Exploring the Interactions by Virtual Characters for Interconnectedness Communication

Wen-Shou Chou, Ming Chuan University, Taiwan
Pen-Yu Liu, Ming Chuan University, Taiwan

Abstract
Peoples communicated on the current social media were mainly to share emotions and experiences in addition to exchanging information. However, the researches for discussing how to design the interface for interconnectedness communication are still very rare till now. It is especially true for this kind of communication based on the use of virtual characters. This study tried to explore what interactions peoples would like to take to let each other feel "keeping in touch" emotionally by the use of virtual characters. According to the method of statistical factor analysis, four factors of the interactions were extracted, namely the "getting close", "attracting attention", "being together", and "looking after". It was also found that there was no significant difference between the genders for these four factors.

Keywords: interconnectedness communication design, emotional design, social media, new media.

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Introduction

Social media such as Line or Facebook could provide the platform for peoples sharing their emotions and exchanging information. For the communication of emotions and experiences, some static graphics (such as the emotional icons), or the clips of motion graphics, were usually applied to express their feelings, in order to compensate the lack of real time communication clues, such as the eye's contacts. By sharing emotions and experiences with the help of using these graphics, peoples could also feel enjoyment and satisfaction.

The emotional graphics used in these media often contained graphics and texts, some of the graphics contained virtual characters. These emotional graphics were often released pack-by-pack. Since a single pack of graphics could not cover the needs of users to express their variety feelings, peoples would like to use several packs of graphics simultaneously in order to choose the most appropriate graphic to express their feelings. How to design the graphics to fit the needs of users for variety situations is still lack of research reports, furthermore, how to design the interactions for the virtual characters embedded in these graphics also needs more explorations.

This study aimed to explore the interactions of virtual characters in designing such emotional graphics or in developing a connectedness communication interface, where the interactions between virtual characters maybe controlled by the users, instead of being drawn fixed in the current media.

Social Presence, Awareness, and Interconnectedness

The social presence is a sense of "being together" (Biocca, Harms, & Burgoon, 2001), it represents the degree of feeling each other while peoples communicate through the social media (Short, Williams, & Christie, 1976). Some immediate behavior, such as smile, could enhance the feeling of presence (Gunawardena, 1995). The work "SharedSpaces" (Handberg, Gullström, Kort & Nyström, 2016) intended to provide the feeling of social presence, it extracted the images of peoples in front of the green screen and projected them onto the same virtual space, to let peoples feel they were located in a same place. The awareness means to understand the environment, situations, and corresponding activities of the remote coworkers in the field of computer supported cooperated work (CSCW). Suitable awareness deign could enhance the efficiency of co-works through the media. The Connectedness, or the Interconnectedness, is an emotional sense for letting the users of social media to feel "keeping in touch". For example, peoples could say good night by using the short message to keep the sense of connectedness (Nardi, Whittaker, & Bradner, 2000). In this study, we would like to use the interconnectedness, instead of the connectedness, to emphasize the interactive characteristics between virtual characters in the following discussions.

The interconnectedness is correlated to, but not equal to, the social presence and awareness. It was the most important demand factor for the social communication (Rettie, 2003). In many situations, users just want to let each other to feel keeping in touch, and don't want to know what he or she is doing. The design of awareness often needs sensing the environment and transmitting the images or sounds in real-time. For interconnectedness, it may only need to reveal what the relationships between two

virtual characters embedded in a graphic, such as the stick graphics used in the Line social media.

Works for the design of Interconnectedness

Since the interconnectedness is essentially to invoke an emotional feeling, peoples would remind their friends or family (and thus created an interconnectedness feeling) when watching news or weather reports about the places they lived (Rettie, 2003). The "WhiSpiral" which designed by the Media Lab of Europe (Agamanolis, 2005), embedded mini microphone in the scarf, when you fondled the scarf, the pre-recorded voice of family or friends would be re-played to create an interconnectedness experience. In the work of Dey and de Guzman (2006), they designed an electronic picture frame placed in the bedroom, it could show the pictures of remote family or friends via the internet, and created an interconnectedness feeling when people noticed the picture was updated remotely. The "MoodCake" (designed by Chou, Chang, & Fan, 2012) applied music to design an interconnectedness interface (Fig. 1). Users could click one of the four buttons in the interface to represent his or her feeling, and the remote one would listen to a corresponding music. The user could also click the question button to query the situation of the remote one. The MoodCake can invoke the interconnectedness experience successfully by music.
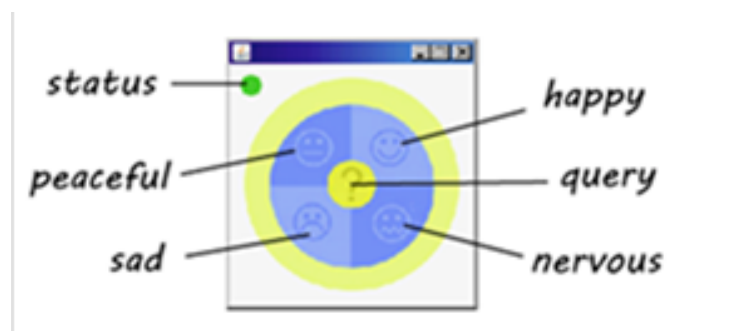

Figure 1. The interface of MoodCake

The Interconnectedness Communication by Virtual Characters

To invoke an interconnectedness feeling, one can use pictures, sounds, text messages, graphics, objects, or the clips of motion graphics. However, there is still lack of a more holistic design for establishing the interconnectedness experience communication channel. We have proposed a prototype, based on the use of motion graphics embedded with virtual characters, to let users send text messages, give/receive virtual gifts (will be shown as motion graphics), tell the remote partner what he or she is doing and what he or she feels now (by selecting and clicking the corresponding icons).

