Using Kinetic Typography to Convey Emotion in Text-Based Interpersonal Communication

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ABSTRACT
Text-based interpersonal communication tools such as instant messenger are widely used today. These tools often feature emoticons that people use to express emotion to some degree. However, emoticons still lack the ability to communicate the details of an emotional response, such as the speaker's tone of voice or intensity of emotion. In this paper, we hypothesize that kinetic typography – text that moves or changes over time – can address some of this problem by enhancing emotional qualities of text communication using its dynamic and expressive properties.

This paper presents a study showing that a small sample of designers can create kinetic effects that end-users could employ to consistently convey emotion. In the study, three designers prepared 24 kinetic examples expressing four different emotions. We found that the examples were rated quite consistently by 66 participants. These findings provide a preliminary indication that designers can create predefined kinetic effects which can be applied to a variety of textual messages, and that these effects will reliably convey a particular emotional intent. The findings from this study inform design guidelines for designing an instant messaging client that uses kinetic typography presentation.

AUTHOR Keywords
Emotive Text, Instant Messaging, Animation.

ACM Classification Keywords
H5.2. [**Information interfaces and presentation**]: Graphical User Interfaces

General Terms
Design

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INTRODUCTION AND MOTIVATION

Instant messaging (IM) is one of today's most popular communication tools. As more and more people have access to high-speed internet connections at work and home, we can expect to see even more use of this communication tool. Further, text-based communication is now also available on many cellular telephones, and the number of text message exchanges with these devices are also increasing [2, 3, 7].

Text-based communication has a long history, but has remained a static form until recently. While text-based communication supports dialogue and information exchange, its form alone does not readily support expressing emotion. For this reason, poets, typographers and graphic designers have historically developed various methods to represent emotion [8] (see for example, Figure 1).

Expressing one's emotional state has become an important issue, particularly in interpersonal text-based communication. Emoticons have been invented to respond to the need to express one's emotional state [13, 16]. Emoticons can depict one's emotional state through their shape, and can therefore help readers to understand the emotional intention of the message. The first generation of emoticons was generated using ASCII text. Several combinations of characters were used to create a variety of emoticons. In many current instant messaging systems, pre-designed emoticons mimic the yellow smiley symbol, a familiar cultural icon since the 1970's. More recently, animation features were added to yellow IM emoticons. For example, in the recent version of Microsoft instant messenger, the 'wink' emoticon actually winks at users [17]. Users can also simply input a series of ASCII characters and the software will convert them automatically to smiley-style icons (Figure 2). These animated emoticons were made not only to draw recipient's attention but also to express sender's emotion more intensively.

Several limitations exist, even with animated emoticons. These emoticons only depict emotion in an abstract and general manner. They cannot depict the tone of voice or intensity of emotion of the speaker. Sometimes users attempt to express intense emotion by putting several

Figure 1. The bald prima donna, (Robert Massin, 1966)

emoticons together, but this technique is not sufficient to convey emotional subtlety.

Kinetic Typography

Kinetic typography is an alternative solution to expressing emotion in text-based communication. Kinetic typography is defined as text that changes in color, size, or position over time [6]. Adding time as a design element to static typography allows for dynamic text in digital media.

Kinetic typography has been examined as a means of enriching emotion in text-based communication [5, 9, 10].

Smile	:-) or :)	
Cry	:'(	
Wink	;-) or ;)	
Angry	:-@ or :@	
Sad	:-(or :(	

Figure 2. Microsoft instant messenger creates a smiley-style emoticon by converting user's keystrokes into an emoticon.

Several studies have demonstrated that kinetic typography can enhance emotional qualities in communication, for example by communicating the tone of voice of a speaker or by imitating the physical or emotional status of a character. Figure 3 shows how typographic treatments such as bolding, pacing, and size change help to describe the loud, urgent voice of a speaker (3a) or to portray the tone of a calmer utterance (3b). There is substantial evidence that kinetic typography can increase the emotive content of text.

Based on existing background studies on kinetic typography, we are interested in building an interpersonal text-based communication tool using kinetic typography, particularly in the form of an instant messaging client, in order to understand to what extent kinetic typography might improve the emotional experience of communication.

To do so, we need to first know if kinetic typography effects can be used in a consistent and repeatable manner to convey emotion. To our knowledge, no studies have been undertaken to determine whether kinetic effects can convey a particular emotion reliably to a range of viewers. In this paper we present a study to answer this question. We also present design guidelines for a Kinetic Typography Instant Messenger (KTIM). Our guidelines build on several interactive systems for working with kinetic text. Some are professional, more general, time-based animation tools, and others are specific tools for kinetic typography [6, 11]. However, in this paper, we do not compare the effectiveness of using kinetic typography in interpersonal communication to that of emoticon use.

