefore be expected that people draw on previously acquired expectations when encountering emojis as immediate stand-ins for real nonverbal expressions.

Indeed, a small but growing body of research has demonstrated that the use of emojis may yield more or less positive effects depending on the sender's compliance with established behavioral norms. For example, it has been found that adding emojis to text messages is generally more well-accepted in leisure than in business contexts (e.g., Ahn et al., 2011; Cavalheiro et al., 2022), which mirrors similar display rules from face-to-face settings (e.g., Clark & Taraban, 1991; Kramer & Hess, 2002). Along the same lines, the use of particularly expressive emojis is often perceived as more acceptable among women than among men (Tang & Hew, 2019), resembling another classic social norm from natural interactions.

More recently, a handful of scientific analyses have further suggested that sporadic insertions of single emojis might constitute a more well-received form of nonverbal communication than excessive uses of the feature—as the latter may be seen as intrusive, difficult to read, or insincere (Roele et al., 2020; Wagner et al., 2020; Wortmann & Wattenberg, 2019; Zhu, 2015). Indeed, journalistic publications and online etiquette guides have long supported the notion of 'optimal' emoji amounts (e.g., Bradley, 2017; Ryan, 2020). As such, both scholarly and non-scholarly insight seems to suggest that a considerate use of emojis fosters communicative success, paralleling moderate levels of expressivity as they are preferred during face-to-face interactions (e.g., Leathers & Eaves, 2016; Shields, 2005).

The first study of the current project investigated how adhering to norms of moderate emotional intensity (via emojis) translates into more or less positive interpersonal outcomes. In particular, this research effort focused on the first digital encounter with a stranger, as norms of moderate nonverbal intensity were expected to be particularly relevant in this situation—a critical and often brief window in which important foundations for subsequent interactions are laid (Peplau et al., 2005). As text-based communication features less cues to form impressions to begin with, norm violations (in terms of overly extreme or insufficiently weak nonverbal displays) appeared particularly relevant during this stage.

However, what is considered a desirable number of nonverbal cues will likely change over the course of subsequent interactions. With growing familiarity, general norms of appropriate emotional intensity may get shaped into more specific interpersonal dynamics—so-called *local norms* that are mutually upheld by immediate interaction partners (Carrus et al., 2009). For the topic at hand, this raises the question if people's normative understanding of an appropriate amount of emojis varies between different communication dyads. Most importantly, the answer to this question seems to be informed by the fact that humans have an innate tendency to mirror each other's nonverbal behavior—an accommodation mechanism that could occur not only offline but also in the online realm (Coyle & Carmichael, 2019; Hajjat & Miller, 2017; Nexø & Strandell, 2020). Therefore, the second experiment examined the norm of appropriate nonverbal reciprocity, observing how online users mirror the expressivity of acquainted interaction partners.

Experiment 1: Appropriate Nonverbal Intensity (During First Encounters)

Experiment 1 investigated medium emoji frequency as a precursor for effective and well-accepted online communication—with particular focus on a communicative setting that (a) plays an important role in many people's daily lives, (b) revolves around amicable intentions, and (c) has been shown to benefit strongly from appropriate nonverbal behavior: (online) dating.

Research has firmly established that the successful initiation of romantic ties depends, rather critically, on the adequate use of facial expressions and bodily cues (Moore, 2010). In modern times, however, this high relevance of nonverbal signals for the dating process meets a notable challenge—as more and more people use online chat platforms to find romantic or sexual partners (Rosenfeld et al., 2019). Due to the text-based design of these platforms, important nonverbal channels are removed from the initiation of romantic ties, thereby impeding people's impression formation, as well as the evaluation of romantic compatibility. In turn, it comes as no surprise that emojis have taken on a crucial role in the online dating realm. For example, it has been found that using emojis can lead to significantly longer conversations between users of virtual dating platforms and increase the likability of forming stronger ties (Gesselman et al., 2019). Similarly, it has been revealed that emojis constitute an effective means to lead new online conversations in a more intimate direction (Thomson et al., 2018).

Applying the described norm of moderate nonverbal intensity to the chosen digital context, Experiment 1 examined potential consequences of an (in)appropriate emoji frequency in first-contact dating messages (so-called "conversation starters"). First, the study focused on two interpersonal perceptions that take on a key function in human dating, namely, the *likability* and *humor* ascribed to the dating partner (e.g., Alves, 2018; McGee & Shevlin, 2009). Based on the fundamental notion that compliance with social norms facilitates positive social judgments (e.g., Abrams et al., 2000; Gibson & Gore, 2015), a positive effect of moderate emoji use (versus no emoji use) was proposed for both of these variables.

Research has also shown that displaying an appropriate amount of nonverbal expressiveness (compared to no expressiveness) may boost the *physical attractiveness* ascribed to a person (Sabatelli & Rubin, 1986)—potentially due to the well-established *halo effect* (Nisbett & Wilson, 1977), whereby positive attributes and behaviors of a person exert strong downstream effects onto other interpersonal perceptions. In tandem, studies have shown that norm violations significantly reduced the attractiveness ascribed to both male and female confederates (Gibson & Gore, 2015). Therefore, participants might come to expect the sender of a dating message to be more physically attractive if he or she had used a suitable amount of emojis—which could be further related to a higher willingness to continue the interaction. In sum, it was predicted:

H1: Online dating messages with sporadic emojis lead to (a) more interpersonal liking, (b) more perceived humor, (c) a stronger expectation of physical attractiveness, and (d) stronger intentions to continue the interaction than messages without emojis.

