An Eye Tracking Analysis of a Restaurant Menu
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Introduction

- The goal of a restaurant menu is to convey food information efficiently to the customer.
- Eye tracking data allows for the better understanding of eye movement and fixation of a menu.
  - It has been shown that menus are typically read in a book-like fashion.
  - Initial gaze points for a 1-panel menu are typically in the top-middle.

Current Study
- The purpose of this study was to examine the effect of color on viewing a 1-page restaurant menu.
- The Tobii Pro 2 Glasses (Figure 1) were used to examine the impact of color on eye movement upon the initial viewing of the menu.

Figure 1. Tobii Pro 2 Glasses.

Method

Participants   Mean Age = 21 (2.68)
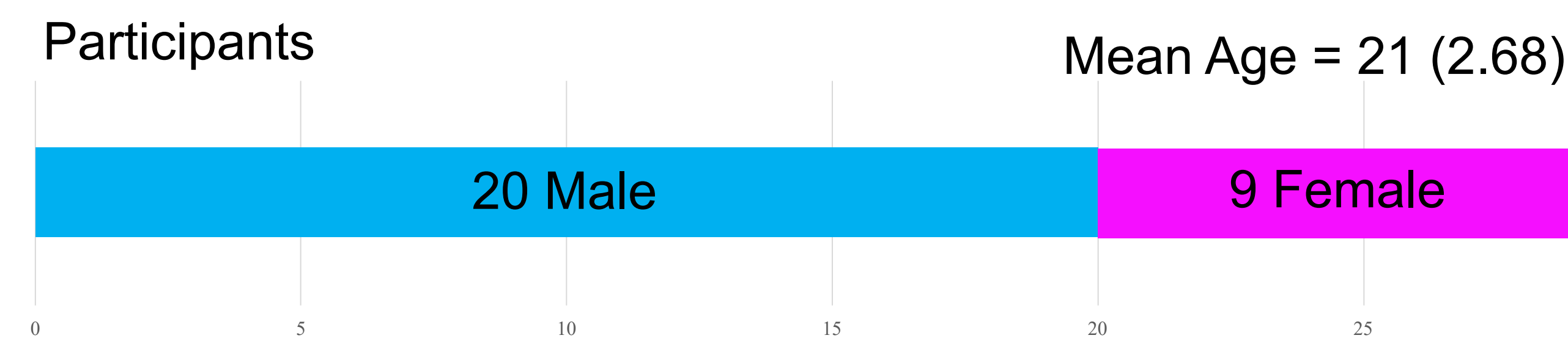
| 20 Male | 9 Female |

Figure 2. Demographics.

