

An Investigation of the Computer-mediated Communication of Emotions

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Abstract: Computer-mediated communication (CMC) is one of the most widely utilized communication techniques in the business world. However, little is known about the effectiveness of CMC in communicating affective information (i.e., emotions). A primary objective of this paper is to investigate whether CMC can transfer affective information and, if so, the extent to which CMC transfers such information. This paper proposes a conceptual model and investigates the impact of emotional message cue, emotion words, linguistic markers, and paralinguistic cues. The research design involved 225 students who participated in a 2 x 3 x 3 laboratory experiment. The results indicate that affective information can be transferred through CMC. Message receivers were able to detect the sender's emotion by (1) associating the message content with positive or negative emotions, (2) using emotion cues such as emotion words, linguistic markers, and paralinguistic cues, and (3) through the combination of these techniques. The results further indicate that message receivers indicated a higher degree of senders' emotions when the number of emotion cues in the message increased. The paper concludes with implications for practitioners and directions for future research.

Key words: CMC, Emotions, Affect, Paralinguistic, Linguistic

INTRODUCTION

On March 13, 2001, Neal L. Patterson, Chief Executive Officer at Cerner Corporation, a medical software development company based in Kansas City, Missouri, sent an email to his senior managers. Part of his email read as follows:

"We are getting less than 40 hours of work from a large number of our K.C.-based EMPLOYEES. The parking lot is sparsely used at 8 a.m.; likewise at 5 p.m. As managers, you either do not know what your EMPLOYEES are doing, or you do not CARE. You have created expectations on the work effort which allowed this to happen inside Cerner, creating a very unhealthy environment. In either case, you have a problem and you will fix it or I will replace you.

"NEVER in my career have I allowed a team which worked for me to think they had a 40-hour job. I have allowed YOU to create a culture which is permitting this. NO LONGER."

Mr. Patterson further listed six potential punishments, including 5 percent staff reduction in Kansas City office. He suggested managers to schedule meetings at 7 a.m., 6 p.m., and Saturday morning. The parking lot will be used as a measure for success. It should be substantially full at 7:30 a.m. and 6:30

p.m. on weekdays and half full on Saturdays. At first, the message was sent to approximately 400 senior managers at Cerner, aimed at promoting discussion among them. The email, however, was taken out of context. On March 21, 2001, one week after the original email was sent out, the message appeared on the Yahoo! Financial message board and copies were forwarded on the Internet. Thousands of readers, including market analysts and investors, were surprised by the tone of the message since Cerner was ranked number 56 on the Fortune magazine's 2001 list of 100 Best Companies to Work for in America. It was the only healthcare information systems provider that was included in the list. The impact of Mr. Patterson's email was beyond what he could imagine. On March 22, 2001, one day after the email was posted on the message board, trading of Cerner's shares went up from the average of 650,000 shares per day to 1.2 million shares, and 4 million shares on the day after. Within three days after the incident, Cerner's stock price dropped 22 percent in value^[1,2]. The incident at Cerner Corporation clearly showed that effective communication both within and between organizations is necessary to promote smooth operation and to maintain the organization's place in the competitive environment. Miscommunication or misinterpretation,

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on the other hand, may slow down operations or cause a business failure^[3]. At Cerner, the original purpose of the email was to generate discussion among the managers. The message, however, was misinterpreted. According to Mr. Patterson, "I was trying to start a fire. I lit a match, and I started a firestorm"^[2].

Numerous researchers have suggested that affective information such as moods and emotions are as important as cognitive information in interpersonal communication^[4]. To date, most computer-mediated communication (CMC) research has investigated the communication of cognitive information^[5]. Only a few studies have partially incorporated affect into their analyses, and of the extant research, few have included multiple emotion cues. As suggested by Te'eni^[6], research in CMC should include affect in the research model. Thus, this research effort hopes to answer the questions:

- Can CMC transfer affective information?
- To what extent does CMC transfer affective information?

The common goal of both cognitive and affective information is to make an impact on the message receiver. Cognitive information, the factual information, tends to rationally influence the receiver from outside-in (externally), whereas affective information emotionally influences the receiver from inside-out (internally). Assuming that messages containing well-balanced affective and cognitive information encourage a mutual understanding among communication parties, this balance represents an indication of effective communication^[4,7]. Therefore, answers to the research questions would provide a more complete picture of the effectiveness of the CMC process. If CMC can transfer affective information, understanding factors that assist or obstruct that transfer would result in the improvement of organizational communication strategies^[8,9]. In addition, the extent of affective versus cognitive information transfer over CMC would provide a basis for balancing the affective and cognitive content of messages. This study investigates the two primary research questions mentioned above by testing the impact of three different types of emotional cues, namely emotion words, linguistic markers, and paralinguistic cues, in the CMC process.