Likewise, falling short of moderate expressivity norms with a complete lack of emojis or excessive use of emojis could result in reduced interpersonal success (cf. Roele et al., 2020; Wagner et al., 2020):

H2: Online dating messages with excessive emojis lead to (a) less interpersonal liking, (b) less perceived humor, (c) a weaker expectation of physical attractiveness, and (d) weaker intentions to continue the interaction than messages with sporadic emojis.

Method

Procedure

The current experiment was conducted online, using a 1×3 between-subject design. An automatic randomization procedure assigned each participant to one of three conditions: Online

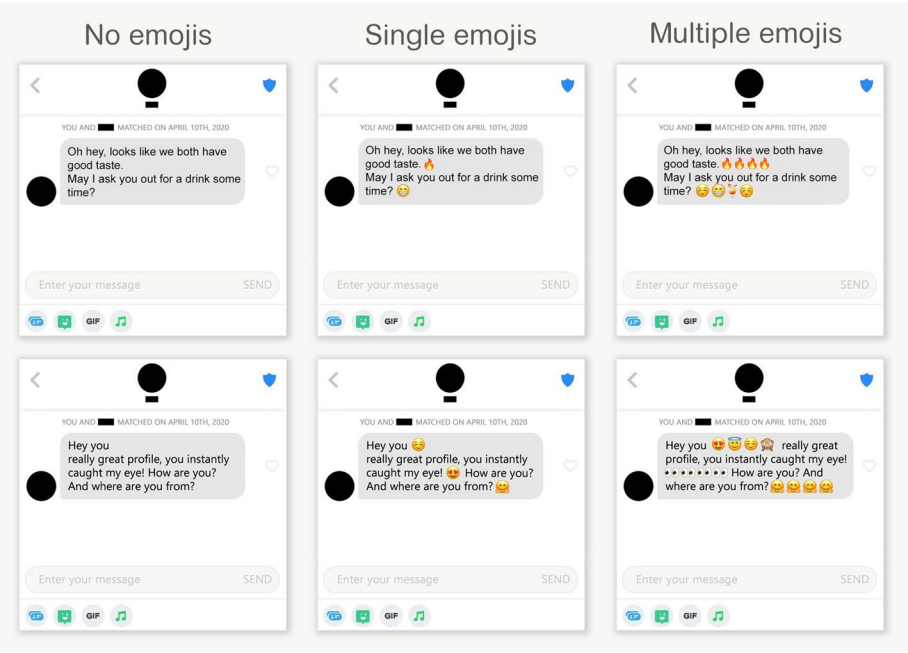

Fig. 1 Stimulus Examples from Experiment 1 (Translated from German to English for Publication)

dating messages with no emojis, sporadic emojis, or excessive emojis. At the beginning of the study, informed consent was obtained from all participants. To start, they were briefly introduced to the online dating context and asked to assume the perspective of a message recipient on a famous dating app. They were then presented with four fictitious screenshots of incoming conversation starters. Depending on the assigned condition, the depicted messages contained either no emojis at all, a single emoji after each sentence, or combinations of four emojis after each sentence; apart from this manipulation, message content remained the same. Figure 1 illustrates the differences between the three groups.

Below each of the presented screenshots, participants were asked to fill in the same measures on the four dependent variables (interpersonal liking, perceived humor, intention to continue the interaction, and imagined physical attractiveness). In the subsequent statistical analyses, the ratings for all presented stimuli were averaged into a single score per outcome variable. Concluding the experiment, participants were thanked for their time and received a ticket for a gift raffle of €50 cash prizes.

Participants

An a-priori calculation of minimum sample size via G*Power software (assuming a moderate effect size, 80% power, and an alpha error probability of 0.05) resulted in a lower threshold of at least 186 participants. Accordingly, a total of 188 German-speaking, young adult participants (age $M = 21.97$ years, $SD = 2.61$, range: 18–36 years) were recruited for the online experiment, using personal contacts, mailing lists at the local university, and social media groups. A control question on participants' diligence ("Did you carefully read

and answer all provided questions?") resulted in no negative answers, so that all obtained datasets could be included in the study.

In terms of gender distribution, the majority of the sample self-identified as female (130 female, 55 male, 3 other). Furthermore, participants were asked to indicate their sexual orientation in order to use this variable as a potential covariate; apart from one person who declined to answer this voluntary question, the sample consisted of heterosexual ($n = 164$), bisexual ($n = 14$), homosexual ($n = 5$), and other-identifying ($n = 4$) individuals. Lastly, regarding their educational background, most participants reported a high level of education, either in the form of a university-entrance diploma (69.7%) or a finished university degree (19.1%).

