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The communicative role of non-face emojis: Affect and disambiguation

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ABSTRACT

Emojis have evolved from imitations of facial expressions meant to communicate affect into pictures of objects, food, and places that are not directly linked to affect. While emojis that resemble facial expressions are well-researched, emojis that resemble objects and items are much less so. The current experiment is an exploration as to whether these non-face emojis disambiguate messages and communicate affect in the same manner in which face emojis do. Participants rated the affective content and ambiguity of text messages that are either accompanied or not by a non-face emoji. Results suggest that non-face emojis may disambiguate messages and transmit affect, and that these roles interact such that the extent to which an emoji communicates affect is related to how much it disambiguates a message. These results are discussed through the lens of the sociological theory of emotion work. The author also suggests ways in which research on non-face emojis might uncover more flexible communicative roles not possible with face emojis.

1. Introduction

Emoticons began as a sequence of keyboard symbols meant to capture facial expressions, introduced by a faculty member motivated to reduce misunderstandings on a university blog (Kennedy, 2012). The trend caught on quickly and globally: By 2001, 98% of North Americans could identify the keyboard symbols for "smiley face":-) and "frowny face":-((Walther & D'Addario, 2001), and by 2014, nearly 100% of Indians could identify both (Sarkar, Shetty, & Humstoe, 2014). It soon became clear that users desired more than just a smile or a frown, as user creativity lead to ever more complex keyboard character creations, adding new facial expressions such as "hesitant face":-\, characters such as "Santa Claus" *<|:-), and even involving body parts as in "person shrugging shoulders" _(ツ)_/, creations that sometimes used multiple fonts within the same emoticon. Users also began creating objects with keyboard characters, such as hearts <3 and roses @}->–.

The use of keyboard symbols was cumbersome and time-consuming, however, leading to an increasing demand for more pictorial symbols, particularly in Japan. As Unicode became a standard in computing, such pictorial symbols became possible, and the creativity of emoticons was taken out of the hands of the users and put into the hands of graphic designers and software engineers. Emoticons were translated into Unicode characters, now called emojis,[1] becoming faces with detailed expressions, such as reddened cheeks and furrowed eyebrows. As users embraced these new characters, they also called for new ones from developers, who quickly added emojis representing food, flags, animals, clothing, weather, activities, and more. Unicode allows for endless creations of new graphics, and each new Unicode version has included new emojis. The current version, Unicode 9.0, added 72 emojis to the former set (Unicode.org, 2017), bringing the total number of emojis to 2389.

As users increasingly incorporated emojis into their online communications, developers began facilitating their use, including emoji menus in instant messaging programs, email programs, and applications. In the U.S., in a bid to move into the Japanese cell phone market where emojis were already commonly used, Apple released an emoji menu as part of an iOS 2.2 upgrade to the iPhone in 2007. The feature was originally hidden from U.S. users and not widely publicized, but users quickly found and embraced the new way of communicating, producing several how-to blogs that taught

[1] It is generally accepted that emoticons are created using keyboard characters, whereas emojis are graphics made with Unicode. The name "emoji" comes from the Japanese words for "picture" (e) and "character" (moji), and emojis originated in Japan, widely attributed to the work of Shigetaka Kurita.

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iPhone users how to "unlock" the emoji menu (e.g., Kim, 2008). Surprised at the popularity of emojis in the U.S. market, in October 2011, Apple released a standard international emoji keyboard as part of iOS 5 (9to5mac.com, 2011), making the emoji menu a standard part of the iPhone.

As using emojis became increasingly convenient, users began to incorporate them at ever greater levels. In a March 2015 report, nearly half of the text on Instagram contained emojis, overtaking the use of internet slang such as OMG—and further, the rate of increasing use was directly related to the adoption of emoji keyboards in both Apple and Android devices (Dimson, 2015). Indeed, emojis have become a business unto themselves—primarily through the sale of branded emoji keyboards (e.g., Rosenthal, 2016), but also by spawning a retail industry selling emoji pillows, candies, jewelry, board games, and more.

1.1. The communicative role of face emoticons and emojis

Given the rapid and widespread adoption of emoticons and emojis, it is perhaps not surprising that research on their communicative role has been abundant. Most prominently researched is the effect emoticons have on the perceived affect of a message. Testing this experimentally, Lo (2008) showed participants an emotionally ambiguous message that was either followed by a smiley face, frowny face, or neither. He found that the smiley face made the message more positive, and a frowny face made the message more negative, than the message without an emoticon. In the same vein, Luor, Wu, Lu, and Tao (2010) developed two neutral instant messages without emoticons, then paired each with a smiley face, a neutral face, or a frowny face, to determine whether the inclusion of an emoticon altered the perception of affect in the instant message. Overall, results echoed Lo (2008): The smiley face made the message appear more positive and a frowny face made the message appear more negative, in comparison to the message without an emoticon. The neutral face had no effect.

The problem with these two studies, and many others like them, is that when a message is neutral or ambiguous in manner, the only cue that is available by which to clarify the message is the emoticon or emoji, and thus the emoticon or emoji must necessarily lead to a different perception. Had the messages not been neutral or ambiguous, it is possible the emoticon or emoji would have been superfluous. Indeed, Derks, Fischer, and Bos (2008) suggested that the function of an emoticon or emoji may be primarily to reduce ambiguity in a message: By adding a smiley face, the possibility of misinterpretation of a joke would be reduced.

This disambiguation purpose is most obvious when a message possesses verbal information about affect. Walther and D'Addario (2001) gave participants messages that were ostensibly from a friend and asked them to rate the messages. The researchers found that the addition of an emoticon to a message that was the same valence (e.g., a smiley face added to a positive message, or a frowny face added to a negative message) did not reliably affect the ratings of the message's affect. The same lack of difference was found when the emoticon and message differed in valence (e.g., a smiley face added to a negative message, or a frowny face added to a positive message). In other words, the verbal message was the most important piece of information by which to determine affect, and the emoticon was only useful when ambiguity was present. This idea was further supported by Riordan and Kreuz (2010) corpus analysis: The authors conducted a semantic categorization of words associated with several nonverbal cues (e.g., emoticons, multiple exclamation points, capitalization) and found that most cues were associated with either disambiguation of message content or affect communication.

It appears, then, that emoticons and emojis may serve two primary roles: First, to communicate affect, and second, to disambiguate a message. It is possible that these two roles may interact with each other such that the extent to which an emoticon or emoji communicates affect is dependent upon how ambiguous the verbal message is. Indeed, Walther and D'Addario's (2001) experiment suggests that emoticons would only alter the perception of affect when a message is ambiguous.

Whether interacting or not, it is clear that these two roles are significantly helpful at avoiding social faux pas and miscommunications in the rise and adoption of communication mediums that lack access to nonverbal cues that might otherwise disambiguate and communicate affect, such as someone's tone of voice and facial expression. Emoticons may compensate for such lack of visual cues (Rice & Love, 1987), add to the verbal message itself (Rezabek & Cochenour, 1998), and even provide information on intentions and motivations (Thompson & Foulger, 1996).

1.2. The communicative role of non-face emojis

As use of emojis has spread, more and more have been developed, expanding significantly on the smiley and frowny faces, to the current dictionary of more than 2000 emojis, spanning several different categories, from food to travel. Interestingly, in a 2014 report of the most used emojis on Twitter, based on a project by Matthew Rothenberg, the most commonly used emoji was not a face at all, but "hearts" (Chalabi, 2014). Rothenberg's Emojitracker continuously compiles data on Twitter emoji use in real time (Emojitracker, 2017). When accessed by the author in January 2017, only four of the top ten emojis on Twitter were faces, suggesting widespread user adoption of non-face emojis for communicative purposes. However, despite the increasing number and use of them, little research has looked into the communicative role of emojis that are not faces.

