



Enriching the User Experience in Social Messaging: Emotion in Communication Design

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ABSTRACT

Different research had been developed recently with a focus on user experience design. It explores how design outcomes could be easily motivated by users' responses and creates pleasant and positive user experience for users in consumption. Emotion is found as an important role in users experience and it is important to manipulate emotions in designing the design outcome which can elicit users' pleasant emotions. As a result, scholars would like to develop a better system to understand how the user experience could be further enriched and optimized in "user-orientated" approach which is believed to elicit the emotion of users. Among these design aspects, not much research has explored how emotion could apply in visual/graphic design to carry out its corresponding functions in user experience design of instant messaging application. This paper explores how emotion could apply in communication design in enriching the user experience design of instant messaging apps.

Keywords: Communication Design, User Experience, Instant Messaging Apps, Emotion and Communication

1. INTRODUCTION

Emotion influenced much on individual's interpretation about his/her experience, some scholar studied how the users response to technology with their cognition (Beaudry and Pinsonneault, 2010; Zettl, 2002). These studies discussed the topics, for example, the usability of design outcomes. Some scholars transcended the usability of design outcomes to consider empirically emotional elements of design. They found that understanding design consumption experience had three processes as sense, emotion and cognition. These findings were not only important to optimise designs being ease of use, and also lead users to experience emotions, such as happy, involvement, trust, satisfaction, etc. Most researches conducted in the area of emotion when users were using the products. However, few studies were conducted the user experience



in visual communication as some emotional responses and reaction presented in the user consumption on the visual communication design outcomes were too subtle and difficult to be measured. It was difficult for scholars to measure or identify the emotional changes of the users. However, emotion took the important role in information examination and communication technology systems (Kim, Lee and Choi, 2003; Sun and Zhang, 2006). The emotional responses and the reactions of the users would be regarded as the reflection of the usability of the visual communication design outcomes. This study adopted social media messaging applications as the substrate to illustrate the relationships between emotion and user experience in visual communication.

2. EMOTIONAL CONCERNS IN USER EXPERIENCE

Adopted the constructivism approach from psychology, some studies identified a spectrum of emotion. Some emotions were identified, for example, anger, sadness, fear, anxiety, joy, sadness, disgust, shame, and guilt (Smith and Lazarus, 1993; Scherer, 1997). Emotion, based on constructivist perspective, had been seen to have two components: arousal and valence. (Cenfetelli, 2004; Roseman et al., 1996). Arousal reflected the intensity of the response. Valence referred to the direct emotional response, no matter they are positive or negative (Russell, 1980; Deng and Poole, 2004, 2010). Scholars from design and emotion studies, Desmet (2004) proposed that emotion was aroused during the user was consuming the design outcome. It was a reflected emotional change based on a response to design elements. Therefore, the user felt a sense of satisfaction when design were functional or/and appealing. In other words, the design elicits enjoyment or excitement (i.e. user experience). Kim and his team (2007) expanded focus that includes not only the usefulness or ease of use, but also the role of emotion in the information examination and communication technology systems (Sun and Zhang, 2006). For instance, Hassenzahl (2006) (p. 266) elaborated the concept of usability which should include both "work-related issues" (e.g., effectiveness) and "non-instrumental human needs and related phenomena" (e.g., emotion, feeling, mood and experience). In other words, the measurement of the usability involved criticism in cognitive information processing and elaboration in reflected emotional concerns.

3. THE IMPACT OF EMOTION IN VISUAL COMMUNICATION

Before investigating the influence of emotion on visual communication, the knowledge on the connections among emotion, cognition and motivation is needed. According to the psycho-evolutionary concepts, it was found that emotion was a set of evaluating respond to the external environment (Rosenberg, 1998). This reacted evaluation was conducted in a quick



and effective way that was not easily noticed by the individual (Gratch and Marsella, 2005). The findings from Frijda (1986)'s 'appraisal process' proposed that emotion led the process of information perceiving and categorising on the external environment. This process determined the interpretation and explanation about the surrounded environment; and sharpening the perception. (Gratch and Marsella, 2005). The concepts from the psycho-evolutionary theories and the further exploration on how emotion influence the action took by the individual influenced some design studies. Faiola and Matei (2005) examined the influence of emotion individual's responses through web design. They invited designers those had various cultural backgrounds to create a web-based platform. The participated designers were asked to present themselves, included bias and emotion through the design of the web-based platforms. This study investigated that emotion linked with users' appraisal on the web design. Faiola and Matei explored that the users' bias and emotion users affected their appraisal processes and subjective evaluations during the design consumption process of the web design. This study result reflected that emotion influenced users' appraisal of the web design. The research result could be generalised as a reference to understand how emotion was influence on the users' evaluation of aesthetic elements in visual communication. Based on the knowledge of the impact of emotion in the visual communication, further exploration on how emotion provides better user experience is needed.