Materials

The stimuli for the three experimental groups were self-created with the help of a focus group consisting of four media communication students, who contributed as part of a curricular research project. Consulting a large-scale analysis of nearly 1,000 students' emoji use—which had concluded that one emoji per sentence constituted regular use, whereas three emojis per sentence were already seen as 'excessive' (Zhu, 2015)—the focus group discussed personal experiences and decided on the following criteria for the dating context: (a) one emoji per sentence as norm-consistent behavior, and (b) four emojis per sentence as excessive behavior. Next, the students composed four conversation starters (e.g., "I am into cooking and sports…just noticed that we share these interests! Up for a chat?") as they might occur on an online dating platform. Subsequently, each of these messages was edited to contain either no emojis, one thematically fitting emoji after each sentence, or four emojis after each sentence; during this step, all members of the focus group had to unanimously agree on an emoji's suitability for it to be included.[1]

Lastly, the finalized messages were inserted into the chat interface of a popular mobile dating application. In order to avoid confounding effects due to the name, gender, or profile icon of the fictitious dating partner, these elements were blinded in the final screenshots (Fig. 1).

Measures

For the current project, all measures were self-translated to German (using back-translations by native speakers to ensure validity). In the following, however, example items are provided with their original English wording.

Interpersonal Liking

Participants' liking towards the fictitious online dating partner was assessed using the three items (e.g., "I have positive feelings for this online dating partner"; "I feel close to this

[1] Although we had initially planned to include only identical symbols in the four-emoji condition, we soon noticed that the resulting stimuli turned out too artificial. As such, it was decided that messages for this condition could also feature several different icons, as long as they remained thematically fitting and similar in valence. By these means, a more externally valid depiction of excessive nonverbal expressivity via emojis was intended.

online dating partner") provided by Wojciszke et al. (2009). Five-point scales were used to capture participants' responses (1 = *not at all*; 5 = *very*). The measure showed good internal consistency, with Cronbach's α ranging between 0.78 and 0.96 ($M = 0.89$) across all applications of the scale.

Perceived Humor

In order to measure participants' perception of humor, five semantic differentials (e.g., "not humorous–humorous"; "not playful–playful") developed by Zhang (1996) were used. Five gradation points were given to answer these items. Following the multiple uses of this instrument in the study, the average reliability of the scale turned out satisfactory, $M = 0.78$ (Cronbach's α ranging between 0.70 and 0.87).

Imagined Physical Attractiveness

The expectation of physical attractiveness was measured using a set of six ad-hoc items ("I picture this dating partner as very attractive"; "…sexy"; reverse-coded: "…ugly"), which were presented using 7-point scales (1 = *not at all*; 7 = *very*). Internal consistency turned out very good, with an average Cronbach's α of 0.91 (range: 0.88–0.94).

Intentions to Continue the Interaction

To address participants' intention to further engage with the respective dating partner, five ad-hoc items were created (e.g., "I could imagine responding to this message."; "I would like to talk more with this chat partner."; reverse-coded: "I would not consider meeting this person"). Again, seven-point rating scales were used (1 = *not at all*; 7 = *very*). An excellent internal consistency was observed for this measure, Cronbach's α between 0.91 and 0.96 across all measurements ($M = 0.93$).

Results

All means and standard deviations observed for the three experimental groups can be found in Table 1. Since the four dependent variables were highly intercorrelated (Table 2), a multivariate approach to the data analysis was pursued. Conducting a multivariate analysis of variance (MANOVA) with all four dependent variables, a significant effect of the dating messages was observed, Wilks' $\Lambda = 0.84$, $F(8364) = 4.24$, $p < 0.001$, $\eta_p^2 = 0.09$.

I followed up this multivariate result with univariate planned comparisons. Doing so, no noteworthy group differences between the *single emojis* and the *no emojis* conditions were found—leading to the rejection of H1. However, my contrast analyses showed that messages containing multiple emojis after each message indeed received significantly lower ratings than messages with single emojis, both in terms of less expected physical attractiveness, $t(125) = 3.95$, $p < 0.001$, $d = 0.71$, and weaker intentions to continue the interaction, $t(125) = 2.35$, $p = 0.020$, $d = 0.42$. As such, hypotheses H2c and H2d were supported by the collected data.

For strictly exploratory purposes, I repeated the described analytical procedure entering participants' sexual orientation as a dummy-coded covariate (0 = *heterosexual*, 1 = *LGBTQ*). Doing so, no notable deviations from the initial results pattern were found.

Table 1 Descriptive Statistics for Study Variables (Experiment 1)

Variables	Full sample ($N = 188$)	No emojis ($n = 61$)	Single emojis ($n = 67$)	Multiple emojis ($n = 60$)
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Interpersonal liking[1]	2.91 (0.63)	3.03 (0.55)	2.97 (0.61)	2.74 (0.69)
Perceived humor[1]	3.04 (0.60)	2.97 (0.57)	3.15 (0.57)	2.98 (0.67)
Intentions to continue the interaction[2]	4.27 (0.89)	4.49 (0.85)	4.33 (0.80)	3.97 (0.95)
Imagined physical attractiveness[2]	4.47 (0.71)	4.54 (0.62)	4.67 (0.80)	4.17 (0.60)

[1]Measured with 5-point scales. [2]Measured with 7-point scales

Table 2 Intercorrelations for Study Variables (Experiment 1)

Variables	1	2	3	4	5	6
1. Age	–					
2. Gender	–0.23**	–				
3. Interpersonal liking	–0.01	–0.06	–			
4. Perceived humor	–0.03	0.07	0.68***	–		
5. Intentions to continue the interaction	0.00	–0.13	0.80***	0.59***	–	
6. Imagined physical attractiveness	–0.02	0.09	049*	0.45***	0.62***	–

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

However, the strongly imbalanced group sizes in this regard clearly limit the informative value of this analysis.

