Affective Computing and Interaction:

Psychological, Cognitive and Neuroscientific Perspectives

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Chapter 12
The Influence of Intimacy and Gender on Emotions in Mobile Phone Email

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ABSTRACT

This chapter focuses on the roles of interpersonal closeness and gender on the interpretation and sending of emotions in mobile phone email messages[1]. 91 Japanese college students were shown scenarios involving either a friend or an acquaintance describing situations intended to evoke one of four emotions: Happiness, sadness, anger, or guilt. The participants' rated their emotions and composed replies for each scenario. Analysis revealed that in the happy and guilt scenarios, emotions experienced by the participants were conveyed to their partners almost without change. However, in the sad and angry scenarios, the emotions sent to the partners were weaker than the actual emotions experienced. Gender analysis showed that men were more likely to experience and express anger in the anger scenario, while women were more likely to experience and express sadness in the anger scenario. In addition, more women's replies contained emotional expressions than did the men's messages.

INTRODUCTION

While modern technology continues to expand our communication options, much of our daily communications rely on one of our oldest tools: Written text. As a distance communication me-dium, written communications offer numerous benefits including smaller file sizes, faster transfer speeds, and lower costs. There are limitations as well, although researchers are divided on the degree to which these limitations impact our com-munications. The following section will consider the positive elements of text-based mediated

communications and some of the challenges to using these methods.

As infants, we are introduced to communication through face-to-face interaction. These early exchanges are essential to our developing communication ability and continue throughout our lives. Face-to-face communications involve a combination of verbal and nonverbal cues which are we use to create understanding. One way these cues are used is to judge the emotional state of our communication partner (Krauss & Fussell 1996; Kraut 1978; Patterson 1994). Our long experience with such interactions makes us proficient at judging other people's characteristics, such as familiarity, gender, emotions, and temperament (Cheng, O'Toole, & Abdi 2001). So how our communication efforts affected when a significant portion of this information (e.g. non-verbal cues) is unavailable to us?

Text-based communications lack much of the non-verbal communication cues we are accustomed to in face-to-face interactions (Short, Williams, & Christie 1976; Sproull & Kiesler 1991). Both sender and receiver rely on the written word to convey not only their meaning, but also their emotional intent (Kato, Kato, & Scott 2007). Research has shown that the transmission of emotions is difficult and misunderstandings can easily happen (Hancock 2007; Kato & Akahori 2006; Kato, Kato, & Scott 2007). Studies also suggest that low degrees of emotional cues transmitted between communication partners in email messages can cause misunderstandings (Kato, Kato, & Akahori 2007). Such emotional misunderstandings in computer-mediated communications (CMC) can, if left unchecked, develop into serious human-relations problems (see for example Green, Pitts, & Millward, 1995; Lea, O'Shea, Fung, & Spears, 1992; Morahan-Martin 2007; Siegel, Dubrovsky, Kiesler, & McGuire, 1986).

Kruger and his colleagues noted that the lack of nonverbal cues such as gesture, emphasis, and intonation can make it difficult to convey emotion and tone in email messages (Kruger, Epley, Parker

& Ng 2005). Kruger et al. conducted several studies on email writers' estimates of how well they can communicate in email messages. The studies' findings confirmed that email writers were largely unaware of email's limitations that would inhibit their ability to convey emotion or tone (e.g. sarcasm or humor). The authors characterize these findings as egocentrism—using one's own perspective in lieu of another's—and believe it to be the cause of email miscommunications as "the greater the difference between the communicator's own interpretation of the stimuli and the stimuli available to the audience, the greater the miscalibration" (Kruger et al. 2005, p. 933). Egocentrism may be a necessarily element in communication but "…successful communication depends on an accurate assessment of one's clarity (Keysar & Henly 2002), [thus] overconfidence of that clarity reduces the quality of communication" (Kruger et al. 2005, p. 934). These studies suggest that if writers remain unaware of email's limitations, they may experience a variety of communication problems.

Even trivial misunderstandings in email exchanges can produce unpleasant emotions (Kato & Akahori 2004a, 2004b). Unpleasant emotions may cause communication partners to distrust one another damaging their interpersonal relationship. Kato, Kato, & Akahori (2007) focused on the relationships between the emotions experienced by senders and receivers and the degree of emotional cues contained in the email messages. The researchers investigated the influence the degree of emotional cues transmitted between the sender and receiver had on the emotions which were experienced. They found that while positive emotions were directly expressed and easily understood, negative emotions proved to be more difficult to interpret (Kato, Kato, & Akahori 2007). The results of the current study, described below, address this final point, that is, why are negative emotions more challenging to interpret?

Young people may be particularly susceptible to the potential problems of text-based commu-

nications as they tend to be early adopters and heavy users of new technologies (Jones 2002). This phenomenon seems common in many countries and examples from Japan and America are presented here. The overall mobile phone ownership rate by household in Japan was 85.3% at the end of 2005 (Ministry of Internal Affairs and Communications, Japan 2006). Mobile phone use by Japanese young people in general, and college students in particular, is nearly universal; even back in 2003, Ito noted that mobile telephone use by college students was over 97% (Ito, Okabe, & Matsuda 2003). Mobile phone email makes up a large percentage of this use. The Japanese Ministry of Internal Affairs and Communications reported in their 2006 white paper on information and communications in Japan (2006) that email is the most widely used function of mobile phones. This report pointed out that 57.7% of the users of mobile phones used email by the end of 2005. As one point of comparison, all participants of the current study owned mobile phones and 97.8% said that they use mobile phone email every day or several times each week.