3.1 Emotion and Usability in Visual Communication

Based on the studies of investigating the aesthetic elements of the design influence on users' emotional responses, some scholars explored how they further influence the users' actions. These studies measured the usability of web-based platforms depends on how the platforms lead the users follow the instruction. In order words, this involved how the design provided information and how it influences the users' reactions. If only focused on the information providing process, the user would only evaluated the usability of the platform but not the enjoyment of the consumption experience (Blythe, Overbeeke, Monk, & Wright, 2004; Norman, 2004). In order to investigate how the design would influence the user's reaction. There were some studies tended to explore the relationships between users' emotions and their preferences in the design consumptions. After the exploration of some studies in the recent years, the design of a computer-related platform involved the criteria of its aesthetic appeal and its achievements on providing the users' satisfaction. The performances of the computer-related platform design in these criteria linked to the users' attitudes, expectations, and motivations closely. They stimulated the emotional responses those influence the users' cognition and hence, it was subjectivity mediated the interactions among the users with



computer-related platform. In other words, emotion might dominate a cognitive process as a response to the visual stimuli (in the design of a computer-related platform) (Norman, 2004). Schifferstein and Zwartkruis-Pelgrim (2008) investigated the determinants of the emotional response of users towards the design outcomes. They found that people used objects to identify the difference between themselves and the others, to protect and enhance their own identities. The studies mentioned above provided the theoretical understandings of the relationships between emotion and the design elements for a better user experience in the computer-related activities or platforms. These studies provided the background knowledge for further exploring on how the design elements actually influence the user experience in the social media messaging applications.

3.2 Aesthetic Elements in visual communication and Emotional Responses

Some scholars in visual communication explored how the users' aesthetic experience, that created by aesthetic elements' stimulation, elicits the users' response. They found that some aesthetic elements were particular effective to evoke the emotional responses of individual in the information processing stages. Schenkman and Jonsson (2000) revealed how the aesthetic senses and preferences of individual influence the user experience of web design. It found that the methods of arranging the aesthetic elements influence individuals' judgement. Schenkman and Jonsson (2000) identified several criteria, such as 'complexity', 'legibility', 'meaningfulness', 'comprehension', etc. This research result reflected that the users' personal preference on design elements would influence their feedback on the "beauty of the pictures (design element)". However, there were still rooms for further investigation on how the emotional impact of specific design elements work in visual communication design. Gobe (2001) explored how the explorations on how the emotional concerns elicited by specific design elements through his study of colour. He proposed that colour was one of the key aesthetic elements those stimulated individual's responses when the signal delivered from the key aesthetic elements influenced the nervous system in the brain. Therefore, the designed colour compositions were able to generate specific influences on mood. Zettl (2002) had the similar studies with Gobe and he further explored how colours influence the emotional changes. He found that a colour which ranged from cold to warm could cause the emotional changes of individual. Some other design elements, except colours were examined for understanding how they influence the users or audience's emotion. Typefaces were found as a significant aesthetic element to influence the individual's emotional responses to the ideas in the text (Gobé, 2001; Watzman, 2003). Under this proposed direction, Fogg (2003) designed a set of bold and assertive type as an example. This design elicited some recognisable responses from the audience. Fogg's study



was a start to apply the concepts that emotion influencing audience's responses in visual communication design.

