Understanding Diverse Interpretations of Animated GIFs

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Abstract
Animated GIFs are increasingly popular in text-based communication. Like other forms of nonverbal communication, animated GIFs are susceptible to open interpretation. We explore whether people have different interpretations of animated GIFs, how those interpretations differ, and what factors impact the degree of difference. Through an online survey, we solicited people's interpretations of a sample of GIFs, and analyzed the variance in sentiment based on the emotions participants used to describe GIFs. We find diverse interpretations of GIFs, and that duration of GIFs has a significant impact on interpretation. Positive GIFs also have more variance in interpretation than negative GIFs. Overall, we show that there is potential for miscommunication in animated GIFs, and animated GIFs may be a more nuanced form of nonverbal communication than emoticons and emoji.

Author Keywords
animated GIFs; CMC; emotion; nonverbal communication; sentiment analysis

ACM Classification Keywords
H.5.1. Information interfaces and presentation (e.g., HCI): Multimedia information systems; J.4 Social and behavioral sciences

Figure 1: A still shot of an animated GIF from Giphy's "excited" emotion category. Original GIF: http://gph.is/1yqexne

Introduction

Animated GIFs have become pervasive online. These silent, short, usually low-resolution video clips are more engaging than any other kind of media on Tumblr [1], and many other social network sites and instant messaging tools, such as Facebook, iMessage, and Slack, have incorporated animated GIFs as part of their standard functionality. Compared to text and static images, animated GIFs may be especially good at conveying complex emotions because of the greater range of expression of animations and the resemblance to real-life scenarios. As noted by *The New York Times*, animated GIFs are now "a way to relay complex feelings and thoughts in ways beyond words and even photographs" [4].

Prior work has shown that many kinds of nonverbal communication, such as emoticons and emoji, are interpreted in inconsistent ways [7,8]; therefore it is likely that animated GIFs are also susceptible to a wide range of interpretations. Varied interpretations could be particularly problematic since animated GIFs are often used to express emotions [2]. To explore this area further, we asked the following research questions:

1. Do people have different interpretations for the same animated GIF?
2. If so, how are the interpretations different?
3. What factors contribute to the variance in interpretations?

We conducted an exploratory survey as a first step towards examining this space. Our findings reveal that different people do interpret the same animated GIFs differently. We also find that the duration of the GIF contributes to degree of variance in interpretation. These findings point to future directions for research around using GIFs in communication, as well as for the design of communication tools that incorporate animated GIFs.

Related Work

Due to the limited scholarship on animated GIFs, we surveyed literature on computer-mediated communication (CMC), emoticons, and emoji to provide a foundation for understanding the interpretations of animated GIFs. In this section, we first summarize literature on nonverbal communication in CMC, and then discuss what is known about interpretations of emoticons and emoji. We conclude with a discussion of existing research on animated GIFs.

Nonverbal Communication in CMC

Ambiguity in the interpretation of mediated communication is a staple of CMC scholarship. Early research in CMC suggested that CMC might be inherently impersonal due to the lack of nonverbal cues. Kiesler argued that one of the characteristics of CMC was the scarcity of social context information because CMC conveyed fewer contextual and nonverbal cues abundantly available in face-to-face communication [5,9].

However, more recent research has acknowledged the availability of paralinguistic cues and their ability to significantly affect communicators' perception in CMC. In the development of SIDE theory, Lea and Spears argued that paralanguage was an important source of CMC information that people use to form impressions of each other when communicating [6]. In the absence of interpersonal cues, communicators form impressions about each other from whatever limited cues are

available. Impression formation is more socially categorical, rather than personal, impression of others. Lea et al. also found that when communicators were geographically separated, paralinguistic cues were perceived positively if the group relationship was more salient and negatively when individual identities were more salient.

Other CMC theorists, however, have argued that the ambiguity of CMC can be overcome. Social Information Processing Theory argues that over time, and after sufficient exchanges, communicators will develop sufficient personal and relational information as to negate the effects of CMC [11]. Building on this theory, Hyperpersonal model argues that CMC message receivers have idealized perceptions of senders, not only due to their over-reliance on minimal cues, but also because the senders are able to selectively present themselves [12]. This loop of perception intensification made CMC exceed the level of affection of interpersonal communication–it became "hyperpersonal."