Discussion of Experiment 1

Being smiled at by a stranger can feel pleasant and engaging, but once the friendly nonverbal signals become too intense, any positive effects may vanish—or even turn downright uncomfortable. Experiment 1 investigated whether over- or underusing emojis during first interactions in this setting would counteract the beneficial effects that usually go along with a considerate use of the feature.

As hypothesized, statistical analyses revealed that online conversation starters containing four emojis after each sentence led to significantly worse impressions than one or a complete absence of emojis. More specifically, a fictitious dating partner using multi-emoji combinations was rated less attractive and evoked a lower willingness to engage in further interactions. Considering that both of these outcomes are crucial to proceed from a first encounter to further stages of relationship formation, it appears that display norm violations were penalized by the study participants, who rated the respective individuals as less promising romantic prospects.

At the same time, a rather surprising result emerged in the lack of significant differences between messages containing single emojis—which had been hypothesized as an appropriate use of the feature—and those including no emojis whatsoever. Perhaps one icon after each sentence might still have seemed a bit too intense to participants, especially considering the brevity of the composed messages. Thus, the intended *moderate* level of nonverbal intensity might not have been matched perfectly in this condition. Of course, further work on the exact boundaries of moderate emoji use is much needed to scrutinize this potential shortcoming; in particular, research could compare different stages of the communicative process—and explore how these might be related to shifting display rules. Two recent studies showed that online dating users may prefer quite different emoji behaviors during initial encounters (Gesselmann et al., 2019) than with established romantic partners (Rodrigues et al., 2017). Hence, what is being considered moderate during the first few messages between two daters might not necessarily seem that way a few days or weeks later.

The results pattern also may have been affected by the *qualitative* aspects of the created emoji messages (e.g., the tonality of the included emojis, the interplay between verbal and nonverbal content). The created four-emoji combinations did not always contain repetitions

of the same symbol but also included different emojis. While this approach was chosen deliberately for reasons of external validity, it arguably introduced a potential confound by increasing the nonverbal variety in the multiple-emoji condition. This should not be ignored—especially since recent research suggests that even supposedly analogous emojis can signify different intentions in the realm of online dating (Rodrigues et al., 2022). Along the same lines, considering that only amicable emojis were featured in the current experiment, results are likely to change once more negative symbols come into play during a first online encounter. Lastly, I want to caution readers against a careless generalization of the reported results to other communicative settings, as the specifics of the chosen online dating context (e.g., romantic interests and desires) have likely played an important role for the obtained findings.

Experiment 2: Appropriate Nonverbal Reciprocity (with Acquainted Interaction Partners)

Whereas the first experiment had focused on initial encounters with digital strangers, Experiment 2 served to acknowledge the fact that norms of nonverbal expressiveness have a strong individual component—meaning that people's behavioral expectations usually change according to the relationships they develop (Carrus et al., 2009). Thus, the second study examined participants' emoji use with more familiar communication partners as well as a different communication norm: nonverbal *reciprocity*, a well-established display rule from natural interactions that might also hold true when using emojis.

Indeed, several recent studies suggest that having one's emoji use 'mimicked' by an interaction partner significantly improves interpersonal impressions (Coyle & Carmichael, 2019; Hajjat & Miller, 2017; Nexø & Strandell, 2020). As such, principles of communication accommodation also seem to apply to digital text-based interactions—promising clear social benefits once users manage to attune their nonverbal signals. Conversely, by failing to match the emotional intensity of the digital other, people might come across as unempathetic, cold, or inauthentic, just like face-to-face communicators who show much more restrained or intense nonverbal behavior. However, the abovementioned literature has only observed how emotional mirroring by (real or fictional) others affected people's evaluations of them; meanwhile, no experiment to date has explored whether participants themselves actively use emojis to accommodate others. Thus, the present study investigated participants' own replies to stimulus messages containing different amounts and types of emojis.

Based on the understanding of nonverbal accommodation as a highly adaptive and beneficial behavior in social interactions (e.g., Chartrand & Bargh, 1999; Giles & Smith, 1979; Seibt et al., 2015), it was hypothesized that receiving messages with emojis would prompt individuals to adjust their own emoji frequency as well:

H1: Participants will use significantly more emojis when replying to messages with emojis than when replying to messages without emojis.

At the same time, I anticipated that participants' emoji use would depend on the respective conversation partner—as numerous studies have underscored the higher acceptance for emojis in private than in professional interactions (e.g., Ahn et al., 2011; Cavalheiro et al., 2022). Hence, a second main effect via the communicators' familiarity was proposed:

H2: Participants will use significantly more emojis in conversations with close than with distant interaction partners.