Emoticons and emojis originated as depictions of facial expressions, meant to communicate information about a writer's affect. As they moved away from facial expressions, it is possible that this role has evolved as well. However, some evidence suggests it may not have: Kaye, Wall, and Malone (2016) asked participants to explain their use of emoticons and emojis (both faces and non-faces) while emailing, texting, or posting to social media. The authors uncovered two major themes in participant responses: Emoticons and emojis are used to alter affect and to disambiguate a message. Further, Novak, Smailovic, Sluban, and Mozetic (2015), in a corpus analysis of tweets containing face and non-face emojis versus tweets that do not, discovered that those with emojis were consistently more positively-valenced than those without, suggesting that emojis convey affect. Further, the authors note that those who were rating the valence of a tweet had higher levels of agreement when emojis were present in the tweet, suggesting emojis decrease ambiguity. This effect has also been experimentally tested: Riordan (2017) examined the effect of non-face emojis on the perception of affect in an unambiguous message. She found that non-face emojis increased the perception of positive affect in general, and joy in particular—and this increase was the same no matter the number of non-face emojis included in the message. Such results parallel those found for face emojis and suggest that non-face emojis may serve the same affective purpose as face emojis. This is surprising, as non-face emojis are not depictions of emotion expressions in themselves, but rather everyday items such as clothing or sports equipment.

The current experiment sought to systematically replicate Riordan (2017) with a new set of stimuli and emojis. It also sought to test whether non-face emojis are used to disambiguate messages in the same way as face emojis, as is suggested by Novak et al. (2015) and Kaye et al. (2016), to further build on the idea that

non-face emojis serve comparable purposes as those that resemble faces. In addition, the interaction between the two roles of disambiguation and affect communication was also investigated. The hypotheses, based on the aforementioned research using face emojis, were as follows:

H1. Adding a non-face emoji to an ambiguous message will reduce the perceived ambiguity of the message.

H2. Adding a non-face emoji to an unambiguous message will not alter the perceived ambiguity of the message.

H3. Adding a non-face emoji to an ambiguous message will alter the perceived affect.

H4. Adding a non-face emoji to an unambiguous message will not alter the perceived affect.

2. Method

2.1. Participants

Fifteen hundred two participants (724 males, 767 females, and 11 who chose not to identify with either sex) completed the online survey using Amazon's Mechanical Turk (mturk.com). The sample was limited to those within North America who has successfully completed 95% of the prior 100 tasks they had chosen on Mechanical Turk. Participants ranged in age from 18 to 78 years (M = 34.35 years, SD = 11.38; three missing). The sample consisted of 338 people between 18 and 25 years (23% of the sample, 52% male), 648 people between 26 and 35 years (43%; 54% male), 272 people between 36 and 45 years (18%; 40% male), 146 people between 46 and 55 years (10%; 35% male), 75 people between 56 and 65 years (5%; 35% male), and 20 people over the age of 66 years (1%; 60% male). Each participant was paid fifteen cents.

2.2. Materials

Twenty text messages were developed as semantic variations on the words "shot" and "ticket", which were chosen because they are words that have multiple meanings (i.e., homonyms), interpretable in negative, positive, and neutral manners. The basic text messages were "Got a shot" and "Got a ticket", with no additional information given, thus representing the most ambiguous conditions. Each of these two most ambiguous text messages was then given several variations: Three types of non-face emojis added, three types of words/phrases added, and three combinations of an emoji and a word/phrase.

For example, the basic text message "Got a shot" is the most ambiguous of the text messages. This text message is then presented in combination with one of three different emojis: A needle, a basketball, and a glass of alcohol. Each emoji is projected to disambiguate the homonym "shot." The basic message is also presented in combination with one of three different phrases: "at the basketball game", "at the bar" or "at the nurse", each of which is also projected to disambiguate the homonym "shot." Lastly, a combination of both the phrase and corresponding emoji are presented. See Table 1 for the full set of 20 text messages used as stimuli.

2.3. Procedure

This study is an experiment in which participants are randomly assigned to see only one text message. Participants were recruited via Mechanical Turk, where they opted to participate by clicking on a link that took them to a survey webpage. After agreeing to participate, they answered demographic questions for age and sex and then were randomly presented with one of the twenty text messages. Participants were asked to indicate how much negative or positive emotion they detected in the text message on a slider from −50 (negative) to 50 (positive). Then they were given a list of eight emotions (joy, trust, fear, surprise, anger, sadness, disgust, and anticipation; Plutchik, 2003) and asked to indicate how much of each emotion was present in the text message on a scale of 1 (not at all) to 7 (very much). These two methods of measuring affect in a text message were the same as in Riordan (2017), replicating the original study that found the addition of a non-face emoji led to a significant change in the interpretation of affect in a message.

Participants were then asked to indicate how confident they felt in their ratings on a scale of 1 (not at all) to 7 (very much). Lastly, participants were asked to indicate how ambiguous they felt the text message was, on a scale of 1 (not at all) to 7 (very much). In this manner, ambiguity was assessed both by the direct participant rating of ambiguity and by participant confidence in his or her interpretation. These two different methods of rating ambiguity were used to capture different aspects: The direct ratings capture how much ambiguity participants perceive in the message, while confidence ratings capture how much participants believe that ambiguity affects their ability to interpret the message.

After finishing the survey, participants submitted a code for payment. Using this procedure, each of the 20 messages was rated between 147 and 152 times.

3. Results

3.1. H1 and H2: ambiguity and confidence ratings

It was expected that (1) the addition of an emoji to the basic message (i.e., the "emoji message") would significantly decrease ambiguity compared to the basic message alone, per Hypothesis 1, and (2) the addition of an emoji to the message with the additional word/phrase (i.e., the "word + emoji message") would not significantly decrease ambiguity compared to the message with the additional word/phrase alone (i.e., the "word message"), per Hypothesis 2. ANOVAs were used to compare message conditions, with LSD post-hoc tests where significance was found. All means and standard deviations can be found in Fig. 1. Overall patterns are discussed following statistical results.

3.2. Basketball message

Ambiguity was significantly higher for the basic message than any of the three variations of the Basketball message ($F(3,602) = 18.74$, $p < 0.001$). Ambiguity was also significantly higher for the emoji message and for the word message than for the word + emoji message. The word message was not significantly different from the emoji message.

Confidence was significantly lower for the basic message than for any of the three variations of the Basketball message ($F(3,602) = 8.26$, $p < 0.001$). Confidence was also significantly lower for the emoji message than the word + emoji message. No difference was found between the word message and the emoji message or the word + emoji message.

3.3. Bar message

Ambiguity was significantly higher for the basic message than any of the three variations of the Bar message ($F(3,591) = 33.74$, $p < 0.001$). Ambiguity was also significantly higher for the emoji message and the word emoji message than it was for the word message. No difference was found between the emoji message and

Table 1
Stimuli presented to participants.