Literature Review:

Affective Information and Emotion: sCognition, in general, refers to the processes of complex thinking such as learning and memory, concept formation, logical inference, and problem solving^[10]. Affection, on the other hand, is a mental process related to feelings and emotions such as sadness, anger, fear, happiness,

joy, and love^[11]. Following the definitions, cognitive and affective information refer to information used in the formation of cognitive and affective assessments. While cognitive information is perceived to be more "rational," there is evidence that affective information is not always "irrational"^[12]. As a result, instead of taking a contrary view, cognitive and affective information play complementary roles with each other. This study focuses on the CMC of emotions, a specific type of affective information. The communication of emotions, as with all communication, follows a process of encoding, transmitting, and decoding^[13]. Encoding includes *emotional expression*, i.e., the incorporation of emotions into the message. Normally, emotions are expressed through emotion cues, and multiple cues, verbal or nonverbal, are used to communicate emotions^[14]. Verbal cues are emotion words or phrases in spoken or written language that indicate emotions such as happy, sad, and angry. Facial expressions, tone of voice, and body gestures are common examples of nonverbal cues. Communicating messages and emotional cues are then transmitted through communication channels to the receivers, who interpret or decode the messages. The decoding of emotional cues results in an *emotional experience* for the receivers. However, little is known about the CMC of affective information, thus the purpose of this investigation.

Research Model: The research model, presented in Figure 1 is specifically designed to address the research questions: can CMC transfer affective information, and if so, to what extent does CMC transfer such information? As a result, the research model focuses on cue utilization, i.e., emotional message cues used by message receivers to interpret the emotions of the senders in CMC environments. Message receivers may detect the senders' valence and degree of emotional intentions using two types of message cues: verbal and nonverbal cues. Verbal cues include emotion words and linguistic markers that message senders use to communicate meanings. Nonverbal cues, on the other hand, consist of different types of paralinguistic cues. Paralinguistic cues, or nonverbal surrogates, are message characteristics in text-based CMC used to convey meanings normally achieved via tone of voice, body gesture, and other behavior in face-to-face communication.

Emotional Message Cues: In the communication process, affective information including emotions is communicated through various types of message cues. Cognitive information, on the other hand, may be conveyed through the message content only. In other

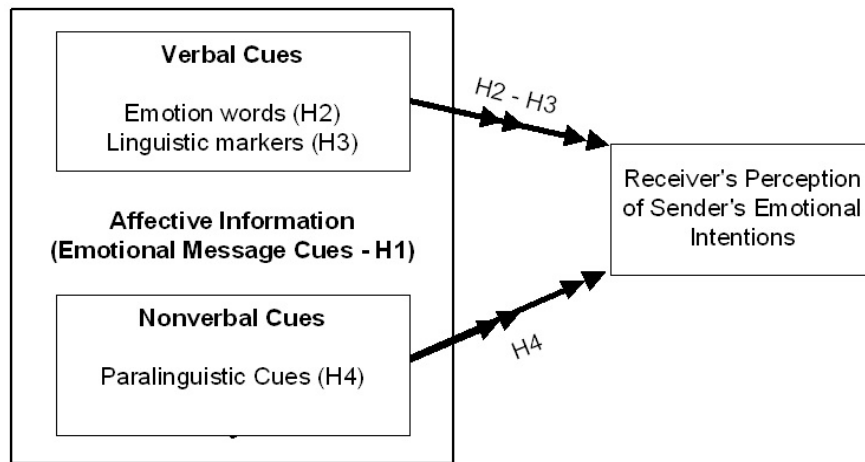


Fig. 1: Research model

words, cognitive information may be transferred without any help from such emotional cues. Therefore it is expected that the existence of emotional message cues assists in the transfer of affective information.

Hypothesis 1: Message receivers will use the number of emotional cues contained in messages to indicate a degree of emotional content such that the greater number of emotional message cues, the higher emotional content.