4. THE SPECIFICATIONS OF USABILITY IN VISUAL COMMUNICATION

It was clearly shown in the literature and previous studies that visual aesthetics affects the user experience and the perceptions of the system or product. Which methods to choose and apply to evaluate its level was a less studied field. The level of aesthetics could be evaluated based on users' emotions evoked by the visual communication design. Emotions could be manifested in following ways: in physiological reactions, in facial expressions, in behaviours and in feelings connected to the experience (Thuring & Mahlke, 2007). Correspondingly, different user study methods to measure the impacts of an aesthetic experience could be applied. Ngo et al. (2000) define the aesthetic measures for graphic layout: balance, symmetry, equilibrium, sequence, order and complexity, unity, proportion, simplicity, regularity, homogeneity, rhythm, cohesion, economy, density. The elements of visual aesthetics could be characteristics of layout, quality of graphics, amount of text, number and choice of fonts, use of colours, etc. The values of these measures could be calculated mathematically based on the sizes and placements of visual objects on the screen. An exploratory study carried out by Tractinsky and Lavie (2003) resulted in a two factor structure, forming two overall aesthetic dimensions of users' perception of website aesthetics – classical and expressive – represented by five site attributes each. The first, "classical aesthetics" stands for orderly and clear design that was very close to the views of many usability professionals. It corresponds to the term suggested by Nassar in 1999, "visual clarity" dimension (Tractinsky & Lavie, 2003) and "simplicity" (Moshagen & Thielsch, 2010) that in Tractinsky's and Lavie's model refers to the following website attributes: aesthetics, pleasant, clean, clear, and symmetrical. Secondly, "expressive aesthetics" represented creativity and originality of designers; those would break the design conventions. It corresponds to another term suggested by Nassar, "visual richness" dimension (Nassar, 1999, cited by Tractinsky & Lavie, 2003) and "diversity" (Moshagen & Thielsch, 2010) that in Tractinsky's and Lavie's model refers to the website attributes included creativity, variety, originality, sophistication, and fascination.

The model of visual aesthetic suggested by Moshagen and Thielsch (2010) contains four facets – simplicity and diversity, mentioned above, and colourfulness and craftsmanship. The latter was added to stress the importance of being up-to-date, professionally designed and structured. Colourfulness aims to consider the use of colours in the design as it was mostly considered too complicated to evaluate the use of them. Based on the model suggested by



Moshagen and Thielsch, an evaluation questionnaire called VisAWI was developed and was adopted as the measurement of evaluating the visual aesthetics of the social media messaging applications in the following quantitative research.

5. QUANTITATIVE RESEARCH ON THE IMPACT OF EMOTIONAL CONCERNS IN USER EXPERIENCE THROUGH VISUAL COMMUNICATION OF SOCIAL MESSAGING APPLICATIONS

5.1 Methodology

An online survey was conducted for investigating the connections between design elements and the user experience in the social media messaging applications. Four social media messaging applications were selected to be the sample for understanding the role of emotion in social media messaging applications. The research questions were set as the followings:

1. What is the role of emotion in social messaging applications?
2. How emotion would influence the users when they are using the social messaging applications?

5.2 Samples

In order to guarantee the significant of this study, four popular social messaging applications in Asian countries included Japan, Korea and China, Hong Kong, Taiwan were selected as the sample of the investigation. All of them were messaging-centric applications those developed diverse services on mobile platform. Kakao, Whatsapp, WeChat and LINE were the biggest social media messaging applications which all already reached over millions of users. (Kakao.com, 2014; Whatsapp.com, 2014; WeChat.com, 2014; Line.me, 2014) While Whatsapp developed its flagship market in Hong Kong, WeChat's main market was in China. KaKao Talk finished its marketing development in Korea, and LINE was mainly used in Japan and South-East Asia. However, all of them explored opportunities to expend their market share within the international market. The user base of Whatsapp was estimated to be 250 million worldwide. It was a relatively simple messaging application as it did not offer as many features as some of the other competitors. WeChat was introduced in January 2011 and it grown quickly in the Chinese market. It got outstanding performance on building up the social media network among the Chinese users. LINE was first launched as a messaging application, and then it developed more features in order to evolve into a multi-purpose platform. Most of its functions were similar to KaKao Talk and WeChat. Comparing by the percentages of the market shares, the four applications, had similar leading states in Asian countries. They both have been



evolving from an instant-messaging application to a global platform. All of them were free, and support the communication through voice, video, photo and text messages. They also had the capability for one-to-one, one-to-many and group conversations. All four applications made the phone as a walkie-talkie by their voice message button. This was a very popular feature among users; the feature decreased the difficulty of typing in the Asian language, which had complex structures for typing. Different with others, new stickers (most were emoticon) were released in Kakaotalk platform every week. Some stickers were released only for a particular period or only for special events. This motivated the users purchased the stickers and shared with their friends as gifts.

