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Application of eye-tracking technology to compare how instant lemongrass drink packaging imagery influences customer interest

ABSTRACT

The research aimed to compare how different styles of instant lemongrass drink package imagery influence consumer interest and behavior using eye-tracking technology. A total of 30 participants, aged 19 to 65, evaluated three packaging styles: style 1 Images of instant lemongrass drinks served in a cup, style 2 images of instant lemongrass drinks served in a cup with steam and style 3 images of instant lemongrass drinks being poured into a cup. To determine visual areas of interest (AOIs), we examined eye-tracking variables including number of fixations, duration of fixations, and heatmaps. To mitigate positional bias, we displayed each style at a randomly assigned screen position each time. Participants also filled out a survey to determine which style they would most likely purchase. A one-way ANOVA and Tukey HSD post-hoc testing revealed significant variations in fixation metrics among the styles. The result demonstrates style. Two images of instant lemongrass drinks served in a cup with steam had the longest average duration of fixations and were the most popular style that affected customer choice. This is due to the warm sensation they experience when they gaze at it, which is associated with their preference for hot tea over cold tea, as well as the sensation of being close to a product as if it were in front of them. The findings highlight the necessity of using dynamic emotional packaging imagery and resonant visual features in packaging. This study makes actionable ideas for packaging designers and marketers to increase customer engagement and product awareness in competitive markets.

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Introduction

The global market for ready-to-drink herbal powder products has experienced tremendous growth due to increasing consumer demand in the healthcare sector. Based on global retail data for herbal products, the Asia-Pacific region was projected to have the largest market share for these products in 2022. Based on worldwide consumer data, 70% of customers prioritize supplements that promote bodily equilibrium, with a specific emphasis on natural herbal extracts.

According to the Department of International Trade Promotion (2023), in Thailand, nearly half (47%) of consumers who want to buy healthy food choose to do so in the form of food and drinks. Out of these consumers, the majority (63%) prefer to purchase beverages. Due to the growing demand and popularity of herbal drinks, there is a heightened level of market competition. Consequently, every natural herbal powder manufacturer has introduced new items in response to the varied demands of consumers seeking pre-made herbal powder drinks.

Based on the forecast for the domestic herbal market, the expected value of the market in 2027 is 100,000 million baht. There are many well-liked herbal beverages and supplements, including those containing turmeric, fingerroot, and lemongrass. The government is actively supporting and promoting Thai herbs as a means of exerting influence in the worldwide market (Bangkokbiznews, 2024). According to the study on the state of herbs in the country by Sansanaphongpricha (2023), lemongrass is a highly coveted herb on the market. Lemongrass is cultivated and processed by farmers in Thailand as a widely grown crop, mostly because of its traditional medicinal attributes in tropical nations such as Thailand, Myanmar, Laos, Malaysia, Indonesia, and Sri Lanka (Central Laboratory and Greenhouse Complex, 2001). Lemongrass herbal products have been developed in a variety of forms which are in line with the needs of consumers. Whether they are dietary supplement products or not, there are many brands of lemongrass herb-related products on the market. In addition to factoring in product quality, consumers should be made aware of the benefits of the product.

Packaging is also one of the factors that influence consumers' purchasing decisions (Ketudom, 2022). Packaging is something that can attract consumers' attention and plays an important role in creating product and brand recognition (Köster & Mojet, 2015). Therefore, designing packaging that is suitable for consumers' interests is something that herbal entrepreneurs should focus on because packaging is the first characteristic that catches the eye of consumers and promotes their impression of the product. Packaging elements include colors, font, images, and shapes of packaging. Wästlund, Shams & Otterbring (2018) demonstrated the role of peripheral vision in the consumer product selection process by using eye-tracking technology. This can help increase a product's chances of being bought. The use of eye-tracking technology in this study leads to better understanding of consumers' visual behaviour in real world environments. Studying the impact of packaging images on consumer buying behavior is extremely important because packaging is an important part of grabbing consumers' attention and making a first impression on them. The research of Mazhar et al. (2015) showed that the image on and composition of the packaging have a direct impact on consumers' purchasing decisions. In addition, it was found that the image on the packaging can create a good perception of a product and make it appealing. This makes consumers feel more eager to buy the product. Well-designed and attention-grabbing packaging can significantly increase sales. In addition, packaging designs that clearly communicate the product's information and create the right mood also play an important role in building brand loyalty, especially through image elements, which play an important role in attracting consumers' attention because they communicate the characteristics of the product to the target audience.

They also play the most important role in creating recognition of the product because they are the elements on the packaging that consumers spend the most time looking at (Kovačević & Brozović, 2018). Therefore, when selecting a food image for the packaging, it is crucial to carefully consider the details of the image, including size and position. Nikolaus & Bendlin (2015) conducted a study on the visual appearance of various foods, including their color, shape, and size. The study's findings indicate that these factors significantly influence human eating habits (Rolls, Rowe & Rolls, 1982). However, consumers tend to focus on the product image, which can significantly influence their decision to try the product and ultimately make a purchase (Szocs & Lefebvre, 2016).