Shot Stimuli

Set	Message	Text	Full Stimulus
	Basic Message	"Got a shot"	Got a shot
Basketball	Emoji	"Got a shot" + ball emoji	Got a shot at the basketball game
	Words	"Got a shot at the basketball game"	
	Words + Emoji	"Got a shot at the basketball game" + ball emoji	
Bar	Emoji	"Got a shot" + glass emoji	Got a shot at the bar
	Words	"Got a shot at the bar"	
	Words + Emoji	"Got a shot at the bar" + glass emoji	
Nurse	Emoji	"Got a shot" + needle emoji	Got a shot at the nurse
	Words	"Got a shot at the nurse"	
	Words + Emoji	"Got a shot at the nurse" + needle emoji	

Ticket Stimuli

Set	Message	Text	Full Stimulus
	Basic Message	"Got a ticket"	Got a ticket
Speeding	Emoji	"Got a ticket" + police emoji	Got a speeding ticket
	Word	"Got a speeding ticket"	
	Word + Emoji	"Got a speeding ticket" + police emoji	
Movie	Emoji	"Got a ticket" + movie emoji	Got a movie ticket
	Word	"Got a movie ticket"	
	Word + Emoji	"Got a movie ticket" + movie emoji	
Plane	Emoji	"Got a ticket" + plane emoji	Got a plane ticket
	Word	"Got a plane ticket"	
	Word + Emoji	"Got a plane ticket" + plane emoji	

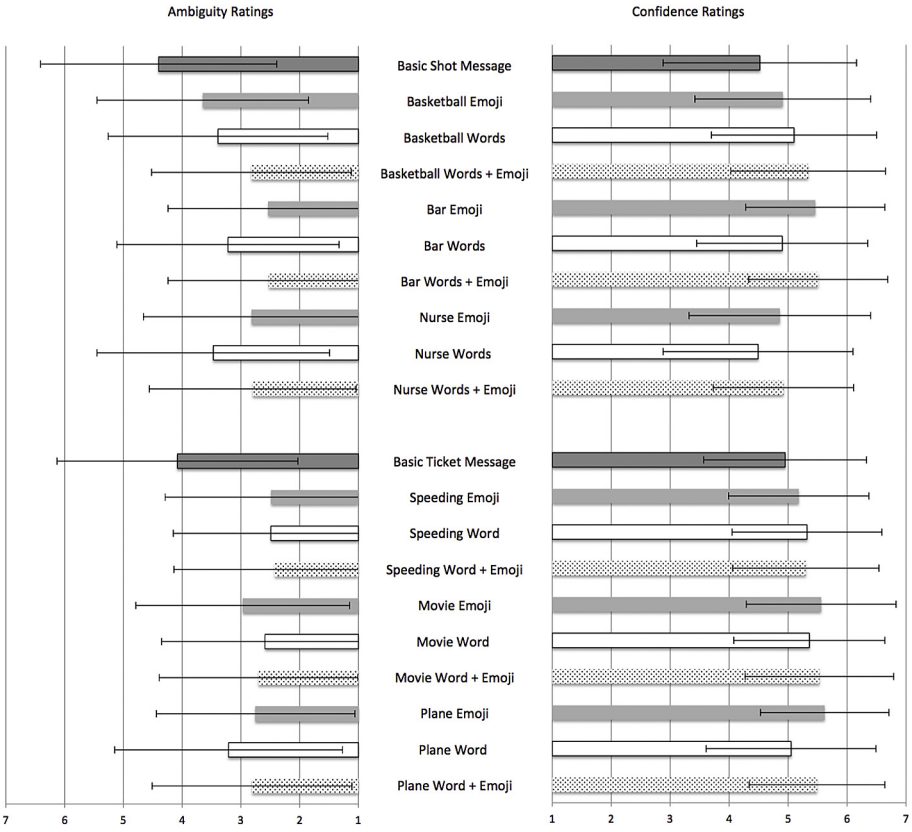

Fig. 1. Ambiguity and confidence ratings for each text message. Higher scores indicate participants rated the message as more ambiguous or were more confident in their interpretation. Error bars indicate the standard deviation.

the word + emoji message.

Confidence was significantly lower for the basic message than for any of the three variations of the Bar message ($F(3,591) = 17.28$, $p < 0.001$). Confidence was also significantly lower for the word message than for the emoji message and the word + emoji message. No difference was found between the emoji message and the word + emoji message.

3.4. Nurse message

Ambiguity was significantly higher for the basic message than any of the three variations of the Nurse message ($F(3,604) = 23.57$, $p < 0.001$). Ambiguity was also significantly higher for the word message than the emoji message and the word + emoji message. No difference was found between the emoji message and the word + emoji message.

Confidence for the Nurse message was significantly lower for the basic message than the emoji message and the word + emoji message ($F(3,604) = 3.42$, $p < 0.01$). Confidence was significantly lower for the word message than for the emoji message and the word + emoji message. No difference was found between the emoji message and the word + emoji message, or between the basic message and the word message.

3.5. Speeding message

Ambiguity was significantly higher for the basic message than any of the three variations of the Speeding message ($F(3,601) = 29.38$, $p < 0.001$). No other differences were found.

Confidence for the Speeding message was significantly lower for the basic message than the word message and the word + emoji message. No other differences were found ($F(3,601) = 2.63$, $p < 0.05$).

3.6. Movie message

Ambiguity was significantly higher for the basic message than any of the three variations of the Movie message ($F(3,591) = 20.38$, $p < 0.001$). No other differences were found.

Confidence was significantly lower for the basic message than any of the three variations of the movie message ($F(3,591) = 6.81$, $p < 0.001$). No other differences were found.

3.7. Plane message

Ambiguity was significantly higher for the basic message than any of the three variations of the Plane message ($F(3,599) = 16.46$, $p < 0.001$). Ambiguity for the word message was significantly higher than the emoji message, and marginally higher than the word + emoji message ($p = 0.06$). No difference was found between the emoji message and the word + emoji message.

Confidence for the Plane message was significantly lower for the basic message than the emoji message and the word + emoji message ($F(3,599) = 9.87$, $p < 0.001$). Confidence for the word message was significantly lower than the emoji message and the word + emoji message. No difference was found between the emoji message and the word + emoji message, or between the basic message and the word message.

3.8. Patterns across stimuli

It was expected that the addition of an emoji to the basic message would decrease ambiguity. This prediction was widely upheld, for both ratings of ambiguity and ratings of confidence, supporting Hypothesis 1. Secondly, it was expected that the addition of an emoji to the message with the additional word/phrase would not significantly decrease ambiguity compared to the message with the additional word/phrase alone (i.e., adding an emoji to a message with a homonym that is already disambiguated by verbal content would not make the message any more disambiguated). This prediction was not supported, rejecting Hypothesis 2. Overall, the combination of both the additional word/phrase and the emoji led to lower ambiguity and higher confidence ratings than messages with the additional word/phrase alone, though the pattern is not significant for all stimuli. In other words, messages that are disambiguated by verbal content may still become further disambiguated with an emoji, though this seems to be context-specific.

Interestingly, for the Bar, Nurse, and Plane messages, ambiguity was higher and confidence was lower for the word message than the emoji message. This was unexpected: It was assumed, as in prior research, that added verbal content would be more disambiguating than an added emoji, but for these three messages, the emoji appeared to disambiguate more. Thus, it is worth a different look at Hypothesis 2, at whether the emoji message was more or less ambiguous than the word + emoji message. Thus, to reword the second expectation of this project, it would be expected that the addition of a disambiguating word/phrase to a message with an emoji would not significantly decrease ambiguity compared to a message with an emoji alone (i.e., adding an additional word/phrase to a message in which the homonym is already disambiguated by emoji content would not make the message any more disambiguated). This prediction was upheld for nearly all stimuli; however, in the Basketball and Bar messages, ambiguity was higher for the emoji message than the message with both the emoji and additional word/phrase. Also in the Basketball message, confidence was also lower for the emoji message than the message with both the emoji and the additional word/phrase. In summary, with a reversal of an underlying assumption that verbal content was more disambiguating than an emoji, Hypothesis 2 is largely upheld.