- Before viewing menu, participants were given an open card sort of 72 items from restaurant menu they would later observe (Figure 3).
- Following the card sort, participants wore the eye-tracking glasses and viewed the menu to complete a set five searching tasks.
  - Participants were randomly placed into either the color or black and white (BW) menu group (Figure 4).
- Once completed, participants gave their opinions about the menu. Then, were shown the other menu and asked which they preferred.
- Heat maps and gaze plots were generated as measures for the first 10 seconds of viewing the menu.
- Rank order of time to first fixation in areas of interest (AOI) for top, middle, and bottom of each menu condition compared overall viewing order.
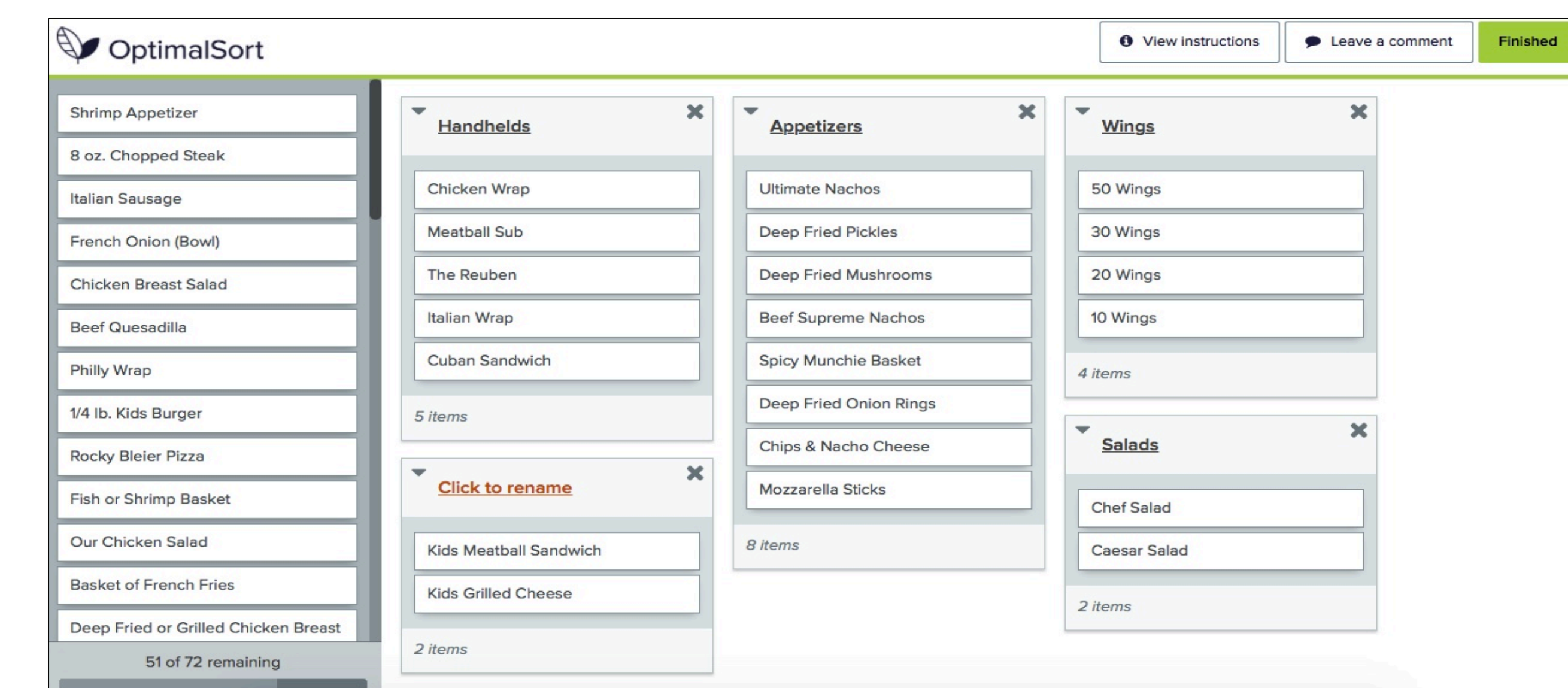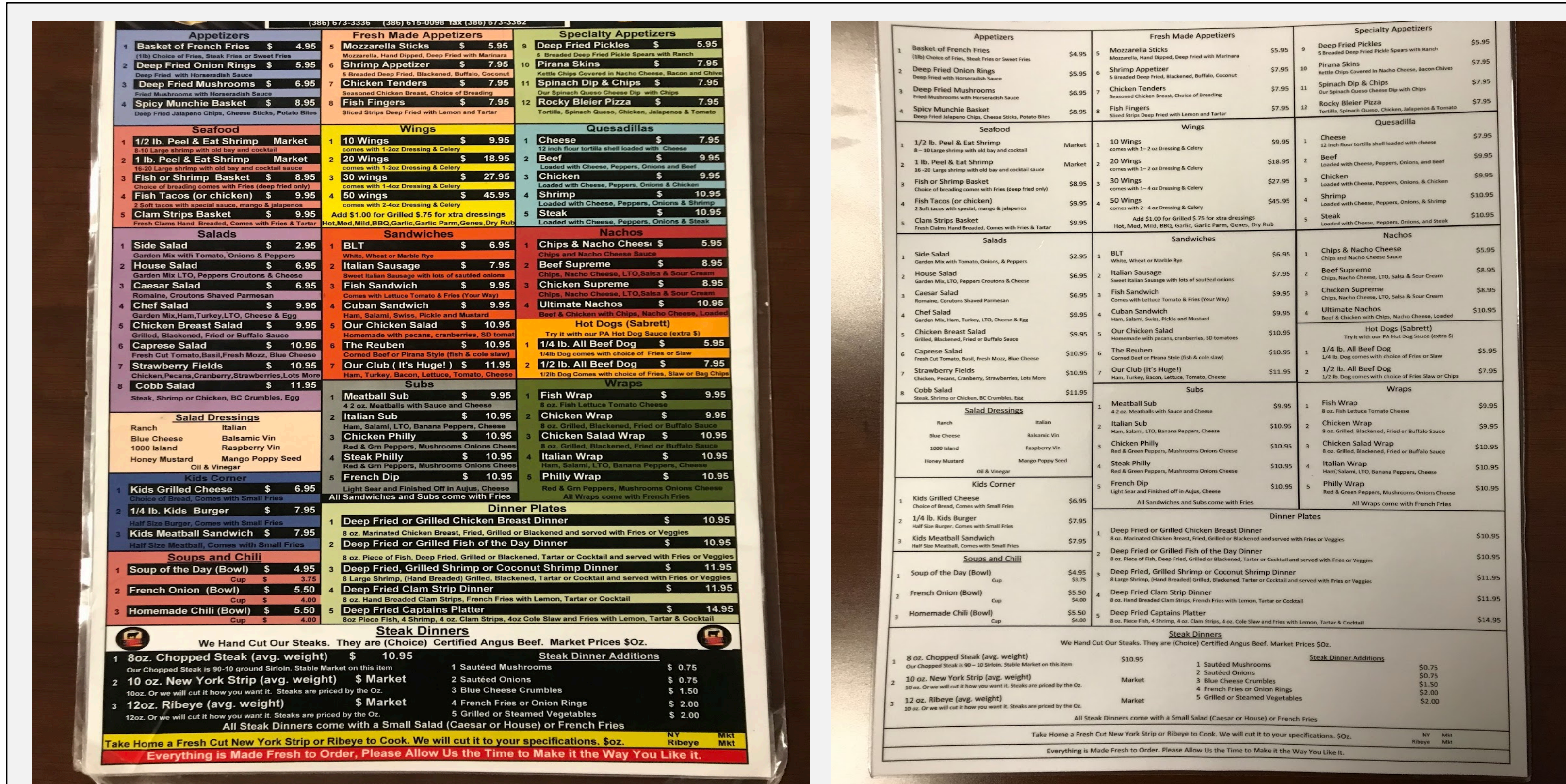

