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Examining the Selections in Restaurant Menus with Eye-Tracking Technique

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Abstract

This study aims to understand the decision-making process of restaurant customers through menu designs. In this context, the study was carried out in a simulated restaurant. This study was designed according to the design and development research. 13 participants were determined voluntarily by the purposeful sampling technique. Three differently designed menus were examined with an eye-tracking device. It was concluded that the use of visuals in the menu is not completely effective. The most focused area of the costumers was the middle part of the right page in the menu, and orders were given from this part. Although an average screening path was specified in the study, contrary to the literature, the first point to look for didn't coincide with the point where the orders are highest. It can be said that the sweet spot was not found. Also, the order of gaze didn't affect purchasing behavior.

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INTRODUCTION

Food and beverage organizations are commercial businesses that meet the needs of the customers regarding food and beverage for a certain fee (Biçici, 2008). These organizations try to reach the highest profit by considering customer satisfaction. The use of the menu is really important for the sales of the organization; therefore, the menu and its design according to the target audience should be taken into consideration. Menus are designed by using different strategies like positioning, monitoring, pricing, and labeling. The relationship between the design elements and the amount of sale of food and beverages is seen as an important research field. Because the differences that will be created by different design strategies can attract customer's attention to certain items on the menu.

And at the end of this process, one may expect to see a significant difference in customer's buying behavior. After all, many types of research have been conducted to explain the customer's decision-making process, to understand the elements that affect buying behavior, and naturally about menu designs to increase the profit margin. The researchers intended to develop an ideal menu design strategy by presenting customer's behaviors when they were analyzing the menu and also, they intended to produce different theories about the effects of the design on customer's preferences. Though many different theories and assumptions were presented, there are limited scientific research (Kincaid and Corsun, 2003; Reynolds et al., 2005; Choi et al., 2010; Yang, 2012; Shafei et al., 2016) in this field. Nevertheless, it is observed that while the number of research is increasing; there are very few studies in our country about the subject.

This study is designed considering the suggestions of Yang's (2012) concentrated fields which means the relationship between first seen products and buying behavior; Kincaid and Corsun's (2003) arrangements of a menu should be tested idea and Shafei et. al's (2016) the importance of the effect of the variants on a menu on buying behavior should be partially measured idea. Within this scope, this study is designed by using 3 different menus and 2 different strategies in positioning and monitoring. It is intended to present the differences between customer's preferences by using designed menus.

It is believed that this study with its strategy and achieved results will contribute to the theoretical gap in this literature and will present important arguments to the theoretical background. From this point, this study aims to understand the decision-making process of restaurant customers through menu designs, present an ideal menu design strategy, and contribute to plan and manage businesses marketing activities by its achieved results.

Literature Review

Menu and Its Management

Today, the concept of the menu means the complete list of food and beverages served in a business for customers (Gürel & Gürel, 1986). The concept of serving food and beverages in a restaurant (Özdemir and Çalışkan, 2014) can be viewed differently from customers' and organizations' point of view (Özdemir & Nebioğlu, 2018). From the customers' point of view, it is seen as a source that gives information about what and how to eat and drink and their prices. However, for the organizations it is a powerful tool that enables them to plan operational processes and marketing, conducting, controlling, and gathering consumer's experiences to provide better services. Though from different perspectives its meaning alters, it has a critical importance for both sides.

In the historical process, it is seen that the design of the menu and improving it has gained importance. The first menus were in a form of a list where the names of the food and beverages were written. With developing service varieties, over time it became a tool that enables guests to make their decisions more easily and comfortably (Gren et al., 1981).

The menu is not only a marketing tool but also a way to help businesses to reach their goals. It defines the plan of the facility, interior, and exterior designs, and staff training strategies. It also has effects on supplies, required tools. From this point of view, to use the menu entirely for the benefit of the business, the business and the management of the menu should be handled together, and one must work on this subject meticulously. It is widely known that the menu management and all the other factors are a system together (Cömert & Keleş, 2018).

Menu planning is a process that defines the products that should be on the menu in the food and beverage field. To manage this process efficiently and with quality, a product list should be presented which will consider the expectations of the business's managers and their customers (Alan & Suna, 2019). The points that have high importance in menu planning can be lined up as seasonal characteristics, food's nutritive values, cultural factors, and business's potential (Sezgin et al., 2008). Menu analyzes basically has two parts that are very important in menu management. In menu analyzes, first all the products in the menu are evaluated according to their performance indicators, and then if a product fails from this evaluation, improvement processes begin (Özdemir & Nebioğlu, 2015). Despite its significance and role, it is seen that the managers don't pay enough attention to menu planning and menu analyzing according to Akay and Sarıışık's study in 2015. As to menu development, it states two technical efforts about research and form. The first one includes technical work about the size of the menu, the color of the menu card, the material of the menu card (like cartoon and wood), the positioning of the products on the menu, the font style, publishing, presenting, preserving and distributing of the menu. The latter includes research about the color, the shape, the image, the taste, its name, endurance, and storability of the food and beverages (Hazarhun & Koçak, 2019).

The Effects of Menu on Purchase Intention

Menu design expresses the whole process which includes; increasing business sales, forming a positive attitude against the business, provide information to the customers about food and beverages, preventing possible errors in orders by facilitating them, menu cards size and color to save time, and positioning of the items on the menu (Altınel, 2017, p. 189-190). Likewise, Özdemir (2012), defines menu design as "creating a distinguished menu card which not only provides information to the customers but also attracts customers attention to the products which the business intends to sell more". Walker (2008) defines menu design and organization as "the silent salesman of the restaurant". These definitions show that menu designs are important to create an effective communication between the business and the customers and also it plays an important role to establish an effective advertisement process (Hou et al., 2015).

Menu design has effects in almost all operational fields of the business according to these statements. Considering these wide effects, the menu design means so much more than just words, symbols, and price lists (Kara, 2019). Some studies examine customers' tendency in ordering through restaurant menus by the eye-tracking method. Especially when examined from menu positioning factor, while some studies (Bowen and Morris 1995; Kincaid & Corsun, 2003; Reynolds et al., 2005) states that menu positioning factor has no important effect on restaurant sales

and customer preferences others (Yang, 2012; Choi et al., 2010; Shafei et al., 2016) state menu positioning has positive effects on restaurants sales and customer preferences.