The image on the packaging of a finished instant lemongrass drink typically depicts the appearance of the product in a coffee cup, along with an arrangement of the main ingredients as they provide information about the origin of the product. With regard to the attributes of the packaging imagery, the impact of an image on a person's perception varies depending on whether it evokes calming emotions or dynamic emotions. Images are crucial in raising awareness and conveying the characteristics of a product. Hence, it is imperative to select an image for the packaging based on its intended objective in terms of communication with the target consumer. Images that calm emotions provide customers with the chance to clearly perceive the information presented in the image, while employing dynamic emotions enhances the vivacity of the consumer experience. The source of this information is a publication by Gvili et al. (2015). Assessing consumer interest by comparing packaging imagery that conveys a sense of calm and dynamic emotional packaging imagery can improve communication efficiency through alignment with the consumers' interest in the product.

Eye-tracking technology is a good tool that helps to assess the interest in the elements on the packaging (Varela et al., 2014). The use of eye-tracking technology in studying consumer shopping behavior is extremely important because it allows researchers to understand consumers' viewing and decision-making patterns in detail. Research by Mawad et al. (2015) shows that cognitive style has an impact on data processing and yoghurt label selection, which can be measured using eye-tracking technology. There are different characteristics of looking at and paying attention to the information on a label. The use of eye-tracking technology allows for the identification of areas of interest (AOI) and the number of fixations, as well as the fixation duration, which is important information in packaging design. Additionally, the combination of eye-tracking and visual recognition technology with deep learning allows for more accurate and efficient analysis of consumer behavior data (Chen et al., 2022). Because it can be used to check how consumers are interested in the image on the packaging, eye-tracking technology is also a good research tool to

suggest appropriate image design for marketing communication and creating a positive user experience (Pei, Huang & Ding, 2022). Therefore, eye-tracking technology must be used as part of this assessment of consumer interest behavior, which will be used as a guide for the development of packaging design patterns and the characteristics of choosing appropriate images to meet the needs and interests of consumers as well.

Conceptual Framework

The research evaluated consumer interest by analyzing the impact of packaging images on consumers by using eye-tracking technology. The researcher developed the theoretical framework for the investigation. The method of identifying the area of interest (AOI) was used for analyzing the sample's area of interest in terms of overall packaging components, which included logo information and image (Piqueras-Fiszman et al., 2013).

The researchers analyzed the packaging's image features by categorizing them according to the emotions and sentiments that each image's visual elements expressed. An individual uses the notion of discerning the elements of figure and ground to notice the elements of visualization, which encompass the fundamental components of line, the most prominent visual aspect. The horizontal line evokes feelings of tranquility, stillness, quietness, and serenity when noticed, while the descending curve, undulating straight line, and circular curve communicate a sense of motion that is soft and comfortable.

Line vision (Tathaisong, 2003) is the primary factor that differentiates each image. It is classified under two separate characteristics:

1. Dynamic emotional packaging imagery
2. Calming emotional packaging imagery

The researchers conducted a survey on instant lemongrass drink packaging imagery in the market, which led to the classification of image characteristics for consumer interest testing. The imagery was classified under three styles:

1. Images of instant lemongrass drinks served in a cup.
2. Images of instant lemongrass drinks served in a cup with steam.
3. Images of instant lemongrass drinks being poured into a cup. Figure 1 presents the three styles used to classify the imagery.

The researchers conducted visual perception testing to assess consumers' interest when looking at the area of interest (AOI) on the packaging by using screen-based eye-tracking technology.

Analysis of the consumer's interest in the area of interest, including the number of fixations and duration of fixations (Andrychowicz-Trojanowska, 2018), was performed in accordance with the following:

1. The packaging imagery that the consumer most frequently saw was defined as the highest “number of fixations,” as an average total (times).
2. The packaging imagery that captured the consumer's attention for the longest was defined as the “duration of fixation" (ms.) and was found by utilizing “heatmaps.”
3. In the survey of packaging imagery styles, the participants had a choice of three styles.

» **Figure 1:** *Styles of instant lemongrass drink packaging imagery for consumer interest testing*

Method

Population and Sample Groups

The research population comprised consumers who were working-age women and men aged 19–65 years old (Ministry of Public Health, 2024) because they are the main target group for buying instant lemongrass drink products (Pijitbanjong, 2015). The consumer group, which was made up of people who had drunk instant lemongrass drinks, comprised female and male individuals at Rajamangala University of Technology Thanyaburi, was calculated by determining a power analysis =.80; the sample size was calculated from an effect size = 0.5, and the value (= 0.05) was calculated by the G*Power software.