Hypothesis 2: The number of emotion words contained in messages will be positively correlated with message receivers' ratings on the valence and degree of emotional content of the message.

Verbal Cues: Verbal cues are a linguistic mechanism used to communicate emotions^[15]. Linguistic mechanisms, or language, are comprised of written, spoken, or even signed language. In traditional CMC where communicating parties rely primarily on the written language, message receivers may detect the degree and type of emotions in communication from verbal cues contained in the message content. Two forms of verbal cues are examined in this study: emotion words and linguistic markers.

Emotion Words: Emotion words are a direct means of communicating emotions in written language^[15]. Shaver, Schwartz, Kirson, and O'Connor^[16] categorized the six main emotion types, i.e., love, joy, surprise, anger, sadness, and fear, into either positive or negative emotions.

Using emotion words is a simple way to communicate emotions.

Linguistic Markers: In addition to emotion words, message senders and receivers can communicate the type and degree of emotions by using a wide variety of linguistic markers^[15]. Linguistic markers are specifically used in this study to refer to verbal cues other than emotion words that individuals use to communicate the type and intensity of their emotions.

People seldom use emotion words to directly communicate their feelings^[16,17]. For example, it is rare that someone will mention, "I'm angry" or "I am feeling depressed today"^[19,48]. In contrast, it is more common to detect speakers' negative emotions from various indirect emotional phrases such as "That's impossible, you can't do that to me" or "I want to thank him a thousand times." As a result, phrases that do not contain emotion words, but do attempt to communicate emotions between message senders and receivers under CMC, will be categorized as linguistic markers in this study. Another group of linguistic markers considered in this study are those used to investigate the evaluative functions of narratives as suggested by Labov and Waletzky^[20] and further extended by Reilly and Seibert^[15]. In essence, information can be packaged lexically or syntactically. Lexical encoding of emotions can be in a form of intensifiers (so, very, really), modals (would, might, will), hedges (maybe, possibly), or affective predicates (love, despise, delight, cry, laugh). Syntactical encoding of emotions, in contrast, includes emotional attitudes in a subordinate clause. Similar to emotional words, linguistic markers can be used to communicate the valence of emotions, i.e., positive and negative emotional states. Linguistic markers can also be used to indicate the degree or intensity of the positive and negative emotions. Thus, it is predicted that:

Hypothesis 3: The number of linguistic markers contained in messages will be positively correlated with message receivers' ratings on the valence and degree of emotional content of the message.

Nonverbal Cues (Paralinguistic Cues): Nonverbal cues play significant roles in communicating emotions^[14,15]. Since CMC is mostly text-based, nonverbal cues such as tone of voice and body gestures are often unavailable^[21]. Instead, this study suggests that message receivers will interpret senders' emotional intentions using various paralinguistic cues contained in messages.

In this study, paralinguistic cues refer to message characteristics in text-based CMC used to convey meanings normally achieved via tone of voice, body gestures, and other behaviors in face-to-face communication. There are five categories of patterns of paralinguistic cues used in text-based CMC: vocal spelling, lexical surrogates, spatial arrays, manipulation of grammatical markers, and minus features^[22]. Vocal spelling such as "weeeell" and "y'all" and lexical surrogates like "uh huh" and "yuk yuk" use non-standard spelling intended to imitate vocal communication. Spatial arrays or spatial arrangements are techniques often employed by CMC users to draw pictures using the standard English character set and numbers available on keyboards^[23]. Examples of this feature are emoticons such as :-) (smile) , :-((frown), and :-D (laugh). Manipulation of grammatical markers such as capital letters, periods, commas, quotation marks, parentheses, and exclamation marks are another set of features that CMC users may apply to indicate pause, express attitude toward lexical items, and signal tone of voice. Finally, minus features refer to an absence of certain elements in normal composition such as a lack of paragraphing or capitalization. These message characteristics may also provide a tone to the message, and, as a result, significantly facilitate the communication of type and degree of emotion. Therefore, it is suggested that message receivers will utilize paralinguistic cues as nonverbal indicators to communicate the type and degree of emotions.

Hypothesis 4: The number of paralinguistic cues contained in messages will be positively correlated with message receivers' ratings on the valence and degree of emotional content of the message.