Combining both of these assumptions into a potential interaction effect, different outcomes seemed reasonable. On the one hand, CAT predicts that people feel more inclined to converge (non-)verbally with those from whom they seek approval (Soliz & Giles, 2014)—a motive that seems to be more evident when communicating with new or professional (i.e., distant) acquaintances (e.g., Kroll et al., 2018). On the other hand, paralinguistic accommodation can also be used to lower uncertainty and increase mutual understanding (Giles & Smith, 1979), which could just as well be relevant when talking to closer friends and family. As such, an open research question was formulated:

RQ1: Will the reciprocation effect described in H1 be modulated by the familiarity of the conversation partner?

Lastly, it was investigated whether nonverbal reciprocity only manifests in adjusted emoji frequencies, or if it also involves the actual imitation of affective states—keeping in mind that nonverbal attunement is typically expected to include similar levels *and* types of emotion (Soliz & Giles, 2014). Yet, due to the somewhat ambiguous nature of many emojis (e.g., Bai et al., 2019), a valid assessment of mirrored basic and/or secondary emotions did not seem feasible in this quantitative study. In consequence, a strictly exploratory perspective was asked with regards to general emoji valence:

RQ2: When replying to messages with emojis, how often do participants use (a) emojis expressing a similar valence, and (b) exactly the same emojis?

Method

Procedure

This experiment employed a 2×2 within-subject design. After obtaining informed consent, participants were shown a total of 20 fictitious chat messages and asked to reply to them as naturally as possible. Serving as the first experimental factor, 50% of the presented messages were framed as texts from close family and friends ("mom" or "best friend"), whereas the other 50% depicted more formal interactions with distant acquaintances ("boss" or "neighbor"). As second experimental factor, half of the messages were randomly selected to be augmented with thematically fitting emojis, while the other half was not. To avoid potential order effects, two sequences of the twenty messages were prepared, in which the fictitious interaction partners occurred in different order; during the experiment, either one of these sequences was randomly displayed for each participant.

Examples for the four resulting factor combinations can be examined in Fig. 2. The complete set of the prepared messages is provided in the project's online supplement (https://osf.io/wx843/).

Participants were successively guided through 20 survey pages, each of which contained a single chat screenshot (according to the assigned message sequence). On each page, participants were asked to read the depicted message carefully and to expend their best efforts to assume the perspective of the addressed person. Then, they typed an answer into a chat field below, with the instruction to reply "as spontaneously and authentically as possible." A brief note also explained to participants that they could add emojis if they desired to do so—either via their mobile devices' built-in keyboards, or by using the clickable emoji selector next to the text field. While it is possible that adding this disclaimer nudged

Fig. 2 Stimulus Examples from Experiment 2 (Translated from German to English for Publication)

participants' behavior towards stronger emoji use, it was deemed more important to explain the possibilities of the experimental interface to avoid an unrealistic underusage of emojis.

Participants

Initial calculations with G*Power software suggested a minimum sample size of 34 to detect moderate effect sizes in a within-subject design. Following recruitment efforts using social media and local mailing lists, a total of 269 German-speaking individuals (age $M = 23.56$ years, $SD = 6.52$; 178 female, 90 male, 1 other) took part in the current study. However, based on a control question on attentive responding ("Did you carefully read and answer all provided questions?"), 18 participants had demonstrated less-than-optimal diligence, leading to their exclusion from the study. Also, due to the imaginary nature of the prepared scenario, a second control question was used to identify and exclude participants who had lacked the necessary mental involvement ("Were you able to assume the perspective of the message recipient?"; 1 = *not at all*, 5 = *completely*). Using this measure, eight participants scoring below the value 4 were excluded. Lastly, one person finished the experiment in less than five minutes, a duration that had been pretested as minimum time for attentive responding. As such, the final sample consisted of 242 participants (age $M = 23.64$ years, $SD = 6.56$; range 17–61 years). Nearly two thirds of the sample identified

as women (163 female, 78 male, 1 other) and most participants reported a high level of education, with 66% being currently enrolled as students.

Materials

The text messages needed for the current experiment were created by a focus group of four media communication students, who contributed as part of a local research project. Since my work aimed at comparing participants' responses to close and distant interaction partners, the group first created two fictional personas for each of these conditions: the recipient's mother and best friend, as well as their boss and new neighbor. Subsequently, five messages were composed for each persona (e.g., mom: "Are you free tomorrow? I would really like to spend some time with my child again"; boss: "We just approved another important appointment for tomorrow…you need to come to the shop after all.")—making sure that each condition included five different mood states (happy, amused, neutral/inquisitive, annoyed, and sad). Next, the resulting twenty messages were adapted into two versions: A plain text without emojis, as well as a second version with one or two emojis added to the end of the message. Similar to Experiment 1, the decision as to which emoji should be added was made unanimously by the involved student focus group.

Concluding the design of the study materials, image processing software was used to insert the created messages into the interface of a popular messaging app, yielding realistic smartphone screenshots. To give participants the impression that they could directly type in their answers, a transparent text field was displayed on top of the screenshot's reply area. Furthermore, anticipating that some participants would access the experiment using desktop computers, open-source PHP code was used to add a clickable emoji selector next to the response field. Participants using a mobile device could simply use their phones' emoji keyboard.

