Can doodle convey an emotion?

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ABSTRACT

Computer-mediated communication have long been criticized for lack of lack of visual and aural nonverbal behaviors which undermines emotional understanding. Doodles, being newly introduced to IMs, are used as an auxiliary channel to enhance emotional communication. To understand how people convey emotions with doodle, we examined strategies and visual cues communicators used in communication. The result has shown 3 main strategies for doodle: facial expression, metaphor and manga iconography. We listed common expressive cues for each emotion.

INTRODUCTION

There's always been a constant effort to enrich the computer-mediated communication. From text-based communication of old days, recent Instant Messengers(IM), i.e. Facebook messenger and Snapchat, encompasses more expressive medium: photos, emoticons, and video.

The trends are natural; As Schwarz [1] mentions, a significant part of interpersonal interaction has been migrated into IMs, but the nature of Computer-Mediated Communication(CMC) limits the way of sending non-verbal cues, making emotional communication unsuccessful [2]. Alternative medium other than text fills the hole providing more ways to convey a nuisance of conversation.

Doodle is one of such new medium, which is actually much welcomed by people[3]. The simplicity and unconstrained nature of doodle make it able to express many complicated emotions. However, usage of such doodles has got limited attention. In this study, we try to show the effectiveness of doodles on conveying emotional cue. Two important questions are addressed to support the claim: (1) How are the emotions expressed in doodles? and (2) can their partner catch that emotion? We answer each question in turn by explaining the cues people use to encode emotion, and then proving that doodle can initiate intended emotion on the respondent.

RELATED WORK

The ability to propagate emotion in CMC had been long reputed [4], saying without nonverbal cue, it's impossible to embed emotion on text [5]. However, as IM usage grows in everyday life among teenagers and college students [6], researchers moved to an idea that text-based CMC can be more expressive than previously thought since communicators had discovered new ways to express emotional and social information in a text. Hancock, Landrigan and Silver investigated this claim using data from IM, and find out four strategies (degree of agreement, using negative affect terms, use of punctuation and speed of response and verbosity) people used to fit in their emotion expression to a text-based medium. Social Information Processing(SIP) theory arose to explain the phenomenon; SIP argues that people are able to employ different strategies to convey nonverbal behaviors in text-based CMC. Hancock [7] further succeeded to show that emotional contagion can actually happen in asynchronous and distant nature, even with sole text-based messages.

Apart from theoretical research on how people communicate on text-based CMC, growing number of features and designs are introduced to facilitate emotional communication in IM. The use of graphic emoticons was one of most researched strategy [8]. Emoticons were defined as iconic forms to compensate the absence of nonverbal cues such as gestures and facial expression and to indicate the subject's mood or feeling [9]. Kaliouby and Robinson presented expressive avatars which automatically convey subjects' emotion via facial expression recognition [10]. Haptic responses [11] and Kinetic typography [12] are also explored. Most recently, multi-touch gestures have been introduced as a probable form to enhance emotional expression [13].

Our research further extends the SIP perspective by investigating how people embed emotion to newly introduced medium: doodle. At the same time, we present doodle as a new complementary form of expression, showing an ability to accurately form and interpret designated emotion.

DOODLE TO COMMUNICATE: MODIFIED LENS MODEL

We are using modified version of Brunswik's lens model [14] to conceptualize the emotional communication via doodle. It models emotional communication [15] into three steps: encoding (expression), transmission and decoding (impression). The model has been widely used to analyze emotional message cues, varying in context they are grounding. Scherer [16] used this model to analyze vocal

communication. Boonthnom used it to study emotional cues used in text-based emails.

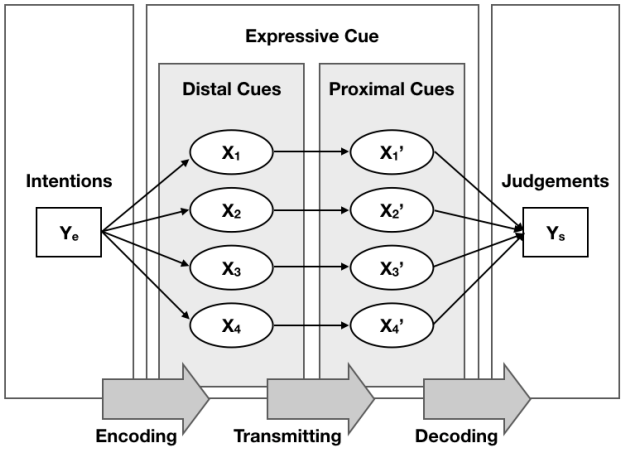

Figure 1. The Diagram for Modified Lens Model

The lens model is a conceptual model helping researchers analyze communication better. The sender, called subjects, try to communicate with the respondent, the judge. Judges make inferences about a subject's emotional state by observing subject's emotion cues. These cues, however, can differ from the original subjects' distal cue, since the proximal cue, observed by the judge, is being interpreted in a different environment. The process of subjects encoding their emotions is closely related to the environment. Based on ecological understanding on how these cues will be interpreted by the others, they generate expression that can be easily understood by others.

We will further articulate the idea, listing strategies and emotional cues communicators use in communication via doodle on discussion.

USER STUDY

To understand how people communicate emotion by visual representation, an user study: emotional communication by. The purpose of the experiment is to gain a general understanding of how people convey and perceive emotion by visual representations. Here, we adopt doodle, a drawing that was done without thinking carefully but only express drawer's current feeling. This experiment involved bidirectional (sender and receiver) emotional communication (encoding emotion and decoding emotion) through doodling on papers.