MATERIALS AND METHODS

The importance of communicating emotions through electronic media, although practically realized, has not been well understood in the extant literature^[6,24]. Since this study is one of only a few that

directly addresses the topic, the communication technology used in the experiment was kept to the simplest form. As a result, the primary communication technology used in this study was an electronic message (email). A 2 x 3 x 3 (with control groups) laboratory experiment was the selected research technique. The independent variables consisted of two emotional states (positive and negative emotions), three types of message cues (emotion words, linguistic markers, and paralinguistic cues), and three levels of message cues (low, medium, and high). Subjects were 225 undergraduate students recruited from various business classes at a southeastern state university. Student participation in the study was voluntary. The demographic makeup of the sample was 57.3% male, an average age of 21.55 years old, with a racial breakdown of 67.1% Caucasians, 15.1% African-Americans, 8.4% Hispanics, 5.8% Asians, and 3.6% Other. Most subjects (96%) were upper division students and their average GPA was 3.21 on a 4.00 scale.

Each subject was asked to read only two messages. One message was randomly selected from ten positive message groups (treatments) and the other message was randomly selected from ten negative message groups (treatments). The message topics were selected from a topic pool, which was generated by asking 35 non-business undergraduate students to describe two conversation topics, one positive and one negative, that elicited strong emotional responses, that the typical student could easily relate. The selected topics were getting a job after graduation for a positive message, and breaking up with boyfriend/girlfriend for a negative message. A total of twenty experimental messages were developed, ten for each type of emotion (i.e., positive and negative emotion). For each emotion type, there was one control email message containing only factual information (cognitive information) without any of the message cues. The other nine experimental messages were generated as complete combinations of the three types of message cues (e.g., emotion words, linguistic markers, paralinguistic cues) where each cue contains three levels (i.e., number) of message cues (e.g., 1 (low), 3 (medium), 5 (high)). Two sample messages (one positive and one negative) are provided in italics below:

Positive Emotion / Medium (3) Paralinguistic Cues:
Do you remember that I had an interview with the PYC consulting company about two weeks ago? I just received a response from them today and I GOT THE JOB. I will start working as soon as I graduate, which should be at the beginning of January 2004. (Woohoo) They will pay me quite well plus the benefits that I told you about earlier :-)

Hope all is well for you. I know you are still waiting for your responses from the firms. Let me know when they come in.

N5-M-LM (Negative Emotion / Medium (3) Linguistic Markers): I don't think I will go to the meeting tomorrow night. I don't want to see anyone right now since I just broke up with my boyfriend this morning. He came over and told me that he found someone new and wanted to break up with me. What a jerk. We were dating for almost three years and now he wants to date a girl he met just two days ago. That makes me sick just to think about it.

Since I will not be there tomorrow, please say hi to everyone for me. I will call you later to see if there is anything I have to do.

The dependent variable was a single variable indicating both type and degree of emotion that message receivers detected from reading email messages. After reading a message, subjects were asked a question "What do you think was the sender's emotions when writing the email?" Subjects provided their responses on a 15-point Likert scale, ranging from strongly negative (-7), moderately negative (-4), slightly negative (-1), neutral (0), slightly positive (1), moderately positive (4), and strongly positive (7). This study utilized a combination of both a within-subject and a between-subject experimental design^[25]. The within-subject design resulted in a total of two messages for each subject (i.e., one positive and one negative). The between-subjects design randomly assigned each subject to one of the ten positive message groups (treatments), and to one of the ten negative message groups. The experiment was divided into two phases, A and B. Subjects were scheduled to complete both phases within a single semester with a three to four week period between the two phases. In phase A, each of the subjects were asked to complete pre-task questionnaires, read one email message, which could contain either positive or negative emotions, and indicate the type/degree of emotion they thought the message sender felt while writing the message. In phase B, subjects were asked to read another email message containing different emotion from phase A, evaluate the type/degree of emotions, and provide demographic information. Most subjects completed phase A and B in approximately 35 and 20 minutes, respectively.

RESULTS AND DISCUSSIONS

Results:

Manipulation Checks: Manipulation checks were conducted to ensure the effectiveness of the experimental treatments. After reading each email

message and indicating the type/degree of the message sender's emotions, subjects were asked to report whether they detected the sender's emotions from the email message they had just read. If they indicated that they did detect the emotion, they were further asked to indicate whether they detected it from (1) the message content, (2) the explicit specific emotion word(s), (3) the indirect phrase(s), (4) all other emotion cues such as text manipulation (capital letters, bold, etc.), exclamation marks, etc., or (5) cues other than those previously described. The results of the manipulation checks indicated that subjects were able to detect the sender's emotions from the emails they read.