Eye Movement and Its Metrics

Although eye-tracking has been considered as a method since the beginning of the 19th century (Mascati, 1952), the first studies in which the eye was tracked by a device are at the beginning of the 20th century. Today, similar studies entered the literature from the 1960s by (Deutsch & Deutsch, 1963; Yarbus, 1967; Noton & Stark, 1971). In the 1980s the results of eye-tracking began to be evaluated by computers and finally in the 1990s media contents began to be processed. In this context, eye-tracking studies showed itself in different academic fields like medicine, psychology, sociology, marketing, and computer science under its historical process (Ömür & Aydogdu, 2017). With the use of metrics in eye-tracking technology, the evaluation process becomes more reliable. The metrics which examine eye movements are divided into two which are fixation and saccade. Saccades are very fast and irregular eye movements that position the image into the related area and data processing is usually suppressed during saccadic movements. On the other hand, fixations are characterized as longer and smoother eye movements and it is known that it has a high correlation with the intense cognitive process. Some certain measurements are more prominent under these two main metrics. The fixation-based measurements are the time passed until the first fixation, fixation time, total fixation number, users fixation ratio for an area of interest, fixation time in the area of interest, and fixation percent in the area of interest (Harężlak et al., 2015; Öcal, 2018). As for saccade-based measurements, they are saccade number, saccade size (the distance between two continuous saccades), and saccade time (Goldberg & Kotval, 1999; Öcal, 2018).

Eye Movement and Related Theories on Menu

Eye movement theory explains the path of eye movements of individuals when they are reading the menu and how this path affects the decisions they are going to make (Choi et al., 2010). This theory claims that consumers read the sections in the menu card in a specific order and this affects the sales level of the products (Jones & Mifli, 2001). Choi et al. (2010) exhibits how customers view the menu by using the eye movements model and how it affects their ultimate food choice. This study intensifies the theory. William Doerfler who put forwards the eye movements theory is known to discover customer's sweet spots, the areas where they likely to fixation and give their attention (Miller & Pavesic, 1996).

Sweet spots are defined as the most effective spots customers tend to look at the beginning, at the end, and often (Yang, 2012). In fact, the researchers conducted in this area emphasizes that there are special parts on the menu which are called "sweet spots" and it is important to put individual attentions to those certain points to increase the possibility of selected products (Reynolds et al., 2005; Bowen & Morris, 1995). Some researchers emphasize that sweets spots are the best positions on a menu and people look at them first. The path of systematic tracking of eye movements between fixation points is called scan paths (Yang, 2012).

The research about eye tracking theory state that people read a single-page, two -page, and three-page menus in different ways (Kincaid & Corsun, 2003). In the single-page menus, the eye fixations on the upper part of the center. The eye first fixations on this part and then moves below. Top selling items are located in this part called sweet points. Therefore, products can be placed on this part considering the serial position effect (Kincaid & Corsun, 2003).

According to some other studies, people read menus starting from the center point and move between right upper corner, left upper corner, left down corner, right down corner, and to the beginning point like a zig-zag (Miller & Pavesic, 1996; Panitz, 2000).

As for two-page menus, it is known that the eye first looks at the upper part of the right page. The customer starts scanning the menu from this point. Then he moves counterclockwise, first to the upper left corner then to the down left corner, and the right upper corner diagonally and completes its path. However, some researchers claim that instead of moving to the starting point diagonally, it moves to the right down the corner from the left down corner and then to the upper left corner to complete its path (Bowen & Morris, 1995).

William Doerfler who is a leading name in menu design concept explains that in two-page menus it is supposed that there is a drawn diagonal line starting from the upper corner of the left page to the bottom quarter of the right page and the most important location is the upper part of the line on the right page and especially the part right on top of the center (Choi et al., 2010). Though there are some studies (Livingston, 1978; Miller & Pavesic, 1996) based on Doerfler Model which was explained by Livingston (1978), there are doubts about its scientific validity (Niemeier & Hayes, 2003). Despite the doubts, it is agreed that the most viewed spots are the upper part of the center on single page menus and the right upper corner on two-page menus (Livingston, 1978; Miller & Pavesic, 1996; Panitz, 2000; von Keitz, 1988).

The first important scientific research conducted in eye movement courses is Gallup research. It was conducted by the Gallup Organization in 1987 to test Doerfler Model. The research was conducted by using single page, two-page, and three-page menus. In the research, the eye movements of the participants were tracked by cameras and it was concluded that Doerfly Model is valid only for single page menus. In two and three-page menus unlike Doerfly Model suggests it was detected that the eye first fixations on the left upper corner of the menu. However, Gallup's research was criticized because the research took place in a laboratory instead of a restaurant with real customers (Choi et. al, 2010). According to the results of Yang's (2012) research, the customers scan the page starting from the upper corner of the page on the left.

Introduced by Hedwig von Restroff, one of the important names of the Gestalt approach, the Vonrestorff effect is an approach that makes it easier to remember an object or thing that attracts attention in different ways in a group. It is also conceptualized as the isolation effect (Hunt, 1995). It can be said that when an item in the menu is differentiated from other items by various methods such as color, font, framing, or highlighting, attention will be focused more on the differentiating item. In this respect, one of the most distinctive distinguishing factors is the use of images. Hou et al. (2018) concluded that the addition of images to commonly used food names has a positive effect on the purchase and order rates of the customer compared to the food names that are not very well known. Şahin and Yazıcıoğlu (2020) found that menu design has a significant effect on menu item selection. They also suggest that using larger images affects the scanpath. They also partially supported the serial position effect.

In addition, in the studies related to the menu, titles such as menu size, font size, menu item location, menu description, menu item label, cover, paper type, content, font, colors, visual usages, artworks, ordering were examined. In this context, mistakes made in menu design are listed as follows in the literature (Baysal & Küçükaslan, 2009; Doğdubay & Saatçi, 2014; Koçak, 2016).

- Too small menu size

- Too small font size

- Lack of explanatory texts

- Failure to implement marketing strategies

- Non-included items

- Blank page usage

In this research, the effect of the menu design on eye movements and menu item selection were studied. The consumers' eye movements when they were scanning the menu, their first fixation point, the time they spend, and the scanning paths they use were investigated. Accordingly, three different menus with different designs were presented to the participants and they were asked to choose menu items among them In this way, it is aimed to answer whether the menu design has an effect on the menu item selection. To answer the research question, fixation counts and gaze durations, fixation fields, scanning paths of consumers related to these three different menus were examined.

Method

This study was designed according to the design and development research type in quantitative studies about examining eye movements on different menus. Quantitative research can be defined as a positivist opinion which has the perspective that guides the researcher to understand and explain the events, which accept the reality independently from the researcher and which accepts that it can be observed and measured objectively (Büyüköztürk et al., 2016).

As for design and development research, they are defined as a type of quantitative research in which a new product, tool, model, and process are developed and in which all these factors can be evaluated through applicability, effectiveness, and productivity. The design and development research intend to use information directly as solution-oriented rather than possessing it. This type of research enables us to see the effective and productive characteristics of information in daily life and it also creates new grounds to produce new information in experimental processes.