In this project, ambiguity was measured both directly, by asking participants to rate the ambiguity of the message, and indirectly, by asking participants to rate their confidence regarding their interpretation of the message. While the same patterns of results are seen in both measures, the effect is more obvious when measured directly rather than indirectly. This effect suggests that while message receivers are clearly aware of ambiguity in a message, the actual effect that they feel ambiguity has on their interpretations is not pronounced. A further exploration of the relationship between these two concepts and how such methods of measurement may affect experimental outcomes is warranted, particularly as it informs theory.

3.9. H3 and H4: affect ratings

Emojis may influence the type and amount of affect a reader interprets in a text message. It was expected that (1) the addition of an emoji to a basic message would significantly alter affect ratings, per Hypothesis 3, and 2) the addition of an emoji to a word message would not significantly alter affect ratings, per Hypothesis 4. These expectations test for an interaction between the two posited roles of an emoji: Affect communication and disambiguation. In the first expectation, the emoji serves to disambiguate the message (i.e., define the homonym), and as such should lend information on the type and amount of affect information. However, in the second expectation, the emoji does not serve to further disambiguate the message, as the verbal content already does so. Thus, any significant differences in affective information would be directly related to the presence of the emoji and not to disambiguation of the message itself. The effect of emojis on affect is assessed both as an overall positive-negative rating on a slider scale and as eight specific

emotion ratings, to look at both overall affect and specific affect, and to replicate Riordan (2017). ANOVAs were used to assess the hypotheses, with LSD post-hoc tests where significance was found. Overall patterns are discussed following statistical results.

3.10. Emotion slider ratings

These results are depicted in Fig. 2.

3.10.1. Basketball message

For the Basketball message, the emotion slider was significantly more negative for the basic message than for any of the three variations. The emotion slider was also significantly more negative for the emoji message and for the word message than for the word + emoji message. No difference was found between the emoji message and the word message ($F(3,602) = 68.88$, $p < 0.001$).

3.10.2. Bar message

For the Bar message, the emotion slider was significantly more negative for the basic message than for any of the three variations ($F(3,591) = 84.86$, $p < 0.001$). The emotion slider was also significantly more negative for the word message than for the emoji message and the word + emoji message. No difference was found between the emoji message and the word + emoji message.

3.10.3. Nurse message

For the Nurse message, the emotion slider was significantly more negative for the emoji message and the word + emoji message than the basic message ($F(3,604) = 19.55$, $p < 0.001$). The emotion slider was also significantly more negative for the emoji message than for the word message. The emoji message was marginally more negative than the word + emoji message ($p = 0.06$), and the word message was marginally more negative than the basic message ($p = 0.06$).

3.10.4. Speeding message

For the Speeding message, the emotion slider was significantly more positive for the basic message than any of the three variations ($F(3,601) = 22.50$, $p < 0.001$). No other differences were found.

3.10.5. Movie message

For the Movie message, the emotion slider was significantly more negative for the basic message than for any of the three variations ($F(3,591) = 85.93$, $p < 0.001$). The emotion slider for the word message was significantly more negative than the word + emoji message, and marginally more negative than the emoji message ($p = 0.07$). No difference was found between the emoji message and the word + emoji message.

3.10.6. Plane message

For the Plane message, the emotion slider was significantly more negative for the basic message than for any of the three variations ($F(3,599) = 121.01$, $p < 0.001$). The emotion slider was also significantly more negative for the word message than for the emoji message and the word + emoji message.

3.11. Patterns across stimuli

As expected, the addition of an emoji significantly altered the affect of the message. For all stimuli except for the Speeding and Nurse messages, the addition of an emoji led to more positive affect ratings than the basic message, supporting Hypothesis 3. For the Speeding and Nurse messages, the addition of an emoji made the ratings more negative, but only significantly so in the case of the Nurse message. Unexpectedly, for all message sets except the Speeding message, the word + emoji message was rated as

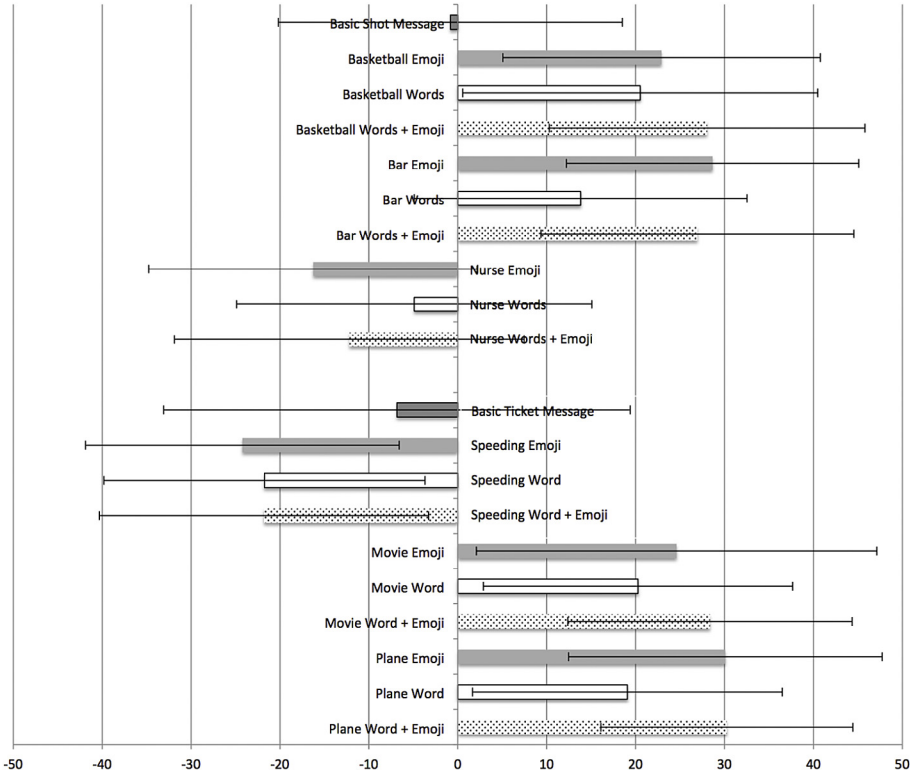

Fig. 2. Emotion slider ratings for each text message. Negative ratings indicate more negative emotion; positive ratings indicate more positive emotion. Error bars indicate the standard deviation.

significantly more positive (or negative, for the Nurse message) than the word message alone, suggesting that emojis communicate affect over and above simply disambiguating a message. This result rejects Hypothesis 4 in favor of the conclusion that emojis add affective content even to messages that are disambiguated by verbal content, and parallels the conclusion to Hypothesis 2.

Specific Emotion Ratings*: *Comparing the Basic Message to Emoji Message Means and standard deviations are presented in Figs. 3 and 4.

