Prompter "●" Based Creating Thinking Support Communication System That Allows Hand-Drawing

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Abstract. Research into creative thinking-support tools and communication is commonly focused on how to develop and share ideas between participants or with others. In this paper, we proposes a creative thinking support method that utilizes randomly generated visual prompter (black circle) image patterns (VP-patterns) and free hand-drawing and writing functions. Concepts and ideas of the research have been explained together with the development of the systems (CSP1 and CSP2). Experiments have been conducted in order to evaluate the potentials and effectiveness of the system. From the results, a tendency towards inspiring creative ideas by participants has been observed.

Keywords: Creative communication, visual stimuli, idea generation, creative thinking support, self-expression, learn and develop creative ability.

1   Introduction

Researchers and educators have shown great interest in the fields of creative processes, thinking-support methods and educations. There has been numerous research into creative thinking-support tools, creative process and communications (e.g. [1][2][3][4][5][6]). However, it is always difficult to investigate and evaluate those processes and methods since development of human creativity is a very complex activity (both consciously and unconsciously), and requires knowledge from several different domains, such as psychology, physiology, sociology and cognition computer science and linguistics etc. Past researches of the creative thinking-support methods and tools tended to focus on developing thought processes towards an existing idea or generate idea for certain groups or fields, instead of supporting the generation of ideas. In this paper, the authors try to approach creative thinking support from different point of views, and propose a creative thinking (idea generation and creativity education) support method that utilizes randomly generated visual prompter (black circle) image patterns (VP-patterns) and free hand-drawing and writing functions.

2   Background, Concept, Purpose of Research

The authors have been researching a visual tele-communication method between two or more participants for inspiring ideas and supporting creative thinking processes. More specifically, our first Communication System with Prompter (CSP1), as shown in Fig 1, was built and analyzed [7]. The CSP1 randomly encloses VP-patterns within the background frame of "Creation Window," as cognitive stimuli to participant in order to encourage cognitive discovery. The participant then associates the idea with other information, including personal experiences and knowledge, and creates the "message" by inputting texts (character-type data) into the "Creation Window." During the creation process, the inspired ideas and associated information are combined together and transferred into visual forms, which appear to the participant as visual stimuli and lead to encourage cognitive discovery. Then, the participant sends the "message" to the opponent participant via the network. The sent "message" can be a source of stimuli for the ideas and creations for the opponent participant: i.e., the sent "message" supports the opponent's creative thinking process as the presentational interpretative stimuli.
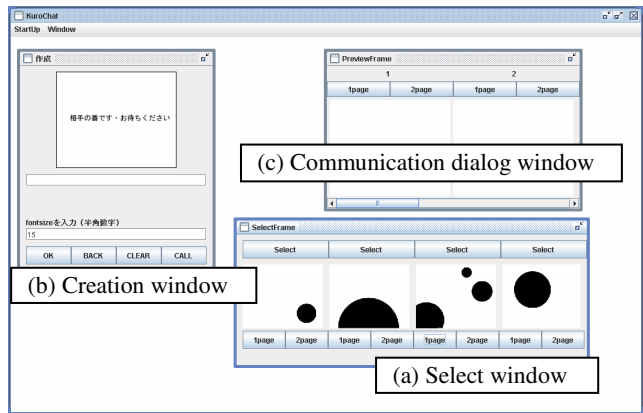

Fig. 1. Interface of Communication System with Prompter (CSP1)

Although the prototype CSP1 has shown a considerable tendency toward the inspiration of creative ideas by the participants, a main limitation of CSP1 is that it only allows text input. If arbitrary hand-drawing input is also allowed, creative thinking process might be more enhanced. To confirm this, we conducted paper based simulation, in which the participants can hand-draw arbitrary figures in a paper in which VP-patterns are printed [8]. The simulation results suggested that we should develop our second networked system, CSP2, which allows the participants' hand-drawing.