Global (Preliminary) Test: Figure 2 (insert Figure 2 about here) graphically presents the mean score of the dependent variables for both the positive (Figure 2a) and negative messages (Figure 2b). For positive messages, the average rating of the degree of emotions was 4.54 when the message contained no message cues (negative control message). As can be seen, subjects indicated stronger degrees of positive emotions as the number of emotion words and linguistic markers contained in the message increased. However, for the paralinguistic cues the results showed an overall upward trend, but there was a surprising finding as the degree of emotions actually decreased when the paralinguistic cues increased from three to five. Results for the negative messages were consistent with those found for the positive messages. The average rating of the degree of emotions was -2.73 when no message cues (negative control message) were present. In general, subjects indicated stronger degrees of negative emotions as the number of linguistic markers, paralinguistic cues and negative emotion words increased.

Correlations and Analysis of Variance: The correlation matrix for all study variables is presented in Table 1 (insert Table 1 about here). To test the hypotheses, an Analysis of Variance (ANOVA) was conducted. Table 2 (insert Table 2 about here) presents the ANOVA results along with the summary of hypotheses. Overall, statistical results confirmed the predictions. Hypothesis 1 predicted that the message receivers' perceptions of the senders' emotions varied significantly by the number of emotion cues. The ANOVA results for both positive and negative messages were significant ($p < .001$ for positive messages and $p = .026$ for negative messages). Therefore, Hypothesis 1 was strongly supported. For Hypothesis 2, the mean scores of subjects' ratings of the senders' emotions when writing messages were significantly different across the level of the treatment groups (i.e., low, medium, and high level of

Table 1: Correlation Coefficients Among Variables (N = 225)

	DV (+)	DV (-)	Cue Level (+)	Cue Level (-)	Gender	Race	Class	Age	GPA	SS (+)
DV (-)	-.122									
Cue Level (+)	.281**	-.053								
Cue Level (-)	.193**	-.199*	.312**							
Gender	.030	-.132*	-.079	-.016						
Race	.059	.006	.031	-.010	.124					
Class	-.095	.119	.003	.011	-.119	-.082				
Age	.033	.088	.025	-.041	-.124	.031	.294**			
GPA	-.021	-.034	.028	-.011	.035	-.045	-.130	-.008		
SS (+)	.126	.054	-.074	.007	-.033	-.014	.040	.036	-.017	
SS (-)	.215**	-.053	.043	.035	.081	.011	-.078	-.001	.026	.376**

Note: * $p < .05$ (2-tailed); ** $p < .01$ (2-tailed).

DV = Dependent Variable (type/degree of emotions); SS (+/-) = Social status for positive/negative messages