3.11.1. Basketball message

For the Basketball message, fear, sadness, disgust, and anger were rated higher, but joy, trust, surprise, and anticipation were rated lower, in the basic message than the same message with a ball emoji. [Joy: $t(302) = 12.44$, $p < 0.001$, Trust: $t(302) = 2.60$, $p < 0.01$, Fear: $t(300) = 5.45$, $p < 0.001$, Surprise: $t(301) = 4.27$, $p < 0.001$, Sadness: $t(302) = 6.31$, $p < 0.001$, Disgust: $t(302) = 5.42$, $p < 0.001$, Anger: $t(299) = 4.92$, $p < 0.001$, Anticipation: $t(301) = 2.19$, $p < 0.05$].

3.11.2. Bar message

For the Bar message, fear, surprise, sadness, disgust, and anger were rated higher, but joy, trust, and anticipation were rated lower, for the basic message than the same message with the glass emoji [Joy: $t(294) = 15.33$, $p < 0.001$, Trust: $t(294) = 4.90$, $p < 0.001$, Fear: $t(292) = 5.65$, $p < 0.001$, Surprise: $t(293) = 1.99$, $p < 0.05$, Sadness: $t(293) = 5.80$, $p < 0.001$, Disgust: $t(293) = 5.11$, $p < 0.001$, Anger: $t(292) = 5.32$, $p < 0.001$, Anticipation: $t(293) = 5.95$, $p < 0.001$].

3.11.3. Nurse message

For the Nurse message, joy, surprise, and anticipation were rated higher, but fear and sadness were rated lower, for the basic message

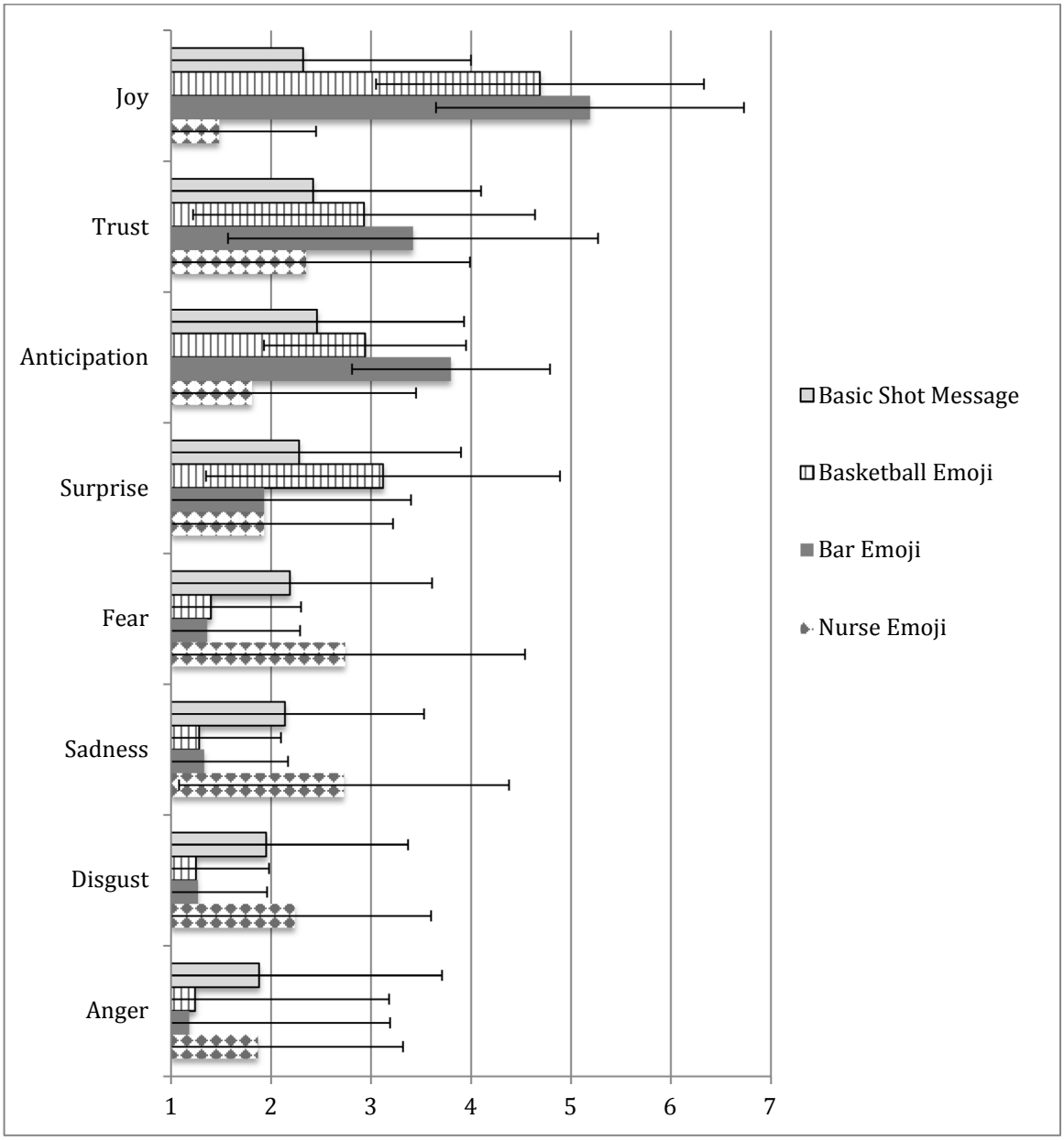

Fig. 3. Comparing specific emotion ratings among the basic Shot message to the emoji variations of the message. Emotions were rated on a scale of 1 (not at all) to 7 (very much). Error bars indicate the standard deviation.