The authors actually built a CSP2 system. As shown in Fig 2a and 2b, CSP2 has not only all the functions present in CSP1 but also handwriting and drawing functions. The CSP2 system is designed so that the participants can express their ideas, inspirations and thoughts more easily, freely and rapidly than CSP1.
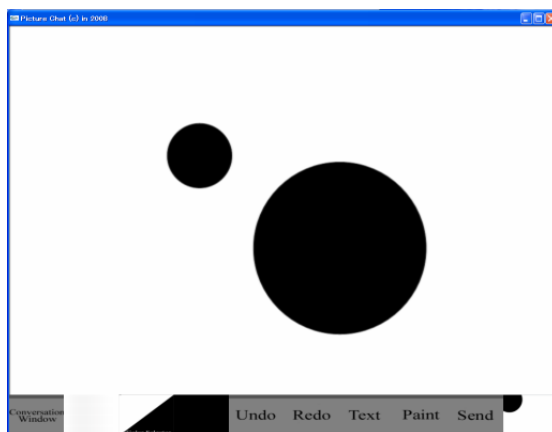
Fig. 2a. Paint module (Creation Window) interface of CSP2 (Functions are located on the bottom of the Creation Window, which allows user to "undo" and "Redo" the actions, create message in "Text" mode through hardware or software keyboards, or "Paint" mode with free hand writing or drawing. The "Send" allows user to send the message to sever and display in the "Conversation Window".)
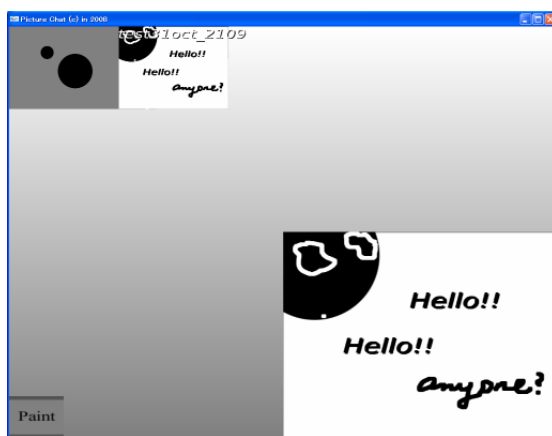

Fig. 2b. Display module (Conversation Window) interface of CSP2 (User can enlarge the message by point on the message, as shown on the Fig 2b. The "Paint" on the left corner allows user to go back to "Paint module (Creation Window).)

The CSP2 system is implemented as a client-server application, where the client consists of three basic components, (1) Paint module (Creation Window), Fig 2a, which allows participant to input handwritings and drawings, (2) Conversation display module (Conversation Window), Fig 2b, which shows the recent messages, and (3) Network module, which handles the communication between participants. The paint module and the conversation display module are realized in two screens, where the participants can easily switch between the two at any time.

2.1   The Concept of Communication System with Visual "●" Prompter (CSP)

The research hint was inspired from a Japanese book, "Ehon-Zukuri training [9]", in English as "Picture book making Training" by S. Hasegawa, a comic writer. The CSP1 was inspired by Hasegawa's idea on using black circles which then further motivated and developed into a visual tele-communication method and system between two participants using the VP-patterns. Figure 3 shows examples of the VP-patterns (There are 50 different types of VP-patterns). Those VP-patterns were designed and analyzed through several experiments in our previous research and were selected in order to stimulate participants' creativity thinking without hindrance or interference the processes.
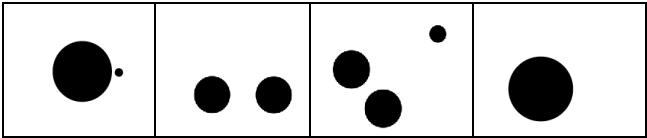
Fig. 3. Examples of VP-Patterns embedded within CSP1 and CSP2