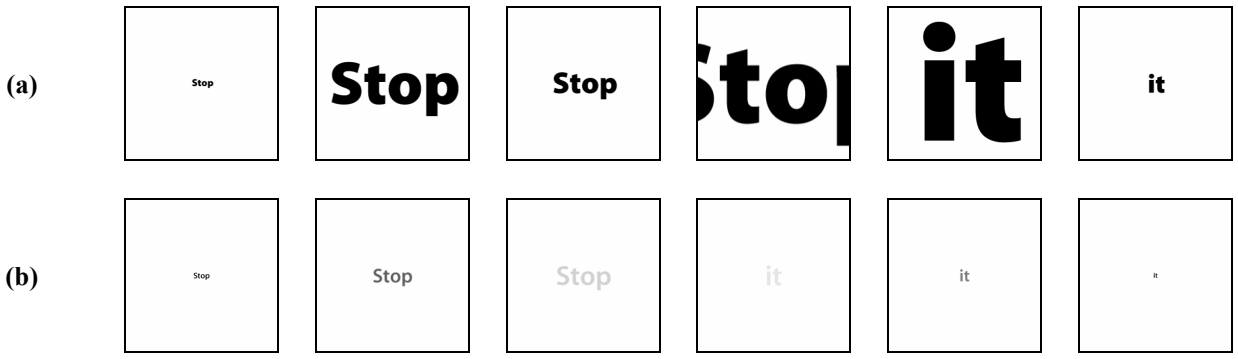


Figure 3. Kinetic Typography Examples

KINETIC TYPOGRAPHY TOOLS THAT SUPPORT INTERPERSONAL COMMUNICATION

Currently, only a few software tools exist to build kinetic typography. Moreover, only one prototype system [1] was developed to support the use of kinetic typography for real-time instant messaging. Nonetheless, it is important to review existing tools carefully to design a tool for instant messaging that supports kinetic typography. We categorized these existing tools into the three groups depending on primary purpose and targeted user. The three categories include general purpose animation tools, tools specific to creating kinetic typography, and tools for rapid editing of text by non-professionals.

General purpose animation tools such as Adobe After Effects or Macromedia Flash make up the first category. Since these tools were originally developed to generate a variety of time-based visual forms, they provide experienced users with substantial flexibility to create a variety of kinetic effects, as well as detailed control by tweaking each property in detail. However, these tools are not appropriate for messaging systems, which require rapid text entry. It takes even an experienced user a great deal of time to generate a simple kinetic effect. Furthermore, previous knowledge of kinetic design principles and familiarity with animation tools is required to use these tools.

The second group of tools is targeted specifically to create kinetic typography. There include Apple LiveType (Figure 4), the Wigglet editor (Figure 5), and the ActiveText system [12]. These tools provide not only a set of pre-designed effects that inexperienced users can easily apply, but additionally detailed control over individual kinetic effects that professional designers can leverage. Unlike the tools in the first category, message composition time using these tools is greatly decreased. However, they are not yet optimal for real-time interpersonal communication.

The third category includes tools that have been explicitly targeted to more rapid editing commonly done by non-professionals, such as the Kinedit editor [6] (Figure 6) and the Kinetic-Typography Instant Messenger (KIM) system built with the same base software [1]. These tools improve ease of use and speed of composition over those in the first and second categories. Both inexperienced and experienced designers can apply a set of pre-designed effects easily and consistently to text within what resembles a typical text editing environment. However, none of these tools address the level of control that users need when these tools are used for specific purpose. The user interface of these tools will need to be reconsidered in order to use kinetic typography effectively, for example, in instant messaging.

In order to use a set of pre-designed kinetic typography effects consistently, we first need to understand if such an approach is useful. In the next section, we describe a preliminary study to see if kinetic effects can be interpreted consistently.