Data Coding

For the planned statistical analyses, participants' replies were coded regarding emoji use quantity and quality. To this end, four student assistants were tasked with coding the collected data following three central steps. First, the coders counted the mere number of emojis found in each of the 20 replies entered by the participants. Due to their comparable communicative function, this included both text-based emoticons (e.g., ":D") and graphical emojis—with each symbol increasing the count by an increment of 1. Consequently, 20 numerical *emoji frequency* scores were obtained for each participant. These scores were further recoded into dichotomous variables, which only indicated whether a reply had contained emojis (1) or not (0).

In the subsequent second and third step of the coding process, the student assistants examined the *meaning* of the used emojis. Specifically, each reply had to be screened for two distinct occurrences: (a) uses of exactly the same emoji as the stimulus message and (b) uses of emojis expressing a similar valence (positive, neutral–ambivalent, negative). Again, a dichotomous format was used (1 = *occurs at least once in the reply;* 0 = *does not occur in the reply*). Whereas only a perfect duplicate was deemed valid to set the first score to 1 (e.g., replying to a "crying with laughter" emoji with a simple laughing emoji would not result in a hit), the second decision was based on a comprehensive coding sheet that sorted the most common emojis into different valence categories (see Fig. 3). This sheet was prepared using the web encyclopedia Emojipedia (2022), which describes the

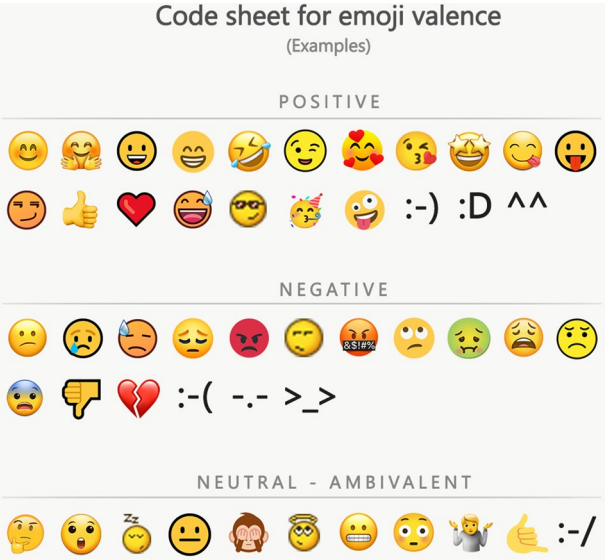

Fig. 3 Coding Instructions for Experiment 2

meaning of all currently available emojis. Moreover, I included examples for both text-based emoticons and graphical emojis as depicted by popular apps and operating systems, and instructed coders to ignore lifeless objects (e.g., plants, food, weather). Cross-checking the final coding sheet with scientific data on average perceived emoji valence (*Lisbon Emoji and Emoticon Database*; Rodrigues et al., 2018), the validity of the created guidelines could be confirmed.

Inter-Rater Reliability

To calculate reliability, ten percent of the full dataset (i.e., the data of 24 participants) were coded by all four coding assistants, before splitting the remaining data equally among them. Perfect inter-rater reliability was achieved (Krippendorff's $\alpha = 1.0$).

Results

Emotional Reciprocity in Quantitative Terms

Based on the coded emoji data, several mean scores were assembled: The average *number of emojis* in replies to (1) messages with emojis, (2) messages without emojis, (3) messages by close interaction partners, and (4) messages by distant interaction partners. Furthermore, it was averaged how many replies by the study participants had contained *at least one* emoji depending on the stimulus condition (see Table 3 for all obtained mean scores).

To test the hypotheses, two repeated measures ANOVAs were calculated: Whereas the first procedure used the average number of emojis in participants' replies as criterion, the second analysis instead focused on the percentage of replies including at least one emoji. The first ANOVA uncovered a significant difference between participants' replies to stimulus messages with and without emojis, $F(1241) = 44.31$, $p < 0.001$, $\eta_p^2 = 0.16$. Specifically,

Table 3 Descriptive Statistics for the Coded Emoji Frequencies (Experiment 2)

	Interaction partner	Mean number of emojis per reply	% of replies containing at least one emoji
		M (SD)	*M (SD)*
Stimuli messages with **emojis**	Close	1.08 (0.58)	75.0 (27.1)
	Distant	0.66 (0.53)	53.2 (36.2)
	Total	0.86 (0.47)	64.1 (27.1)
Stimuli messages **without emojis**	Close	0.96 (0.54)	69.9 (27.7)
	Distant	0.49 (0.43)	40.0 (31.6)
	Total	0.72 (0.41)	55.0 (25.2)
Total	Close	1.02 (0.50)	72.5 (24.6)
	Distant	0.57 (0.38)	46.6 (27.4)
	Total	0.80 (0.41)	59.6 (23.2)

$N = 242$

when replying to messages with emojis, participants used the icons notably more often ($M = 0.87$ emojis per message, $SD = 0.47$) than when replying to messages without emojis ($M = 0.72$, $SD = 0.41$). Likewise, a strong main effect for the familiarity of the interaction partner was observed, $F(1, 241) = 337.38$, $p < 0.001$, $\eta_p^2 = 0.58$. Much fewer emojis were used in replies to distant ($M = 0.57$ emojis per message, $SD = 0.38$) than to close interaction partners ($M = 1.02$ emojis per message, $SD = 0.50$). On the other hand, the procedure did not result in a significant interaction effect between the two experimental manipulations, $F(1, 241) = 0.98$, $p = 0.332$, $\eta_p^2 < 0.01$.