Figure 3. Example of the open card sort.

Figure 4. Original, color menu (left). Replica, black and white menu (right).

Results

Table 1. Actual menu categories versus participant created groups.

Original Menu Categories		User Created Groups
Appetizers	Seafood	Appetizers
Fresh Made Appetizers	Wings	Dinners
Specialty Appetizers	Quesadillas	Handhelds
Hot Dogs (Sabrett)	Nachos	Kids
Salad Dressings	Sandwiches	Salads
Kid's Corner	Salads	Seafood
Soups and Chili	Subs	Steak
Dinner Plates	Wraps	Mexican
Steak Dinners		Wings

- Actual menu had 17 groups; participants created an average of 9 groups (Table 1).
  - For example, 66% of participants grouped the Wraps, Subs, and Sandwiches categories into one group, named Handhelds.

Heat Maps (Figure 5)
- In first 10 sec, where participants fixated the most:
  - Color
    1. Leftmost Appetizers
    2. Sandwiches
    3. Subs
    4. Hot Dogs
  - Black and White
    1. Leftmost Appetizers
    2. Sandwiches
    3. Salads
    4. Fresh Made Appetizers

Gaze Plots (Figure 6)
- In first 10 sec, best representation of overall gaze paths:
  - Color
    1. Sandwiches (middle)
    2. Subs (middle, below sandwiches)
    3. Hot dogs (middle-right)
    4. Appetizers row (top)
    5. Dinners (bottom)
  - Black and White
    1. Leftmost Appetizers (top-left)
    2. Continued row by row from left to right

- AOI average rank order to respective menu gaze paths (Table 2).
- Lower the rank, the earlier that AOI was viewed.
- Middle AOI was fixated first in the color condition; top AOI was viewed first in BW condition.

Table 2. AOI time to first fixation mean rank order.

Area of Interest	Color Mean Rank	B&W Mean Rank
Top	2.09	1.45
Middle	1.64	1.73
Bottom	2.27	2.82

