Research on Effective Arrangement of Beverages in Convenience Store through Eye Movement Analysis

**ABSTRACT**

The arrangement of how the beverages are placed in Japanese convenience store does not have a common rule. To propose an effective way to arrange the inside of a refrigerator, we acquired an eye movement data of a consumer through an experiment. Eye movement of a subject was recorded by head mounted device while selecting a drink from a convenience store drink section reproduced in our laboratory. After that, the subject was shown their eye movement video and was interviewed about their eye movement. We analyzed the data by looking at the relative dwell time, by drawing the path of the eye movement with an illustrating program, and by extracting the fixation data. The eye movement data revealed that the center of each columns, and columns below average eye height had high dwell time, fixation time, and fixation probability.

**METHOD**

- The subjects were asked to go into the store (reproduced in the laboratory) and take one beverage that they want to drink
- Subjects were told to act as if they were in the real convenience store
- After the subjects came back, they were interviewed about their eye movement during the experiment

**Apparatus**

- Employed the EMR-8B system, a head mounted eye-tracking system (nac Image Technology Inc., Tokyo, Japan)
  - Pupil and cornea reflex method
  - Sampling frequency: 30 Hz
  - Resolution is within 0.1 degree
- Images were recorded by Digital Video Camera VX-2000 (SONY Corp., Tokyo, Japan) (Sample image shown in Fig.2)

**Subjects**

- Number of Subjects - 7 (3 Male, 4 Female)
- Average Age - 18.9 years old (18-20)
- Average Eye Height - 158.3 cm

**Analysis**

- Adopted "Frame by Frame" Analysis (Fig.3)
- Determined which beverage was looked frame by frame
- Those data were grouped into rows and columns
- Analyzed by considering relative dwell time, relative fixation (over 5 frames or 165 msec) time, and fixation probability

**RESULTS & DISCUSSION**

- **Columns**
  - Two columns located below the line of average eye height recorded high dwell/fixation time and fixation probability
  - Columns located on the very top and bottom had very low dwell/fixation time and fixation probability
  - Relative dwell/fixation time data and fixation probability data had similar results

- **Rows**
  - Row 6 had the highest dwell/fixation time and fixation probability
  - Row 2 had the lowest dwell/fixation time and fixation probability
  - Relative dwell/fixation time data and fixation probability data had similar results

**CONCLUSION**

- In both rows and columns, relative dwell/fixation data and fixation probability data showed similar results
- In 8 row column, the rows in the middle (3, 4, 5, 6) would be the most effective location to make consumers look at the merchandise
- Consider eye height of the consumer target (e.g., male and female) when arranging a beverage since eye-movement data in columns rely heavily on eye height