Do Citizens Read Newsletters Published by Planning Authorities? An Experimental Study Using the Eye Camera

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Abstract: This study investigates whether the newsletter, which is used during the public involvement process, is actually read by citizens. Through an actual experiment using an eye camera, the study also aims to determine which information in the newsletter attracts the most to readers. We prepared a newsletter with a fictional road plan and mixed with other printed advertisements to be read by experiment participants. The result shows that one third of the readers skipped the newsletter and that even those who read it had less interest in it than in the other inserted advertisements. However, the newsletter, which was edited to have the most articles on the "necessity of the road," attracted the highest interest. Thus, it can be found that an increase in the interest of the newsletter's contents can attract readers.

Keywords: Public Involvement, Citizen Participation, Transportation Planning Process, Information Distribution, Outreach.

1. INTRODUCTION

Public involvement is fundamental to the planning process of transportation infrastructure. It is believed that the environment to introduce public involvement has almost been developed in Japan. However, citizens are unconcerned about the issue, and in many cases, do not understand the purpose or content of the plan. In Japan, it occurs quite frequently that the assumed effect is not achieved. During the public involvement process, informing citizens at an early stage is a valuable technique, primarily because public opinion should be taken into account in infrastructure planning. The newsletter, which is usually inserted in newspaper advertisements, is considered the most important means to transmit information to the public in the early stage of the planning process.

This study investigates whether the newsletter is actually read by citizens. Through an actual experiment using an eye camera, the study also aims to determine which information in the newsletter attracts the most to readers. From the gathered information, it is possible to recommend the types of articles to be included in the newsletter and distributed at the early stages of the public involvement process in infrastructure planning.

Previous studies of eye tracking in the field of transportation have concentrated on driving behavior and safety, e.g. (Horrey and Wickens, 2007; Donmez, Boyle and Lee, 2007; Bryan, 2009; Engstrom, Johansson and Ostlund, 2005). Even if many applied studies can be found in psychology and marketing, e.g. (Rayner , 1998; Wedel and Pieters , 2008), there is no research from the public involvement point of view.

2. EXPERIMENT PROCEDURE

2.1 Creating a Fictional Newsletter

We developed fictional newsletters to distribute to the public as advertising inserts in newspapers. The materials used were such that the public would assume that it was an insert; the size was that of a single page of an A3 sheet. The newsletter contained information such as the project name, the content of the plan, public involvement process, the Technical Advisory Committee, necessity of the project, and who to contact for further information. We referred to some newsletters on existing projects and also used the map of a local road near our institution. This helped the newsletter look more realistic rather than fictional and the project more familiar to the participants.

It is understood that participants wanted to acquire information about the effect on development when the road is completed. As such, it was important to devote space to discussing the goals and necessity of the project. At the same time, it was necessary to reduce the number of unattractive articles due to limited space in the newsletter. Three types of Newsletters were produced by changing the space dedicated to each piece of information. Newsletter 1 was the baseline which contained the same information as that in ordinary newsletters. Specifically, half of its space discussed the "necessity of the road." Newsletter 2 devoted more space to the necessity of the road by reducing the explanation of the public involvement process. More than 70 percent of the information in newsletter 3 focused on the "necessity of the road." The ratio of the volume of information in each newsletter is shown in Figure 1.

