Interactivity and desire for control

in multimedia storybooks

Takeo Maruyama, Akihito Ando

Department of Human Relations, Faculty of Letters,

Mukogawa Women's University, Nishinomiya 663, Japan

Abstract

This study was designed to provide data on how interactivity in multimedia storybooks can affect the user's satisfaction in playing with a special reference to the desire for control. We selected two products from popular electronic storybooks and compared the first "page", measuring the duration of animated events hidden on the screen. We found no clear differences in mean duration between two pages. The distribution of the duration of the animated events, however, was different between two pages. It seems that this variance is the determinant of the user's perceived sense of control. We concluded that the distribution of the duration is very important in producing this type of multimedia storybooks.

Introduction

The purpose of this study is to examine the relationship between the interactivity on multimedia software and the user's satisfaction in playing it. Broderbund's "Living Books" are popular as a new kind of "electronic storybook." The aim of "Living Books" is to create interactive worlds for the user to explore. When the user clicks on almost any part of the picture on the computer screen with a mouse, something interesting and fun will happen. For example, some character talks, and another move with realistic sounds. Some characters sing or dance with lively animation and music. Simply pointing and clicking with a mouse, the user might become active participants rather than being just passive listeners learning to recognize words, phrases and sentences. "Living Books" is characterized by above mentioned animated events performed when the user clicks the hidden buttons. Each animated event continues for a while and has its own play time. We paid attention on this duration and its distribution. The duration is assumed to relate the interactivity of software. It is because we believe that this duration relates to the user's satisfaction of the desire in control that we have conducted this study. We selected two products from "Living Books"; "Just Grandma and Me" and "The Tortoise and the Hare." We picked up these two products because they are very popular and the first pages of these books have the same number of the hidden buttons that have similar types of the animated events. More noteworthy is that in comparing the two first pages, we feel the former is more comfortable than the latter. We tried to testify the hypotheses that the variance of this duration is the cause of the difference of our feeling. "Just Grandma and Me" is a story of Little Critter and his Grandma's trip to the beach. This interactive picture book is based on the best-selling book by Mercer Mayer. "The Tortoise and The Hare" is based on the famous fable that tells the race between the slow-but-steady tortoise and the hurry-up hare by the legendary Greek writer, Aesop.

Methods

The first pages of the two storybooks are shown in Figures 1 and 2, respectively. We call the first page of "Just Grandma and Me" as Example 1, and the first page of "The Tortoise and the Hare" as Example 2. We picked up these two pages because we estimate that the first page may be the best page in a product and because we found the same number of the hidden buttons that make similar animated events to take to play. Twenty-four hidden buttons for animated events are there on each page. When we click the buttons, the character speaks, dances or moves. These animated events last for some period and every event has its own play time. The duration is constant for each button whenever we click it with a mouse. We measured the duration that each animated event takes to play, after which time the mouse pointer returns for the user to play some more. This means more concretely that we measured the length from the moment we click the button to the moment the mouse pointer comes back again on the screen. We measured simultaneously every duration and calculated the mean value of the data as the results. We examined the results by statistically, assuming that this degree of the duration probably relates to the satisfaction of the desire for control. We used a personal computer Apple Macintosh (model LC 475, MC680LC40-25MHz C.P.U.) and a double speed CD-ROM drive (model CD-300).