2.2   Inspiration by Visual "●" Prompter Image Patterns

Visual expression usually interacts with viewers' cognitive processes to convey or deliver information or messages. The expression brings up viewers' attention to its individual properties and also stimulates and affects viewers' imaginary associations. Urban[10] has suggested two main groups of components of creativity, the cognitive, such as divergent thinking and doing, general knowledge and thinking base, and specific knowledge base and skills; the personality components, focusing and task commitment, motives and motivation, and openness and tolerance of ambiguity. In authors' previous research, we have researched and analyzed into the creative thinking support method and discovered an important and interesting feature: the "Fortuitous Effect." The "Fortuitous Effect" is based on the theory of surrealism[11], which suggests that a random, fortuitous prompt, while free of conscious control, can be a source of inspiration. This "Fortuitous Effect" results from the process of randomly generating VP-patterns within the "Creation Window" interface of the CSP2, those VP-patterns also can be seen as visual stimuli which encourage divergent thinking process and cognitively foster creative thinking processes.

Another important feature of the system is that the VP- pattern is polysemous and ambiguous; it can refer to any other objects or feelings, either abstract or concrete. As the stimuli mentioned in one of the first stimulation for design from the additional subtest of the Heidelberger Intelligenztest (HIT) [12][13], in the form of figural elements or fragments, were intentionally designed in an incomplete and irregular fashion in order to achieve maximum flexibility as an imperative for creativity. The circle shape and fragments of the circle shapes grouped together within the square frame gives the form of partially complete shapes and some incompletes position in an irregular fashion, which gives flexibility and suggestibility to trigger or evoke creative thinking. On the other hand, circle shape is the most common shape, which gives the advantage that users can see it as other things or objects, and the black color, when considered in another way, is a mixture of all colors, which allows user to see it as any color.

There are three key features in CSP2 which aims to stimulate, encourage, or provoke creative thinking process and idea generation:

1. Inspiration through the "Fortuitous Effect": The positions, sizes, and numbers of the VP- patterns were preset beforehand; therefore, users have to consider the contents together with image patterns' features and properties, which might stimulate imaginary associations and encourage divergent thinking which leads to affects on the expression, and go beyond the imaginations and thoughts of the users.

2. Inspiration through sketching: The definition for "sketch" in this paper is drawing processes by a participant through his or her own hands. While the participant sketches an unclear or abstract idea on paper, they are able to view the idea from third person points of view, which might rouse the imaginary or emotional associations and inspire new ideas [14].

3. Inspiration through the messages created by other users or opponents. Users can learn or imitate expressions from messages create by other users, which cannot only inspire new ideas in the users, but can also enrich users' expressions, and learn and develop creative abilities.

3   Experiment and Results and Discussion

3.1   Purpose of the Experiment

It is thought that the "Fortuitous Effect" and VP-patterns encourage and stimulate participants to gain inspiration, foster to generate new idea, provoke and establish creative and imaginative thinking, enrich self-expression, learn and develop creative ability while creating and receiving messages. Therefore, experiments of system with blank background of "Creation Window", Communication System with Blank background (CSB), and system with randomly VP-patterns, CSP2, have been conducted in order to compare the differences of how VP-patterns affect, influent and inspire participants.

3.2   Experimental Method

In the experiments, participants were divided into pairs; each pair participated in two experiments: Experiment CSB and Experiment CSP2. In each experiment, the instructions of the experiments were explained, and an imaginative question (eg. What if...) was given to the participants as a creative domain and focus in order to compare the results between different pairs. Experiment's procedures were as follow:

1. Participant A started to create message according to his/her thoughts or feelings about the imaginative question by hand-writing or drawing freely on the "Creation Window".

2. After receiving the "Message" from Participant A, Participant B started to create "Message" according to his/her thoughts or feelings toward the imaginative question or in response to Participant A's "Message".