Email is frequently used in Japan when voice communications are difficult or socially unacceptable. It is this type of social prohibition that promotes the use of mobile phone email. For instance, making and receiving voice calls on public transportation is limited (and in some areas, prohibited) and train, bus, and subway companies make frequent announcements reminding passengers to silence or turn off their phones. Many passengers accept this prohibition and turn to mobile telephone email to enable them to keep in contact while riding on the train or subway (see Okabe & Ito 2006 for a detailed discussion of this phenomenon, including its historical development).

In contrast to their Japanese counterparts, American young people are using computers to access the Internet and communicate with their friends. According to a Pew Internet Project Data Memo (Jones 2009), 93% of American young peo-

ple between the ages of 12 and 17 were accessing the Internet. Their top four online activities were gaming (78%), email (73%), instant messaging (68%), and social networking (65%) (Jones 2009). Mobile phone use by American teens has increased over the past five years. Lenhart noted in 2009 that a Pew Internet & American Life Project study in 2004 showed 45% of young people between the ages of 12 and 17 had mobile telephone. Five years later, a similar study showed that number had increased to 71% (Lenhart 2009).

Heavy use of text-based communications—both mobile and computer-based—by young people carries the potential for a variety of miscommunications and emotional problems. The authors are studying the characteristics of emotional transmission in text-based communications with the goal of preventing emotional misunderstandings like those described above. Previous research on emotional transmission focused on how well the emotion produced by mediated-communication users was conveyed to their communication partner (Hancock 2007; Kato, Kato, & Akahori 2007; Kato, Kato, & Scott 2007). One barrier to this process is the disconnect between the sender's intended emotion and the actual message they compose. That is, the sender may be angry, but doesn't want to project that emotion too strongly or directly to the receiver. Such traits are particularly common among Japanese people. Japanese language and culture emphasize toning down or suppressing one's true feelings to avoid complicating or damaging interpersonal relations (Matsumoto & Kudo 1993). Given the importance of in-groups and out-groups in Japanese culture, the current study focuses on the emotional experience, intended emotional transfer, and message contents to two types of receivers: Close friends and acquaintances.

The current study also considers the role of gender in the reading and writing of mobile phone email messages. Colley, Todd, Bland, Holmes, Khanom, and Pike's study (2004) compared email and conventional letters to friends to see if there

were gender differences in the style and content of these two methods. The authors had thought they would find more emotional and relational features of women's written communications (e.g. Rubin & Greene 1992) and the more humorous and offensive nature of men's written communications (e.g. Herring 1994, as cited in Colley et al. 2004). What they found was that "(w)omen used the less formal stylistic conventions of e-mails to signal excitability in different ways to their male and female friends, whereas men ended their communications in a more relational way to their female than their male friends" (Colley et al. 2004, p. 369).

Some work on gender communication in text-based communications has been done in Japan. Scott (2008) looked at Japanese college students' hand-written communication logs as part of a qualitative study. He noted several gender differences, notably that the women's log entries were far longer (over three times) than the men's, that the men's log entries tended to be short and practical notations, and that women's entries were more context-oriented and contained greater elements of reflection (Scott 2008).

Two hypotheses guide the current study. The first hypothesis is

H1: Participants will experience and transmit emotions more strongly to close friends than to acquaintances.

To test this hypothesis, the authors presented the participants with identical scenarios from both a close friend and an acquaintance. Unlike Colley et al. and Rubin and Greene, this study did not specify the recipient's gender; such an approach is intriguing for future research.

Our second hypothesis states that

H2: Messages sent to a friend will contain more emotional cues than messages sent to an acquaintance.

To test this hypothesis, the authors will analyze the emotions which the senders experienced and the email contents they actually sent in response to four basic emotional scenarios: Happiness, sadness, anger, and guilt. It is thought that anger contributes to the creation of emotional trouble, and guilt can lead to avoiding emotional problems. It is also thought that emotions which mobile phone email users want to convey to their partners will change with the degree of intimacy they have with their partner.

RESEARCH METHOD

The participants of the current study were 91 Japanese undergraduate students (56 men, 35 women, ranging in age from 18 to 27 with an average of 19.3 years old) who were studying information processing at a four-year university. All participants owned their own mobile phone. When asked about their mobile phone email use, 89 participants (97.8%) responded that they used mobile phone email every day or several times each week. This heavy reliance on mobile phone email is congruent with the data presented in the previous section on Japanese young people's widespread use of mobile phones.

Scenarios intended to evoke four target emotions (i.e. happiness, sadness, anger, and guilt) were given to the participants. Examples of the messages used for the close friend scenarios are listed in Table 1. The participants were presented with two messages from both close friends and acquaintances for each emotional scenario resulting in a total of eight scenarios. The underlined portions of the scenarios in Table 1 (i.e. "a close friend") were replaced by "acquaintance" to create the second set of scenarios.

In this experiment, a questionnaire was given to the participants to determine the following two emotional aspects:

Table 1. Scenarios presented to the participants (originals were in Japanese)

Happiness	You studied hard for a test. A close friend of yours went to see the results. You received a mobile phone email from them saying you passed the exam!
Sadness	You studied hard for a test. A close friend of yours went to see the results. You received a mobile phone email from them saying you failed the exam!
Anger	A close friend of yours sent you a mobile phone email explaining that they forgot to tell you the test time had been changed and you missed an important exam!
Guilt	You missed a class and a close friend of yours agreed to meet you and give you the class notes. You forgot about the meeting and you received a mobile phone email from them saying they waited for you but you never showed up!