Figure 2. The designed interconnectedness communication interface

The system was built on the client-server internet architecture, as shown in Fig.2, the left virtual character represented the user, and the right one represented the remote partner. When one selected an operation, a corresponding looped clip of motion graphic would be played. For example, one can tell the remote one he/she is busy but happy now by choosing the "busy" status icon and the "glad" mood icon, and the corresponding clips of motion graphics would be shown (Fig. 3). It should be noted that the clips of motion graphics represented the status (what he/she is doing) and those represented the mood (what he/she is feeling) were separated and can be assembled, most of the current social media can not do this.

Figure 3. The screenshot of setting busy status and selecting the glad mood.

According to the test, the system can let the users know the status of each other and express their emotional feeling successfully (Chou, 2018). However, this communication interface could not provide the interactions directly between the two virtual characters, for example, let your virtual character to hug the other one of your partner. In order to design the interactions between these two virtual characters for creating interconnectedness experiences, this study tried to explore what interactions peoples would like to take to create the interconnectedness experiences.

Research Method and Results

The interconnectedness as far as we know is still lack of serious definition. Some researchers in the psychology may refer it as the intimacy or the closeness. The various measures of closeness were based on the two latent dimensions of behavior close and feeling close (Aron, Melinat, Aron, Vallone, & Bator, 1997). To develop the questionnaire and to explore the constructs for the interconnectedness communication, we referenced the interaction terms in the questionnaires of

researches about closeness. Such as doing the following activities with the partner: watching TV, singing, dancing, went to a party, doing laundry, talking on the phone, et al. (Berscheid, Snyder, & Omoto, 1989). Besides, we also collected and analyzed the interactions of virtual characters from the most popular 72 sets of stick graphics in the Line Store (2019). For examples, there were many stick graphics in these sets representing "kiss you" (Fig. 4) or "let's dance" (Fig. 5), et al.

Figure 4. Examples of stick graphics representing "kiss you" in the Line Store.

Figure 5. Examples of stick graphics representing "Let's dance" in the Line Store.

There were totally 30 questions proposed in the questionnaire with 7 points Likert scale for exploring the interactions. 154 (male: 56, female: 97) volunteers were invited to test the questionnaire, most of them were aged between 15 to 29 years old (90.2%). According to the scree plot of statistical factor analysis, four factors were extracted, and they were named as "getting close", "attracting attention", "being together", and "looking after" respectively. After deleting the questions with unsuitable factor weights, 23 questions were remained. The questions were re-arranged based on these four factors and summarized in the Appendix.

The Cronbach's α of the whole questionnaire was 0.934, and those values for the four factors were 0.948, 0.859, 0.835, and 0.809 respectively, it showed that the questionnaire was highly reliable. For the validity analysis, the KMO and Bartlett's spherical test were examined. The KMO value was 0.890, and the Bartlett's test of sphericity also achieved significant. The total cumulative variance explained by these four factors was 68.523%. According to the t test, there was no significant difference between genders among these four factors.

Conclusion

The interaction of virtual characters designed for emotional graphics was important to reveal the emotional feelings for peoples communicated on the social media. This study tried to explore what kind of interactions peoples would like to take to express their feelings and to let each other feel keeping in touch. We believed the proposed four factors of interaction could cover a large number of interaction needs and provide

an important reference to design an interconnectedness communication system in the following studies.

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Contact email: cws@mail.mcu.edu.tw

Appendix : the extracted factors and questions involved in the questionnaire.

Factors	Item	Questionnaire Topic
Getting Close	1.	Sometimes I would like to "kiss" the partner.
	2.	Sometimes I would like to "hug" the partner.
	3.	Sometimes I would like to "rub" the partner.
	4.	Sometimes I would like to "cuddle" the partner.
	5.	Sometimes I would like to "sleep" together with the partner.
	6.	Sometimes I would like to "pinch" the partner's "face".
	7.	Sometimes I would like to "pat" the partner's "head".
	8.	Sometimes I would like to "hold" the partner's "hands".
	9.	Sometimes I would like to "lean on" the partner.
	10.	Sometimes I would like to "pillow my head on" the partner's "lap".
	11.	Sometimes I would like to "feed" the partner.
Attracting Attention	12.	Sometimes I would like to "press" the partner.
	13.	Sometimes I would like to "tap" the partner.
	14.	Sometimes I would like to "hit" the partner.
	15.	Sometimes I would like to "threat" the partner.
	16.	Sometimes I would like to "kick" the partner.
Being Together	17.	Sometimes I would like to "sing and dance" with the partner.
	18.	Sometimes I would like to "watch shows" with the partner.
	19.	Sometimes I would like to "join the party" with the partner.
Looking After	20.	Sometimes I would like to "tickle" the partner.
	21.	Sometimes I would like to "give" the partner "a piggyback".
	22.	Sometimes I would like to "pick" the partner "up".
	23.	Sometimes I would like to "hypnotize" the partner.