3. The above processes repeated till participants completed ten (10) messages. (Approx. one (1) hour duration)

4. After each experiment, each participant was separately interviewed and questioned about his/her thoughts and feelings toward each messages created during the experiments.
5. Each participant has also been requested to give a degree to his own created messages, from zero (0) to ten (10), and also give evaluations to the opponent participant's messages.
6. Lastly, the pair of participants has been requested to talk or share their thoughts about those created "messages" to ensure and gain more understanding about each other's meanings, feelings and thoughts.

3.3 Experimental Results and Discussion

The results of Experiment CSB were mostly created by participant's own wills and thoughts, which strongly refer to the general information and knowledge or backgrounds of their knowledge and specialties. Although the results seem quite interesting and creative, but most of them were referring to what has been already imaged or created. The unconventionality of those messages was somehow missing. Some message results of Experiment CSB are shown as Fig 4 and Fig 5 below.
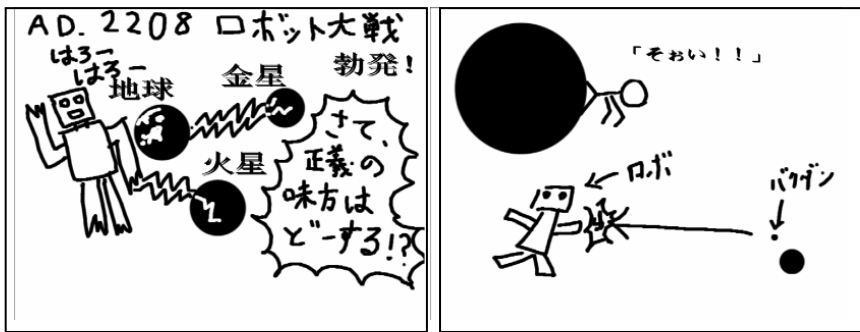

Fig. 4. And Fig 5. "Message" created by Participant using CSB (Fig. 5, Japanese words' translations are: left: "Future", right: "Can be seen")

The results of Experiment CSP2 were mostly created or started creation process from VP-patterns. Some of the messages have shown some tendencies that VP-patterns do encourage, influence or provoke towards creative thinking and inspirations. Although it is difficult to describe the results messages of CSP2 full of unconventionality, but some messages do shown tendency towards original, surrealistic and fictional imaginations. The followings are some examples of message results by using CSP2. Messages shown in Fig 6a and 6b have shown encourage towards cognitive discovery, where both messages were created by Participant A using the same VP-Pattern. While Participant A was creating message Fig 6b, Participant A has reinterpreted Fig 6a and seen Fig 6a as a visual stimuli and was inspired by Fig 6a, which then created Fig 6b using the same VP-Pattern. Messages shown in Fig 7a and 7b have shown tendency towards conceptual discovery, where Fig 7a was created by Participant A, and Fig 7b was created by Participant B after seen the Fig 7a. Obviously, Participant B was so inspired by Participant A's message (Fig 7a) that Participant B drew the same element (robot) as Participant A.
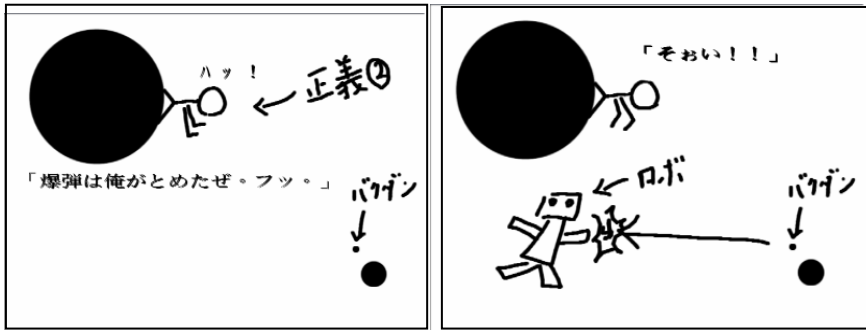
Fig. 5a. and Fig. 6b. "Messages" created by Participant A using same VP-patterns. (Fig. 6a, Japanese words' translations are: upper left: "huh!", upper right: "Justice　", middle: "I will stop the bomb.", and low right: "The bomb". Fig. 6b, Japanese words' translations are: upper: "Oh!!", middle: "robot", and lower right: " The bomb".)