1. Degree of emotions participants experienced when they read each scenario (hereafter called their "emotional state"), and
2. The degree of emotions participants wanted to convey to their communication partner in their response to each scenario (hereafter called their "intended emotion").

These questionnaires measured four basic emotions without limiting the choices to the emotional focus of each scenario; that is, participants were asked to rate their responses to all four emotions for all four scenarios.

This study is limited to a small number of emotions. Although there are many possible emotions from which to choose, they can be classified into certain fundamental ones. In a previous study on computer- and mobile phone-based communications in a business context (Scott, Coursaris, Kato, & Kato 2009), the authors used Izard, Libero, Putnam, & Haynes's 12 emotions: Interest, enjoyment, surprise, sadness, anger, disgust, contempt, fear, guilt, shame, shyness, and inward hostility (Izard, Libero, Putnam, & Haynes 1993). Since the current study included two levels of intimacy with the communication partner, such a lengthy list of emotions seemed too unwieldy for this analysis. A more concise list was offered by Ekman (1992) which contained six basic emotions: Joy, sadness, anger, surprise, fear, and dislike. For the current study, the authors further limited this list to four basic emotions: Happiness, sadness, anger (which correspond to positive, negative and

hostile emotions as used in Kato, Kato, Scott, & Sato 2008), and guilt.

The data collection procedure was straightforward. First, the eight scenarios and related questionnaires were distributed and explained to the participants. Each questionnaire used a five-point scale (1 = strongly disagree, 5 = strongly agree) about the emotional aspects described in the scenarios listed in Table 1. Participants rated the degree to which they experienced each of these four emotions when reading the scenario using the "emotional state" questionnaire (e.g. "You experienced happiness when reading the mobile phone email from your partner."). Similarly, they rated the degree to which they wanted to convey the target emotions in their email response in the "intended emotions" questionnaire (e.g. "You want to convey happiness to your partner in your email response." Analysis of these data are described in detail in the following section.

After completing the emotional state questionnaire, the participants were asked to write an email response for each scenario before starting the intended emotions questionnaires. This was done to simulate the writing of an actual message in hopes of eliciting more natural emotional responses from the participants. For the purposes of this study, participants' responses were written on paper and collected at the end by the researchers. This was done, in part, because of the logistical complications in having students send actual email messages to the researchers, and to enhance participant anonymity. However, the authors are

currently working on a mobile phone-based data collection system that would allow participants to use mobile devices to complete questionnaires and anonymously send actual messages as part of a study. Details of this system will be published in the near future. The total time for data collection was about 1 hour and 30 minutes.

RESULTS

Emotional Questionnaire Data (Combined)

As described above, two sets of data were collected from each participant: The participant's emotional state upon reading the scenario presented, and their intended emotions when writing their email response to their close friend or acquaintance. These self-evaluations of their emotional responses were collected and analyzed and the results are presented below. A third set of data—participants' actual message contents—was also collected and those results are presented later in this section.

In the happy and sad scenarios, the mean of the emotional states and intended emotions showed significant differences depending on the degree of closeness to the communication partner in each scenario as shown in Figure 1. Repeated ANOVAs of 2x2 were conducted using two factors: "Emotional states and intended emotions" and "close friends and acquaintances." Figure 1 shows that emotional states and intended emotions are significantly higher in scenarios involving close friends (happiness, $F(1,90) = 6.64$, p < 0.05; sadness, $F(1,90) = 20.97$, p < 0.01). And, compared with the emotional states, intended emotions fell in both the happy and sad scenarios (happiness, $F(1,90) = 55.34$ p < 0.01; sadness, $F(1,90) = 11.96$ p < 0.01). Moreover, there was a significant difference for intended emotions to fall rather than emotional states in the scenario of sadness compared with happiness as seen in Figure 1.

These data show that for the happy and sad scenarios, participants experienced significantly greater emotions when the scenario involved a close friend rather than an acquaintance, and that they wanted to convey a significantly greater degree of that emotion to their close friend.

The mean of the emotional states and intended emotions for anger and guilt are shown in Figure 2. This figure is displayed according to the degree of closeness the participants had with their communication partners. In the anger scenario, the mean of the emotional states and intended emotions showed significant differences depending on the degree of closeness to the communication partner in each scenario.

In order to confirm statistically the tendencies implied in these graphs, repeated ANOVAs of 2x2 were conducted using two factors "emotional states and intended emotions" and "close friends and acquaintances." The data sets were slightly reduced as deficit values were excluded, thus a final data set of 87 was used in the anger scenario and 88 in the guilt scenario. Figure 2 shows