5.3 Procedures

One hundred participants from the five regions: South Korea, Hong Kong, Taiwan, Mainland China and Japan were invited to attend this study. All of them used Asian instant messaging applications, were invited to complete the questionnaire in this study. They installed all four instant messaging applications in their mobiles. This requirement ensured that the participants must have the experience on using all four social media messaging applications. The questionnaires were sent to the participants randomly through different forums and discussion groups online randomly. The participants had general knowledge on user experience according to their past experience. Therefore, their feedbacks were initiative. Selecting the samples at random prevented any bias, and ensured that the collected feedback would be more effectively generalised for further analysis.

5.4 Measurement

Took reference from the study by Faiola and Matei (2005), initiative description on the experience is an effective tool for evaluating user experience as a whole. This work introduced and analysed through application some well-developed questionnaire methods for evaluating visual aesthetics. The average results of user questionnaire – VisAWI, classical and expressive aesthetics – were presented in table 1. The determinants of the emotional response of users towards the design outcomes those adopted in the researches of emotional responses (Schifferstein and Zwartkruis-Pelgrim, 2008) were adopted and designed as three questions. These questions were designed to understand how the participants used the application to define the self, how it related to their sense of identity and their self-concept. The independent scores were average scores from 60% users on a 10-point scale (1 was the lowest and 10 was the highest). General scores were the sum of four facts (simplicity, diversity, colourfulness, and craftsmanship) of VisAWI questionnaire (the highest possible score 28). The statements



formed the VisAWI questionnaire could be seen in figure1. Adopted on the measurement of the VisAWI, the questionnaire was set as followings:

Simplicity

- The application is too difficult for communication.
- The layout of the application is under control.
- Everything works together on this application.
- The application is not stable.
- The layout application is well structured.

Diversity

- The layout is pleasantly varied.
- The design is creative.
- The design of the application is inspired.
- The layout of the application is dynamic.
- The design is interesting.

Colourfulness

- The colour composition is impressive.
- The colours are match.
- The colours of the application are appealing.

Craftsmanship

- The layout of the application is professionally designed.
- The layout is updated.
- The application is designed with care.
- The design of the application is conceptual.

Emotional responses

- I got the enjoyment while using the application.
- I think this application would be part of my self-identity.
- I use this application as the main communication tools with my friends.

5.5 Results

This study introduced and evaluated the influence of emotion in visual aesthetics through VisAWI. The independent scores were average scores with 1 the lowest and 10 the highest. General score was the mean score of four facts: simplicity, diversity, colourfulness, and craftsmanship, Expressive aesthetics (four facts based on the VisAWI method) and the score of



the ability of presentation and motivation caused by the emotional response to the design. The statements forming the VisAWI questionnaire could be seen in Figure 1.

Social Applications Method / (VisAWI)	Messages elements	Kakaotalk	Whatsapp	WeChat	Line
Simplicity					
1. The application is too difficult for communication.	6		4	7	7
2. The layout of the application is under control.	5		7	6	6
3. Everything work together on this application.	5		4	7	8
4. The application is not stable.	6		5	7	7
5. The layout application is well structured.	7		8	6	5
Score in Simplicity	29		28	33	33
Diversity					
6. The layout is pleasantly varied.	6		6	5	4
7. The design is creative.	7		7	6	5
8. The design of the application is inspired.	5		8	7	8
9. The layout of the application is dynamic.	6		3	4	3
10. The design is interesting.	8		4	5	5
Score in Diversity	32		28	25	25
Colourfulness					
11. The colourcomposition is impressive.	7		5	5	5



12. The colours are match.	7	4	4	5
13. The colours of the application are appealing.	7	3	4	5

Score in Colourfulness **21** **12** **13** **15**

Craftsmanship

14. The layout of the application is professionally designed.	6	5	7	7
15. The layout is updated.	7	5	4	4
16. The application is designed with care.	7	5	6	4
17. The design of the application is conceptual.	6	6	5	4

Score in Craftsmanship **26** **21** **22** **19**

Emotional responses

18. I got the enjoyment while using the application.	8	6	6	7
19. I think this application would be part of my self-identity.	7	4	6	5
20. I use this application as the main communication tools with my friends.	8	8	7	7