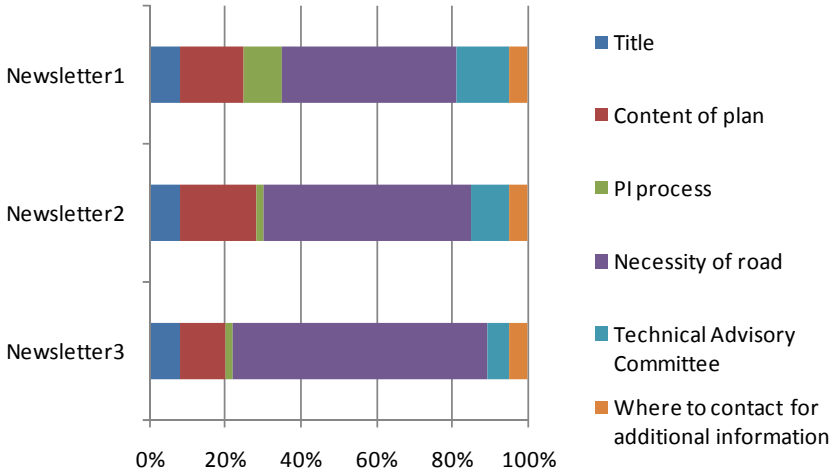


Figure 1. Volume of information in each newsletter

2.2 Experiment

Participants were asked to read eight printed advertisement inserts concerning topics, such as consumer electronics and supermarkets, delivered to ordinary households with the actual newspaper. The participants consisted of nine students from departments other than the Department of Civil Engineering. These participants were chosen because of their lack of familiarity with the subject, which ensured the reliability of our results. After selection, participants were informed, "You are asked to read eight printed advertisements while wearing an eye camera. Afterwards, you will be asked to answer a short questionnaire."

There are two series of experiments. The first is a "read as usual" series and the other a "read only the public involvement newsletter" one. In the first series, we orally explained to

each participant that they were supposed to read eight advertisements while wearing an eye camera. They were asked to be read as they normally did at home and ignore the presence of the eye camera. They could skip any advertisements, return to any advertisement, and stop reading any time. When the participants finished reading, we stopped the eye camera's recording. Next we proceeded to the second series, the "read only the public involvement newsletter" experiment. Regardless of whether participants skipped the fictional newsletter, they were asked to read it again. We recorded their reading. The duration of the series depended on the participants' free will. After completing the second series, participants were asked to fill out a short questionnaire.

The experiment was executed in December 2010. During the experiment, we played soothing music in the background to reduce any stress the experiment caused. In addition, we served tea and cookies, which further helped the participants feel at home and relaxed. Figure 2 displays the photograph of a participant wearing an eye camera.

Figure 2. A participant wearing an eye camera

2.3 Analysis Methods

The eye camera used in this experiment is EMR-9, developed by Nac Image Technology, Inc. The head unit of EMR-9 is small and light and resembles a baseball cap. The glance position is always detected from the center of the pupil where the cornea is reflected. We calibrated the equipment for each participant before measuring the glance. The eyeball movement is caught accurately and the eye mark—the sign that shows the glance—is displayed in the monitor (Figure 3).

Two analysis methods were used: gaze analysis and pupil reaction analysis. Both were performed using the analytical software "EMR-d Factory" developed by Nac Image Technology, Inc. Glance data was obtained from the glance measurement. The gaze analysis is a method used to decide the item that participants glanced at in the frame. We confirm the view image using the gaze analysis for every single frame. Because we made participants gaze at each item on the list, checked the view image of every frame, and selected the item name, we were able to analyze what item each participant read and how much time they spent reading it. Moreover, the change in the pupil diameter during the experiment is extractable using this software data. Pupil diameter assists in determining a participant's attention to a specific article. Typically, pupils unconsciously expand in response to stimulation due to participants' interest and excitement.

Figure 3. Snapshot of an eye camera recording

3. RESULT AND DISCUSSION

3.1 The "Read as Usual" Experiment

This section discusses the results of the first experiment, in which participants were asked to read eight advertisements inserted in a newspaper. We prepared three sets of newsletters that were read by three groups of participants. The difference between the three sets lies in the space dedicated to discussing the public involvement process. The allocation of each group's newsletters is as follows. Newsletter 1 for participants C, F, and J; Newsletter 2 for participants A, D and G; and Newsletter 3 for participants B, E, and H.

Three of the nine participants, B, D and G, essentially skipped the newsletter by reading it only for a few seconds. This indicates that the prepared newsletter did not interest them. The newsletter's characters were larger than they appear in the actual newsletter, to encourage their attention; however, the newsletter concerning the road projects did not attract every participant's interest. It is difficult to catch every reader's interest even if the inserted advertisement is made more attractive.

Figure 4 shows the normalized calculated average of the pupil diameter for each advertisement and newsletter of all participants. We also calculated the normalized average of the pupil diameter of the three versions of the newsletter discussing public involvement. This information is shown in Figure 5. The average pupil size recorded when reviewing fashion brands, supermarkets, mobile phones and consumer electronic are higher than the others, as shown in Figure 4. From this, we can surmise that participants are more interested in this type of advertisement. Moreover, the newsletter about the road project has the third lowest point, which was 47.4 points. We must note that it is not easy to acquire interest in the situation and that the newsletter was only inserted in the newspaper with other advertisements. Figure 5 shows that newsletter 3 is the best. There are two reasons for this. First, it contains only a few characters because they were enlarged for easy readability. Second, the figure and the photograph were also enlarged.