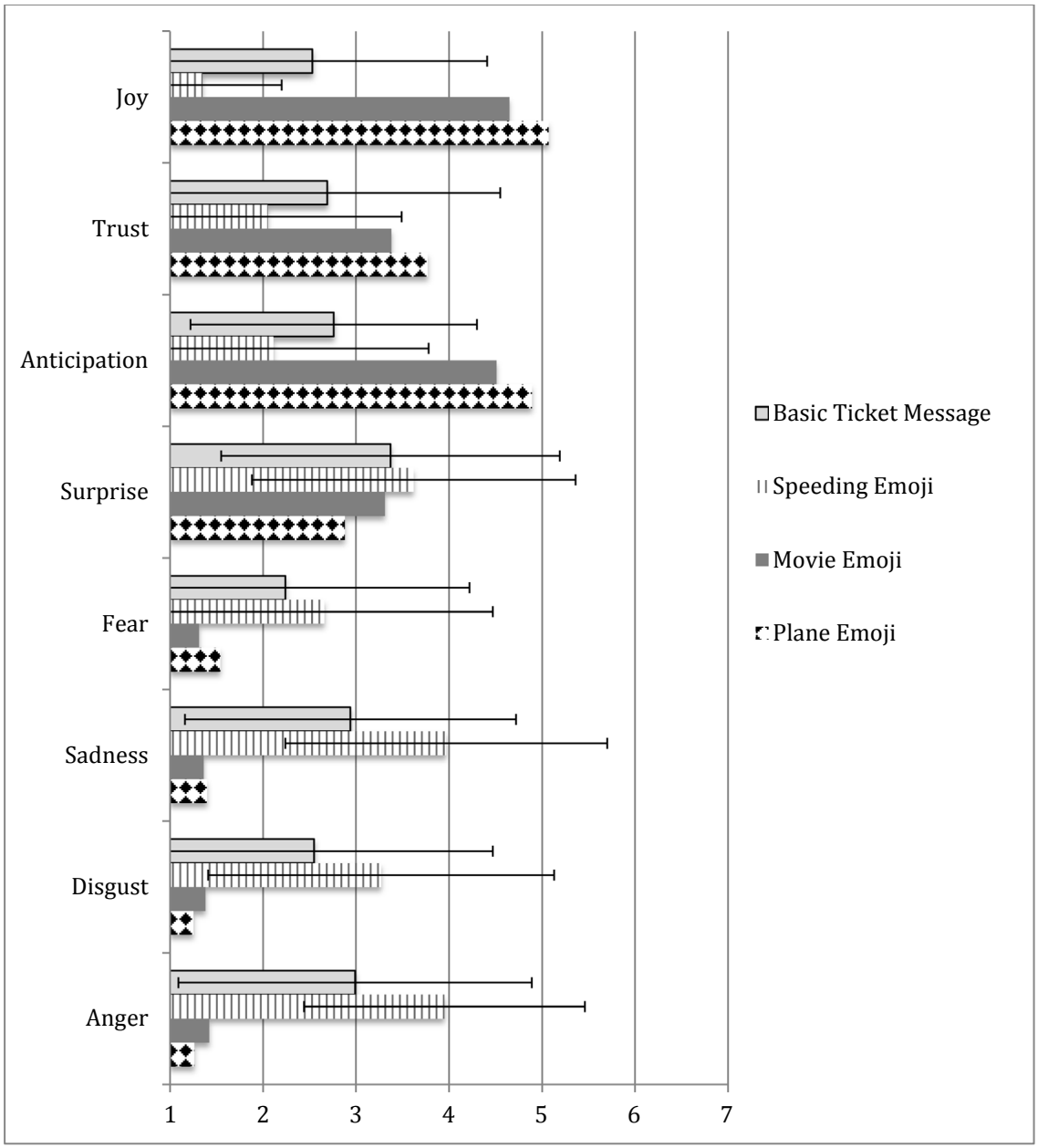

Fig. 4. Comparing specific emotion ratings among the basic Ticket message to the emoji variations of the message. Emotions were rated on a scale of 1 (not at all) to 7 (very much). Error bars indicate the standard deviation.

than the same message with a needle emoji [Joy: $t(300) = 5.38$, $p < 0.001$, Fear: $t(299) = 3.06$, $p < 0.005$, Surprise: $t(299) = 2.11$, $p < 0.05$, Sadness: $t(300) = 3.16$, $p < 0.005$, Anticipation: $t(299) = 3.42$, $p < 0.001$].

3.11.4. Speeding message

For the Speeding message, joy, trust, and anticipation were rated as higher, but fear, sadness, disgust, and anger were rated as lower in the basic message than the same message with the speeding emoji [Joy: $t(293) = 7.02$, $p < 0.001$, Trust: $t(292) = 3.30$, $p < 0.001$, Fear: $t(291) = 2.20$, $p < 0.05$, Sadness: $t(292) = 4.69$, $p < 0.001$, Disgust: $t(293) = 3.49$, $p < 0.001$, Anger: $t(292) = 4.33$, $p < 0.001$, Anticipation: $t(291) = 3.21$, $p < 0.001$].

3.11.5. Movie message

For the Movie message, fear, sadness, disgust, and anger were rated as higher, but joy, trust, and anticipation were rated as lower in the basic message than the same message with the movie emoji [Joy: $t(291) = 10.04$, $p < 0.001$, Trust: $t(291) = 3.20$, $p < 0.005$, Fear: $t(289) = 6.45$, $p < 0.001$, Sadness: $t(291) = 8.67$, $p < 0.001$, Disgust: $t(291) = 6.90$, $p < 0.001$, Anger: $t(290) = 8.61$, $p < 0.001$, Anticipation: $t(289) = 7.12$, p < 000].

3.11.6. Plane message

For the Plane message, fear, surprise, sadness, disgust, and anger were rated higher, but joy, trust, and anticipation were rated lower in the basic message than the same message with a plane emoji [Joy: $t(297) = 12.57$, $p < 0.001$, Trust: $t(296) = 5.07$, $p < 0.001$, Fear: $t(295) = 4.60$, $p < 0.001$, Surprise: $t(297) = 2.30$, $p < 0.05$, Sadness:

$t(297) = 8.64$, $p < 0.001$, Disgust: $t(297) = 8.20$, $p < 0.001$, Anger: $t(295) = 10.21$, $p < 0.001$, Anticipation: $t(294) = 9.68$, $p < 0.001$].

Specific Emotion Ratings: Comparing the Disambiguated Message to the Disambiguated Emoji Message Means and standard deviations are depicted in Figs. 5 and 6.

3.11.7. Basketball message

For the Basketball message, ratings for joy and trust were lower for the word message than for the word message with the ball emoji [Joy: $t(297) = 3.91$, $p < 0.001$, Trust: $t(295) = 3.54$, $p < 0.001$].

3.11.8. Bar message

For the Bar message, ratings for sadness were higher, but ratings for joy, trust, and anticipation lower, for the word message than for the word message with the glass emoji [Joy: $t(293) = 5.73$, $p < 0.001$, Trust: $t(294) = 2.68$, $p < 0.01$, Sadness: $t(293) = 3.33$, $p < 0.001$, Anticipation: $t(293) = 2.45$, $p < 0.01$].