Procedure

Encoding 20 participants (11 female; 20-30 ages) were recruited. We used UC Davis Set of Emotion Expressions (UCDSEE) as emotion dataset, 10 emotions included. UCDSEE also provides photos that actors express certain emotion using post and facial expression. The experimenter showed every participant 4 emotions with title and photos and asked participants try to feel the emotions presented by the expressers. Then, participants were asked to draw a doodle to express their emotion. After they finish drawing, we had an interview with each of them. The interview concentrated in three phases: (1) what did people consider when they draw a doodle to express their feeling, (2) what indicators, elements in doodle, do they think are the most important cue for emotion, and (3) how they expected others will interpret this doodle

Decoding After participants finish emotion encoding part, the experimenter showed them 4 doodles drawn by others. The 4 doodles are chosen with different emotions from which those participants have been shown in encoding section. We first asked participants what emotion they feel the drawer want to express and what are the indicators for that emotion. Them, we showed them they emotion dataset (10 emotion types with photos) and asked them to choose one emotion that matched most with the doodle.

Results

We gathered total 80 doodles, 8 for each emotion. Here we will focus on 5 emotions which are happiness, sadness, anger, surprise and shame, former 4 ones are chosen for comparing to the emoticons in next section while shame is sampled from a special set of self-conscious emotions — embarrassment, pride, and shame — which are emotions that relate to our sense of self and our consciousness of others' reactions to us.

Emotion	Match Rate	Emotional Cues and # of corresponding doodles
Happiness	8/8	Facial expression: 6 Metaphor: 2 Movement: 2 Gesture: 2
Sadness	7/8	Facial expression: 4 Tears: 3 Metaphor: 2 Movement: 1
Anger	8/8	Eye, eyebrow: 5 Smoke, cross popping mark: 4 Facial expression: 2 Mouth: 1
Surprise	6/8	Question or exclamation mark:4 Mouth:3 Facial expression: 2 Eye: 1 Metaphor:1
Shame	3/8	Blush dots: 4 Text: 2 Tear lines: 2 Gaze: 1

Table 1. Emotional Cue used in communication via doodle

Emotional cues are extracted by coding the interview contents. We found that people tend to express certain emotion in a similar way, sharing same visual cues, while those cues difference between different emotions. We listed the emotional cues for five emotions in Table 1. We judge whether encoding emotion matched decoded emotion by the emotion that doodle viewers choose after seeing the dataset. If the viewer chooses the emotion which is the

same as we shown to doodle drawer, then we judged it as matched. Match rate is the ratio of the number of matched cases to total cases.

DISCUSSION

The use of cue varies a lot according to the strategy the subject chooses to use. Three major strategies are found: Facial expressions, Metaphors, and Manga iconography.

Facial expressions Facial expression dominates the visual cue for happiness. People tends to emphasize happiness by eyes and mouth shape. This is obvious because the common sense of happy face is almost shared with everyone. For sadness, tears and surprise, instead of focusing on whole facial expression, people saw tears, fronted eyes and circled mouth as the most important emotional cues.

Metaphors Metaphors do not explicitly show the emotion but try to imply the mindset using other objects. One participant draw a flying butterfly to imply happiness, and the decoder also successfully receive the emotion that drawer wanted to convey. But there are also many chances that people interpret metaphor differently. For example, a drawer expresses sadness by drawing a cracked floor, but the viewer thinks that means wanting to hide into a hole, which implies shame.

Manga iconography We found that manga iconography apparently influenced how people expressed emotion, especially to emotions with high energy (e.g., angry) and implicit facial expression (e.g., embarrass, shame). Smoke and cross popping mark are both come from manga iconography to express anger, while blush dots are used to mimic the blushing reaction. We think these iconographies add more situational sense, which simple facial expression usually misses.

Visual representation for self-conscious emotion

We found that shame showed considerably low accuracy compared to other four emotions. In psychology, shame is categorized into self-conscious emotion, which relate to our sense of self and our consciousness of others' reactions to us. These emotion is considered to be cognitively complex and have no distinct universally recognized facial expressions. Most of the subjects drew blush dots to express shame, but this kind of presentations are mostly confused with embarrassment by the judge. Actually, blushing dots are used to measure embarrass emotion in research of self-conscious emotions [17]. We think the confusion is originated in transmitting process on communication. The self-conscious emotion necessitates understanding of others' reactions to us. However, most subjects only focused on the feeling of oneself, not giving a cue on other's reactions to the subject. The judge, without having situational cue, conclude to embarrassment which is common and more socially acceptable.

CONCLUSION

The study tried to explore the emotional communication on doodle-based CMC. As a preliminary study, we've found strategies and common cues communicators used to communicate via doodle. Also, the doodle has shown a high accuracy on communication of basic emotions such as happiness, sadness, anger and surprise.

However, our limitations are also clear. First, our sample size is small and not diverse in age. We've used convenience sampling and most of our participants were in 20s. Further study will reexamine the results of this study with bigger sample size. Second, participants were asked to act out different emotions of happy, sad, and angry rather than actually experiencing it. This might have affected our result, leading to unnatural, exaggerated expression. Thirdly, we've made participants to draw doodles on paper, but in further study, we will make people to draw on the touch screen, and study how these doodles have to be shown digitally.

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