Figure 1. Writers' emotional states and intended emotions for happy and sad scenarios
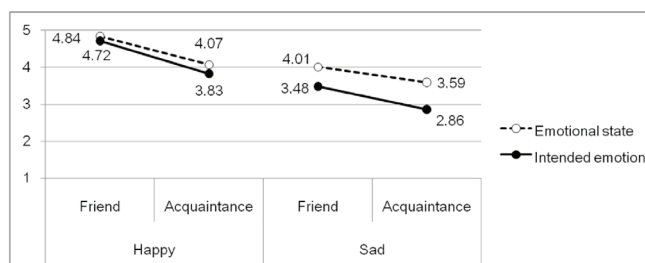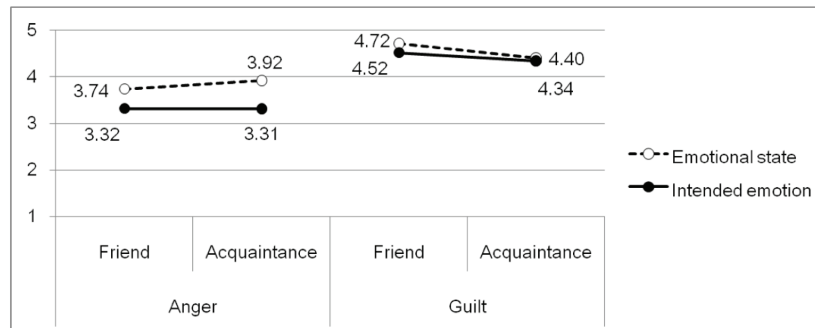
Figure 2. Writers' emotional states and intended emotions for anger and guilt scenarios
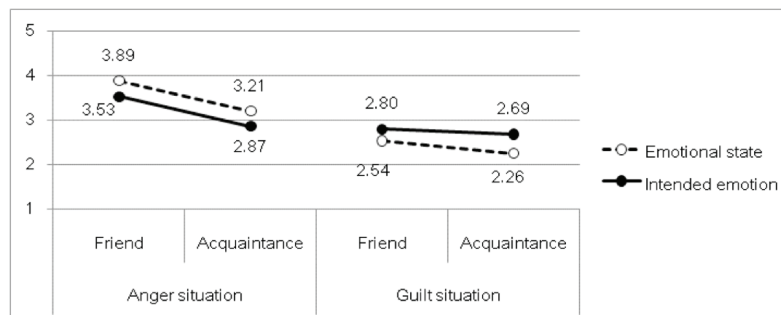

that intended emotions in the anger scenario fell compared with the emotional states ($F(1,86) = 23.41, p < 0.01$, with a significant main effect of factor "emotional states and intended emotions." Figure 2 also shows there was a significant difference for emotional states and intended emotions to be higher for close friends ($F(1,87) = 5.09, p < 0.05$, with the significant main effect of factor "close friends and acquaintances").

The analysis of these last two figures was extended as the emotions of anger and guilt included in the current study are not necessarily produced in isolation. Often, these emotions are produced with the emotion of sadness as described in a separate article (Kato, Kato, Scott, & Sato 2008). Therefore, as part of the analysis of the emotions of anger and guilt presented here, we felt it was

necessary to also investigate the tendency of the emotion of sadness.

The mean of the emotional states and intended emotions of sadness in both the anger and guilt scenarios is shown in Figure 3 according to the degree of intimacy with the communication partner. Repeated ANOVAs of 2x2 were conducted using two factors: "Emotional states and intended emotions" and "close friends and acquaintances." Compared with the emotional states, intended emotions fell in the anger scenario ($F(1,86) = 8.28, p < 0.01$, with the significant main effect of factor "emotional states and intended emotions"), compared with the intended emotions, emotional states fell in the guilt scenario ($F(1,87) = 13.00, p < 0.01$, with a significant main effect of the factor "emotional states and intended emotions"). In addition, the tendency for emotional states and

Figure 3. Tendency of sadness in anger and guilt scenarios

intended emotions to be higher was seen for close friends in the anger scenario ($F(1,86) = 26.86$, $p < 0.01$, with the significant main effect of factor "close friends and acquaintances").

From Figure 2, we saw a tendency to weaken the degree of the emotion of anger expressed to the communication partner. On the other hand, in the guilt scenario, the tendency to convey the emotion of the guilt which participants actually experienced directly to the partners was seen. In the anger scenario shown in Figure 3, the emotion of sadness is suppressed when conveyed, and in the guilt scenario, the tendency to convey sadness more strongly than actually experienced was seen. From these results, it is thought there is a difference between the anger scenario and the guilt scenario.

In addition, as influenced by the degree of intimacy with communication partners, in the anger scenario the tendency to convey the emotion of sadness to a close friend more than an acquaintance was seen. In the guilt scenario, there was a tendency to convey the emotion of guilt to a close friend more. From these results, we conclude that there is a tendency to convey an emotion more to a close friend in both the anger and the guilt scenarios, though the particular emotion expressed (e.g. sadness in the anger scenario and guilt in the guilt scenario) may be different.

Emotional Questionnaire Data (Gender)

The previous section described the results of the combined data of all participants, men and women. The following section considers the relationship between gender and emotion.

Figures 4, 5, and 6 show the results of repeated ANOVAs of 2x2x2 that were conducted using three factors: "Emotional states and intended emotions," "close friends and acquaintances," and "participants' gender." No significant results or tendencies regarding gender differences were observed for the happy, sad, or guilt scenarios. In these cases, men's and women's experiences with the scenarios and email responses showed no statistically significant differences.

However, in the anger scenarios (Figure 4), one significant difference was observed. In the scenario of anger, men experienced anger more than the women in the study. Moreover, men choose to convey the anger they experienced to their partners more than women ($F(1,85) = 4.12$, $p < 0.05$).

As was done in the combined analyses, the factor of sadness in the anger (Figure 5) and guilt (Figure 6) scenarios was investigated. In the scenario of anger, women experienced sadness to a greater extent than men. In addition, women tended to convey sadness to their partners more ($F(1,85) = 2.67$, $p < 0.10$) in the anger scenario.