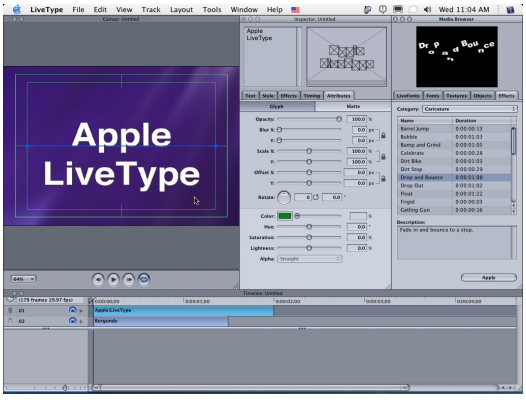


Figure 4. Apple Computer's LiveType

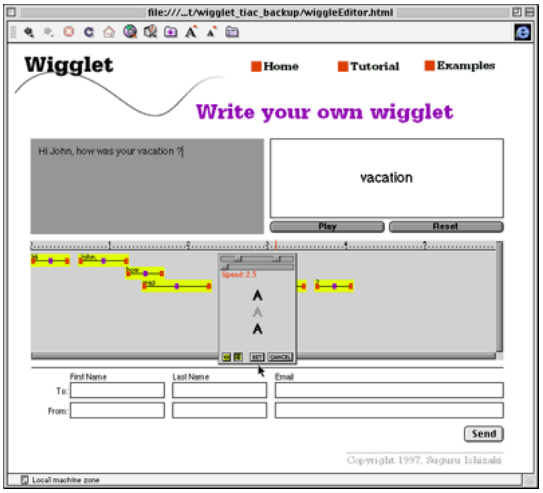


Figure 5. Wigglet

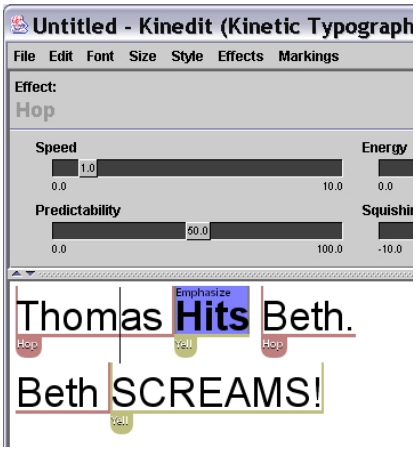


Figure 6. Kinedit

PRELIMINARY STUDY

In order to gauge the potential for use of kinetic typography in real time, text-based interpersonal communication, we wanted to explore the following three questions. First, can pre-designed kinetic typography effects reliably evoke a consistent emotional response from the viewer? Second,

can viewers interpret kinetic effects in the ways that designers intended? Finally, can designers consistently create these emotionally communicative effects? For example, if designers are asked to create effects to convey "happiness", can effects be created that are actually interpreted by viewers in the same way that senders want to convey the "happiness" of a message?

Pre-designed Effects

To find out the answers to these questions, we conducted a study to understand if pre-designed kinetic effects could be used in the way that emoticons are currently used in instant messaging systems. We asked three expert kinetic typography designers (not directly associated with our research group) to generate kinetic typography expressions with pre-defined emotions and a neutral-content sentence. Four distinct emotions were chosen: Happy, Joyous, Angry and Sad. Each designer made two examples for each emotion, using a neutral sentence, "I am fine," that made sense in all four of the emotional conditions (Figure 7).

To further constrain the design process, we asked the designers to use a specified typeface (Arial), to employ black text on a white background only, and to constrain the screen size of the movie to 320x240 pixels. In addition, designers were asked to generate their solutions using Adobe After Effects software without the use of third party filters. The length of each movie was not constrained.

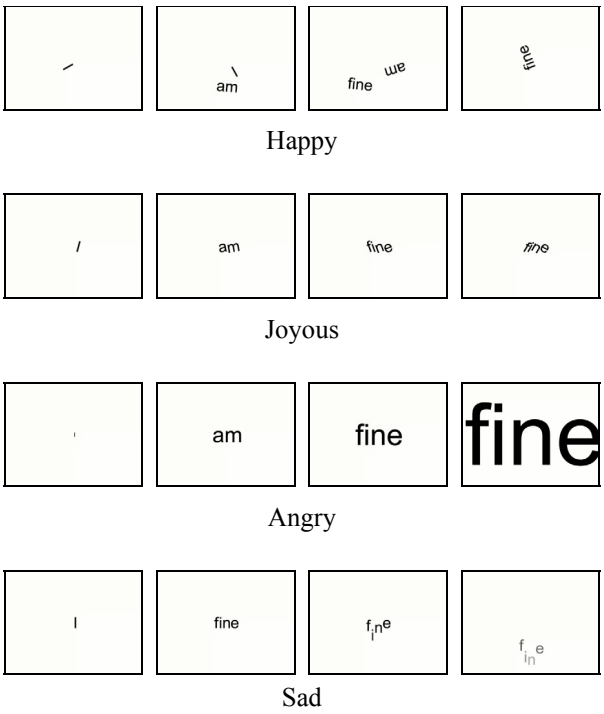


Figure 7. Four example kinetic effects used in the study

Participants and Procedure

We recruited participants for the study through several online bulletin board services in and around our university. A total of 66 subjects participated, 20 female and 46 male, ranging in age from 17 to 67 (mean=27.22, SD=7.58).

In a pretest questionnaire, we asked participants about their previous knowledge of kinetic typography and their frequency of IM use. Most of our participants were unfamiliar with kinetic typography (Figure 8 top). On the other hand, most participants were using instant messenger regularly. Less than 10% of our participants reported not using instant messenger at all (Figure 8 bottom).

Participants viewed the 24 kinetic type examples in a randomized web-based study. They were asked to rate each movie using an emotional scale with the dimensions of Mood and Energy. This scale was derived from previously developed emotional scales, such as the Circumplex of Affect [14]. Mood measures the positive or negative aspect of the emotion, and energy measures the intensity of the emotion. Figure 9 shows an example of the kinetic type excerpt and its associated rating scale. Each variable could be ranked using a 7-point scale, where 1 represented a low rating and 7 a high rating.

