On the Identification of Humor Markers in Computer-Mediated Communication

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Abstract
This study presents a quantitative analysis of humor markers in computer-mediated communication (CMC). The data for this analysis consists of naturally occurring asynchronous CMC interactions from a public fan forum. Posts were tagged and coded as either humorous or non-humorous, and each individual humorous unit was coded as being one of 8 specific forms of humor. Next, each post was tagged and coded for the use of linguistic markers in the following categories: Punctuation, formatting, emoticons, laughter, and explicit. Descriptive and inferential statistics determined the following in the present data set: 1) Markers from each of the 5 marker categories occurred significantly more in humorous than non-humorous turns (p > 0.001); 2) Each of the 8 forms of humor present in the data were tested for the use of each marker-type, which suggests the existence of correlations between the iconic use of formatting in hyperbole (p > 0.001), the use of laughter in jocularity (p = 0.019) and insult (p = 0.024), and the use of emoticon in jocularity (p = 0.031); and 3) Humorous units which used humor markers gained significantly more humor response than unmarked humorous units (p > 0.001). These results provide a better understanding of features potentially related to the automated identification of humor.

Introduction
There exists no comprehensive survey of humor markers in computer-mediated communication, nor an in depth quantitative analysis of humor markers in the CMC setting, which the present study aims to supply. In linguistics, the term marker has a very broad meaning. Linguistic markers are typically perceived as independent from syntactical constraints, and can refer to any signaling agent such as a word, phrase, gesture, expression, etc. Before discussing the signals used to mark humor in CMC and FtF settings, it is first important to make clear what “markers” in this context fully entail, and how these features differ from other features. Attardo (2000) distinguishes between markers (signaling elements), and that of factors (constitutive elements). Markers can be removed without necessarily altering the humorous intent; the removal of factors, however, would affect whether or not an utterance is humorous (Attardo, 2000, p. 7).

Certain discourse features specific to CMC are thought to promote or cue figurative and humorous interactions (Herring, 1999). Hancock (2004) examined irony recognition in face-to-face and CMC settings and found that amplifiers, ellipsis, and emoticons served as cues for ironic intent, though no quantitative assessment of those features was performed. Although there is very little work on humor markers in CMC, relevant studies exploring functional or interactional aspects of discourse have contributed toward what we know about cues used to convey emotional, non-literal, and humorous messages in this communicative setting (e.g., Danet et al. 1997, Witmer & Katzman, 1997, Baron, 2000, and Whalen et al. 2009). What is still unclear, however, are the forms and frequencies of specific linguistic strategies used to convey nonliteral and humorous intent in CMC. This field would benefit from a quantitative examination of the linguistic markers used to signal humor, as well as an investigation of whether those markers promote humorous interactions among other users, and whether the use of markers has any impact on humor response. Obtaining a list of linguistic humor markers ordered by frequency could aid in the identification of humor in future corpora, as well as benefit natural language processing at large as these markers are clues to pragmatic intention.

Method and Procedure
The data for this analysis consist of 423 asynchronous text-based CMC interactions from a public Star Trek fan forum, totaling approximately 18,000 words. No changes or corrections were made to any of the data, and there were no exclusionary criteria. As no comprehensive survey curr-
Currently exists of linguistic humor markers in CMC, the linguistic markers under examination in the current study have been selected based on existing literature and preliminary examination of the data. The markers considered in this study fall under five categories: Punctuation (ellipsis, exclamation mark, and quotation marks not being used for actual quoted speech), formatting (caps lock, elongation, and spelling variations used for effect), emoticons, laughter (textual and acronym), and explicit (e.g., “just kidding” or “I’ve got a good one for ya”). The text was imported to the UAM corpus tool for analysis, and all occurrences of the linguistic markers under investigation were hand tagged and coded as belonging to one of the five categories.