Score in Emotional **23** **18** **19** **19**

Responses



General Score	6.65	6.05	5.95	5.65
Total Score	133	121	119	113

Figure 1: The score of all four social messaging applications

5.6 Analysis

Based on feedback of the participants, Kakaotalk got the highest score among the four social media messaging applications. Its design in diversity and colourfulness were outstanding, while it also achieved the highest score in emotional responses. It reflected that the design of the applications in interfaces would influence the strength of the Emotional responses of the users with the social media messaging applications. This found result was similar to the research by Jibril and Abdullah (2013). They proposed that a design (i.e. the interfaces of the social media messaging applications), included colours, were the tools to support the verbal communication. The score of the Whatsapp in the emotion attachment part reflected that its interface was simple but less customise design in colour, layout (those were mainly determined the score in the craftsmanship) the participants would treat it as their communication tools rather than their self-identity. The score of WeChat and Line in their visual communication were relatively lower than Kakaotalk but higher than Whatsapp. Their score of emotional response of user were lower correspondingly. The findings of this empirical study reflected that emotion responses of the users would be influenced by the designs of the social media messaging applications and the emotional responses would influence the users' attachment with the social media messaging applications. Based on the feedback from the participants, Kakaotalk had 7 points in the 16th statement: "The application was designed with care" and 8 points in the 18th statement: "I got the enjoyment while using the application". It reflected that the ease of use (i.e. design with care) which was mainly under the criteria of craftsmanship and very important to let the participants enjoy the user experience. The combination of pictures and beauty in Kakaotalk, WeChat and Line led the participants understood that "the design of the application presented a concept" and this would motivate participants to "think this application would be part of my self-identity" and further use the application. Similar to the studies those investigated the relationships between emotion and visual communication, pictures, colour and beauty, was an especially important element of aesthetics. The element of visual communication let the participants agree and adopt the apps as part of their self-identity. The reasons would be explained by Gobe's studies in 2001 as mentioned, the picture and colour delivered signals to the brain. These signals stimulated the nervous system and the brain responded with judgement and decision making. The carefully designed colour schemes, combined with pictures produced specific influences on mood while the participants were using



the social messaging application. The bright and warm colours (such as Kakaotalk's yellow) and pictures which presenting positive messages would further enhance the user experience and motivate users to keep using the social media messaging applications.

5. CONCLUSION

This empirical study further provided the qualitative understandings that the simplicity, diversity, colourfulness, and craftsmanship presented by the social media messaging applications would influence the participant's emotional responses to the applications. According to the investigation from the literature review about the connections between emotion and aesthetic elements, emotion was possible to influence the user experience in visual communication. These designs of the social media messaging applications were the key elements to lead the participants adopt the applications as part of their self-identity and the tools to communicate with others. Although there was limitation on the research results generalization which was mainly caused by the cultural differences, it should not influence the signification of the research result. In order to prevent the influence on the cultural difference on the generalization on the participants' origin or background, all the participants installed and used the most popular applications in Asian countries. All four social media messaging applications were already compared fairly with the VisAWI method. This research result provided designers the insights on the further directions of the new designs for the social media messaging applications. It suggested that innovative interface design should consider the users' emotional concerns. This direction was an important research topic in emotion and design, and provided a platform for further exploration by designers, researchers and scholars. More systematic studies were needed to enhance the understanding of emotion's role in the communications through the social media messaging applications.

REFERENCES

- Beaudry, A., and A. Pinsonneault (2010). The Other Side of Acceptance: Studying the Direct and Indirect Effects of Emotions on Information Technology Use, *MIS Quarterly*, (34:4), 689-710.
- Blythe, M., Overbeeke, K., Monk, A.F., & Wright, P. (Eds.), (2004). *Funology: From usability to enjoyment*. New York, NY: Springer-Verlag.
- Deng, R. T. 2004. Inhibitors and Enablers as Dual Factor Concepts in Technology Use, *Journal of the Association for Information Systems* (5:11-12),
- Deng L. & Poole M. S. (2010). Affect in web interfaces: a study of the Impacts of Web Page Visual Complexity and Order. *MIS Quarterly*, 34 (4).711-730.