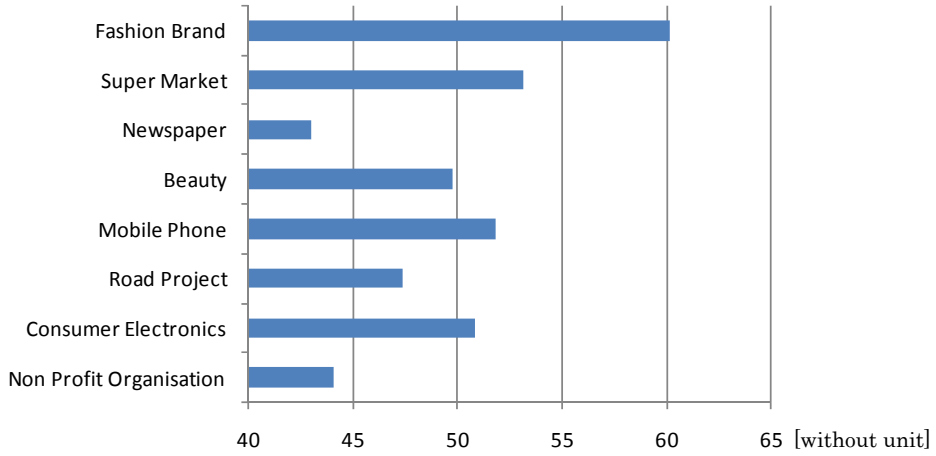


Figure 4. Normalized average of the pupil diameter for eight advertisements

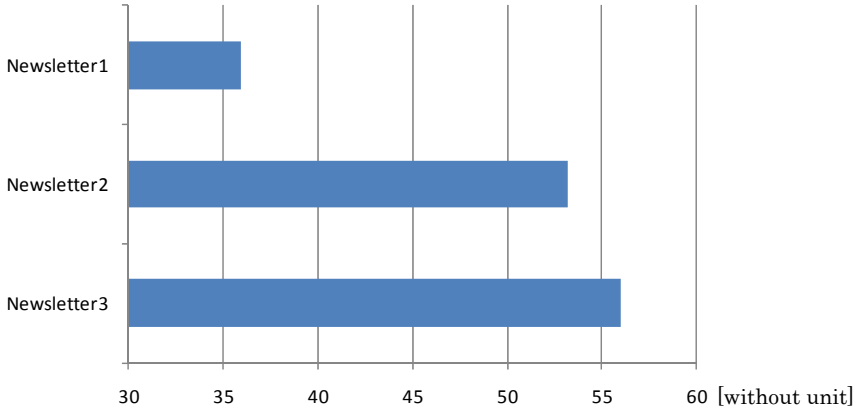


Figure 5. Normalized average of the pupil diameter
for the newsletters discussing public involvement

3.2 "Read Only the Public Involvement Newsletter" Experiment

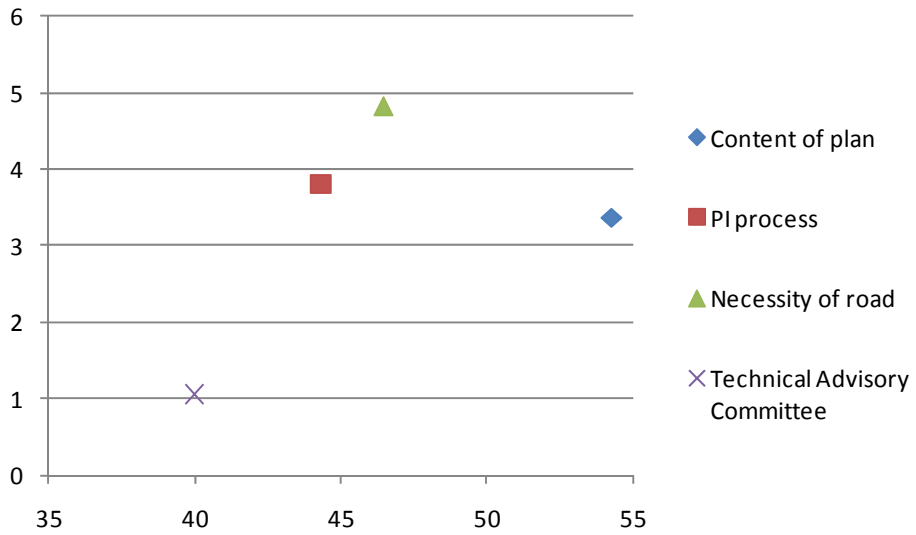
Three participants who skipped the newsletter in the first series read it for a longer time in the second series. The durations are 64, 62, and 95 seconds for these participants. Therefore, it can be surmised that participants will read this newsletter if they are given a second opportunity.