Fig. 6. and Fig 8. "Messages" created by Participant A(Fig. 7) and Participant B(Fig. 8). (Fig. 7, Japanese words' translations are: upper: "AD 2208 Robot is breaking out", 2nd upper left "hello hello", 3 black circles: Earth, Venus and Mars, lower right: "What the robot in the justice side will do?". In Fig. 8, Japanese words' translations are: upper: "Oh!!", middle: "the robot", right: "the bomb".)

The interview data have shown that most participants refer themselves as conventional and not a creative type of person who merely draw, paint or involve in any sort of creative activities in their daily occasions, and were pretty surprised and amazed about the outcomes of their own creations. Participants' evaluations towards messages have shown interesting results that most participants evaluated his/her own creations higher than or equal to opponents' through all participated experiments. From the interview, we also understand that participants often started creation with an "unclear" idea or images, then while sketching the idea or imagine, the sketching somehow associates to other imaginations or ideas and form the final "message". This have proved that participants have been inspired through sketching, which allows participants to view the idea from third person points of view, and rouse the imaginary or emotional associations and inspire new ideas and creative thinking.

4   Conclusion

This paper has approached creative thinking support from different point of views and has proposed a new Communication System with Prompter, which allows the participants' hand-drawing. From the results of the experiments, the tendency towards cognitive discovery has been observed, and the encouragement towards conceptual discovery has been recognized. Influence and stimulation by VP-patterns, stimulations through sketching and influence by other's messages have also been approved. In order to obtain more solid conclusion, we should collect experimental data of a larger number of participants.

References

1. Hori, K.: Visualization of Mind. Journal of Visualization 19(72), 2–6 (1999)
2. Kawakita, J.: Keijeiho to Miraigaku. Tokyo Chuokoronsha, Tokyo (1996)
3. Sumi, Y.: Visual Displays as Stimuli to Cognitive Processes. Journal of Visualization 19(72), 17–22 (1999)
4. Suwa, M.: Visual Displays as Stimuli to Cognitive Processes. Journal of Visualization 19(72), 13–18 (1999)
5. Suwa, M.: The Act of Creation: A cognitive Coupling of External Representation, Dynamic Perception, the Construction of Self and Meta Cognitive Practice. Journal of Cognitive Studies 11(1), 26–36 (2004)
6. Tan, A.-G.: Creativity: A Handbook for Teachers. World Scientific Publishing Co. Pre. Ltd., USA (2007)
7. Chen, L.J., Harada, N., Yonemura, S., Ohya, J., Tokunaga, Y.: A study of a Computer Mediated Communication via the prompt system. In: IEEE International Conference on Multimedia Expo., Beijing (2007)
8. Chen, L.J., Yonemura, S., Ohya, J., Tokunaga, Y.: A study of a Computer Mediated Communication via the prompt system: Analysis of the affects on the stimulation of thought processes and the inspiration of creative ideas. In: IADIS Interfaces and Human Computer Interaction, Amsterdam (2008)
9. Hasegawa, S.: Ehon-Zukuri Training. Chikumashobo, Tokyo (1988)
10. Urban, K.K.: Different models in describing, exploring, explaining and nurturing creativity in society. European Journal for High Ability 6, 143–159 (1995)
11. Tythacott, L.: Surrealism and the exotic. Routledge, London (2003)
12. Kratzmeier, H.: Heidelberger Intelligenztest. HIT 1-2. Weinheim, Beltz (1977)
13. Urban, K.K.: Assessing Creativity: The Test for Creative Thinking – Drawing Production (TCT-DP). International Education Journal 6(2), 272–280 (2005)
14. Nakajima, Y.: Eizo no shinrigaku: maruchimedia no kiso. Tokyo Science co. (1996)