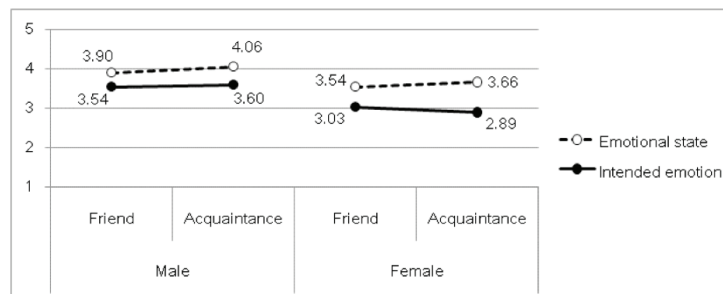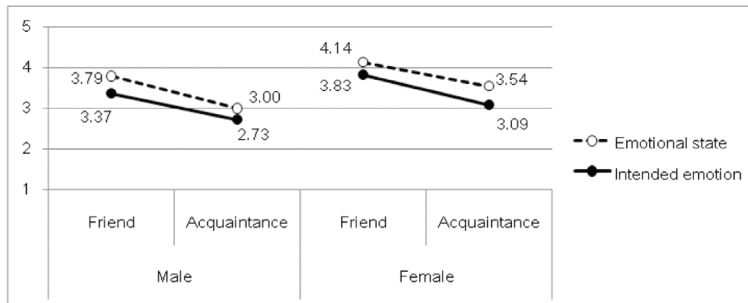*Figure 4. Anger scenario: Emotional state and intended emotion by gender*

Figure 5. Tendency of sadness in the anger scenario

The gender analysis of the emotional state and intended emotion data revealed that it was anger, the negative emotion in the current study, that was the area where difference could be observed. Men were more likely than women to experience anger when reading the anger scenario and elected to convey their emotions more directly to their communication partner. When the factor of sadness was added to the analysis, it was found that women were more likely to experience sadness in an anger scenario and were more likely than the men to express those feelings.

Content Analysis of Mobile Phone Messages (Combined)

As described above, participants were asked to write out their replies to both close friends and acquaintances for each scenario. These messages were collected, input, and analyzed for three elements: Number of characters, emotional cues, and greetings. Emotional expressions and greetings are included in the index of social presence (Murphy 2004). Garrison & Anderson (2003) note that these elements are considered a socio-emotional utterance which promotes social presence (Sato 2007). The importance of social presence was mentioned above (Short et al. 1976) and is helpful in order to prevent emotional trouble in communications that lack nonverbal information, such as mobile phone email interactions.

In 364 copies of email replies (91 participants x two scenarios x two degrees of intimacy), the number of characters were counted, emoticons and language like "I am glad" were included as emotional expressions, and the existence of greetings, such as "hello" and "thank you," were

Figure 6. Tendency of sadness in the guilt scenario
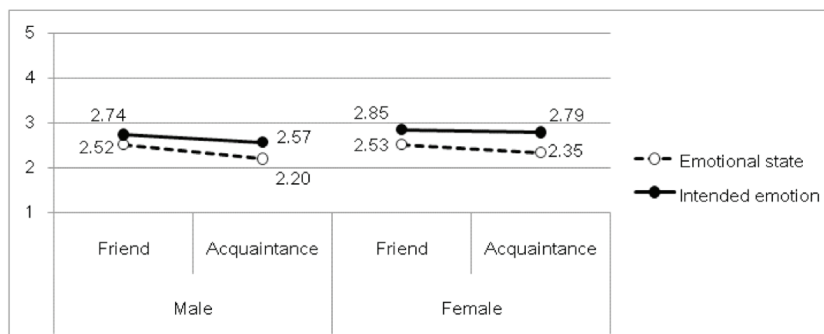
Table 2. Total characters in email responses by degree of intimacy

	Close Friends	Acquaintances
Happy	21.18	17.34
Sad	21.73	17.71
Anger	20.52	17.81
Guilt	25.34	22.43

counted. The result of the total number of characters is shown in Table 2.

The results of the number of characters in all scenarios is shown in Table 2. In order to confirm statistically these apparent differences, repeated ANOVAs of 4x2 were conducted using two factors: The "happy, sad, anger, and guilt scenarios" and "close friends and acquaintances." A data set of 87 was used as invalid or empty responses were excluded.

These data reveal a statistically significant main effect for "close friends and acquaintances" (F(1,87) = 26.25, $p < 0.01$) in all scenarios with messages to close friends being significantly longer. This result indicates that intimacy with the communication partner is a significant factor in email message length for these scenarios.