While only a brief summary, this research shows the ability of nonverbal cues to shape interpretations in CMC and provides a foundation to understanding the interpretations of animated GIFs as a form of CMC. As communication extends beyond text (e.g., emoticons, emoji, and GIFs) and into new platforms, ambiguity may increase due to reduced context, new communication channels between communication pairs, and novel forms of interaction.

Emoticon and Emoji Interpretation

Emoticons and emoji are common nonverbal cues in today's CMC, and recent research has shown their ability to shape perception and their varying interpretations. Researchers found emoticons were able to shift the interpretation of messages [13]. The interpretations of emoticons were consistent within cultures, but varying cross-culturally [8]. Interpretations of emoji were less consistent both within-platform and cross-platform [7,10]. However, little is known about interpretations of animated GIFs.

Animated GIFs

Little research has been done on animated GIFs. Bakhshi *et al.* found that animated GIFs were more engaging than other kinds of media on Tumblr through an analysis of a large dataset and interviews with 13 Tumblr users [1]. Despite animated GIFs' high level of engagement, interpretations of animated GIFs may not be consistent. The GIFGIF project[1] from MIT Media Lab allows people to vote on the one GIF that best represents a given emotion between two animated GIFs. From the results on GIFGIF's website, we can see a high number of votes for multiple emotions for a single GIF, implying various interpretations of GIFs.

Methods

We created an online survey to solicit people's interpretation of a sample of animated GIFs. We gathered emotions that people associated with GIFs and examined how much the sentiment of emotions varied.

Animated GIF Sample

We collected a dataset of animated GIFs in the Emotion category of Giphy,[2] a popular online GIF repository. We randomly collected 100 animated GIFs along with their

[1] http://www.gif.gf/

[2] http://giphy.com/categories/emotions

	M	SD	Min	Max
text	-.13	.29	.73	-.81
no text	.05	.29	.90	-.74
long	-.02	.30	.79	-.74
short	-.07	.28	.90	-.81

Table 1: Descriptive statistics of *text*, *no-text*, *long*, and *short* groups.

	χ^2	p
text vs. no-text	2.82	>.05
long vs. short	7.81	<.01
positive vs. negative	7.00	<.01

Table 2: Bartlett's test result of *text* vs. *no-text*, *long* vs. *short*, and *positive* vs. *negative*.

meta-information from each of 26 subcategories in the Emotion category using the Giphy API (e.g., awkward, excited, unimpressed). Figure 1 is an example GIF from the "excited" emotion category.

To consider what characteristics of GIFs might impact interpretation, we grouped the GIFs in terms of two variables: whether they have embedded text (*text* group vs *no-text* group) and whether they are long in duration (*long* group vs *short* group). We further generated four smaller groups by joining the two variables: *text-and-long*, *text-and-short*, *no-text-and-long*, *no-text-and-short*. Long GIFs are defined as having lengths above the median length of the sample, and short GIFs are defined as having lengths equal to or below the median (26 seconds). We decided to use the median instead of average because the GIF lengths followed a long-tail distribution and the average length was skewed by very long GIFs (M = 38.75, SD = 38.28, min = 2, max = 540). We randomly chose 10 GIFs for each of the four groups, resulting in 40 GIFs in total for our survey.

Survey Design

The survey began by asking participants for their demographic information (age, gender, and location), as well as their frequency of sending or receiving animated GIFs. Then, each survey participant received a random sample of 15 GIFs from the total 40, evenly presented. For each GIF, participants were asked to provide an emotion they associated with the GIF, and also (in an open-ended response) had the option to provide any additional information about the GIF.

Participants

We recruited participants from social media (seeded from the authors' social networks), as well as online communities such as Reddit and Tumblr. We encouraged participants to share the call for participation, resulting in a snowball sample. There were no participation restrictions beyond a requirement that participants be at least 18 years of age. 152 participants completed the full survey, of whom 81 were female, 69 were male, 1 genderfluid, and 1 reported as "female-ish." The average age was 30.23 (SD = 9.61, min = 18, max = 70). Regarding the frequency of sending or receiving GIFs, 31% of the participants send or receive animated GIFs multiple times a day, 21% multiple times a week, 23% multiple times a month, 17% less than once a month, and 7% have never sent or received any animated GIFs. We collected 1606 interpretations across all 40 GIFs, with an average of 40 interpretations per GIF (median = 40, max = 47, min = 34).