Once all markers were assessed, instances of humor occurring in the data set were identified. The current study adopted a triangulation method to identify humorous interactions, in which three distinct methods are combined for the assessment and identification of humor: 1) Humorous intent of speaker; 2) Humor response from interlocutor(s); and 3) The General Theory of Verbal Humor (Attardo and Raskin, 1991). It is not necessary for a message to match the criteria of each of the three approaches in order to be identified as humorous. Instances that meet all three criteria have a higher assurance that the message is indeed humorous. As the data begins to rely on only two or one of the criteria for humor identification reliability may decrease, but this does not rule out the potential for humor.

After completing all coding for markers and instances of humor, the data underwent three separate analyses that examined the following: Whether the frequency and use of markers differs between humorous and non-humorous posts; Whether different forms of humor have an impact on the frequency and forms of markers; How the use or absence of markers in humorous posts impacts humor response. In order to examine how the use of markers varies between humorous and non-humorous posts, each individual post, or turn, was isolated and coded accordingly. Each post was also coded as either being marked (i.e., having one or more of the humor markers in question present in the turn) or unmarked (i.e., having no humor markers present in the turn).

The second analysis of this study examined how different forms of humor may affect the use of humor markers. This study treats subcategories of irony (i.e., hyperbole, understatement, rhetorical question, and sarcasm) as individual forms of humor, parallel to other non-ironic forms. Additionally, ironic statements can be ironic without necessarily being humorous, and only humorous irony was considered for this study. A list of working definitions was developed in order to further categorize humorous messages as one of 8 forms of humor present in the data set: Hyperbole, rhetorical question, understatement, sarcasm, teasing, insult, jocularity, and pun. While the original heuristic was prepared to account to additional humor forms, such as register, canned jokes, or narrative, the list of humor forms presented has been minimized in order to provide definitions for only the forms of humor present in the current data set. Each working definition is listed below, as well as an example from the present data set. The complete unit that is considered as each respective humor-type is underlined.

**Hyperbole**: Non-literary meaning expressed by exaggerating or overstating the reality of a given situation or state

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user26: What? The vultures' ears in the new version aren't pointed enough?! CANCEL MY PREORDER RIGHT NOW!!!! :) 
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**Rhetorical question**: An insincere interrogative speech act

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user37: I would tell you what I think, but why bother? You'd only forget :P
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**Understatement**: Non-literal meaning expressed by understating the reality of a given situation or state

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user12: fed curved hallways seem a bit BIG... >: I think I could stack my character on top of himself 15 times in there
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**Sarcasm**: A critical and often aggressive insincere speech act, without necessarily being playful; not necessarily directed at target

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user46: It's obvious the ears of the vultus females are not curved forward because she wears heavy earrings while not on duty. Duh! :D
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**Teasing**: A playful, critical, and often ironic insincere speech act without element of aggression, and directed at the target

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user15: Ooooh, don't be so hard on the guy! He is from Germany - he shouldn't be held responsible for his typos... :)
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**Jocularity**: Non-threatening, playful banter

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user61: The bed in the Klingon quarters has a mattress. Klingons do not sleep on mattresses like weak humans! :P
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**Insult**: Direct slanderous form of address (this study only considers humorous insults)

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user53: Maybe it's a really, really hard mattress :P
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user73: If you're having those kind of problems, then you're clearly the worst player on the planet. Don't try to make it about the designers! (can I get an Amen?!) 
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Pun: String of units (phonemes in verbal discourse, graphemes in written discourse) which evokes and is connected to a second string which may or may not differ from the first string in one or more units, and presents a script opposition and overlap.

user92: Space... the final front ear :P
user83: I ear you!

For the second analysis, humor is measured by units rather than by entire turns. Humorous units are defined as single humorous sentences, or any number of consecutive sentences that complete a single humorous frame (e.g., a canned joke that requires a setup and punchline in order to preserve the humor). Consider the following example:

user98: (1) You're seriously concerned with that?!  
(2) Oooh, gimmie a vulcan break... (3) "Oh nooo, the ears! They're not perfect! Gimmie back by money!" :)

In this example, the entire turn is comprised of humorous statements. However, each of the three statements are separate humor units, with different categorizations of humor-type. Therefore, the above example would get one count for rhetorical question (1), one count for pun (2), and one count for teasing (3), totaling three counts of humor units within the single humorous turn.