Focusing on the percentage of replies containing at least one emoji, the second ANOVA uncovered two significant main effects, both for the type of stimulus message, $F(1241) = 34.74$, $p < 0.001$, $\eta_p^2 = 0.13$, and the familiarity with the interaction partner, $F(1241) = 291.524$, $p < 0.001$, $\eta_p^2 = 0.54$. In particular, stimulus messages with emojis led to a higher percentage of emoji-containing replies ($M = 64.1\%$, $SD = 27.1$) than stimuli without emojis ($M = 55.0\%$, $SD = 25.2$), and replies to close interactions partners contained emojis more often ($M = 72.5\%$, $SD = 24.6$) than those to distant partners ($M = 46.6\%$, $SD = 27.4$). In addition to this, a significant interaction effect was encountered, $F(1241) = 7.49$, $p = 0.007$, $\eta_p^2 = 0.03$. This effect is illustrated in Fig. 4. As can be seen here, participants' decision to use emojis in their own messages was less affected by the stimulus emoji use when talking to close than to distant conversation partners.

In summary, the obtained results supported hypotheses H1 and H2, while providing a mixed answer to RQ1. As anticipated, participants felt more inclined to use emojis when replying to stimulus messages that had also contained emojis, as well as in interactions with close (instead of distant) ties. A significant (albeit small) interaction effect further indicated that initial emoji use in the stimulus message was slightly less impactful when chatting with friends and family instead of distant acquaintances.

Emotional Reciprocity in Qualitative Terms

To explore how often participants used similarly-valanced or the same emojis when replying to emoji messages (RQ2), the coded occurrences of (a) identical and (b) similarly

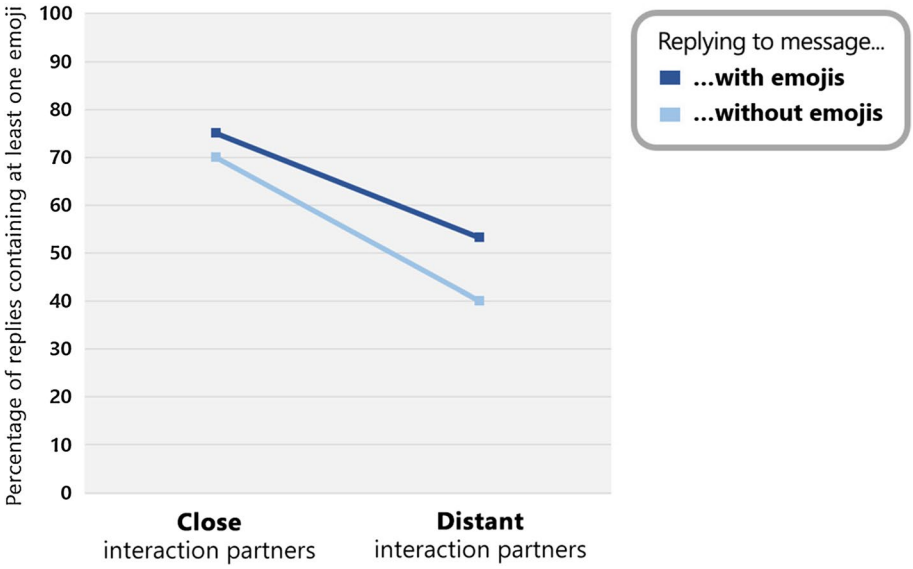

Fig. 4 Percentage of Replies Containing at Least One Emoji (Experiment 2)

valenced emojis in participants' replies were coded—focusing only on reactions to stimulus messages with emojis (as only these conditions were theoretically relevant here). Results showed that participants had used identical emojis in approximately 12% of their replies, regardless of whether they had imagined talking to a familiar or a distant person (Table 4). However, by extending the analysis to emojis with a similar valence, it was found that broader forms of emotional mirroring were much more common, occurring in 51% of the analyzed replies. The reciprocation of general emoji valence occurred notably more often when replying to close (63% of all messages) than to distant acquaintances (38% of all messages). In summary, this suggests that online users echo their communication partners' emotional states frequently, especially if they interact with a close friend or relative.

Discussion of Experiment 2

As the nonverbal attunement of two communicating parties increases, so may their mutual appreciation, empathy, and attachment. In turn, people may come to expect nonverbal accommodation by their interaction partners—and might feel a normative inclination to show such behavior themselves. Experiment 2 investigated whether this fascinating social mechanism could also be observed in text messages, a media channel where emojis typically serve as stand-ins for nonverbal cues. Supporting the hypotheses, it was revealed that receiving messages with emojis (versus no emojis) encouraged participants to insert more icons themselves—with a moderate to large effect size describing the observed difference. Further, analyses showed that people's own nonverbal behavior strongly depended on the respective interaction partner: Not only did participants' familiarity with the message recipient exert a strong main effect on its own, but it also showed a significant (yet small) interaction with the presence of emojis in the stimulus message. Taken together, Experiment 2 indicates that online users indeed adhere to norms of nonverbal reciprocity,

Table 4 Descriptive Statistics for Emoji Meanings (Experiment 2)