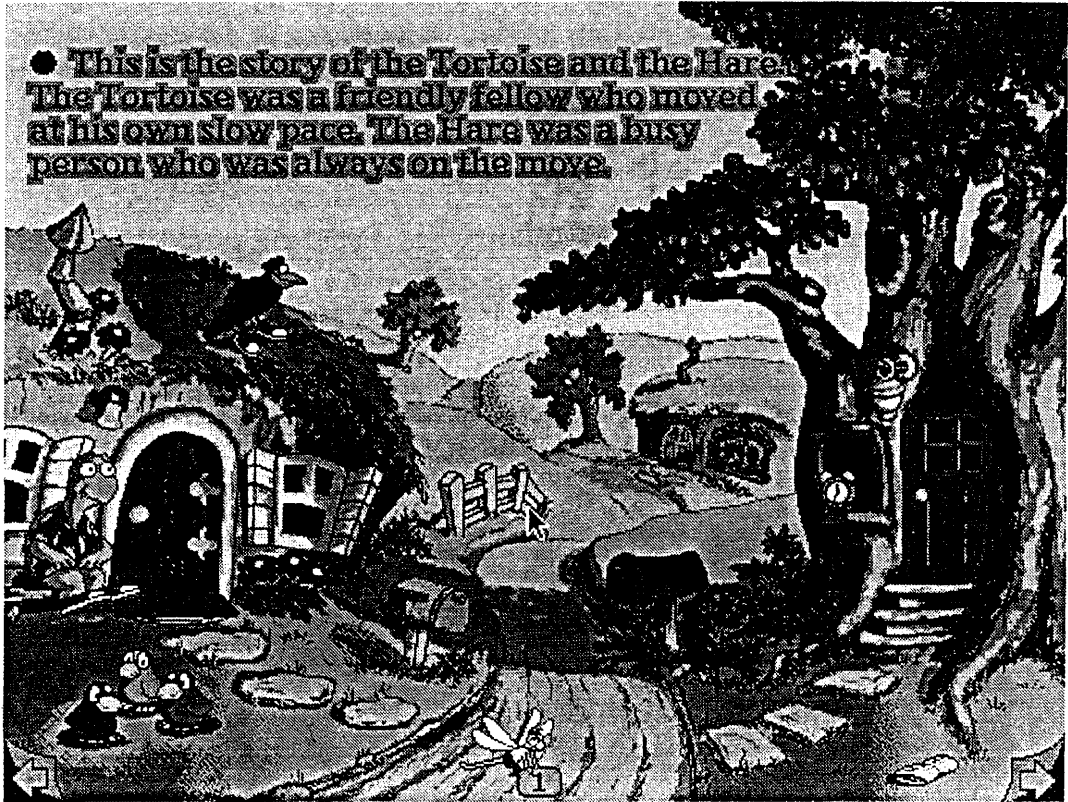**Fig. 1.** The first page of "Just Grandma and Me" (Example 1).

Fig. 2. The first page of "The Tortoise and the Hare" (Example 2).

Results

The results of the measurements are shown in Table 1. The data are respectively sorted in ascending order.

Table 1. The results of measurements

No.	Example 1	Example 2	No.	Example 1	Example 2
1	1.27	1.48	15	4.82	7.87
2	1.48	1.52	16	5.17	7.93
3	1.54	1.57	17	7.40	8.32
4	1.70	1.58	18	7.46	10.00
5	2.75	1.71	19	7.86	10.95
6	2.88	1.96	20	8.74	11.56
7	3.13	2.07	21	10.23	13.69
8	3.14	2.49	22	14.60	14.95
9	3.39	3.22	23	16.01	15.53
10	3.88	4.97	24	24.57	17.62
11	3.93	5.08	M	6.20	6.91
12	3.99	5.54	SD	5.38	4.93
13	4.32	6.94	Me	4.16	6.24
14	4.63	7.20			

The difference of mean duration of Examples 1 and 2 was not significant (t=.47, N.S.). The median of all including both of Examples 1 and 2 was 4.90 sec. Every duration of each event to play were divided into long- and short- halves via a median split method. Table 2 shows that Example 1 has more short-duration animated events than Example 2 (median test; $\chi^2(1) = 3.00$, p<.10).

Table 2. Contingency table of the number of occurrences of short- and long- animated event