The third and final analysis examined whether the use of humor markers impacts humor response. For the response analysis, each humorous unit was coded as either having or not having gained a response, and as being either marked or unmarked. Responses considered include recognition, or appreciation expressed through laughter, emoticon, explicit statements, or a continuation of humor (i.e., mode adoption). This analysis is focused on the frequency of response to marked and unmarked humor, and is therefore not considering the forms of response, but only the presence of response.

Results

Markers in Humorous and Non-humorous Turns

The present data deals with categorical data, and does not presuppose a normal distribution. For these reasons non-parametric tests were used to investigate the current data. The chi-square test ($\chi^2$) was selected to measure for significant distributions of markers across turn-types and humor-types. The phi coefficient ($\phi$) and Cramér’s V ($\phi_v$) were selected for measures of association for the use of markers by turn-types and humor-types. An alpha level of .05 was adopted for all statistical tests.

A total of 423 turns occurred in the data set, with a total of 615 markers. An interesting relationship seems to exist between the total sum of each marker category, and the average number of occurrences of that marker category in a single turn. Not only does punctuation have the highest frequency of all marker categories (N = 306) making up 50% of all markers present in the data, it also has the highest frequency of marker-type per post ($M = 0.63$, $SD = 0.778$); Emoticons were the second most frequently used of the marker categories at 31% ($N = 188$), also with the second highest frequency of emoticons per turn ($M = 0.39$, $SD = 0.570$); Formatting had a much lower frequency in the overall data at 13% ($N = 80$), as well as the number of usages per turn ($M = 0.16$, $SD = 0.419$). Laughter had a surprisingly low number of occurrences in the total data, making up only 4% of all markers ($N = 28$) with one of the lowest averages of number of instances per turn ($M = 0.05$, $SD = 0.221$). Finally, the Explicit category had the lowest frequency in the total data at 2% ($N = 13$) as well as the lowest average number of occurrences per turn ($M = 0.03$, $SD = 0.163$).

The first analysis of the data investigated whether humorous turns use markers differently than non-humorous turns. Since explicit markers only have the possibility to occur in humorous messages, this marker-type was excluded from this portion of the analysis. All other marker categories underwent descriptive and inferential statistics in order to determine relationships between turn-type and marker-type. Out of the 423 total postings, 43% ($N = 180$) contained humor while 57% ($N = 243$) contained no humor. Over half of all turns were marked (62.4%). When each turn-type is examined, however, the vast majority of humorous turns used markers (87.8%), while less than half of non-humorous turns were marked (37.6%). Humorous turns used markers as a whole significantly more than non-humorous turns ($\chi^2 = 0.570$); Formatting had a much lower frequency in the total data at 13% ($N = 80$), as well as the number of usages per turn ($M = 0.16$, $SD = 0.419$). Laughter had a surprisingly low number of occurrences in the total data, making up only 4% of all markers ($N = 28$) with one of the lowest averages of number of instances per turn ($M = 0.05$, $SD = 0.221$). Finally, the Explicit category had the lowest frequency in the total data at 2% ($N = 13$) as well as the lowest average number of occurrences per turn ($M = 0.03$, $SD = 0.163$).

The next portion of the turn-type analysis examined whether use of individual marker-types differed between humorous and non-humorous turns. Overall, the use of each marker-type in humorous turns significantly exceeded those in non-humorous turns: Punctuation, $p > 0.001$, $\phi_c > 0.25$; Formatting, $p > 0.001$, $\phi_c > 0.25$; Emoticon, $p > 0.001$, $\phi_c > 0.25$; Laughter, $p > 0.01$, $\phi_c > 0.11$.