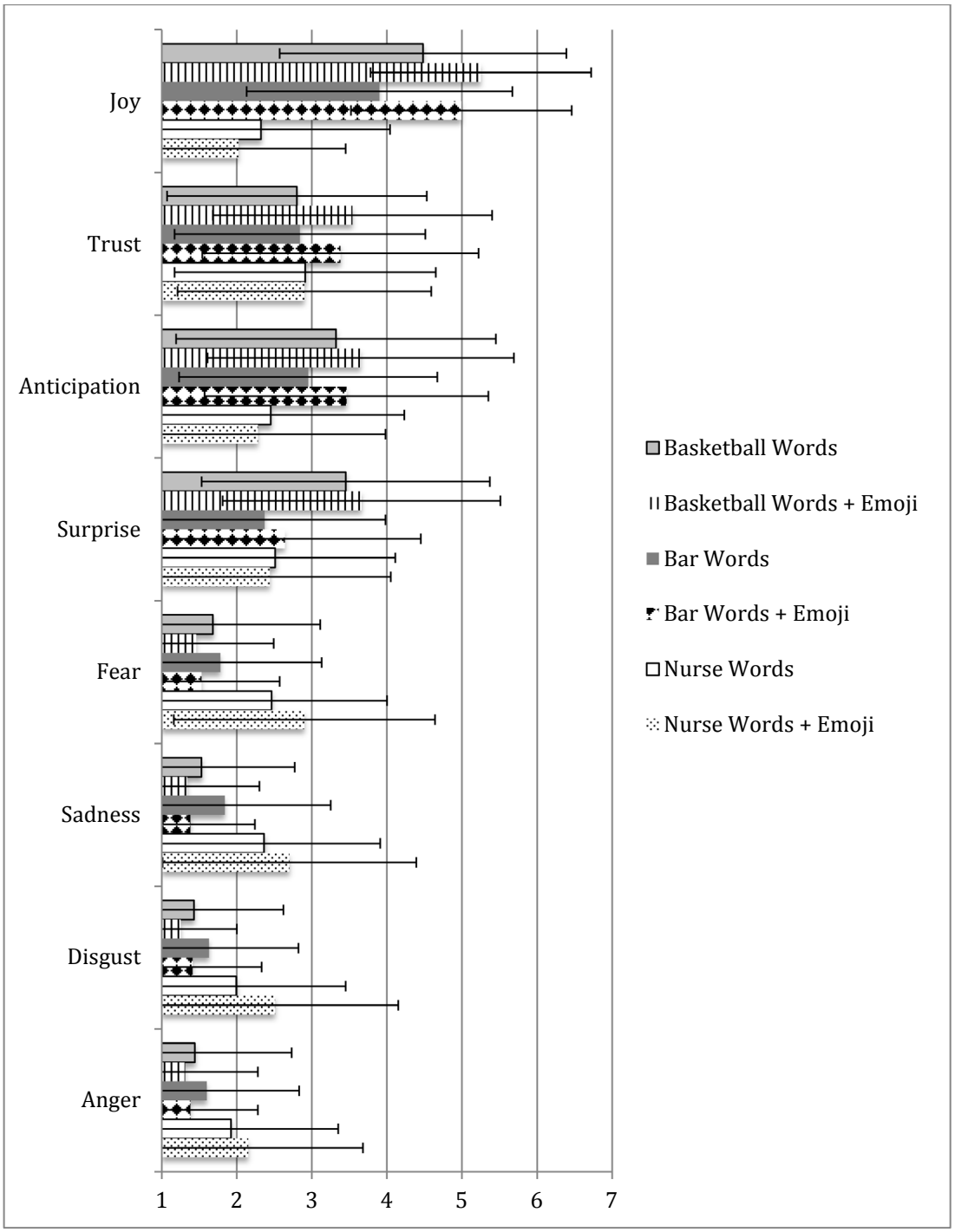

Fig. 5. Comparing specific emotion ratings among the word messages and words + emoji messages within the Shot message set. Emotions were rated on a scale of 1 (not at all) to 7 (very much). Error bars indicate the standard deviation.

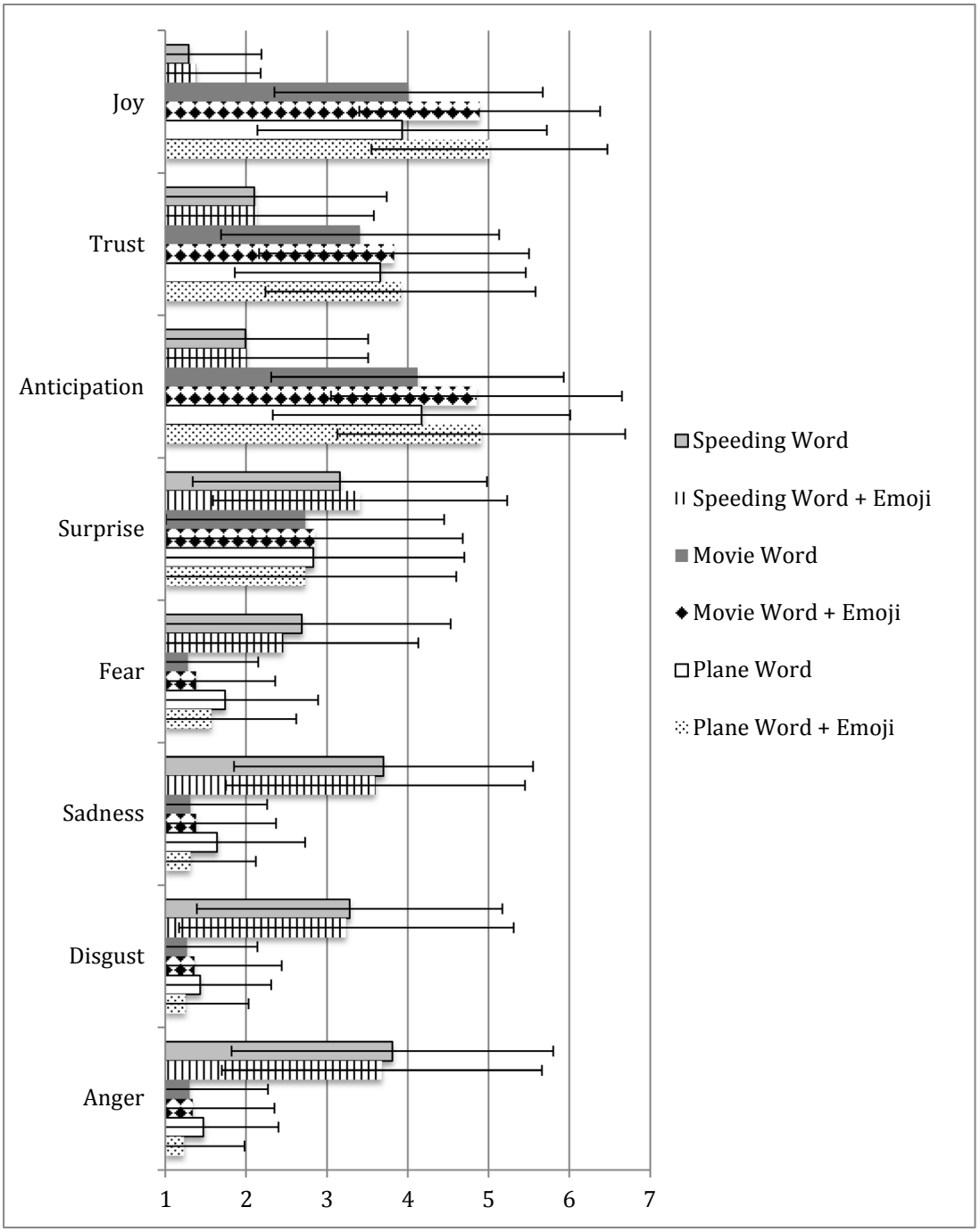

Fig. 6. Comparing specific emotion ratings among the word messages and word + emoji messages within the Ticket message set. Emotions were rated on a scale of 1 (not at all) to 7 (very much). Error bars indicate the standard deviation.

3.11.9. Nurse message

For the Nurse message, ratings for fear and disgust were lower for the word message than for the word message with the needle emoji [Fear: $t(301) = 2.53$, $p < 0.05$, Disgust: $t(300) = 2.89$, $p < 0.01$].

3.11.10. Speeding message

For the Speeding message, affect ratings for the word message were not significantly different from affect ratings for the word message with the police emoji.

3.11.11. Movie message

For the Movie message, ratings for joy, trust, and anticipation were much lower for the word message than for the word message with the movie emoji [Joy: $t(297) = 4.78$, $p < 0.001$, Trust: $t(294) = 2.12$, $p < 0.05$, Anticipation: $t(296) = 3.50$, $p < 0.001$].

3.11.12. Plane message

For the Plane message, ratings for sadness and anger were higher, but ratings for joy and anticipation were lower, for the word message than the word message with the plane emoji [Joy:

$t(299) = 5.73$, $p < 0.001$, Sadness: $t(298) = 2.95$, $p < 0.005$, Anger: $t(297) = 2.42$, $p < 0.05$, Anticipation: $t(299) = 3.54$, $p < 0.001$].

3.12. Patterns across stimuli

Overall, the inclusion of an emoji to the basic and most ambiguous message significantly, and across every emotion, altered affect ratings, as expected by Hypothesis 3. What was unexpected, however, was that when the message was disambiguated by verbal content, affect ratings still significantly changed, suggesting that emojis carry affective information beyond simply disambiguating a message, thus rejecting Hypothesis 4. It is notable, however, that these changes were small and concentrated mainly in the emotions of joy, trust, and anticipation, thus suggesting that while emojis do carry affect of their own, the effect they have is far less pronounced when a message is less ambiguous than when a message is more ambiguous.