Figure 7. Emotional expressions and greetings for each emotion to friends and acquaintances
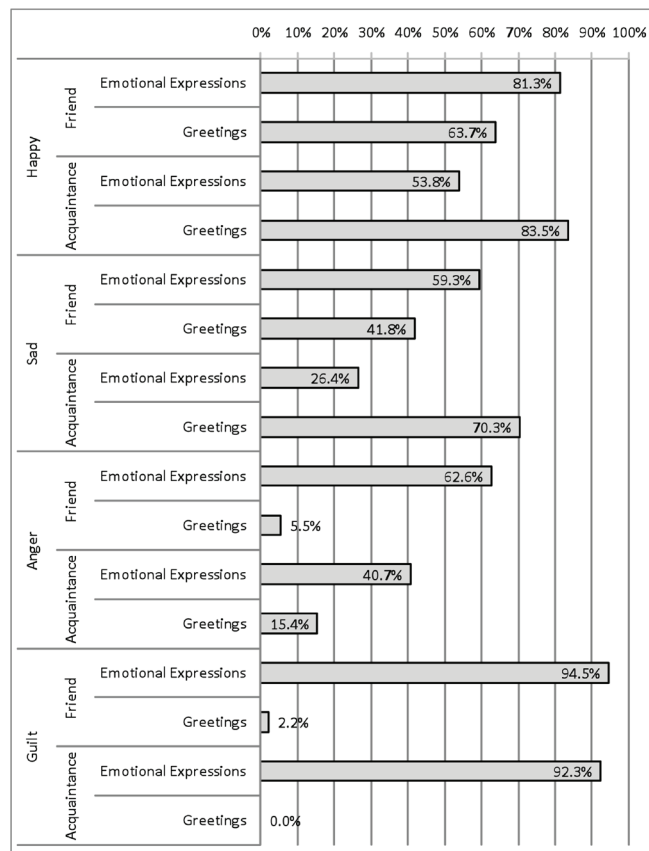
These data also reveal a statistically significant main effect for "the happy, sad, anger, and guilt scenarios" (F(3,261) = 11.25, $p < 0.01$). It is worth noting that happy, sad, and anger scenarios had similar average message lengths. However, a Bonferroni test confirmed significant differences between the "happy, sad, and anger scenarios" and "the guilt scenario" with the guilt scenario having significantly more characters ($p < 0.01$). This difference may be attributable to the sense of responsibility the participants may have felt vis-à-vis their communication partner; this difference may warrant additional investigation.

This section describes the basic emotional expressions and greetings that were included in the participants' written responses and are shown in Figure 7. The number in each bar in Figure 7 expresses the percentage of email messages containing emotional expressions. In the happy and the sad scenarios, the tendency for emotional expressions to be included more in the email replies to close friends was seen. On the other hand, there was a tendency for more greetings in the email replies to acquaintances. Moreover, the tendency for two indicators (i.e. emotional expressions and greetings) to be included was seen more in the happy scenario compared with the sad scenario. In the anger scenario, the tendency for emotional expressions to be included more in the email replies to close friends was seen. On the other hand, the tendency for greetings to be included more was seen in the email replies to acquaintances. In Figure 7, emotional expressions were seen in almost all the replies in the guilt scenario.

Just as with the data presented above, more messages to close friends contained emotional cues than did the messages to acquaintances. This was especially true for the sad scenario where

Figure 8. Emotional cues in email responses by degree of intimacy and gender
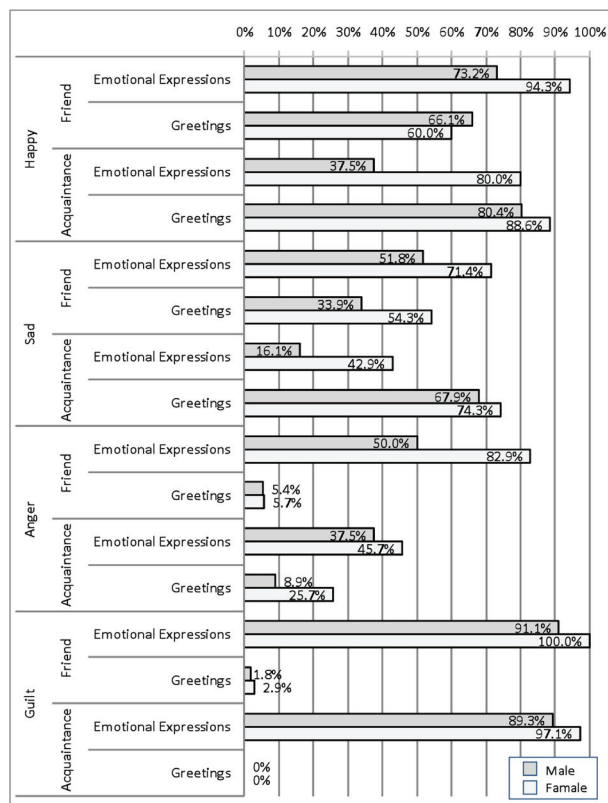
less than half as many replies to acquaintances contained emotional cues as did replies to close friends (59.3% vs. 26.4%). However, while slightly more messages to friends had emotional cues, nearly all messages to both close friends and acquaintances in the guilt scenario contained some degree of emotional cues (94.5% vs. 92.3%).

The overall lack of greetings is typical of the informal nature of email messages. In these scenarios, as the topic becomes more negative, the writers seem to further dispense with formalities and enter directly into the message contents. However, a more detailed analysis—including interview data—will need to be done to test this theory.

Content Analysis of Mobile Phone Messages (Gender)

Content data were further analyzed by gender to see if men's and women's email responses showed any significant differences. Table 3 shows message length data for both men and women for all four emotional scenarios.

In both happy and sad scenarios, women's email responses contained more characters than did the men's messages. In addition, the difference of women's and men's message length was bigger in sadness than in happiness (interaction effect: Scenario (emotion) x gender, $F(1,87) = 7.08$, p < 0.01). In both anger and guilt scenarios, women's

message contain significantly more characters than men (Main effect: Gender, $F(1,87) = 12.19$, p < 0.01). These findings echo the results of another study where the women participants wrote significantly longer entries than did their male colleagues (Scott 2008).

Figure 8 shows the percentage of email replies that contained emotional cues for both men and women participants.