Markers in Humor Units

The second investigation of this study concerns the use of the markers by the 8 individual humor-types. A total of 242 humorous units occurred in the current data set with a total of 375 markers. The frequencies of each marker category as they occur in humor units reflects the same order found in the frequencies for humorous turns, with punctuation occurring most frequently both in the total units, but also with the highest average frequency of occurrences per unit ($M = 0.66$, $SD = 0.780$). Emoticons are the second most frequently used marker in humor units, followed by formatting, and finally laughter. The explicit category was
taken into account for this portion of the analysis, and occurred least out of all marker categories.

The next analysis examined whether the use of markers from each individual category differed between the 8 humor-types. Figure 2 displays the percentages of each humor-type that used markers from each of the 5 marker categories. Punctuation was the most frequently used marker category for jocularity, sarcasm, hyperbole, and pun. Teasing used punctuation least of all humor-types. Formatting was the most frequently used marker-type for insult, while pun and rhetorical question used no form of formatting. Emoticon was the most frequently used marker-type for teasing and understatement, while hyperbole used emoticons least of all humor-types. Laughter was used most frequently in instances of insult and jocularity, and no laughter was used in pun, hyperbole, teasing, or rhetorical questions. Explicit, the least used of all marker-types, was used most frequently by teasing, and was not used at all in instances of insult, pun, or understatement. In order to determine whether the form of humor has an impact on the type of markers used, inferential statistics were conducted between each humor-type and individual marker category. Significant relationships were found only between the use of formatting and hyperbole ($\phi = 0.321$), the use of laughter in insult ($\phi = 0.024; \phi = 0.146$), the use of laughter in jocularity ($\phi = 0.019; \phi = 0.151$) and the use of emoticons in jocularity ($\phi = 0.031; \phi = 0.139$). It is important to note, however, that these results may be affected by the low occurrence of several forms of humor (pun, insult, and understatement in particular) as well as a low occurrence of markers from the laughter and explicit categories.

Markers and Humor Response

The third and final analysis investigated the impact of marker use on humor response. Of the 101 humor responses that occurred in the total data, an outstanding majority stem from marked units. 6% of the responses stemmed from hyperbole, 14% from rhetorical questions, 26% from sarcasm, 7% from understatement, 13% from teasing, 30% from jocularity, and 2% from puns. No instance of insult gained a response. Of the 43 unmarked units, only 10% gained a response. Responses are targeted at units that use markers significantly more often than at unmarked units ($\chi^2 = p > 0.001; \phi = 0.286$).

Conclusion

The present study offers the first quantitative assessment of linguistic markers and humor in the computer-mediated setting, in which statistical correlations are made between particular marker categories and humorous data. Each marker category (punctuation, emoticon, formatting, laughter, and explicit) is present in humorous turns significantly more than in non-humorous turns. This means that all of the 5 marker categories are statistically associated with the production of humor, confirming their role as humor markers in CMC. The forms of humor that are most likely to occur and use humor markers in the present dataset are jocularity, sarcasm, and rhetorical question. Furthermore, the present findings indicate a correlation between the iconic use of formatting in hyperbole, the use of laughter in jocularity and insult, and the use of emoticon in jocularity. An expansion and refinement of these detailed relationships between humor-types and marker-types could greatly benefit the computational modeling of humor and emotion, as well as computational tools used to identify humor in CMC settings.

Finally, this study is the first to quantitatively measure for a relationship between the use of humor markers and humor response in the CMC setting. The relationship between marked humorous units and the occurrence of humor response are statistically significant. Obtaining a significant correlation between humor markers and humor response suggests that the recognition of humor and subsequent interactions related to that humor are significantly more likely when markers are present. Better understanding the linguistic elements necessary to convey humor in CMC not only offers advancements for areas in computational linguistics, but also for humor studies and computer-mediated discourse studies at large.

References