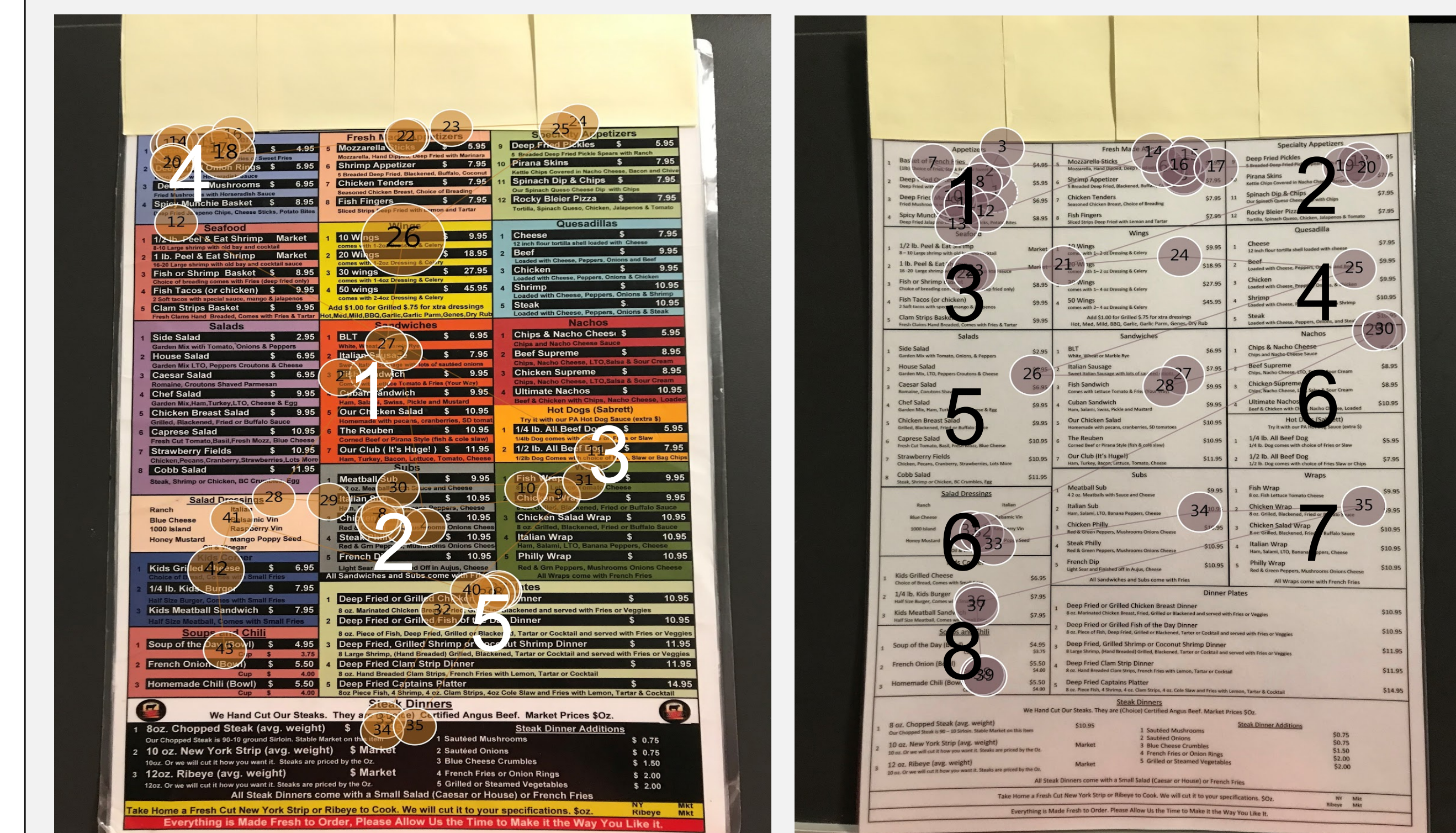*Figure 5*. Color, and black and white menu heat map (First 10s).

Figure 6. Color, and black and white menu gaze path (First 10s). Numbers indicate the general direction of the gaze path.

Discussion

- Color influenced how participants initially viewed a restaurant menu, and may be explained by a difference in saliency between the color and BW menus.
- Color can influence initial gaze patterns.
- Card sorting may be a potential method to gain more insight on how customers understand menus, as participants condensed the original categories.

Future Research
- Further investigation of how color effects how people read a menu.
- Further investigation of card sorting in facilitation of search performance on a menu should be examined.
- Examining if different colors or designs can influence fixation times.

References

- Choi, J. G., Lee, B. W., & Mok, J. W. (2010). An experiment on psychological gaze motion: A re-examination of item selection behavior of restaurant customers. *Journal of Global Business & Technology*, *6*(1).
- Magnini, V. P., & Kim, S. (2016). The influences of restaurant menu font style, background color, and physical weight on consumers' perceptions. *International Journal of Hospitality Management*, *53*, 42-48.
- Poole, A., & Ball, L. J. (2006). Eye tracking in HCI and usability research. In *Encyclopedia of human computer interaction* (pp. 211-219). IGI Global.
- Yang, S. S. (2012). Eye movements on restaurant menus: A revisitation on gaze motion and consumer scanpaths. *International Journal of Hospitality Management*, *31*(3), 1021-1029.