These data show that more women's email messages contained emotional expressions to both close friends and acquaintances than did the men's replies for all four emotional scenarios. This difference was particularly pronounced in happy scenario messages to acquaintances (80.0% vs. 37.5%) and anger scenario messages to friends (82.9% vs. 50.0%). Other notable cases of large differences were sad scenario replies to acquaintances (42.9% vs. 16.1%), happy scenario replies to friends (94.3% vs. 73.2%), and sad scenario responses to friends (71.4% vs. 51.8%). Thus, more women's messages included emotional cues than men's messages for happy and sad scenarios to both friends and acquaintances. There seems to be no clear difference in these results that would favor close friends and acquaintances implying that the sender's relationship with the recipient is less of an issue than is the sender's gender.

The results for messages including greetings is similar to those for emotional cues with more women's replies containing greetings than their

Table 3. Total characters in email responses by degree of intimacy and gender

		Close Friends	**Acquaintances**
Happiness	Men	19.70	15.56
	Women	23.46	20.09
Sadness	Men	17.87	15.06
	Women	27.71	21.80
Anger	Men	16.96	15.08
	Women	25.54	21.63
Guilt	Men	20.45	18.58
	Women	32.74	28.26

male counterparts. The two exceptions are greetings to friends in the happy scenario (66.1% vs. 60.0%) and greetings to acquaintances in the guilt scenario where no participant—man or woman—sent a reply with a greeting. In contrast to the emotional cue data, the gender differences for greetings are less pronounced; the one case of greatest difference being messages to friends in the sad scenario (54.3% for women vs. 33.9% for men). While the current data preclude a more detailed analysis, these results show promising differences that warrant a more fine-grained analysis in a future study.

DISCUSSION AND CONCLUSION

This chapter described a study of Japanese young people's emotional reactions to four sets of emotional scenarios. The participants were Japanese college students who rely on mobile phones for their daily communications. Email messages designed to evoke four target emotions (i.e. happiness, sadness, anger, and guilt) were presented to the participants who rated their emotional responses to each scenario, wrote out a reply, and rated the degree of emotion they intended to convey to their communication partner. The data were collected and analyzed and those results are summarized below.

The first hypothesis (H1) was that participants would experience greater emotions when reading email from close friends than acquaintances and that they would transmit stronger emotions to their friends. In the happy and sad scenarios, both parts of the hypothesis were supported: Participants rated their emotional state upon reading the close friend scenario higher than the acquaintance scenario, and intended to convey their emotions more strongly to their friend. However, the situation for the anger and guilt scenarios was complicated, only partly supporting the hypothesis. While participants experienced stronger emotions when reading their close friend's message in the guilt

scenario, the situation was reversed in the anger scenario. And while the participants wanted to convey their angry emotions more strongly to a friend, their estimated emotions for the guilt scenario were nearly identical for both friends and acquaintances. Therefore, the relationship between interpersonal closeness and emotional states and intended emotions seems dependent on the emotional context of the communication.

The overall participant response to the scenarios can be summarized in two main sets, depending on the emotional context: The first is for the happy and guilty scenarios. In these situations, the emotions experienced by the participants tended to be expressed directly to their communication partner almost without change. However, in the sad and angry scenarios, the emotions the participants experienced when reading the scenarios were not transmitted to their communication partner with the same intensity. The resulting messages tended to weaken or downplay the writer's actual emotional experience. This second result is important for understanding and ultimately developing strategies to minimize emotional miscommunication in text-based mediated communications. It is also a point of interest for potential cross-cultural comparisons. While in this study, Japanese participants downplayed their emotional reactions, we wonder how email writers from other cultures might respond. This is a promising area for future research.

The degree of sadness experienced in the anger and guilt scenarios was also examined. Sadness experienced in the anger scenario was suppressed when conveyed to the communication partner although when the partner was a close friend, the participants did express their feelings more strongly. In contrast, in the guilt scenario, the participants showed a tendency to express sadness more strongly than they actually experienced it. These results imply that participants' responses to their emotional state were to avoid sending too strong of a negative message to their partner, whether that was to diminish the sadness they

felt, or overstate their emotions when they were the ones who caused a problem.

As noted in the introduction, in a communication that produces positive emotions (e.g. happiness), previous research showed there is a tendency to directly convey the emotion of happiness the participants experienced to their partner. However, in response to communications where negative emotions (e.g. sadness) are produced, writers tend to express their feelings more weakly in the message than they actually experienced. These findings can help explain the results of our previous studies (Kato, Kato, & Akahori 2006; Kato, Kato, & Akahori 2007) that suggested that while positive emotions were effectively conveyed to the partner, negative emotions in messages were more easily misunderstood. Based on the results of the current study, since negative emotions were weakly conveyed to the partners, the partners may have received insufficient information to correctly judge the writer's emotions resulting in the miscommunication.

The combined results were separated by gender to see if the participant's gender influenced the degree of emotions they experienced and the degree to which they wanted to convey those emotions to their communication partner. The gender analysis of the emotional state and intended emotion data revealed that the anger scenario yielded several significant results. Namely, men were more likely than women to experience anger when reading the anger scenario message and they chose to convey those emotions more directly than women to their communication partner. When sadness was added to the analysis, it was found that women were more likely to experience sadness in the anger scenario and were more likely than men to express those feelings.