- Desmet, P.M.A. (2004). From disgust to desire; how products elicit emotions.
In: D.C. McDonagh, P. Hekkert, J. van Erp, & Gyi (Eds.), *Design and Emotion: the Experience of Everyday Things* (pp. 8-12). London: Taylor & Francis.
- Faiola, A. and Matei, S. A. (2005). Cultural cognitive style and web design: Beyond a behavioral inquiry of computer-mediated communication. *The Journal of Computer Mediated Communication*. Vol. 11(1) .Retrieved July 1, 2006, from <http://jcmc.indiana.edu/vol11/issue1/faiola.html>.
- Frijda, N.H. (1986). *The Emotions*. Cambridge, UK: Cambridge University Press.
- Gobé, M. (2001). *Emotional branding: The new paradigm for connecting brands to people*. New York, NY: Allworth Press.
- Gratch, J., & Marsella, S., (2005). Some lessons for emotion psychology for the design of lifelike characters. *Journal of Applied Artificial Intelligence*, 19, 215–233.
- Hassenzahl, M. (2006). Hedonic, emotional and experiential perspectives on product quality. In: C. Ghaoui (Ed.). *Encyclopedia of Human Computer Interaction*, p. 266–272
- Line.me, (2014). *Line*. Retrieved from <http://www.line.me>
- Jibril, T. A., & Abdullah, M. H. (2013). *Relevance of emoticons in computer-mediated communication contexts: An overview*. *Asian Social Science*, 9(4), 201–208.
- Kakao.com, (2014). *Kakao*. Retrieved from <http://www.kakao.com>
- Kim, J., Lee, J., & Choi, D. (2003). Designing emotionally evocative homepages: An empirical study of the quantitative relations between design factors and emotional dimensions. *International Journal of Human-Computer Interaction Studies*, 59, 899–940.
- Moshagen, M., Musch, J., Göritz, A.S., 2009. *A blessing, not a curse: Experimental evidence for beneficial effects of visual aesthetics on performance*. *Ergonomics* 52, 1311-1320.
- Nassar NMA (1999). *Cassava, Manihot esculenta Crantz genetic resources: their collection, evaluation and manipulation*. *Adv. Agron.* 69: 179-230.
- Ngo, H., Tschudi, C., Gull, K., and Ullu, E. (1998). Double-stranded RNA induces mRNA degradation in *Trypanosoma brucei*. *Proc. Natl. Acad. Sci. USA* 95, 14687–14692.
- Norman, D. (2004). *Emotional design: Why we love (or hate) everyday things*. New York, NY: 640 Basic Books..
- Roseman, Ira J. (1996). Appraisal Determinants of Emotions: Constructing a More Accurate and Comprehensive Theory. *Cognition & Emotion*, 10: 3, 241 -278.
- Rosenberg, E. L. (1998). Levels of analysis and the organization of affect. *Review of General Psychology*, 2, 247–270.
- Russell, J. (1980) *Action from knowledge and conditioned behaviour: Part one: the stratification of behaviour*. *Behaviourism*, 8, 87-98.



- Schenkman, B. N., &Jonsson, F. U. (2000). Aesthetics and preferences of Web pages. *Behaviour & Information Technology*, 19, 367–377.
- Scherer, K. R. (1997). The role of culture in emotion-antecedent appraisal. *Journal of Personality and Social Psychology*, 73(5), 902–922.
- Schifferstein, H.N.J. &Zwartkruis-Pelgrim, E.P.H. (2008) Consumer-product attachment: measurement and design implications, *International Journal of Design*, 2(3), 1-13.
- Smith, C.A., & Lazarus, R.S. (1993). Appraisal components, core relational themes, and the emotions. *Cognition and Emotion*, 7, 233–269.
- Sun, H., and Zhang, P (2006). The role of moderating factors in user technology acceptance. *International Journal of Human-Computer Studies (IJHCS)*, 64, 2, 53–78.
- Thüring, M. &Mahlke, S. (2007). Usability, aesthetics, and emotions in human-technology-interaction. *International Journal of Psychology*, 42, 253-264.
- Tractinsky, N., Katz, A. S. &Ikar, D. (2000). What is beautiful is usable. *Interacting with Computers*, 13, 127- 145.
- Watzman, S. (2003). Visual design principles for usable interfaces. In J. A. Jacko & A. Sears (Eds.), *The human-computer interaction handbook: Fundamentals, evolving technologies, and emerging applications*. Mahwah, NJ: Erlbaum.
- WeChat.com, (2014). *WeChat*. Retrieved from <http://www.WeChat.com>
- Whatsapp.com. (2014). *Whatsapp*. Retrieved from <http://www.whatsapp.com>
- Zettl, H. (2002). Essentials of applicationlied media aesthetics. In C. Dorai & S. Venkatesh (Eds.), *Media computing: Computational media aesthetics*. Boston, MA: Kluwer Academic.