The resulting number of participants was 27 people, and in order to account for the loss of participants during the test, three more participants were added, for a total sample size of 30 people.

Research Tools

The research tools comprised Tobii Pro Glasses 3 eye-tracking device, and screen to model the packaging of the instant lemongrass drink, which was a 27-inch LG UHD 4K monitor (27UP600-W) with a 16:9 (width: height) aspect ratio and a 1920x1080 pixel image size.

Three styles of packaging images were created for screen-based testing with eye-tracking technology. The packaging modeled on the screen for the participants to see comprised 12 images. A computer-aided software package was used to sequence and time the images in this research. Each image appeared for 2.5 seconds because that represents the average time that consumers use to search for products in a store. The first page displayed was an introduction to the testing, with the text “Each set of packaging images will appear on the screen for 2.5 seconds; you can look at each one freely, for a total of 12 images.” This was done by switching between the left, right, and middle on-screen positions of the series A and series B packages. Figure 2 presents examples of model packaging images for series A and series B.

» **Figure 2:** *Model packaging images series: A and series B*

A survey of packaging imagery styles was performed to analyze the participant’s choices. We divided the questionnaire into three parts. Part 1 was used to collect general information about the participants, including their age and gender. In part 2, a close-ended question was used to evaluate the packaging imagery styles that influenced the participant's choices. We asked participants to select the packaging style that most influenced their purchase decisions. Part 3 asked participants to provide reasons for their choices through an open-ended question. The research questionnaire was examined by experts using the index of item-objective congruence (IOC), and it was found that the accuracy of the questionnaire, or the consistency between the question and the objective or content, was 1.00, which indicated that it was a valid questionnaire.

Experiment

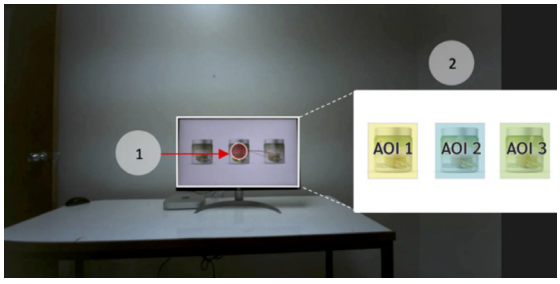
The researcher provided a screen for the participants in the experimental group to view the Ishihara test strip. The researcher then used a web browser simulator (https://www.colourlitelens.com/ishiharatest.html) to process and display the test result as a percentage. Then, the researcher moved on to the next step of the test.

The participants wore Tobii Pro Glasses 3. The participants had to sit 90 centimeters away from the computer screen with their glasses and equipment; the operator had to hold the calibration card, stretch his arm 50 to 100 centimeters away from the participants, and let the participants look at the black dot until a green circle appeared, indicating that the calibration process has been completed; finally, the participants had to look at the screen again. After that, the instructions for the test appeared on the screen, and the images displayed on the screen automatically changed until the viewer had seen the required number of images.

After removing their glasses, the participants responded to the packaging imagery styles survey form. The simulated packaging of three styles was presented on the monitor. The participants could select only one style which they had decided to buy.

Data Analysis

The packaging imagery of an instant lemongrass drink was compared by using eye-tracking technology. The analysis of the results of the eye-tracking test used with the participants was performed to determine the number of fixations and duration of fixations of each packaging in a total of 30 participants.



» **Figure 3:** *Analysis of eye-tracking test results with the Tobii Pro Glasses 3 Controller*

In figure 3, number 1 represents the gaze overlay, and the red circle indicates the subject's focus on a specific area of interest on the monitor. In the image, the gaze overlay appears on the screen when the participants look at a given style of model packaging, where the diameter of the gaze overlay covers the graphic elements on each style of packaging. In this study, we conducted the test by assessing the comprehensive image of the entire package, concentrating on the variables that aligned with the image's changing style.

Number 2 indicates the determination of the area of interest (AOI); the results of each participant’s eye-tracking test were analyzed to distinguish which AOI the person was looking at on the monitor, where AOI 1 refers to the area that covers packaging style 1 (images of instant lemongrass drinks served in a cup), AOI 2 refers to the area covering packaging style 2 (images of instant

lemongrass drinks served in a cup with steam), and AOI 3 refers to the area covering packaging style 3 (images of instant lemongrass drinks being poured into a cup), where the positions of each format were switched on the screen every time so that the placement on the screen did not affect the attention of the participants.

Analysis of data on consumer interest in packaging was performed to obtain findings about the packaging imagery that the consumer most frequently saw, which was defined as the highest “number of fixations," namely, the average total (times) number of fixations on the three styles that were switched between positions on the screen so that each participant saw 12 images.