The second hypothesis (H2) supposed that more messages to close friends would contain emotional cues as opposed to replies to acquaintances. As described above, the data support this hypothesis. All scenarios showed more replies with emotional content to close friends than to acquaintances. This was particularly striking in the sad scenario (59.3% vs. 26.4%), but the happy (81.3% vs. 53.8%) and anger (62.6% vs. 40.7%) scenarios were also quite clear. The guilt scenario results showed a slight (2.2%) difference in favor of replies to friends, but this difference seems negligible. What is more important is the far greater inclusion of emotional cues in the guilt scenario messages to both friends and acquaintances which is described in greater detail below.

In addition, the message contents were also analyzed for length. The combined analysis of these data showed that messages were significantly longer when the communication partner was a close friend. One unexpected result was the length of the guilt scenario responses. Responses to the guilt scenarios were significantly longer than the responses to the other three scenarios (i.e. happy, sad, and anger). Happy, sad, and anger scenarios had similar average message lengths. The longer message length in the guilt scenario may be attributable to the sense of responsibility the participants may have felt for inconveniencing their communication partner.

In addition, compared with a close friend, there were more greetings to an acquaintance. From these results, it is thought that (1) responders felt able to ask a close friend for sympathy, while (2) replies to an acquaintance seemed to require more formality—social courtesies like greetings. The factor of intimacy is considered to be a psychological distance. When the distance is shortened, emotional expressions and emotional exchanges increase. However, emotional expressions are restricted in mobile phone email. As such, unexpected troubles may be produced in even intimate relationships because of the limited emotional expressions peculiar to mediated communications. However, to the partner who is not intimate, there seems to be fewer emotional expressions and more exchanges of polite remarks and matter-of-fact contents. Therefore, it is thought that at the time of the uncommon emotional communication with

the acquaintance, and the everyday exchange with a close friend, emotional troubles may break out.

Content analysis can explain the results obtained from analysis of these questionnaires. Comparison of the number of characters showed that there was a tendency for the guilt scenario to have more characters than the anger scenario. Moreover, in the guilt scenario, emotional expressions were seen in almost all the reply emails. That is, it is thought that the emotion of guilt is conveyed to the partner by writing reply mail including emotion cues with more numbers of characters in the guilt scenario. On the other hand, it is thought that the emotion of anger is suppressed and conveyed to the partner by writing the reply mail which does not include emotion expression with the smaller number of characters in the anger scenario. From these results, Japanese participants suppress and convey the anger when their partner has responsibility, and Japanese participants convey the emotion of guilt firmly, when they have responsibility. That is, it is considered the care which does not give the partner displeasure by suppressing the emotion of anger. Furthermore, it is considered the care which tries to reduce a partner's displeasure by conveying the emotion of guilt clearly. However, when the emotion of anger is suppressed and conveyed, a recipient may misunderstand the sender's emotion of anger. It is a future subject to examine whether the emotion of anger is conveyed clearly or it is suppressed and conveyed for smoother text communication.

As with the emotional response data, the message content data were also separated by gender and analyzed. In both happy and sad scenarios, women's email responses contained more characters than did the men's messages. This was especially true for the sad scenarios.

The inclusion of emotional cues showed clear gender differences. More women's email messages contained emotional expressions to both close friends and acquaintances than did the men's replies for all four emotional scenarios. The differences in the happy and sad scenario replies to

both friends and acquaintances were quite clear. It seems that the sender's relationship with the recipient is less important than is the sender's gender.

Similarly, more women's messages contained greetings than did the men's messages with two minor exceptions. While the gender differences for greetings were less clear than for the emotional cues, they were evident in most scenarios and in two cases (i.e. sad scenario replies to acquaintances and anger scenario replies to acquaintances), showed a considerable gap. These two types of content analysis are limited in their scope but show that this is a promising area for future research.

This study focused on how Japanese young people communicate the experience of various emotions in email messages to close friends and acquaintances. The current study's research design had several weaknesses that should be improved upon in future studies. For instance, only four emotions were included in this study. Given more time and resources, including a greater range of emotions could enhance the nuance of the findings. Also, participants wrote their replies using pencil and paper. While this was sufficient in the current study, future projects will use a mobile phone-based system being developed by the authors. This system (MIDAS or Mobile Input Data Access System) will enable users to read actual mobile phone email, answer questionnaires, and compose and send their responses on their mobile phone all while preserving participant anonymity. Finally, the message content analysis did not include the more fine grained analyses of content used by Colley and her colleagues. This shortcoming should be addressed in a future study.

Future research will also include a study of American young people's transmission of emotional content enabling a cross-cultural comparison of the results. Two primary differences in these populations is their media of choice and cultural differences in the approach to interpersonal communications. As noted above, Japanese young people rely on mobile telephones for most of their email communications. Mobile phones have

certain limitations that could affect the nature of the communications, for instance, slower typing speed compared to a full keyboard, smaller device screen limiting the amount of text visible at one time, the tendency for mobile telephone messages to be shorter than computer-based email messages, and the tendency for mobile communications to be accessed in a variety of public and private places whereas the location of accessing computer email tends to be more limited. The second difference, culture, presents the most interesting contrast in such a study. It was explained in the first section that Japanese culture encourages the suppression of one's true feelings. Western cultures in general, and American culture in particular, tend to encourage people to "get things off your chest," and to "say what you mean, and mean what you say," even exhorting those who may be reticent to voice their opinions in public to follow Maggie Kuhn's advice and "speak your mind, even if your voice shakes" (About.com 2010). How people from such a cultural background will approach the task of expressing various emotions in text messages will be a fertile area for future research.

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ENDNOTE

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