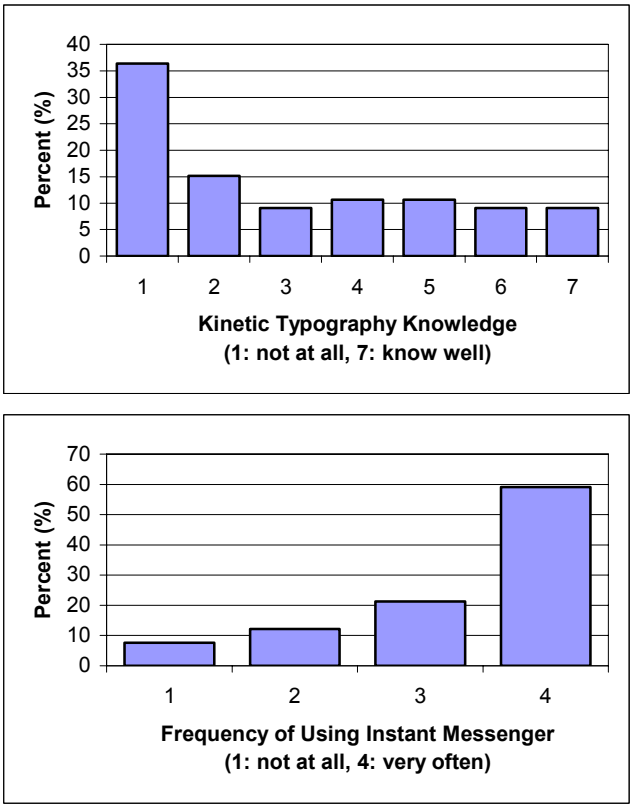


Figure 8. Knowledge of kinetic typography and frequency of IM use.

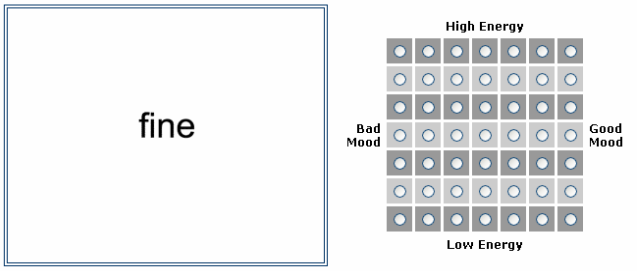


Figure 9. A sample of a kinetic typography excerpt along with the mood scale.

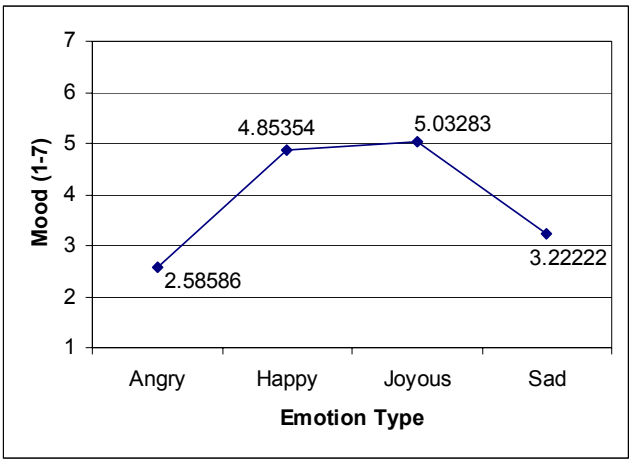
RESULTS AND DISCUSSION

Overall, we learned that kinetic typography can consistently convey emotion, and that designers can consistently create emotionally communicative kinetic typography effects. We performed ANOVA analyses evaluating the within-subjects effects of emotion type on Mood and Energy. We examined whether the four different emotion types were consistently ranked in Mood and Energy. We analyzed the interaction of designer and emotion type. Finally, we examined the between-subject effect of gender and Mood and Energy for each of the four emotions.

Effect of Target Emotion on Mood and Energy

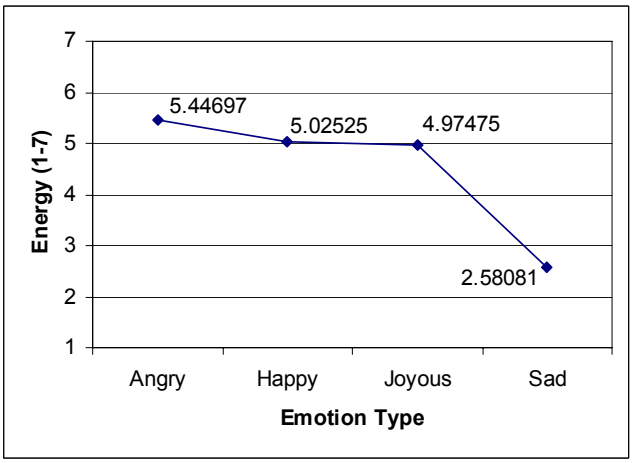
As shown in Figure 10, participants gave Angry and Sad lower mood ratings and Happy and Joyous higher mood ratings. The result is statistically significant, $F(3, 195)=125.805$, $p<0.0001$. Post-hoc analysis with Newman-Keuls method shows significant differences between every pair (Angry & Happy, Angry & Joyous, Angry & Sad, Happy & Sad, and Joyous & Sad) except Happy and Joyous at 5% significance level.