Participants

The research took place inside of the Akdeniz University campus, in a simulation restaurant environment that has the same characteristics as a daily restaurant. 15 volunteers who work in different parts of Akdeniz University participated in the research. The participants were 8 men and 5 women. Their ages were between 22 and 51 and the average of their ages was 35. Their education levels were 9 B.A. degrees, 2 masters, and 2 Ph.D., graduates. To determine the study group the purposive/purposeful sampling method was used. The required criteria to participate in the research was as follows:

- Going to daily restaurants in everyday life

- Consuming meat in daily life

- Having an income level of 500 Euro and above

- Not wearing glasses in everyday life

- Not having any eye problems like color blindness

Also, exclusion criteria were considered and applied to the participants, and the ones who have the criteria below were eliminated. The criteria were:

- Not having an outdoor eating culture
- Adopting a vegetarian lifestyle
- Having a minimum wage income level
- Having an eye problem that affects sight

Data Collection

In the scope of the research, to gather data from the participants two different data gathering tools were used. The first one is three different menu type which was designed specifically for this research. The second one is the Tobii Pro Glasses 2 eye tracking device (Figure 1).


Figure 1. Tobii Pro Mobile Glass 2

For the experiment, the ethics committee permission document required for the collection of the data used in this study was obtained from the Akdeniz University Ethics Committee with the date 17/10/2018 and the number 137. Then according to certain criteria three different types of menus, Menu A, Menu B, and Menu C were designed. For the process of designs and printing the menus a service was received from a private company. For the scope of the developed projects, the researcher attended Eye Tracking Device Use and Analyze Training in Ankara on 15/04/2019 to get information about the device that will be used. With the received training, the researcher gained qualifications in data gathering, data analyses, calibration adjustments, and the use of an eye-tracking device. Before the experiment participants read the consent form and approved being participated as volunteers. The experiment took place in a restaurant simulation to minimize distractibility and other factors that can affect their preferences. All the possible distractive factors were eliminated, and services and tables were positioned to create the restaurant environment. A piece of music was chosen which is suitable for a restaurant environment and which won't distract the participants. In the study, the owner of the experiment commissioned a waiter.

To complete the restaurant setting, the waiter wore suitable outfits, and orders were taken as checks to perform his duty accordingly like in a real restaurant. The experiment was performed every two days between 09:00-16:00 to make sure that the customers don't remember the menu. The total duration of the experiment was 9 days between 16/04/2019 - 24/04/2019. After giving the required information, the participants enter the research field one by one. Then the eye-tracking device was positioned on the participant and it was ensured that it creates no discomfort to the participant. After the calibration adjustments, the participants were asked to examine the menu and order one item. Like in a real restaurant, the participant took their alone time to examine the menu and when they had made their choice the waiter came near them. Each menu was presented one day apart to make sure that their decisions are not affected. The participants were informed that each menu is different from the other and that they can make different

choices. As a result, 39 data were gathered from 13 different participants. The data was gathered by Tobii Pro Controller software and saved in an SD card.

To make sure that there isn't any data loss, the eye movements of participants were examined. Afterward, for three different menus, the participants were put into categories according to the menus they have examined. After categorization, for each type of menu, an analysis was made in order and the results were printed from the system.

For the data analysis, the Tobii Pro Lab Software was used. With the help of this software, basic metrics of eye movements and statistical information about the fixation in the area of interest were obtained. The fixation in the area of interests was evaluated within defined 10 fields which were determined by the visuals, categories, and researched the menu (Yang, 2012; Gallup, 1987). These were fields were shown in Figure 2.
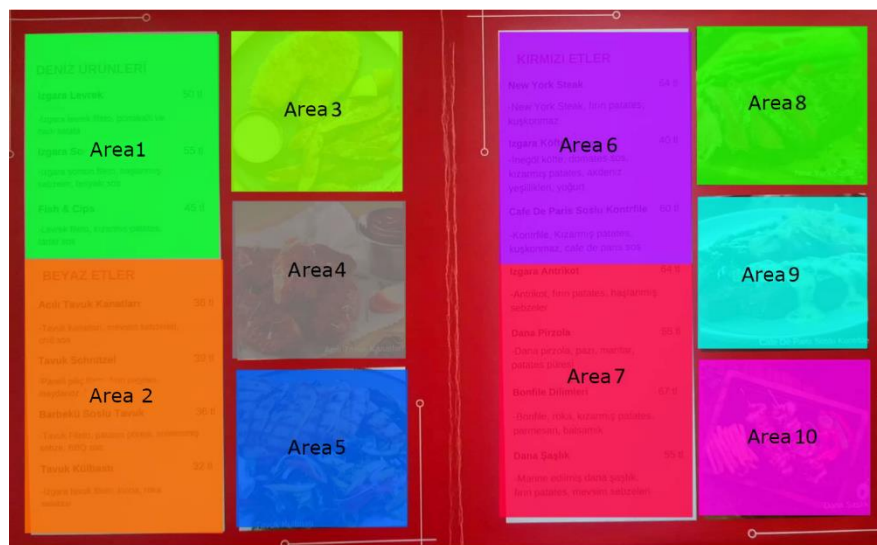
Figure 2. Menu Areas

Menus

Three different menus were prepared based on the Gallup research (1987), the Doerfler Model (Choi et al., 2010), and industry-accepted approaches (Gallup 1987; Bowen ve Morris, 1995; Choi vd., 2010; Yang, 2012), by examining the studies in the literature in terms of the design of the menus to be used in the research.

Menu A was determined as the criterion menu of the research. In other words, the measurements taken from this menu design were evaluated to be compared with the measurements taken from other menu designs. While designing the A menu, the culture of the Turkish society, living structure, sectoral experiences regarding the design were taken into account and academic support was used. A menu was prepared by examining the main course menus of some casual restaurants (Big Chefs, Kitchenette, MidPoint) in Turkey. The restaurants examined are chains and are located in many different parts of the country. In this respect, it is thought that the criterion menu is compatible with social, cultural, and sectoral reality. The B menu is the menu designed to measure the location effect. In this designed menu, the places of the menu items and visuals have been changed based on the Doerfler Model. Menu C is a menu type designed to measure the effect of using visuals in the menu by changing the visuals in the A Menu by keeping the menu items in the A Menu taken as a criterion constant.

The same number and the same size of images are used in all menus. Price information for food is located to the right of the menu items. Although all three menu types consist of two parallel pages, they are the same in terms of

features such as background colors, fonts, materials used, and visual colors. On the other hand, the food categories in the menus are arranged in the same way in all menus. Each category is located on the same page in all three menus. The menu card size is designed to be 9 inches wide and 12 inches high (Miller & Pavesic, 1996, p. 43). In addition, while determining the size, easy readability and the dimensions of the restaurant tables to be applied were taken into consideration. On the other hand, care was taken to express the product contents in a short and understandable way in the menus. In this context, since lowercase letters are easier to read and uppercase letters are more difficult (Türksoy, 2015, p. 135), uppercase letters are used only in titles, and menu items are written in lowercase letters. In addition, the titles are arranged in 16 points and the menu items are arranged in 12 points, and because the fancy and shaped fonts are more difficult to read, Times New Roman has been used as the font. On the other hand, because of its effect on increasing appetite and symbolizing wealth (Miller and Pavesic, 1996, p. 57-58), the menus are designed to be predominantly red. In addition, this color combination is used in the menus, as the black font on a light background will make the menu text easier to read (McVety et al., 2008, p. 140).