For the Movie, Plane, Basketball, and Bar word messages, the addition of an emoji made the affect more positive, either by reducing negative emotions (fear, sadness, disgust, and anger), increasing positive emotions (joy, trust, anticipation, and surprise), or both. These results resemble Riordan (2017). However, no effect was found for the Speeding message, and the Nurse message showed an increase in the negative emotions when the emoji was included. Regarding the latter case, it is possible that what was considered a message that was disambiguated by verbal content ("Got a shot at the nurse"), may actually have been greatly ambiguous—it is possible that the message could have interpreted as being able to get a date with the nurse, rather than a shot administering medication. This explanation is supported by the fact that ambiguity was significantly higher and confidence ratings lower for the word message than the same message with the needle emoji. Under this interpretation, the ostensibly disambiguated message was actually ambiguous, and the addition of the emoji disambiguated the message, leading to a more negative interpretation in the same manner as adding an emoji to the basic message.

In summary, interpretations of affect interacted with the ambiguity of the message such that the more ambiguous the message, the greater the effect emojis had on the perceived affect of the message.

4. Discussion

In the current experiment, non-face emojis were found to fulfill two of the same roles as face emojis. Across several stimuli, non-face emojis disambiguated messages as well as communicated affective information to those receiving the message, and these two roles interacted such that the effect of a non-face emoji on the perception of affect was related to how much it disambiguated the message. Hypotheses 1 and 3 were supported, showing that emojis may disambiguate text messages; and interestingly, in some cases the emoji may do so better than additional words can. For example, in the Bar message, the basic message "Got a shot" was the most ambiguous. When "at the bar" was added, ambiguity was decreased, but when the emoji was added, the basic message was more fully disambiguated. The combination of "at the bar" and the emoji did not decrease the ambiguity any more than the emoji alone did.

Hypothesis 2 was rejected when analyzed under the assumption that verbal content was more disambiguating than an emoji; with this assumption reversed, Hypothesis 2 was upheld. Hypothesis 4 was rejected in light of the evidence suggesting that non-face emojis carry affective information beyond what is necessary to disambiguate a message; however, it is notable that the effect was small and concentrated. In other words, this study did not find evidence paralleling that of Walther and D'Addario (2001), who suggested that emoticons are primarily necessary for disambiguation and do not carry affective information of their own; instead, this study suggests an interaction between disambiguation and affect communication. These results also replicate Riordan (2017)'s result suggesting that emojis alter affective information even when they do not depict facial expressions.

Riordan (2017) explains this result by suggesting that non-face emojis are not necessarily depicting a user's real affect; since they are deliberate rather than spontaneous expressions, they are unlikely to be "real" affect, in the same way the text abbreviation LOL is not likely indicating actual "laughing out loud". Instead, non-face emojis (and likely, face emojis as well) allow users to perform social roles, often involving either real or performed affect, while in absentia. Riordan (2017) suggests that the reason emoticons and emojis were so rapidly adopted by those who use text messages, and why they became so widely used, is because they allow users to do what Hochschild (1979) called "emotion work." Hochschild (1979) describes emotion work as performances done on the part of a person to fulfill a social role. For example, a mother, tired from a long day of work and wishing to go home, might smile and exchange friendly conversation while talking to employees at her child's daycare, in order to perform her social role as a caring parent. This effort to be friendly comes at a cost to the mother, and is not a depiction of her accurate emotion at the time, but a performance of expected emotion. The payoff for that performance cost is that she remains in good relations with those who take care of her child.

In the same way, emojis cost a user time and energy, both in choosing the appropriate emoji to send and in interpreting emojis received. The payoff, then, should at least be equal to the cost, otherwise emojis would not have become such a global trend. Riordan (2017) suggests that emojis allow users to perform emotion work while not physically present. At any given moment, a user might get a text message from a co-worker, child, spouse, parent, or other person that would require the user to engage in emotion work, performing his or her role in order to remain in good social standing with that person. Emojis allow a user to convey various emotions to others (whether real or a performance thereof) that ensure the proper fulfillment of that social role, thus maintaining (and/or building) social relationships. The extra effort involved in including an emoji, combined with well-chosen words, gains favor with the text recipient, and this favor is the payoff for the costly effort.

The current study takes this theory further by suggesting that non-face emojis may take on this emotion work role not only by conveying affect (again, real or performed), but also by helping to ensure that miscommunication is kept to a minimum. Emojis serve to reduce ambiguity in messages, a role that is especially important considering the communication context. When users exchange text messages, they may occupy different physical environments, be engaging in different tasks, and be around different people—and further, the circumstances of each user may be unknown to the other. These differences introduce ambiguity that must be resolved for accurate understanding to occur. Non-face emojis may be tools to reduce this ambiguity, allowing better performance of social roles. In addition, the current study suggests that non-face emojis offer a recipient more confidence in his or her interpretation of the message. This confidence may lead to any number of outcomes: For example, these emojis may help a recipient gain a better idea as to how well one is performing a social role, and thus exists as a form of feedback, or possibly give a recipient a better idea as to how to reply in order to remain in good standing. Several of these ideas remain to be more concretely tested.

4.1. Limitations

The stimuli composed for this experiment were limited in number, consisting of only two basic messages with ten variations each. While many of the same patterns were found across the different variations, it would be unreasonable to suggest that this project is generalizable to all non-face emojis combined with any number of messages. At the same time, the variations of these messages depend upon homonyms, which introduce a specific source of ambiguity. Other forms of ambiguity, such as the environmental context in which the message was sent, remain untested in the current study.

It would also be prudent to consider that these messages were experimenter-generated, and were not presented in any particular context—environmental, relational, or otherwise. Our interpretations of text messages are quite likely to vary depending upon from whom we receive the message and our understanding of the circumstances that may have led to the message, including past interactions with the message sender and the social roles we play with that person. It is also notable that this study only recruited participants in North America—emoji use is global, and these results may not be the same for those of different cultural backgrounds. Lastly, it is worth noting that emojis vary among technology platforms, and even from one version of a platform to another. Because of this, emojis that are carefully chosen by a sender may not appear the same on a receiver's phone, which could introduce a source of ambiguity that may result in a cost to the sender, such as additional time needed to clarify or the loss of a recipient's goodwill. Because of the complexity of such issues, this study is meant to exist as a foundation for exploring the role of non-face emojis in text messages, and to encourage more research in this area.

It would not be unreasonable, however, to suggest that non-face emojis have useful roles in communication, even when the verbal message is quite clear. The increasing rate of non-face emoji use, combined with the increasing rate of their development, suggests their purpose is useful and universal. The context in which these non-face emojis are used, who is using them with whom, and what roles they might serve beyond disambiguation and affect communication is a question for future research.

Indeed, research into whether non-face emojis are also useful in fulfilling purposes other than those explored here is still in its infancy. Sugiyama (2015) found that many users use emojis as expressions of their personality or as art in its own right, adding something quite different than simply affect or clarity to a message. Stark and Crawford (2015) have noted that emojis are sometimes used as a form of play, in which a message is constructed entirely in pictures, with no verbal content. Additionally, though emojis are numerous, they are not infinite, and thus at least some creative construction of meaning surrounding emojis must occur between a message sender and receiver. The construction of this meaning, and whether it varies between face and non-face emojis, remains to be explored. In this manner, non-face emojis might differ significantly in purpose from face emojis, and thus the field is ripe for research.

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