Data Analysis

To analyze the difference in interpretations, we computationally analyzed the variance of the sentiment of reported emotions using the sentiment analysis tool VADER [3]. We chose VADER because it is "specifically attuned to the sentiments expressed in social media," which fits our purpose. VADER takes in a unit of text and produces four metrics: *pos*, *neu*, *neg*, and *compound*, in which *compound* gives the normalized, weighted composite sentiment score of the sentence, ranging from most negative (-1) to most positive (+1). To examine the variance in sentiment on the VADER compound metric between the *text* and *no-text* groups, and between the *long* and *short* groups. Bartlett's test for homogeneity of variance was used to test for

Figure 2: A still shot of a *text* GIF that had varied interpretations. Original GIF: http://gph.is/1EPKQ5B

Figure 3: A still shot of a *long* GIF that had varied interpretations. Original GIF: http://gph.is/2bbWXR5

significant differences in variance between our categories.

Results

We found differences in variance of interpretations between groups. A summary of the descriptive statistics can be seen in Table 1. A summary of the Bartlett's test results can be seen in Table 2.

We found that interpretations of longer GIFs had more variance than shorter GIFs. We performed Bartlett's test between the *long* group and the *short* group; the *long* group (SD = 0.302) has a higher variance than the *short* group (SD = 0.275). This means when one sends his or her friend a long GIF, they are more likely to interpret it differently than the sender, as opposed to if the sender sent a short one. Some participants also described long GIFs as difficult to understand. For one of the longest GIFs in the sample (Figure 3), different participants reported: "I'm not really sure on the emotion associated with this gif" and "hard to read, very confusing."

We did not find a significant difference in the variance of interpretation between GIFs with embedded text (SD = 0.291) and those without text (SD = 0.286).

Finally, we found differences in variance of the interpretation of positive GIFs versus negative GIFs. Specifically, GIFs that were rated positive in sentiment had a higher variance than GIFs rated negative. We performed Bartlett's test between GIFs that had a positive average *compound* metric and GIFs that had a negative average *compound* metric, and we observed that positive GIFs (SD = 0.145) had a higher variance in compound than negative GIFs (SD = 0.121). This means that one's friend is more likely to have a different interpretation of a GIF than the sender if that GIF is positive rather than negative in sentiment.

Discussion

Overall, we found that people have different interpretations of animated GIFs and have identified features that contribute to this variation. GIFs that are longer had a higher degree of variance in their interpretation than shorter GIFs. Based on this finding, we speculate that more information could increase the range or ambiguity of emotions, thus leading to more variance in interpretation. However, we don't see a significant effect from embedded text on the variance of interpretation. While both text and length provide GIFs with more context and more information, one explanation could be that additional visual information in GIFs results in ambiguous or multiple emotions while textual information only serves to reinforce the existing visual content.

Our findings also suggest that positive GIFs tend to have more diverse interpretations than negative GIFs; however, we are not clear what caused this result. We can speculate two possible reasons behind this: First, since we are relying on participants to use words to describe the emotions, it could be that the linguistic variance of positive words for emotion is higher than negative words. Another possible reason is positive GIFs are inherently more nuanced than negative GIFs. This is an interesting question that could be examined in future work.

These findings suggest that there is potential for miscommunication when using animated GIFs, and it is affected by duration and sentiment polarity. These

multiple factors could mean that GIFs are a more nuanced form of nonverbal communication than emoticons and emoji. These factors, therefore, need to be taken into consideration when using animated GIFs in communication and when designing communication tools that incorporate animated GIFs. For example, communicators can intentionally choose simple GIFs to reduce miscommunication potential, and systems can allow users to clip GIFs to capture only the necessary parts.

Limitations and Future Directions

This exploratory study was a first step in examining a nuanced phenomenon, and thus there are some limitations to our work that suggest avenues for future studies. We considered emotions on the one-dimensional sentiment scale VADER provided: negative to positive. However, emotions are more complex and subtle than a single dimension.

In future work, we plan to analyze emotions on other dimensions (e.g. anger, happiness, sadness) to capture the complexity of emotions. We will also look at how reported emotions diverge from the category provided by Giphy for each GIF on various dimensions, which has implications for the use and design of search tools. We are also interested in knowing how people understand the intention of GIF senders, as well as how people choose different GIFs for different scenarios. Now that this exploratory survey has provided useful directions for further inquiry, we plan to conduct additional, larger-scale surveys with more representative samples, as well as to examine more in-depth data by conducting interviews.

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