Findings

General Findings Regarding Menus

When the orders given from menu A were examined, it is seen that 13 orders were divided into 10 certain items out of 14. Examining them from the most selected to the least, the list goes as; Veal Chops (n=3), Veal Shashlik (n=2), Grilled Sea Bass (n=1), Grilled Salmon (n=1), Hot Chicken Wings (n=1), Chicken with Barbecue Sauce (n=1), Chicken Cutlet (n=1), Grilled Meatballs (n=1), Steak with Cafe de Paris Sauce (n=1) and Grilled Entrecote (n=1). It is seen that Fish & Chips, Chicken Schnitzel, New York Steak, and Steak Slices which menu items were also, were not selected. In total, there were 14 items, 8 of them selected once, and the most selected one Veal Chops was selected three times.

There were 5 selected items on the left side of the menu and 8 selected items on the right side of the menu. When considered the number of orders, it is seen that the items on the center part of the right page were selected the most. However, there aren't any specific fixation areas on the left side of the menu.

The total of 13 orders in Menu B is divided into 7 items. From most selected one to the least, it follows as; Grilled Entrecote (n=4), Grilled Salmon (n=3), Grilled Meatballs (n=2), Hot Chicken Wings (n=1), Chicken with Barbecue Sauce (n=1), Steak with Cafe de Paris Sauce (n=1) and Veal Shashlik (n=1). It is seen that participants don't prefer Fish & Chips, Chicken Schnitzel, Chicken Cutlet, New York Steak, and Veal Chops.

While 4 items in the menu were selected once, the most selected item is Grilled Entrecote which was selected 4 times. Also, there were 5 orders from the left side of the menu and 8 orders from the right side of the menu. And the orders from the left side of the menu are focused on the upper side of the left side of the menu.

As for Menu C, there were 9 orders out of 14 items. From most selected one to the least, it follows as; Grilled Meatballs (n=4), Grilled Sea Bass (n=2), Grilled Salmon (n=1), Chicken Schnitzel (n=1), Chicken with Barbecue Sauce (n=1), Steak with Barbecue Sauce (n=1), Grilled Entrecote (n=1), Steak Slices (n=1) and Veal Shashlik (n=1). It is seen that participants don't prefer Fish & Chips, Hot Chicken Wings, Chicken Cutlet, New York Steak, and Veal Chops. While 7 items in the menu were selected once, the most selected item is Grilled Meatballs which was selected for 4 times. 5 items on the menu haven't been selected.

Also, there are 5 orders from the left side of the menu and 8 orders from the right side of the menu. When it is examined, it is understood that the upper part of the right and left sides was focused.

The participant mostly examined Menu A (75,62 sec.), then Menu B (58 sec.), and Menu C (53 sec.). The total duration the participants looked at Menu A is around 20 seconds more. The most selected menu items with photos were in Menu C (10 items). This was followed by Menu A (5 items) and then Menu B (3 items). The total number of orders from Menu C was around 6 times more than the total orders from Menu A and Menu B.

What are the fixation durations, counts and areas of customers regarding the three different menus?

Table 1. Average Fixation Durations and Counts on Menus

	Menu A			Menu B			Menu C		
MA	AFc	AFd (sec)	sd	AFc	AFd (sec)	sd	AFc	AFd (sec)	sd
1	34,08	6,15	9,70	13,75	3,46	6,13	22,50	3,79	6,15
2	25,92	4,68	2,99	23,58	4,98	6,05	29,00	4,33	6,01
3	7,50	1,26	1,69	4,08	0,63	0,65	5,73	0,77	1,30
4	4,00	0,57	0,72	3,30	0,42	0,39	9,67	1,37	2,62
5	3,75	0,36	0,36	4,78	0,50	0,60	4,00	0,41	0,62
6	33,62	6,74	4,68	32,31	6,23	5,01	34,92	5,84	7,22
7	43,00	8,54	5,57	45,75	8,85	7,99	18,08	3,17	3,65
8	4,13	0,50	0,71	4,56	0,57	0,77	7,44	0,97	1,57
9	4,77	0,83	1,28	5,92	0,86	0,91	5,45	0,87	1,02
10	3,82	0,72	1,39	4,71	0,47	0,75	3,71	0,32	0,53

MA= Menu area, AFc= Average Fixation count, AFd= Average Fixation duration

When the data in the table are examined, it is seen that 7th area as the most and 5th area as the least appear first in the A menu according to the average fixation counts. Differences are observed between the average fixation counts and the average fixation durations, which means that the participants have less fixation duration despite the high number of gazes, or the fixation duration is longer despite the small number of looks. As a matter of fact, it is seen that the 1st Area and the 6th Area and the 8th and 10th Area are replaced by each other in the ranking. When the standard deviations for the A menu data were evaluated, the difference between the fixation times of the individuals was observed at least in Area 5 and the highest in Area 1.
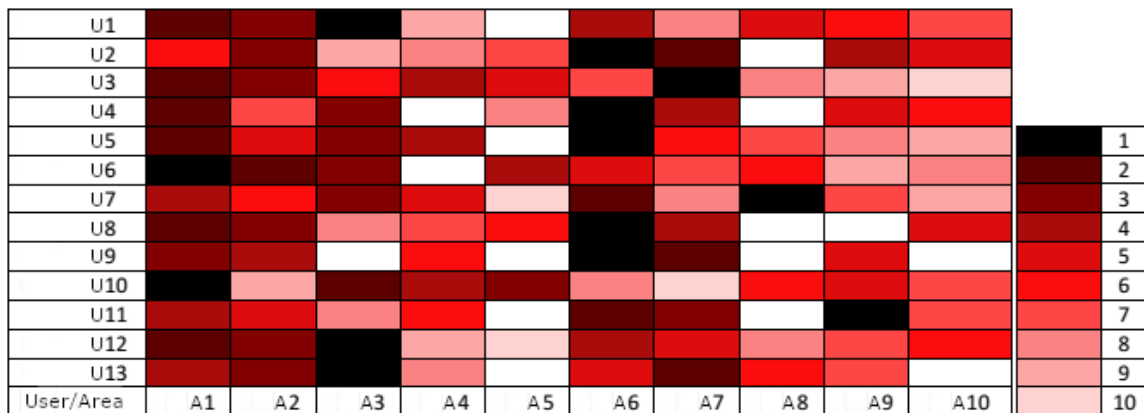
On the B menu, they mostly focused on the 7th domain and the least on the 4th domain. When looking at the average fixation times, it is observed that the highest value is in the 7th area (8.85 sec) and the lowest value is in the 4th area (0.42). In this context, although it is generally observed between the average number of fixation and the average fixation time, it is understood that the standard deviation is low in the 4th area and 7th area. Participants who examined the C menu focused mostly on domain 6 and at least on domain 10. As in other menus, although there are differences between the average number of fixation and average fixation time in the C menu, the difference in standard deviations was observed at least in area 10 and maximum in area 6.

What are the scanpaths for the three different menus?

