Liu, C.-C. et al. (Eds.) (2014). Proceedings of the 22nd International Conference on Computers in Education. Japan: Asia-Pacific Society for Computers in Education

Can time perception be affected by interactive comics?

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Abstract: In this paper, we describe our ongoing work towards understanding how interactive comics could affect time perception. An interactive comic story, The Dreaming Wine, has been created based on our current understanding of interactive comics, time perception and the relation between both. As a starting point for our research, we conducted an experiment on whether the amount of panels would affect the time perception of the comic reader. A list of principles was applied in splitting comic panels. The findings of the experiment are expected to provide a better understanding of how panels in interactive comics have an effect on the reader's time perception.

Keywords: Time perception, interactive comics, panel

1. Introduction

Time perception plays a crucial role in many aspects such as consciousness, memory of the past and future, and more (Grondin, 2010). These aspects are related to learning. In this paper we are interested in time perception, learning and the role interactive comics could play here, as one of the most important attributes of comics is sequentiality (Eisner, 1985; McCloud, 1993)which means it contains "time". We consider that there are at least four kinds of "time" in (interactive) comics: 1) real time in reality, 2) perception of the time in reality, 3) time in a story, and 4) perception of the time in the story.

Comics as a visual information and communication medium have been used in education and training related fields (Gordon, 2006; Mallia, 2007; Tatalovic, 2009). Comics are convenient for translating information into visual language at a relatively low cost. Along with the growing popularity of electronic devices, comics reading behavior migrates from paper-based to digital forms. Comics with designed interactivity can provide space for expression and reaching more engagement of the reader. However, research shows that people still prefer paper as a medium for reading, especially in-depth reading (Liu, 2005). Thus, how to design interactive comics to affect time perception in order to facilitate reading and learning is a relevant question for comic producers and educators.

2. Interactive Comics -- The Dreaming Wine

In order to study interactive comics, we created an interactive comic called The Dreaming Wine. Its story is adapted from an ancient Chinese legend recorded in "In Search of the Supernatural". The original story is about a man named LIU Xuanshi who got drunk by a strong wine called One Thousand Days Intoxication produced by a famous wine maker DI Xi. We found that this story contains valuable concepts of time. The reason why LIU got drunk for that long might be because he got lost in his own intoxicated illusion. Our main adaptation is that we added a "dream world" to the story to visually emphasize this illusion. By creating "the dream world", we create space for different time concepts and expressions. Comparing to the "the real world" in the story, "the dream world" contains unusual narrative time and visual expressions.

2.1 Story structure

The plot of the story contains mainly 3 parts: events in the "real world", events in "the dream world" and events back to the "real world". The finished comic story (Figure 1) contains 20 pages with 104 panels in black and white. See Table 1 for the page and panel distribution according to this plot:

Figure 1. Samples of the finished comic story.

	Events in the "real world"	Events in "the dream world"	Back to the "real world"
Page No.	1-5	6-13	14-20
Panel No.	001-025	026-068	069-104

Table 1: Page and panel distribution.

2.2 Experimenting with panels

There are several factors that can influence the reader's time perception in reading interactive comics, such as panel arrangement, narrative and interactivity. Cohn (Cohn, 2013) divided comic strips into units, visualized as panels or combinations of panels. One of our assumptions is that the reader's time perception can be affected by the amount of the panels in comics. To experiment with this assumption, we have created a second version of "The Dreaming Wine", a variation of the first version with more panels, by splitting the original panels but keeping the same context as much as possible.

2.2.1 Panel splitting

According to McCloud (1993)one single comic panel can possess a period of time. This means time in a panel is divisible, as a period of time can be divided into smaller periods of time. Under the premise of maintaining the same narrative, the same amount of visual information and reading fluency, we tried to split the original comics with 104 panels into 173 panels, following these principles:

- Introduction, talking and thinking: can be split at possible transitions. (Figure 2A)
- Conversations inside a panel can be split at the turns. Chu et al. discussed how to optimize speech balloon according to number of words and emotion embedded in subtitles in their research of generating comics from videos (Chu & Yu, 2013). We adapted their conversation splitting methods in to this principle. See Figure 2B.
- Movements inside a panel can be split at the changes. See Figure 2C. Note: Onomatopoeia—visual words that indicates source of the sound. In comics, onomatopoeia usually happens when there is movement. Therefore, it can be seen as a sign of splitting.
- Silent moments: there are several panels that can be partially replicated to create silent moments. This kind of splitting is subjective and can be created either before or after the original panel. See Figure 2D.
- Exceptions: If the splitting influences clarity of image (mostly because the size of the original panel is already small), the panel shouldn't be split. If there is conversation happening in introduction, to keep the introduction complete, the panel shouldn't be split. See Figure 2E.