	Example 1	Example 2
Short	15	9
Long	9	15

Figures 3 and 4 show the distribution of the duration of each animated event to play of Examples 1 and 2, respectively. The horizontal axis shows the class of 1.00 sec interval. The last class, however, includes all the classes over 10.00 sec.
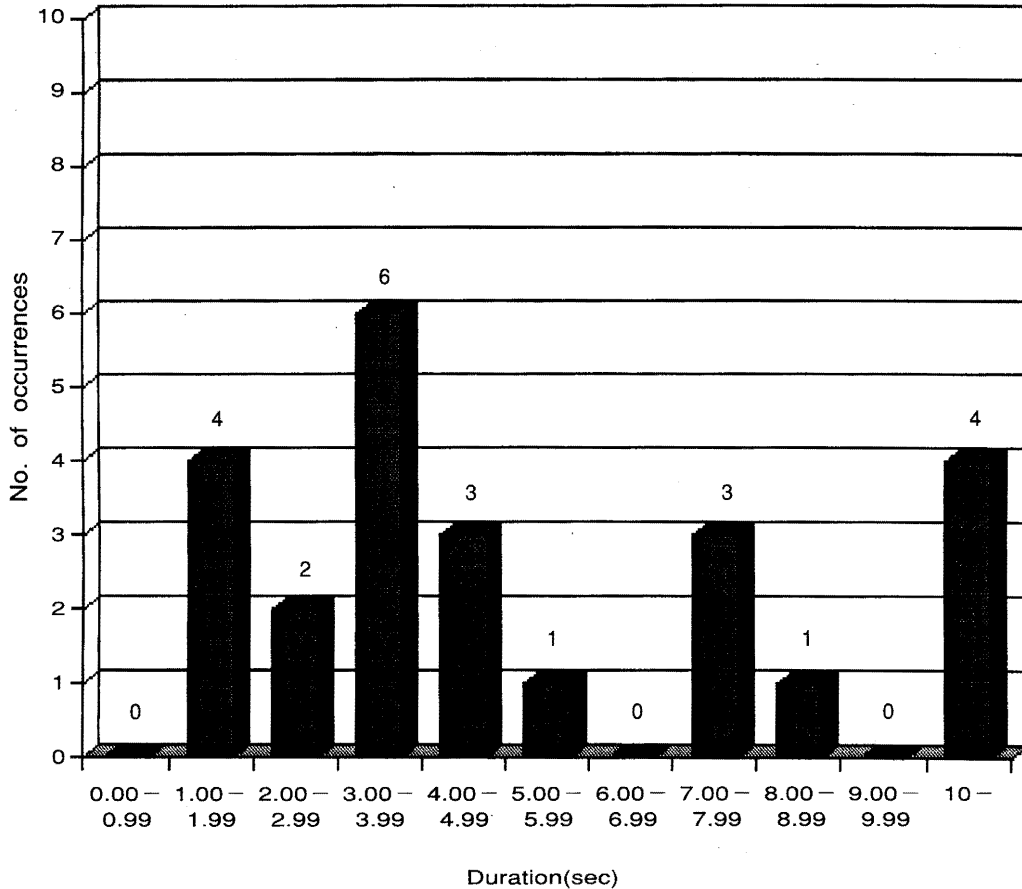

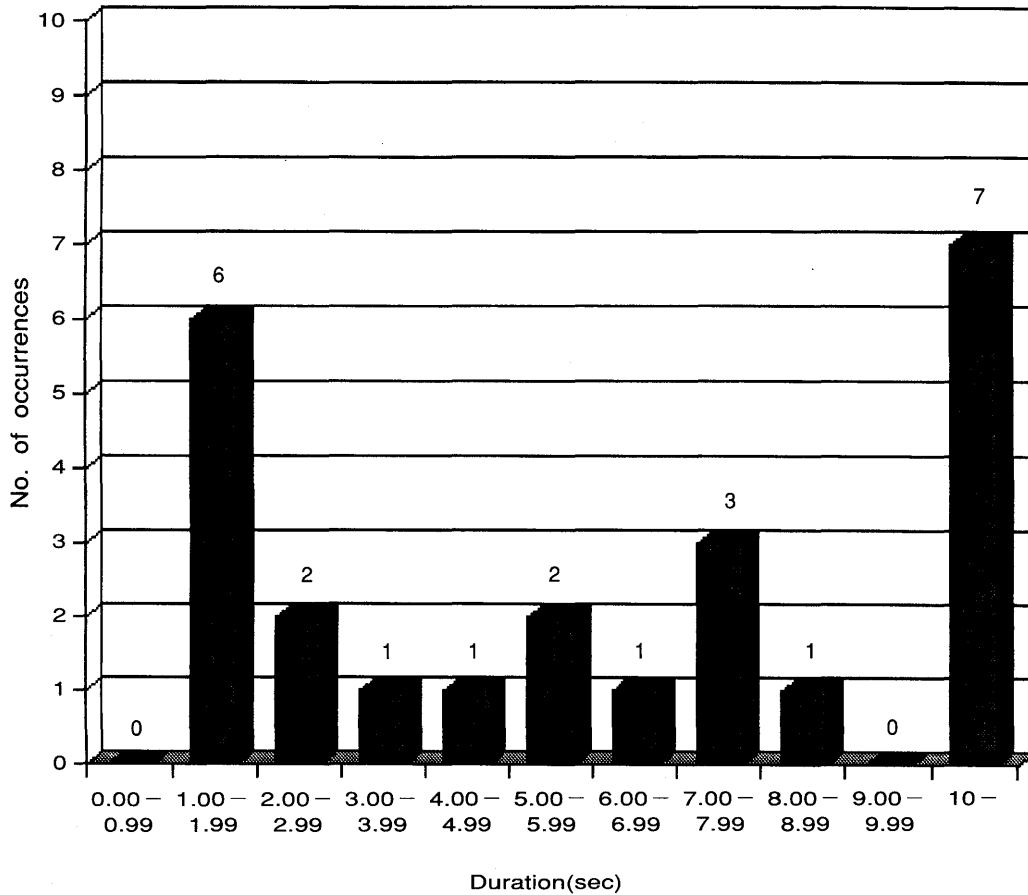**Fig. 3.** The distribution of the duration of Example 1.