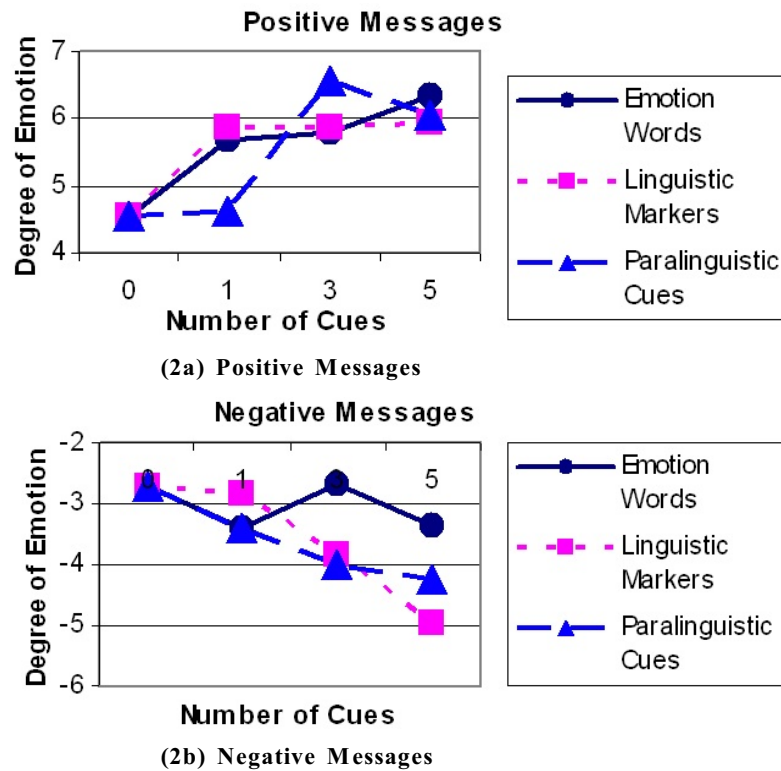


Fig. 2: Mean score of Dependent Variable

emotion words). The ANOVA results supported the predictions for the positive messages ($p < .001$), but not for the negative ones ($p = .618$). As a result, Hypothesis 2 was partially supported. Hypothesis 3 expected that the message receivers' perceptions of the senders' emotions significantly varied with the number of linguistic markers. The differences were significant for both positive ($p = .002$) and negative messages (p

$= .025$). Thus, the ANOVA results strongly supported Hypothesis 3. Lastly, for Hypothesis 4, the mean scores of subjects' ratings of the senders' emotions when writing messages were significantly different across the levels of paralinguistic cues. The ANOVA results supported the predictions for the positive messages ($p = .003$), but not for the negative ones ($p = .102$). As a result, Hypothesis 4 was partially supported.

Table 2: Analysis of Variance (N = 225)

Hypothesis 1: Message receivers will use numbers of emotional cues contained in messages to indicate a degree of emotional content such that the greater number of emotional message cues, the higher emotional content.

<i>Positive message</i>	Sum of Squares	<i>df</i>	Mean Square	F	Sig.
Between Groups	90.625	3	30.208	7.932	< .001
Within Groups	841.624	221	3.808		
Total	932.249	224			

Negative message

Between Groups	62.800	3	20.933	3.137	.026
Within Groups	1474.783	221	6.673		
Total	1537.582	224			

Hypothesis 2: The number of emotion words contained in messages will be positively correlated with message receivers' ratings on the valence and degree of emotional content of the message.

<i>Positive message</i>	Sum of Squares	<i>df</i>	Mean Square	F	Sig.
Between Groups	59.158	3	19.719	6.699	< .001
Within Groups	323.790	110	2.944		
Total	382.947	113			

Negative message

Between Groups	11.643	3	3.881	.597	.618
Within Groups	708.640	109	6.501		
Total	720.283	112			

Hypothesis 3: The number of linguistic markers contained in messages will be positively correlated with message receivers' ratings on the valence and degree of emotional content of the message.

<i>Positive message</i>	Sum of Squares	<i>df</i>	Mean Square	F	Sig.
Between Groups	53.012	3	17.671	5.183	.002
Within Groups	388.691	114	3.410		
Total	441.703	117			

Negative message

Between Groups	76.012	3	25.337	3.225	.025
Within Groups	864.093	110	7.855		
Total	940.105	113			

Hypothesis 4: The number of paralinguistic cues contained in messages will be positively correlated with message receivers' ratings on the valence and degree of emotional content of the message.

<i>Positive message</i>	Sum of Squares	<i>df</i>	Mean Square	F	Sig.
Between Groups	73.295	3	24.432	4.934	.003
Within Groups	529.804	107	4.951		
Total	603.099	110			

Negative message

Between Groups	46.960	3	15.653	2.116	.102
Within Groups	828.652	112	7.399		
Total	875.612	115			

Discussion: The primary purpose of this study was to answer the following research questions: Can CMC transfer affective information? If so, to what extent does CMC transfer affective information? The results indicated that affective information, emotions in particular, could be transferred via a computer-mediated medium. Message receivers indicated that the senders felt positive emotions when sharing good news (i.e., getting a job upon graduation) and negative emotion when communicating bad news (i.e., breaking up with a boyfriend). The results were consistent even when the messages contained only factual information, i.e., no emotion cues. Therefore, depending on whether the message contained emotion cues, the message receivers may have used either one of the two strategies in order to detect the sender's emotions. First, when the message contained no emotion cues, the message receivers associated the positive and negative content of the messages (e.g., good and bad news) with positive and negative emotions, respectively. Second, if the message contained emotion cues, whether they were emotion words, linguistic markers, or paralinguistic cues, the message receivers had options to utilize not only the message content but also the emotion cues to form perceptions regarding the senders' emotions. The second research question addressed the extent to which CMC transfers affective information. In general, the results of the hypothesis tests indicated that message receivers were successful in message decoding (cue utilization). Specifically, the message receivers perceived a higher degree of the sender's emotional states when the number of message cues increased. These findings were consistent for both positive and negative linguistic markers, positive emotion words, and negative paralinguistic cues. Additionally, it is worth noting that this study examined three types of message cues in a single study, thus extending previous research that typically only investigated a single type of message cue^[26].