Variables	*M* (*SD*)
% of replies to **emoji messages by close partners**[a] with…	
…Non-identical emojis of similar valence	51.1 (25.7)
…Identical emojis	12.0 (14.6)
Total	63.1 (27.1)
% of replies to **emoji messages by distant partners**[a] with…	
…Non-identical emojis of similar valence	25.7 (27.6)
…Identical emojis	12.8 (21.0)
Total	38.5 (34.0)
% of replies to **all emoji messages**[b] with…	
…Non-identical emojis of similar valence	38.4 (19.7)
…Identical emojis	12.4 (15.3)
Total	50.7 (24.2)

$N = 242$. [a]Each participant was shown five stimuli matching these conditions. [b]In sum, each participant was shown ten stimuli containing emojis

especially when talking to acquainted communication partners—mirroring digital expressions of emotionality with an increased frequency of nonverbal cues on their part. Moreover, results suggest that nonverbal attunement may happen across a variety of communication contexts, involving both familiar and distant acquaintances.

Looking at the used emojis' meanings, however, it was found that the reciprocation of nonverbal displays with similar affective valence only occurred in every second reply. Even less frequently, actual *mimicry* (in the sense of exactly copied expressions) was identified in every tenth message by the participants. While this investigation was mostly done in an exploratory manner, the results indicate that it may be enough for users to merely converge to the same levels of nonverbal expressivity—without the need to actually mirror each other's emotional state during emoji communication.

In regard to the comparison of different interaction partners, it should be noted that the manipulation of *familiarity* did not take into account participants' actual relationships to the respective social actors (e.g., their mother or neighbor). Thus, depending on each person's own social environment, the prepared conditions may have evoked different levels of familiarity. Also, the analysis of mirrored affective states was mostly preliminary in nature, mainly due to pragmatic concerns. As many emojis encapsulate rather complex or ambiguous emotions (e.g., Weissman, 2019)—the popular "crying with open mouth" emoji, for instance, may express shock, sadness, or even joy—it was decided to limit the sentiment analysis to three types of valence, which in turn limits its implications.

General Discussion

Emojis may fill the void that stems from the 'faceless' nature of text-based online conversations. In turn, this compensatory function implies that people uphold certain norms about the appropriate use of emojis, just as they do for nonverbal displays in the natural world. Suspecting clear parallels between real and graphically conveyed emotional cues, two online experiments transferred traditional display rules to the context of digital text

messaging. Results demonstrated that norms of appropriate emotional intensity and emotional reciprocity both apply to the use of emojis. Avoiding an overly intense display of emotions seems to be beneficial during first text-based encounters, and it may be a highly functional (and prevalent) behavior to match each other's expressivity when chatting with familiar interaction partners. Thus, by covering a notable range of interpersonal communication—from the first words sent by an unfamiliar person to the intimate messages exchanged with one's best friend—the presented research offered promising evidence that well-known principles for adaptive nonverbal behavior hold true in the digital realm. In a particular strength of the current work, this pattern was observed from participants' passive evaluation of incoming text messages (Experiment 1) and in their own, natural communication behaviors (Experiment 2). A possible next step could be to investigate the moderating role of several contextual, dispositional, and cultural factors; likewise, longitudinal studies would certainly help to scrutinize the temporal stability of the obtained effects.

Nevertheless, for the sake of a holistic interpretation, it should be noted that this research encountered several challenges—not least because people's concept of 'proper' emoji use seems to be determined by numerous factors, similar to nonverbal behavior in the natural world. Even though both experiments (especially Experiment 2) were carefully designed to include notable diversity in terms of message content, interaction partners, and types of emojis, the empirical reality is, of course, much more complex. Keeping this in mind, the obtained results might serve best as an additional cornerstone to understand the fascinating phenomenon that is emoji use. Future research should strive to conduct similar experiments in the field, featuring real-life message content instead of fictional materials, ideally between participants and their actual acquaintances. To investigate the generalizability of the reported effects, studies with different communicative contexts, types of emojis, and text platforms are highly encouraged.

Along the same lines, I want to highlight that despite recruiting rather large samples (especially for the within-subject design in Experiment 2), most participants of the current research came from the same demographic and sociocultural background. In both studies, the majority of the sample was young, female, and well-educated, and data was only collected in one study country. Thus, the results of both experiments should not be generalized to different target groups until the necessary replication efforts have been carried out.

As a concluding remark, I would like to underscore that the research logic of the reported studies was to observe participants' judgements and behaviors, and to infer the presence of traditional display norms from these observations. Hence, it remains unclear if *explicit* or *implicit* social norms determined participants' responses, or whether normative expectations in the emoji context should be considered *prescriptive* (revolving around behaviors that are desired), *proscriptive* (revolving around behaviors that are frowned upon), or both. Without a doubt, further investigations and additional methods—e.g., by employing think-aloud protocols to reveal the cognitions underpinning participants' perceptions—will be needed to understand the effects at hand.

Open Practice Statement

The data obtained in both reported studies have been made available in anonymized form in an Open Science Framework repository (https://osf.io/wx843/). This includes sufficient information for independent researchers to retrace the reported results.

Author contributions Jan-Philipp Stein designed and conducted the study experiments, analyzed the data, and prepared the full manuscript.

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Declarations

Competing interests The authors declare no competing interests.

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