Figure 11 shows the energy rating of the four emotions. Participants ranked Angry as the highest energy rating, followed by Joyous, Happy, and finally Sad. These results were also statistically significant, $F(3, 195)=322.075$, $p<0.0001$. Post-hoc analysis with Newman-Keuls method shows there was no significant difference between Happy and Joyous at 5% significance level. Other pairs show



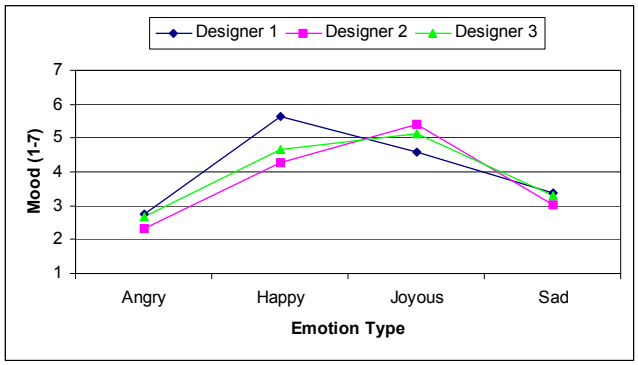
Source	F Ratio	Prob > F
Emotion Type	264.9837	<.0001

Figure 10. Emotion Effect on Mood (1: Bad Mood, 7: Good Mood)



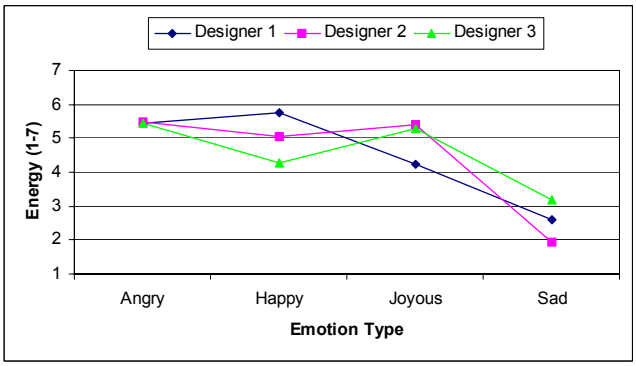
Source	F Ratio	Prob > F
Emotion Type	322.075	<.0001

Figure 11. Emotion Effect on Energy (1: Low Energy, 7: High Energy)



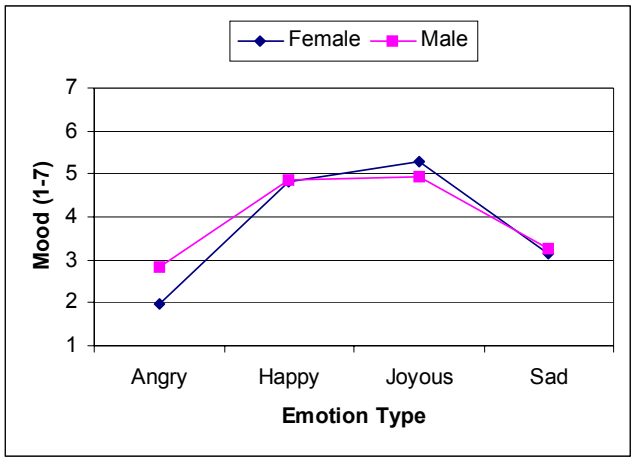
Source	F Ratio	Prob > F
Designer*Emotion Type	15.611	<.0001

Figure 12. Interaction effect on Designers*Emotion type on Mood (1: Bad Mood, 7: Good Mood)



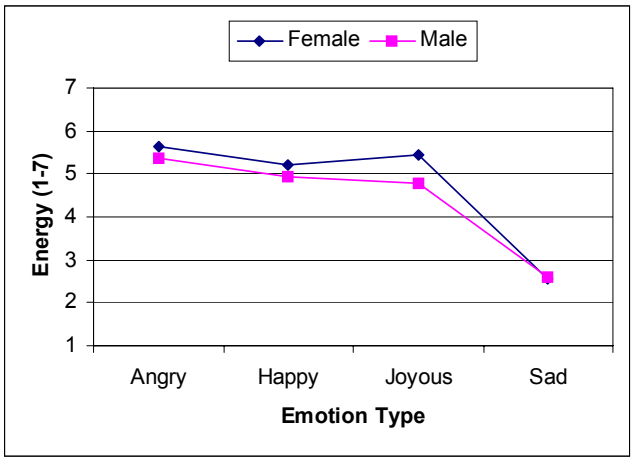
Source	F Ratio	Prob > F
Designer*Emotion Type	41.169	<.0001