When the A menu (Appendix -2) was evaluated, it was observed that the menu was examined more carefully than the left page of the right page, and 2 of the 7 foods on the page were examined intensively. On the right page, attention is especially focused on the middle parts of the page and it is seen that the names of the food are emphasized rather than the content information. On the left page, it was seen that the price information of the food in the first area was focused heavily, but not on the price information of other foods. On the right page, the price information of Cafe De

Paris Sauce Steak in the middle section is focused on, and the price information of other foods is not.

Participants did not fixation on the images in the menu. Looking at the heat map in general, the most focused part in the menu is the middle part of the right page, while the least striking part in the menu is the lower parts of the left page as where price information and images of food has been placed.

User/Area	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10		
U1												1
U2												2
U3												3
U4												4
U5												5
U6												6
U7												7
U8												8
U9												9
U10												10
U11												
U12												
U13												

Figure 3. Scanpaths of Users Regarding the Menu A

The darkest tone represents the 1st look row, while the lightest tone represents the 10th look row, with the scanning paths for the A Menu, and the sequence progresses sequentially. Participants' glance rates can be explained as in 1st rank was 38% to the 6th field (n = 5), 2nd rank was 46% to the 1st area (n = 6), in the 3rd rank was 46% to the 2nd area (n = 6), the 4th rank was 23% to the 4th area (n = 3), the 5th rank was 23% to the 9th place (n = 3), the 6th rank was 23% to the 8th area (n = 3), the 7th rank was 23% to the 9th and 10th areas (n = 3), 8th rank was %15 to 3rd, 4th, 7th and 8th areas (n = 2), 9th rank was 15% to the 4th, 9th and 10th areas (n = 2) and in 10th rank was 15% to 5th area (n=2). On the other hand, it is seen that the 5th and 8th areas are not looked at by 38% of the participants. Therefore, these areas are not included in screening paths for a significant number of consumers.

When evaluated in the light of the aforementioned data, the 1st, 2nd and 3rd look rows are separated and clear; it can be said that the 4th, 5th and 6th glance rows are not clear but are relatively separated. It can be said that it is difficult to suggest a certain scanning path for the 7, 8, 9 and 10 look rows. From this point of view, it seems appropriate to suggest a scanning way for the first 6 looks order, but due to the scattering in the table, the last 4 looks regarding the order, it can be said that this is not possible. The numerical majority of the participants and the scanning path order based on the percentages is given in Figure 4
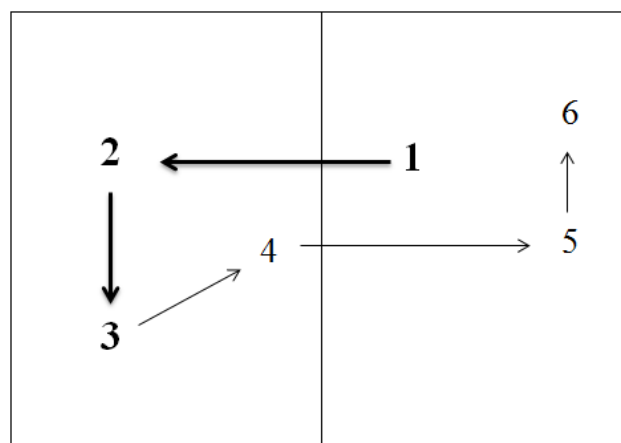
Figure 4. Common Scanpaths of the Menu A

The first 3 glance rows in Figure 4 are shown in bold font based on the numerical majority of the participants, and the next 3 glance rows are shown in thin font because they reflect the common scanning path of relatively few participants compared to the first 3 glance rows. When the focal points are examined, it is seen that the right page attracts more attention than the left page. On the right page, the most striking part is the middle part of the menu. On both pages, prices and images of food are not discussed. The most focused food on the menu has been the Grilled Entrecote. The second area is the Grilled Meatballs. These two products do not have a visual on the menu page. The least focused parts in the menu were the middle part of the left page and the lower part of the right page. The least focused food seems to be grilled sea bass.

Figure 5. Scanpaths of Users Regarding the Menu B

In B menu (Appendix -2); participants' glance rates can be explained as 6th area as for %38 in the 1st rank, (n = 5), 3rd area for 38% in 2nd rate (n = 5), 2nd area as for 38% in the 3rd rank (n = 5), 7th area for 23% in the 4th rank (n = 3), the 9th area as for 38% in the 5th rank (n = 5), 8th area as for %23 to the 7th area (n = 3), the 9th area as for 23% in 7th rank (n = 3). n = 3), to 8th and 10th areas as for %15 in 8th rank (n = 2), 5th, 7th and 9th areas as for %8 in 10th rank (n = 1). On the other hand, 46% of the participants have not looked at 10th are and 31% of the participants have not looked at 5th and 8th areas. In addition, the total of 8 areas have not been looked after by at least one person.

When the data are examined, it is seen that the 1st, 2nd, 3rd and 5th view rows are separated; it can be said that the 4th, 6th and 7th gaze rows are not clear but are relatively separated. It is difficult to comment on the next look. From this point of view, it seems appropriate to suggest a scanning paths regarding the first 7 view order. The scanning path order based on the numerical majority and percentages of the participants is shown in Figure 6.
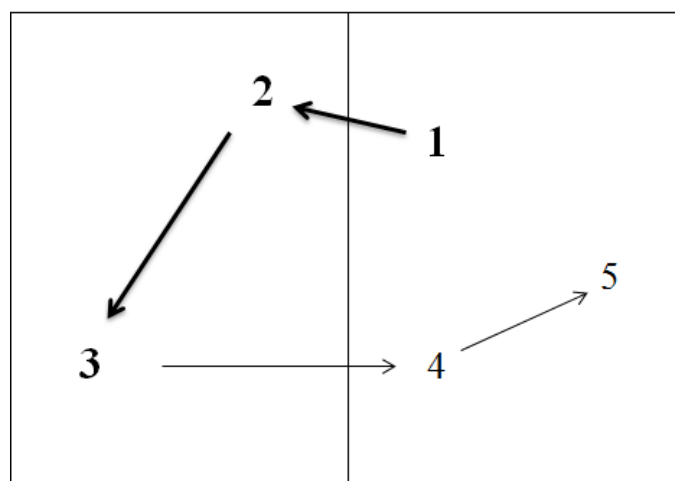

Figure 6. Common Scanpaths of the Menu B

The first three glance rows in Figure 6 are shown in bold font based on the numerical majority of the participants, and the next two glance rows are shown in thin font because they reflect the common scanning path of relatively few participants compared to the first three glance rows.