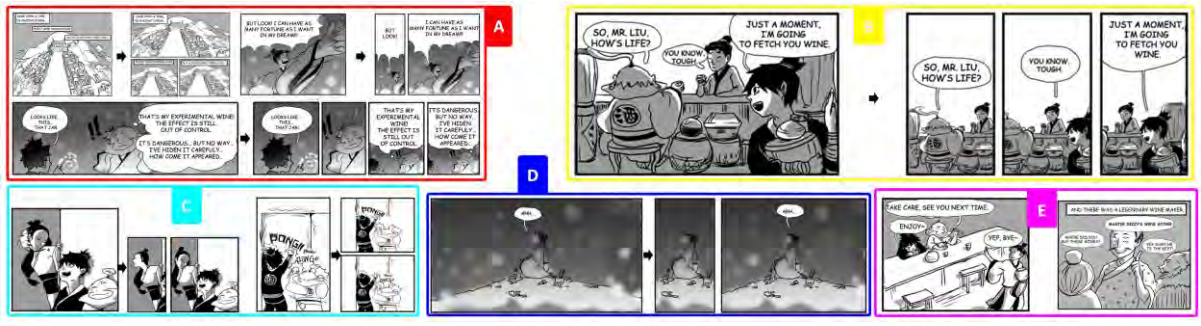

Figure 2.Panel splitting principles.

2.2.2 Experiment setting

We conducted a between-group experiment using the two variations of "The Dreaming Wine". The

variable is the amount of panels. We used two versions of The Dreaming Wine: version A containing 104 panels, and version B containing 173 panels. The comic was shown on a tablet with limited interactivity, using a click left and right button on each side of the page to flip pages. Reading path and time spent on each page were recorded automatically, including flipping back. Each participant was invited to a quiet room (approximately 9 m^2) with a table and chairs. In order to test time perception, each subject was asked to remove their watch and any other portable device that can tell time. Also, the visible clock on the experiment tablet was blocked. Each participant was informed about the basic information of the experiment, and asked to take time to read the comics to get the basic understanding of the story. In order to let participants get familiar with the experiment setting, they would interact with a three-pages training comic first. Then, each participant was asked to estimate 1 minute both before and after reading the formal comics, and also his/her estimation about how long he/she spent on reading. A questionnaire was used at the end of the experiment to check the participants' understanding of the story, and an interview (recorded on audio) was conducted focused on individual reading performance. The experiment was conducted during 9:30-11:30 and 14:30- 16:30 on workdays for two weeks with forty participants in total. We collected data including: total reading time, time spend on each page, reading path (whether there is a read back event), 1 minute estimation before and after reading, reading time estimation of the participant, and story (information) comprehension of the participant.

3. Discussion

We observed several facts that could be important for further research: 1) Reading back event happens often when switching from "the dream world" to "real world"; 2) Some people are more sensitive to verbal information while some are more to image information in the context of comics; 3) People tend to set up their own standing point based on time information shown in the comics to build a time line, the time information can be word and/or image that indicate time; 4) The influence of different amounts of panels is unclear, while time spent on each page does clearly differ. We will conduct further analysis combined with questionnaire and interview data. We believe that in order to study the effect of panels within interactive comics, not only time spent for each page but also time spent for each panel should be recorded, which could mean including eye-tracking in a follow-up experiment.

Acknowledgements

This research is supported by the Chinese Scholarship Council and facilitated by Eindhoven University of Technology.

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The 22nd International Conference on Computers in Education

Main Conference Proceedings

Nov 30 - Dec 4, 2014 Nara, Japan

Proceedings of the
22nd International Conference
on Computers in Education
ICCE 2014

November 30, 2014 - December 4, 2014

Nara, Japan

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ISBN 978-4-9908014-1-0
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ICCE 2014 Organizing Committee, Japan

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