Figure 13. Interaction effect on Designers*Emotion type on Energy (1: Low Energy, 7: High Energy)



Source	F Ratio	Prob > F
Gender*Emotion Type	5.153	0.0019

Figure 14. Interaction Effect on Gender*Emotion type on Mood (1: Bad Mood, 7: Good Mood)



Source	F Ratio	Prob > F
Gender*Emotion Type	3.225	0.0237

Figure 15. Interaction Effect on Gender*Emotion type on Energy (1: Low Energy, 7: High Energy)

significant differences.

These results indicate that even though the kinetic examples were created by different designers, the emotional state of each example was rated consistently by participants. Since the text used in the movies was neutral, and did not express any form of emotion, we can assume that participants were responding similarly to the emotion expressed in each kinetic effect.

Interaction Effects of Designers and Emotion Type on Mood and Energy

Figure 12 and 13 present the ranking of each designer's effects by all of the participants. In general, each designer's emotional text treatments were consistently ranked by participants. However, main effects were found in the interaction of designers and emotion type on both Mood ($F(6, 390)=15.611$, $p<0.0001$) and Energy ($F(6,390)=41.169$, $p<0.0001$). This might be due to the fact that Designer 1 interpreted Happy and Joyous differently than Designers 2 and 3. However, this effect did not affect the overall ratings. These results indicate that even though particular designers have subjective interpretations of emotions, in general, the kinetic designs that they create consistently convey a particular emotion.

We conducted follow-up interviews with designers that supported this idea. Designer 1 believed that Happy is a more active and energetic state than Joyous, while Designers 2 and 3 thought Joyous is a more active and energetic state than Happy. In the future, we could specify the mood and energy rating of each emotion type for the designers to lessen the possible implications of this effect.

Interaction Effects of Gender and Emotion Type on Mood and Energy

Figure 14 and 15 present Mood and Energy ratings of each emotion by gender. There was no significant difference in overall rating for mood between men and women ($t(64)=0.976$, $p=0.3327$). However, there is an interaction effect between gender and emotion type ($F(3,192)=5.153$, $p=0.0019$). This occurs mainly from differences in the ratings for Angry ($t(64)=3.326$, $p=0.0015$). There were also slight differences in the ratings for Joyous (Figure 14), but these were not statistically significant ($t(64)=1.366$, $p=0.1768$) (Figure 16). There was a similar result for energy ratings by gender. There was no significant difference in overall rating for energy between men and women ($t(64)=1.739$, $p=0.0869$). However, there is a significant interaction effect between gender and emotion type ($F(3,192)=3.225$, $p=0.0237$). This is mainly due to the fact that women gave Angry, Happy, and Joyous higher energy ratings than men. The only statistically significant difference was found in the ratings for Joyous ($t(64)=2.945$, $p=0.0045$) (Figure 16). These results might indicate that women are more sensitive to emotional cues than men in this context.

Angry	$t(64)=3.326$, $p=0.0015$
Happy	$t(64)=0.118$, $p=0.9064$
Joyous	$t(64)=1.266$, $p=0.1768$
Sad	$t(64)=0.473$, $p=0.6380$

Mood

Angry	$t(64)=1.061$, $p=0.2928$
Happy	$t(64)=1.281$, $p=0.2047$
Joyous	$t(64)=2.945$, $p=0.0045$
Sad	$t(64)=0.118$, $p=0.9064$

Energy

Figure 16. t-test result for gender differences in each emotion.

DESIGN IMPLICATIONS

We have shown that kinetic typography can consistently convey emotion, and that designers can consistently create emotionally communicative kinetic typography effects in general. Several design implications emerge from the results of this study:

Reusable effects

First, reusable kinetic effects could be created by kinetic typography designers to convey emotion in text-based communication systems. Giving each designer a detailed description and rating for each emotion, pre-designed effects would minimize the personal preferences or biases that might be included in subjective design solutions.

Kinetic typography "emoticons"

Second, since these effects have been consistently ranked for emotional content by participants in the study, we believe that they could serve as useful "kinetic typography emoticons" in IM systems. These treatments could be reapplied to make multiple instantiations of emotional effects. These effects may communicate emotional content even more clearly when combined with likely content (i.e., for instance, a "sad" kinetic treatment with a sad message).

From our reviews of existing tools that support kinetic typography, only Kinedit and KIM can support users in creating text excerpts for kinetic typography text messages. These tools support rapid editing, but could be improved for very rapid text input. For example, when using current instant messaging tools, users will input emoticons with several key combinations, instead of using the mouse. This "need for speed" will be discussed as one of the design challenges for KTIM systems in the next section.