When the heat map regarding the C menu (Appendix-2) is examined, it is seen that the attention is concentrated on the upper parts of the menu on both pages. The bottom of the right page is the least noticeable part of the menu. It is seen that the most striking food on the menu is grilled meatballs. The most unremarkable food is seen as veal squint. This menu does not fixation on prices as in other menus. When the visuals on the menu are examined, it is seen that the steak slices and chicken schnitzel images do not attract much attention. Apart from that, all the visuals have been paid attention, although they are not very intense.
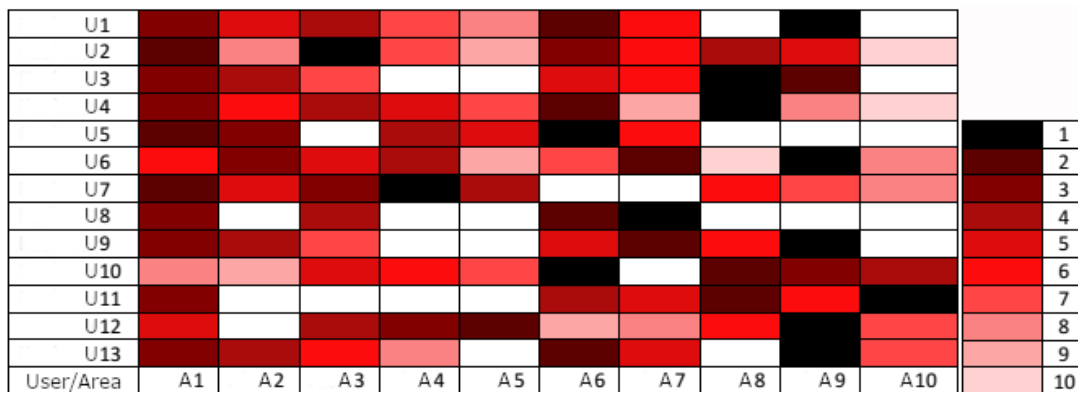
User/Area	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10		
U1												1
U2												2
U3												3
U4												4
U5												1
U6												2
U7												3
U8												4
U9												5
U10												6
U11												7
U12												8
U13												9
												10

Figure 7. Scanpaths of Users Regarding the Menu C

Glances of Participants in the C menu can be explained as 9th area for 38% in 1th rank (n = 5), 6th area for 31% in 2nd (n = 4), 1th area for 54% in 3rd rank (n = 7), 3rd area for 31% in 4th rank (n = 4), 2nd, 3rd, 6th and 7th areas for 15% in 5th rank (n = 2), 7th area for 31% in6th rank (n = 4), 3rd, 4th, 5th and 10th areas for 15% in 7th rank (n = 2), 10th area for %15 in 8th rank (n = 2), 5th area for %15 in 9th rank (n = 2) and 10th area for %15 in 10th rank. On the other hand, 38% of the participants have not looked to the 10th and 5th areas and 4th and 8th areas are not looked at by 31% of the participants. Also 9 areas in total were not looked at by at least one person. In area 1, all participants have looked at least once. It can be said that the 1st, 2nd, 3rd, 4th and 6th glance rows are separated and clear. No clear interpretation can be made about the other glance lines. From this point of view, it would be appropriate to suggest a scanning paths related to the first 4 view rows. The scanning path order based on the numerical majority and percentage of the participants is shown in Figure 8.
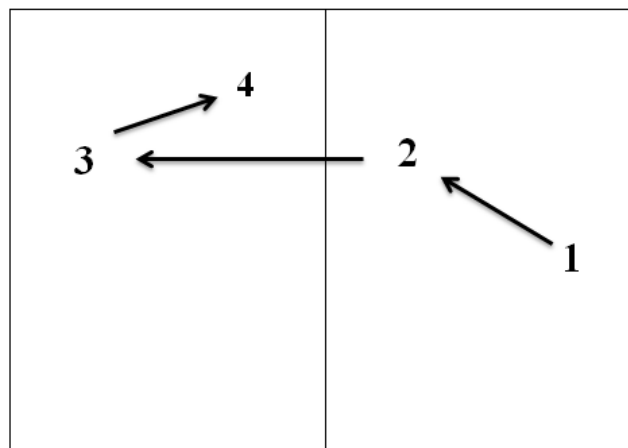
Figure 8. Common Scanpaths of the Menu C

Discussion and Conclusion

In this study, the effects of three different menu types and menu design on eye movements (the first part, focused time, scanning paths) and food selection behavior from the menu were investigated using an eye tracking device. When the heat map obtained in the study, eye tracking movements and orders are evaluated together, it is seen that the use of visuals in menu design has a partial effect on menu item selection. First of all, the orders of the participants from the A Menu and the C Menu were compared. In the evaluation made, a total of 10 orders were areas from the menu items with the visual in the C Menu, while only 5 orders were areas from the A Menu. In other words, 77% of the participants preferred products with a visual in the C Menu, while only 38% preferred products with a visual in the A Menu. In this respect, it can be said that there is a significant difference between the A and C Menus in terms of the preference of products with visuals.

On the other hand, while 1 piece of Grilled Meatballs that do not have a visual in the A Menu was ordered, the order number of the menu item increased to 4 with the addition of the Grilled Meatball image to the C Menu. Again, Calf Meat, which has the visual on the A Menu, has been removed from the C Menu while ordering 2 pieces, and it has been seen that the number of orders has decreased to 1. There was no significant difference in other menu items. Although the order difference is not noticeable in all products with visual changes, this difference in the orders of the visual products suggests that the participants may be sensitive to the visual difference. When all the participants were examined, it was determined that there was no strong relationship between the number of looks and fixation durations and the orders placed. In addition, you can use menu items with a visual in the C Menu than the menu items with a visual in the A Menu.

In addition, a distinctive fixation point could not be determined on any menu item in either menu type. Therefore, it does not seem possible to establish a direct connection and conclude between the orders placed and the visual heat maps. In summary, it is seen that people do not look at the visuals a lot and do not fixation heavily on both menus. While the articles are the parts that need to be read and therefore focused, the visuals are the sections that can be noticed but may not be examined for a long time compared to the articles. One might think that fixation and level of gaze are related to this. The fact that the orders placed on the A Menu generally do not contain visual products may be due to the tendency of people to fixation on the text and therefore ignore the visual.

On the other hand, although there was no significant difference in terms of the number of gaze and fixation intensity, it was found that some participants ordered some menu items more than before when the visuals changed. The A Menu was examined by the participants for a longer time than the C Menu. On the other hand, the participants viewed the images in the C Menu for a longer time than the images in the A Menu. To express the fixation durations of the visuals as a percentage within the total fixation duration, this ratio increased from 6% in A Menu to 9% in C Menu.

Theoretical Implementations

It can be said that this finding partially supports the Von restorff Effect (Hunt, 1995), which argues that a product in the menu is highlighted and differentiated from other products. When the increase in the rate of viewing the visuals of the participants is examined, it can be said that people noticed the visual changes made in the menus.

In parallel with this, the number of orders for the products with visuals is quite higher in the C Menu compared to the A Menu. Contrary to the research finding of Fikri and Ramadhan (2011), which revealed that the menu image has no effect on purchasing behavior, and Hou et al. (2017) and Guéguen, Jacob, and Ardiccioni (2012), similar to the research findings that showed that order rates increased positively with the use of visuals in menus, the participants in this study made preferences indicating the visual effect. In the light of all these findings discussed, it was concluded that the visual elements in the menu were not examined by the consumers much and they were reflected in the orders only when they noticed a change.

