# Differences between Hearing-impaired and Hearing in Performing Web-based Tasks – a preparatory study for understanding *kansei*-interaction of the hearing-impaired –

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## 1. INTRODUCTION

Recently, computer-based support for the hearing-impaired has expanded with the development of a web-based interaction environment. The web is a promising medium for the hearing-impaired since it allows us to control content presentation. Currently, the issue of how the hearing-impaired interact with the web is inadequately studied. We believe computer-based support for the hearing-impaired will improve when we better understand their interaction with computer-based materials. Our study began with detailed observations of how the hearing-impaired use the web by tracking eye movement and hyperlink selections and comparing the results with those of hearing persons.

## 2. EYE-TRACKING EXPERIMENT

Web-based tasks are performed interactively, requiring comprehension of information provided on the computer screen as it relates to the task goal, and the selection of an appropriate action, typically clicking on a link to another page. We conducted a preparatory study aimed at understanding web-interaction processes of the hearing-impaired by observing their eye movement while performing web-based tasks. Three hearing-impaired and three hearing persons participated in the experiment. Their ages ranged from 18 to 24 years old. All subjects were regular internet users.

## 3. RESULT

The task was to locate a page that described car model Z4, and to choose a favorite color for it. Compared to the hearing, the hearing-impaired were more error prone, spent less time per link selection, and consistently chose an easy-to-understand route to the goal.

From the analysis of the eye movement and link selection data, we suggest that there are two aspects where the performance of the hearing-impaired significantly differed from that of the hearing subjects. First, scan paths of the hearing-impaired were not as strategic as those of the hearing. The strategic movements that searched for the desired information were conducted by viewing the category titles on a page in order, and seeing the characters in category groups sequentially from the top. Many strategic movements were observed in the hearing subjects, but not in the hearing-impaired subjects as shown by Fig.1. Second, the level of textual information used by the hearing-impaired was shallower than that used by the hearing subjects. For example, subject A (hearing-impaired) took 3'15" to complete the task, and made 16 errors. She made selections with short intervals; of 17 selections, 13 took less than 10 seconds (Fig.2).

## 4. IMPLICATION TO WEB DESIGN GUIDELINE

The experiment confirmed that the hearing-impaired interact with the web differently than the hearing persons. The hearing-impaired seemed to understand the textual information intuitively, rather than with the deep knowledge associated with the textual information.

Our experiments demonstrate that the hearing-impaired interaction style differs from that of hearing persons, thus the current use of guidelines for the hearing-impaired is seriously limited. More thorough study with an increased number of subjects and wider range of web-based tasks will be needed to derive useful guidelines for the hearing-impaired.

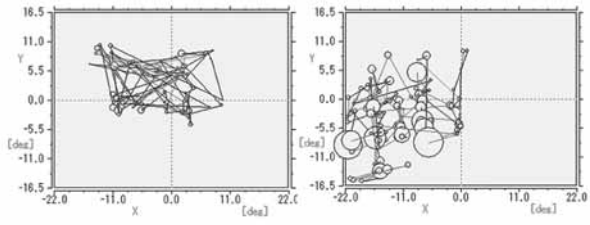


Fig.1. Fixation points.
Left: Subject A (Hearing-impaired). Right: Subject D (Hearing).

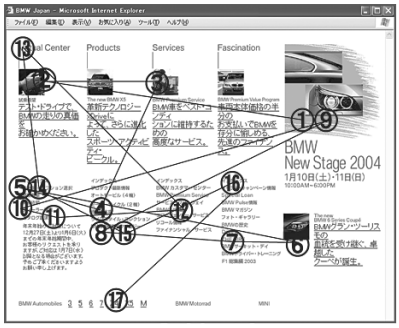


Fig.2. Order of link selections.
Subject A (Hearing-impaired).

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