DESIGN GOALS FOR KTIM SYSTEMS

Inspired by our research on existing tools used for kinetic typography, we created the following design goals for KTIM systems. First, kinetic effects must be available "on the fly," without using the mouse for selection, when users are composing messages. Second, users should be able to select and use kinetic effects without having any prior knowledge of kinetic typography. For example, a small preview of each effect might be available. Third, the system should provide a history view for reviewing the conversation, so that users can take in a history view of kinetic dialogue.

There are two main components to the user interface of most instant messaging systems: the message output window and the user input window. In many of current IM systems, a scrolling text window is used for message output. This window is used for text-based messages as well as small graphical emoticons. It also serves as a message history view. Users can browse the previous contents of a message, and save the entire transcript of a conversation afterwards.

The message input area is usually a small text window allowing for a line or two of input. Users type in text-based messages using the keyboard or select graphical emoticons from a palette of choices. In some systems, emoticons can be created by simply typing some combination of characters (Figure 2).

Our design challenge is to better support message output, text input, and expression of emotion in a KTIM system.

Message output

Since KTIM differs from IM in the way messages are presented on the screen, several design issues arise. In IM, messages from each user are presented in real time, with sender identifications such as a user id or screen name, and visual attributes such as color or typeface. In KTIM, if messages are queued sequentially as in IM, the next message cannot be presented until the previous message's animation has ended. This is problematic in a real-time communication environment. Users of such a KTIM system would experience an awkward moment without feedback after typing in a message. We propose a few design solutions to address this issue.

The first solution is to present several text output windows at once. Each participant could have his or her own message output window. This would avoid presentation delay and identification issues. But it would be hard to concentrate on the conversation because the user's attention would frequently be divided. Understanding the sequencing of a message would also be difficult.

The second solution is to use one message output window, but to assign different areas to each person taking part in a chat or conversation. Designers of KTIM systems could rely on traits of spoken communication such as speaker identification and turn-taking to guide the design solution. We propose design guidelines for both identification and turn-taking below.

Identification

Several design cues have been used in the past to identify different characters in a KTIM system. These include elements used in static typography such as typeface, colors, and style. Position on the display is also a reliable cue for the identification of a speaker. Just as we remember people by appearance, hair and eye color, typographic elements

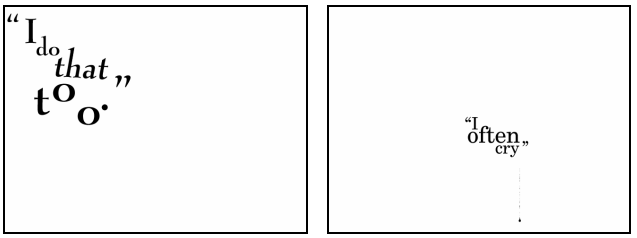


Figure 17. Two speakers take different typographic attributes and positions for identification.
(From the Jack Moffett's movie, "The little boy and the old man", 1997)

can combine to represent individual speakers [15]. The static poetry example shown in Figure 1 illustrates how these cues combine to successfully identify individual speakers. In earlier research on kinetic dialog, it was shown that viewers can recognize two different speakers that are expressed by using different typefaces and positions on the display [5]. Figure 17 shows two speakers in a kinetic dialogue, identified by different typographic attributes and positions on the display. In our proposed solution, we also put a legend of participants near the message output window to help the user to recall the physical position of each participant (Figure 18). As the number of speakers increase, using position as well as typographic cues will be more effective in discerning one character from another on a finite display.