Implications for Practitioners: Previous studies regarding email behavior in the workplace have indicated that email has replaced non-electronic mail as the most used form of business correspondence. However, often times email users feel as though the tone of their emails are misunderstood (e.g., misperceived as angry, abrupt, overly casual, etc.)^[26,27]. The results from this study provide guidance to practitioners on how affective information may be transferred through CMC and hopefully avoid incidents such as was detailed in the opening case at Cerner Corporation. In particular, emotion cues such as emotion words and linguistic markers may not come out as strong when the communicating parties meet

face-to-face or talk on the telephone because body language and tone of voice help the message receivers interpret the right information. Additionally, the results from this study indicate that the higher the number of emotion cues contained in the message, the stronger the senders' emotions that the receivers perceived. Therefore, depending on the situation, practitioners can at least adjust the number of cues used to communicate their emotions^[28]. A final implication for practitioners relates to the general fact that because affect is detectable in email, relationships have the potential to develop^[29]. This means that the "traditional office policies" related to interpersonal relationships are still applicable, even in virtual workplaces^[30].

Research Strengths and Limitations: This section presents a number of strengths and limitations of this study. First focusing on the strengths, the between-subject experimental design provided a higher internal validity compared to the alternative within-subject design^[25]. With this design, the influence of the learning curve was relatively low compared to the within-subject design where each subject may receive more than one message for each emotion type and might be able to comprehend the research manipulations. In addition, this study independently and randomly assigned the positive and negative messages to the subjects. This way, there was a high probability that the experimental messages were equally distributed to the subjects with all the possible treatment combinations. In addition to the strength in the selected research technique, using a computer program to administer the data collection provided a uniform environment for the study. Finally, examining emotion words, linguistic markers, and paralinguistic cues in a single study helps to advance the extent research on the CMC and affective information. This study was also subject to several limitations. One relates to the controlled nature of this laboratory experiment, which limits the generalizability of the results. In particular, although efforts were made to personalize emails (e.g., they were sent to the person's name, etc.), the emails were generated specifically for this experiment and they were sent from a person that the subjects had never met before. Another limitation is that the experimental manipulations may not adequately reflect emotions that occur in real life. This research constraint, again, was a result of the selected research method where experimental treatments were generated based on information from the topic pool. Since the treatment messages were created to accommodate a number of subjects across gender and different personal preferences, the messages in this study might not be perfect stimuli to indicate strong emotions.

Directions for Future Research: Despite the large number of studies in CMC, the communication of affective information under CMC is still a relatively unexplored research area. This study serves as a foundation for future research in this area, but it is hoped it will also spur future research. First, this study empirically examined cue utilization (message decoding) using asynchronous CMC (i.e., emails). Future research should include empirical investigations of message encoding and emotional exchanges using synchronous CMC such as a chat room or instant messenger. Second, this study focused on the cross-sectional CMC of emotions of individual message receivers. Certain relational aspects of CMC such as intimacy, affection, and trust could be developed among a number of communication parties over a period of time^[31,32,33]. Third, the dependent variable in this study was a very broad category of emotions, i.e., positive and negative emotions. According to Shaver *et al.*^[16], emotions are divided into 6 major types: love, joy, surprise, anger, sadness, and fear, so future researchers might want to be more specific as to the exact emotion.

Fourth, it is likely that demographic and personal characteristics influence both the usage and interpretation of affective information in CMC^[34]. Thus, there is a need to investigate these variables in future research. Finally, in order to increase the external validity of the results, the study should be conducted using a field study or field experiment technique rather than a lab experiment. More specifically, the large majority of subjects in this study were college students, and although the results were informing, the findings need to be tested with more “traditional” employees.

Conclusion: With CMC increasing in usage, a need exists to examine factors that contribute to effectively using this form of communication. This study examined message cues in CMC that contributed to the transfer of affective information. The results showed that emotion words, linguistic markers, and paralinguistic cues contributed to higher perceptions of emotions in CMC. However, there are still a number of unanswered questions related to this topic and it is hoped that future researchers will extend the findings from this study in future investigations.

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