Fig. 4. The distribution of the duration of Example 2.

Discussion

As is shown in Table 1, the range of duration of each animated event is wide (Example 1: 1.27–24.57 sec, Example 2: 1.48–17.62 sec). The mean duration of the two Examples, however, show near values (Example 1: 6.20 sec, Example 2: 6.91 sec). We assume that there exists a certain programing restriction for the total duration on one page of the electronic storybook. Actually, the producer of "Living Books" must be careful that the total number of different animated pictures on each page does not exceed a total number (personal communication from Linden, S.). The total duration of each page has strong relation with the total number of animated pictures. Both of the examples reach the certain limitation because of the importance of their first pages. This may be the reason we can not find a significant difference between the two Examples. On the other hand, the median test of duration of animated events shows the slight tendency that Example 1 has more short duration events than Example 2. This implies that it is important to consider the distribution of the duration. We can also intuitively recognize the clear difference of the shapes of the two graphs shown in Figures 3 and 4. From the shape of Figure 3, we

can get the curve shown in Figure 5, and from the shape of Figure 4, we see the tendency shown in Figure 6. This may indicate that we feel comfortable sense of control in playing when animated events continue for around 3 sec.
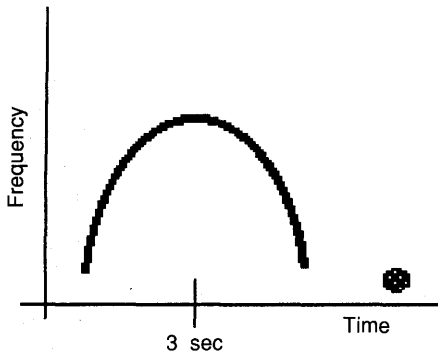

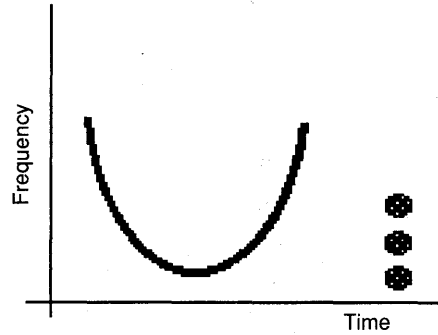**Fig. 5.** The shape of the case of Example 1.　　**Fig. 6.** The shape of the case of Example 2.

We also observed the difference of the number of occurrences over 10 sec in Examples 1 and 2. The number of samples over 10 sec might be important for our perceived sense of control. If we meet extremely long time play, we might have a strong impression that we can never control the animated events to play. Even if it appears a few times, it may impress us strongly. So, it seems that the number of occurrences over 10 sec is the determinant of the user's satisfaction. It may be more comfortable to restrict the number of the long-duration events over around 10 sec.

Conclusion

This study focused on the relationship between interactivity and desire for control. We suggest the distribution of the duration is very important for the satisfaction of the desire for control in producing this type of multimedia storybooks. The results suggest that we had better design the duration of animated events for around three seconds and the number of the case of over ten seconds should limit as much as possible. Further studies are needed to relate the effective conditions on the relationship between the duration and the satisfaction of the user's perceived control. We should make more experiments with more subjects. This is only the beginning of our study.

Acknowledgments

References

1) Broderbund Software, JUST GRANDMA AND ME by Mercer Mayer (CD-ROM), Navato CA, Broderbund Software, Inc.(1992)
2) Broderbund Software, THE TORTOISE AND THE HARE (CD-ROM) , Navato CA, Broderbund Software, Inc.(1993)