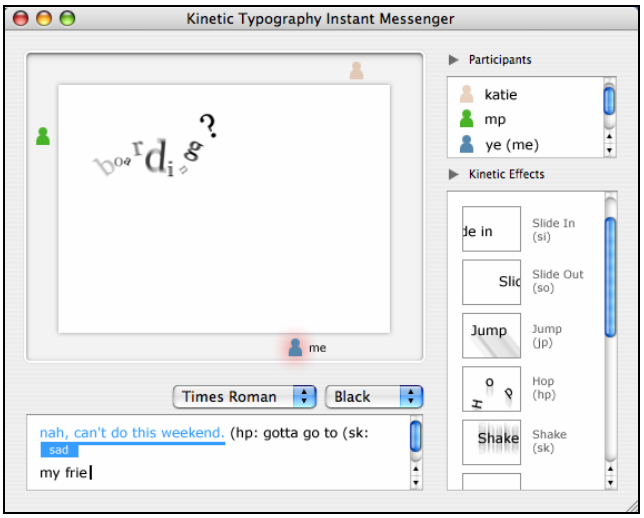


Figure 18. Concept for KTIM user interface

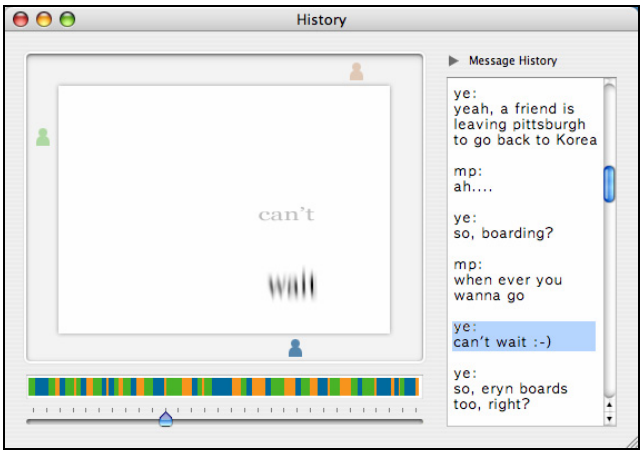


Figure 19. Concept for History view of KTIM

Turn-taking + user's feedback

Since kinetic dialog imitates the way we talk in our spoken the communication, the issue of turn-taking also becomes a design challenge. Turn-taking for two speakers can be quite naturally designed. However, as the numbers of speakers increase, more than one speaker may chat at once and display may become an issue. One way to address this may be to apply a relative size change to the text. For example, if one speaker among six is speaking, the display of his text remains at a consistent size. If two more speakers join in the dialogue, and all three are talking simultaneously, the first speaker's type size may reduce in size a bit in order to use the display window more effectively. To visualize the other three speakers who might want to join the chat, feedback could be given to users who are writing messages but need to wait their turn. In our interface design, user icon around the message output window will be blinking as a visual cue (Figure 18).

Expression of emotion in message composition

Our study shows predefined kinetic effects can be used with KTIM. In IM, all the communication and emotional expressions happen in real time. In a KTIM system, the user should select kinetic effects from a library or add the effects while composing a message.

In current IM systems, emotional expressions are signaled with emotions, which are quick and lightweight. KTIM can also employ this conversion idea. One issue is that multiple emotional effects could be assigned to a single sentence. The minimum unit that could be assigned an emotional effect would be a character. In the KT systems described here, users can assign only one emotional effect per sentence. This is unlike spoken communication and is very limited.

Kinedit [6] does a good job of assigning multiple effects. However, users can only select effects after a message has been composed. Figure 18 shows a conversion example. The user types in a sentence, and assigns the 'Sad' effect. To do this, the user encloses the sentence with parentheses, and puts a specific emotion command inside. For example, *"(s: nah, can't do this weekend.)"*. By closing the parenthesis at the end of the sentence, the assigned emotion effect is denoted with an underline. The remaining other texts were not assigned any emotion yet. Users can also assign a kinetic effect by selecting it from the Kinetic Effects library. Once a user chooses a desired effect from this library, he or she will see example animation of the effect.

We believe this is a feasible solution for quickly generating kinetic messages. In addition, this will support users with little experience in kinetic typography.

History view

One advantage (or disadvantage) of computer mediated chat systems is that the transcript of a conversation can be recorded. These transcripts can be browsed while chatting, or archived for future reference. In IM systems, this is done logically using the text that builds up in the scrollable text window.

Since the output window in KTIM is not a simple scrollable list, but more of a graphical canvas, the history view becomes a design challenge. A separate message history view is needed to browse previous messages. For example, the Chat

Circle system [4] employed a history view with a distinct message history visualization.

A history view of a KTIM message should contain the emotional effects that were attached to that message. Figure 19 is our recommendation of a distinct history view. It looks like a movie player that resides as a scrollable window beside the main display. Because users usually browse messages by content, showing messages in plain text form may be an appropriate solution. Each participant's messages are also color-coded and take a different amount of screen real estate based on the amount of conversation.

CONCLUSION AND FUTURE WORK

This paper presents a study showing that predefined kinetic typography effects can represent emotion consistently and successfully. We have shown that kinetic typography created by a number of designers consistently conveys the same emotion to readers, and that designers can generally consistently create emotionally communicative kinetic typography effects. The results of this study have implications for future instant messaging systems. Kinetic effects such as those used in this study may have an advantage in presenting emotion over current IM systems. They may be able to present subtle details in emotional expressions, rather than the abstractions conveyed by smiley-style emoticons.

In addition, this study presented a new method that was useful for rating the examples. Emotions are very subjective and hard to measure. By employing the Mood and Energy scales, we were able to find subtle differences between emotional ratings.

We also discussed important user interface design issues of kinetic typography based communication tools. Turn-taking technique and user identification issues are important in presenting kinetic message. Message composition with emotional effect also should be as easy as current IM.

Even though our study results are promising, more validation and design iteration will be needed. Our future work will include implementation of kinetic typography in a real-time, text-based communication tool as well as conducting further user studies. Finally, additional emotion types will need to be created and validated.

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