In other words, it is important for consumers to feel a difference in visuals so that the use of visuals in the menu is reflected in the orders. Therefore, in order to achieve the aforementioned effect, "change" can be a key element in menu design in order to save consumers from the orders they have made habitual. As a matter of fact, it does not seem possible for consumers to re-examine the menu images before each order in restaurants they visit regularly. Therefore, the visual change in the menu and the awareness of this change by the consumers can bring the desired success in menu design.

In addition, when heat maps, eye tracking movements and orders are evaluated together, it is seen that the menu design does not significantly affect the selection of the menu item. The orders of the participants through Menu A and Menu B were compared. According to the evaluation, the most ordered menu item in both menu types is located in area 7. In addition, looking at the distribution of orders, in both menu types, the middle part of the right page has been identified as the part that receives high numbers of orders.

When looking at the areas that are not ordered, the middle part of the left page is not prominent in the B Menu, but there is no such area in the A Menu. This finding contradicts the serial position effect (Schultz and Schultz, 2015), which claims that the items at the beginning and end of any list are more easily remembered than the others and are therefore more preferred. While it is assumed that the studies on the menu related to this effect will fixation more on the products in the bottom and top parts of the menu page (Kincaid and Corsun, 2003) and orders will be made intensely from these regions (Dayan and Bar-Hillel, 2011) In the menu type, it is seen that orders are heavily placed in the middle of the right page. On the other hand, Beef Chops (3 pieces), located in Area 7 of Menu A and most ordered, were taken to Area 6 in Menu B and was not ordered. The grill entrecote (4 pieces) in the 7th area of the B Menu and the highest number of orders were ordered only once, although it remained fixed on the A Menu. But the Beef Chop, which is one row below this menu item, has been the most preferred product. Therefore, Veal Chop creates evidence for the effect of location, while the Grilled Entrecote does not contradict altogether. As a matter of fact, the most orders are given just below that menu item.

The area where the participants look the most and the average fixation duration is the most stands out as the 7th area in both menu types. This finding also coincides with the number of orders. In other words, the participants ordered a large number of areas they looked at and focused on for a long time. In addition, Area 6 ranks second in terms of average fixation duration of individuals in both menus. However, the number of orders of the participants in the second rank were not from this area. A common area in the A Menu and B Menu with the least number of gaze and the lowest average fixation time could not be detected. This finding does not support the results of the research conducted by Yang (2012), which showed that the bottom parts of the page in the menu do not tend to attract the attention of consumers.

On the other hand, there are sharp differences in the duration of fixation of the participants in Menu B. In other words, some participants focused too much on Domain 7, while other participants focused too little. When the heat maps were examined, the participants focused on the middle part of the right page in both menus. This finding, Choi et al. (2010), which reveals that the first and most focused point is the middle point, in other words, the sweet spot in the menu is the middle of the page. On the other hand, the B Menu was less read than the A Menu and less emphasis was placed on the visuals. Also, unlike the B Menu, the A Menu has focused on the upper part of the left page.

These findings seem consistent with the assumption that consumers will order over "sweet spots" (Miller and Pavesic, 1996: 34), which is defined by William Doerfler as the areas where consumers tend to fixation their attention and look the most. As a matter of fact, in this study, the participants placed the most orders from the areas they focused on the most. However, while Doerfler suggests that the part that the orders fixation on in his model is the upper part of the right page (Miller and Pavesic, 1996, p. 34), in this research, orders are heavily placed at the bottom of the right page.

Therefore, while the Doerfler model's definition of the sweet spot and its effect was verified, the specific sweet spots and order areas could not be verified. Finally, the search paths of the participants on the A Menu and the B Menu were examined and a common browsing path including the first 5 viewing paths for both menu types was obtained. The scanning path in question can be summarized as follows; Top left of the right page (1st Look), the top of the left page (2nd Look), the bottom of the left page (3rd Look), the look moving to the right (4th Look) and the middle of the right page (5th Look)). In this ranking, although there was not a very clear positioning about the 4th Look, it was observed that the overall view of the participants moved from the bottom of the left page to the right. Therefore, this way of scanning can be stated as an important finding.

On the other hand, the emergence of a scanning path for only the first 5 glance rows may also be a point to be emphasized. When the participants take the menu in their hands, they may be systematically examining the menu in a critical process and the fixation of the people may be dispersed after this process. In other words, the way of scanning, which includes the first 5 views, can be a critical process in which people examine the menu.

On the other hand, a linear relationship has not been found between the order of view in the scanning paths and the orders placed. For example, only 2 orders were placed in the A and B Menus from the first view. In addition, the areas with the highest number of orders are not included in the first areas among these scanning paths. In summary, it can be said that the order of looking at the menu items does not have a determining effect on the orders.

This finding seems consistent with the eye movement theory's assumption (Jones and Mifli, 2001) that consumers read the parts of a menu card in a certain order (not from top to bottom). However, the same theory does not coincide with the assumption that the reading order affects the sales level of a menu item (Jones & Mifli, 2001). As a matter of fact, according to Yang (2012), there is a tendency of consumers to examine the menu with a certain strategy, but orders are not given with this trend.

Although a common search path for A Menu and B Menu is suggested based on the location effect, a scanning path that will include all three menus could not be reached. At this point, average viewing times and changing images can be included in the discussion. In summary, people looked at the A Menu the most, then the B Menu and the C Menu as soon as possible. Therefore, the C Menu has been the menu the participants have examined the least. From

this point of view, it can be concluded that in the menus that are examined over and over again, the participants have more confidence in their experiences, do not systematically examine the menu and give their preferences more decisively. On the other hand, changing the images in the C Menu can be a confusing variable.

Participants' attention may be distracted by changing visuals. As a matter of fact, when the order numbers of the products with visuals are examined, it is seen that the C Menu receives much more orders than the other two menus. Changing the images and decreasing fixation durations seem to support the selection made based on experience. Although there are studies in the literature that reveal that menu item location has a significant effect on sales and customer preferences (Yang, 2012, Choi et al, 2010, Shafei et al, 2016; Sobol and Barry, 1980), location has a significant impact on sales and preferences. There are also studies (Bowen and Morris 1995, Kincaid and Corsun, 2003, Reynolds et al, 2005). Therefore, it cannot be said that the literature has reached a consensus on the effect of the position in the menu. As a matter of fact, findings that will concretize the contradictory discourses discussed in the literature have been obtained in this research. These findings and their relationship with the literature can be summarized as follows:

In the research, there is an area in which orders and the eye fixation heavily, and this finding is compatible with the literature. However, the area of fixation contradicts with the position given in the literature. On the other hand, while the determination of the scanning path is in line with the literature, it is contradicting with the literature that there is no order not to be ordered depending on the scanning path and there is no area that is not checked.