It is also important to compare the items in newsletter 1 with the gaze analysis of the second series. Two of three participants, C and F, did not read the items "public involvement process," "Technical Advisory Committee," and "where to contact for further information." All items in the "Technical Advisory Committee" were skipped by participant J. All participants read the "Technical Advisory Committee" in newsletters 2 and 3. This is possibly because newsletter 1 uses small characters, making this section difficult to read.

In addition, it raises the question of the relationship between "reading time" and "pupil diameter point." Figure 6 shows the reading time and pupil diameter according to the type of information read. From the results, it is determined that readers spend a long time reading the "necessity of the road" with relatively lower pupil diameter point. The reading time of the item concerning "Technical Advisory Committee" is short. And also, readers spend 17 seconds in average with the highest pupil diameter point. Therefore, it is believed that the

reader spends a long time reading about the "necessity of the road." Moreover, the "public involvement process" varied according to the participants as a whole. "Technical Advisory Committee" caught participants' interest only slightly, but was not read in general. The "necessity of the road" is considered important information at the early stage of the plan. From this, it is possible to state that the amount of space dedicated to this may increase during this time. The "Technical Advisory Committee" can be considered unimportant information and, as such, the amount of space dedicated to it should decrease as much as possible.

This article was included in the pupil diameter even when seen only momentarily. However, understanding of the information only after a short perusal is likely not extensive. This issue can be investigated further.



Note: The vertical axis is reading time, one unit = 5 seconds (e.g. 5 units mean 25 seconds). The horizontal axis is normalized pupil diameter without unit.

Figure 6. Relationship between reading time and normalized pupil diameter

4. CONCLUSION

In this study, we prepared a newsletter with a fictional road plan and mixed with other printed advertisements to be read by experiment participants. The article concerning the "necessity of the road" supposed to be the most interesting at the early stage of the public involvement process before our experiments. We arranged the article on the top left of the page, and enlarged the characters. We aimed to have a newsletter that attracted readers.

This experiment, however, shows that three of nine readers skipped the newsletter and that even those who read it had less interest in it than in the other inserted advertisements. On the other hand, participants who skipped the newsletter the first time deliberately read it for 62–95 seconds in the second series. Moreover, the newsletter 3, which was edited to have the most articles on the "necessity of the road," attracted the highest interest. Thus, it can be found that an increase in the interest of the newsletter's contents can attract readers. Therefore, planning authorities should not only distribute the newsletter, but also make it interesting and attractive to readers.

The reading time for the "necessity of the road" was comparatively longer. This derives from the interest evaluation and pupil diameter ratings. The experiment's results show that the "Technical Advisory Committee" only momentarily engaged the reader's interest. Thus, the

"necessity of the road" is effective information at the early stage of the planning. As such, it is possible to increase the volume of information provided and use more space in the newsletter for it. As for the "Technical Advisory Committee" information, this was found ineffective. As such, it is possible to decrease the volume of information provided about this aspect of a plan as much as possible at the early stage.

The interest evaluation and readability of newsletter 3 was the highest. The same result was obtained for the pupil diameter. However, some participants said that "There were a lot of characters" and that the newsletter "should display more figures and the photographs" even when they read newsletter 2 and 3, which contained enlarged character sizes. This shows that the newsletter should aim to be easily observed.

Therefore, this study can be summarized as follows: 1) when compared with inserted advertisements in a newspaper, the newsletter concerning the road project is uninteresting to the general public; 2) the reader's interest evaluation increases if the contents and arrangement of articles are considered attractive; 3) the article discussing the "necessity of the road" should occupy more space; and 4) the article discussing the "Technical Advisory Committee" should occupy a smaller space, even if planning authorities want to accentuate the importance of the committee.

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