This research did not fully confirm the location effect but revealed new details regarding that effect. When evaluated in terms of purchasing behavior, although visual is not effective in the first stage, a positive effect occurs on purchasing behavior when a visual differentiation is made. In addition, the middle part of the right page of the menu was focused heavily and orders were given intensively from this point. In this context, the fixation area has differed in terms of purchasing behavior.

If the "sweet spot" is the most focused point, as a result of this research, it can be said that the middle part of the right page of the menu is the sweet spot, while the first point in the "sweet spot" menu is the sweet spot as a result of the research. On the other hand, the order of glancing has not been found to have an effect on purchasing behavior. Therefore, a definite formula for purchasing behavior could not be put forward.

Practical Implementations

This study examined the visual interest of people in different income groups. In the study, the behavior of prospective customers is discussed. In this respect, it is thought that it will contribute to businesses that want to get an idea about customer behavior. From this point of view, although the strategies used in the menu draw attention, it can be said that consumers examine the menu consciously. Similarly, according to Kincaid and Corsun (2003), the purchasing behavior is determined according to the wishes of the consumers as long as they do not stop reading the menu completely. In other words, since people have consciousness, the strategies used in the menu alone may not be effective. As a matter of fact, purchasing behavior is greatly influenced by individual factors (learning and memory, personal characteristics, attitude and perceptions, motivation, lifestyle) and environmental factors (cultural and subcultural factors, social class, social group, familial variables) (Blackwell et al., 2006: 109) and considering that it is the result of all these variables and evaluation processes (Mucuk, 2008), it can be said that the research results are

compatible with the complex nature of purchasing behavior. The menu types used in the study were designed based on the menus of many chain restaurant businesses in Turkey. In this context, it is thought that the study outputs have a widespread effect.

Limitations and Recommendations

The wearable eye tracking device used in this study may have affected the participants' mood, the way they viewed the menu, and their preferences. Therefore, the participants may not have felt comfortable throughout the study, as they knew that eye movements were monitored during the study. Similarly, since the research was conducted in a restaurant simulation prepared, the findings obtained may have been affected by the organized environment.

On the other hand, the study group in the research was formed by using the purposeful sampling method. Therefore, the resulting findings can be generalized to groups with a similar structure to the criteria used in the formation of the study group. Finally, the limited number of participants can be seen as a limitation in terms of generalizing the research findings.

This study is based on the daily restaurant type. Future research may design this study over different types of restaurants. Different menu types (single-page, multi-page, etc.) can be used in the work to be done. In addition, purchasing behavior and other factors related to the menu (menu item label, menu item description, price, etc.) can also be examined. Since purchasing behavior is a very complex process, a questionnaire can be applied at the end of the study to measure the attitudes of consumers towards purchasing behavior.

In addition, other studies can be done for different socioeconomic income levels. In this way, the purchasing behavior and the strategy phenomenon in the menu can be compared according to the income group. This study, which examines the effect of menu item location and image on menu item selection, is considered valuable in terms of filling the gap in the literature and being an important resource for future research. In addition to scientific studies, research findings contain results that food and beverage businesses can consider on menu design and purchasing behavior.

Declaration

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Appendix:

A

DENİZ ÜRÜNLERİ

Izgara Levrek — 50 tl
-Izgara levrek fileto, portakallı ve narlı salata

Izgara Somon — 55 tl
-Izgara somon fileto, haşlanmış sebzeler, teriyaki sos

Fish & Cips — 45 tl
-Levrek fileto, kızarmış patates, tartar sos

BEYAZ ETLER

Acılı Tavuk Kanatları — 36 tl
-Tavuk kanatları, mevsim sebzeleri, chili sos

Tavuk Schnitzel — 39 tl
-Paneli piliç fileto, fırın patates, maydanoz, limon dilimi

Barbekü Soslu Tavuk — 36 tl
-Tavuk Fileto, patates püresi, sotelenmiş sebze, BBQ sos

Tavuk Külbastı — 32 tl
-Izgara tavuk fileto, kinoa, roka salatası

KIRMIZI ETLER

New York Steak — 64 tl
-New York Steak, fırın patates, kuşkonmaz

Izgara Köfte — 40 tl
-İnegöl köfte, domates sos, kızarmış patates, akdeniz yeşillikleri, yoğurt

Cafe De Paris Soslu Kontrfile — 60 tl
-Kontrfile, Kızarmış patates, kuşkonmaz, cafe de paris sos

Izgara Antrikot — 64 tl
-Antrikot, fırın patates, haşlanmış sebzeler

Dana Pirzola — 55 tl
-Dana pirzola, pazı, mantar, patates püresi

Bonfile Dilimleri — 67 tl
-Bonfile, roka, kızarmış patates, parmesan, balsamik

Dana Şaşlık — 55 tl
-Marine edilmiş dana şaşlık, fırın patates, mevsim sebzeleri

B

DENİZ ÜRÜNLERİ

Fish & Cips — 45 tl
-Levrek fileto, kızarmış patates, tartar sos

Izgara Somon — 55 tl
-Izgara somon fileto, haşlanmış sebzeler, teriyaki sos, sebzeli basmati pilavı

Izgara Levrek — 50 tl
-Izgara levrek fileto, portakallı ve narlı salata

BEYAZ ETLER

Tavuk Külbastı — 32 tl
-Izgara tavuk fileto, kinoa, roka salatası

Tavuk Schnitzel — 39 tl
-Paneli piliç fileto, fırın patates, maydanoz, limon dilimi

Barbekü Soslu Tavuk — 36 tl
-Tavuk Fileto, patates püresi, sotelenmiş sebze, BBQ sos

Acılı Tavuk Kanatları — 36 tl
-Tavuk kanatları, mevsim sebzeleri, chili sos

KIRMIZI ETLER

Dana Şaşlık — 55 tl
-Marine edilmiş dana şaşlık, fırın patates, mevsim sebzeleri

Dana Pirzola — 55 tl
-Dana pirzola, pazı, mantar, patates püresi

Cafe De Paris Soslu Kontrfile — 60 tl
-Kontrfile, Kızarmış patates, kuşkonmaz, cafe de paris sos

Izgara Antrikot — 64 tl
-Antrikot, fırın patates, haşlanmış sebzeler

Izgara Köfte — 40 tl
-İnegöl köfte, domates sos, kızarmış patates, akdeniz yeşillikleri, yoğurt

Bonfile Dilimleri — 67 tl
-Bonfile, roka, kızarmış patates, parmesan, balsamik

New York Steak — 64 tl
-New York Steak, fırın patates, kuşkonmaz

C

DENİZ ÜRÜNLERİ

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-Izgara levrek fileto, portakallı ve narlı salata

Izgara Somon — 55 tl
-Izgara somon fileto, haşlanmış sebzeler, teriyaki sos, sebzeli basmati pilavı

Fish & Cips — 45 tl
-Levrek fileto, kızarmış patates, tartar sos

BEYAZ ETLER

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-Tavuk kanatları, mevsim sebzeleri, chili sos

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