The total number of fixations in each area of interest (AOI 1 /AOI 2 /AOI 3) from a total of 30 participants, who viewed 12 images, was averaged to summarize the number of packaging views with regard to the elements in each of the three styles.

Analysis of data on consumer interest in packaging was performed to obtain findings about the packaging imagery that captured the consumer's attention for the longest, which was defined as the “duration of fixation" (ms.) and was found by utilizing “heatmaps” in the areas of interest on the screen.

There were three styles of packaging that were switched between positions on the screen so that each participant saw 12 images. The total duration of fixation in each area of interest (AOI 1/AOI 2/AOI 3) from a total of 30 participants who viewed 12 images was averaged to summarize the time spent looking at the packaging imagery models in each of the three styles. A one-way analysis of variance (ANOVA) was used to assess statistical differences at a significance threshold of 0.05, succeeded by Tukey HSD post-hoc testing to evaluate pairwise differences among styles. The survey of packaging imagery styles produced evaluation results from the 30 participants on the selection of packaging imagery styles as percentage scores.

Results

The results of the data analysis comparing consumer interest in the packaging imagery of an instant lemongrass drink found by using eye-tracking technology were as follows.

The descriptive data on the number of fixations and fixation durations in the imagery of three designs of instant lemongrass drink packaging is presented in Table 1. Images of instant lemongrass drinks being poured into a cup of style 3. The consumer's most frequent viewing and the diversity of interest levels among participants are reflected in the highest average number of fixations, 35.23 (SD = 16.48). The consumer's attention is held for the longest by Style 2, which depicts images of instant lemongrass drinks served in a cup with steam. The average duration of fixations is 19,545.26 ms. (SD = 7,433.17), and the duration of fixations is highly variable. The shortest fixation duration of 10,003.06 ms. (SD = 4,999.09) and the lowest average number of fixations of 23.57 (SD = 10.44) are indicative of the fact that Style 1, which depicts static images of instant lemongrass drinks served in a cup, elicited the least visual engagement from participants.

The standard deviations for Styles 2 and 3 indicate a significant degree of variability in the frequency and duration of fixations, which implies a range of consumer engagement and interest. These distinctions are additionally underscored by the 95% confidence intervals: The number of fixations in Style 3 varied from 29.08 to 41.39, while the duration of those fixations in Style 2 varied from 16,769.67 ms. to 22,320.86 ms. In contrast, Style 1 consistently exhibited the lowest performance across all metrics, suggesting that it has limited allure in terms of capturing and maintaining visual attention.

These findings underscore the significance of dynamic and atmospheric visual elements in capturing and maintaining consumer attention, which are essential factors in the development of effective packaging.

Table 1

Descriptive Statistics of the number of fixations and duration of fixations for the three styles of packaging imagery (N=30)

		Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Number of fixations (times)	[1]	23.57	10.44	1.90	19.67	27.47	5	47
	[2]	32.87	16.11	2.94	26.85	38.89	8	83
	[3]	35.23	16.48	03.01	29.08	41.39	9	92
Duration of fixations (ms.)	[1]	10003.06	4999.09	912.70	8136.37	11869.75	1495.00	21976.00
	[2]	19545.26	7433.17	1357.10	16769.67	22320.86	10841.00	49738.00
	[3]	18929.66	6832.78	1247.48	16378.26	21481.06	7800.00	35487.00

To evaluate the visual engagement of consumers with the three styles of instant lemongrass drink packaging imagery, statistical analysis was performed to compare the number of fixations and fixation durations across these styles. By using ANOVA, the study aimed to identify whether significant differences exist in these metrics, reflecting variations in consumer attention. The analysis focused on understanding how each style of packaging imagery influenced visual behavior, providing key insights into which design elements are most effective in capturing and sustaining consumer interest. This comparison lays the foundation for the detailed results presented in Table 2, which highlights the significant differences in the number of fixations and fixation durations among the three styles.

Table 2

ANOVA results on the number of fixations and duration of fixations for the three styles of packaging imagery

ANOVA				
		df	**F**	**Sig.**
Number of fixations (times)	Between groups	2	5.34	.006
	Within groups	87		
	Total	89		
Duration of fixations (ms.)	Between groups	2	20.22	.000
	Within groups	87		
	Total	89		

Table 2 shows the results of the ANOVA analysis, highlighting significant differences in the average number of fixations and fixation duration among the three styles of packaging imagery. The analysis revealed that the number of fixations differed significantly across at least one packaging style, with an F-value of 5.34 and a p-value of 0.006, which is below the significance threshold of 0.05. Similarly, fixation duration also showed significant differences among the styles, with an F-value of 20.22 and a p-value of less than 0.001, indicating highly significant variation. These findings confirm that the packaging styles influence both the frequency and duration of visual engagement. Specifically, the significant p-values indicate that the differences in fixation metrics are unlikely to have occurred by chance.

A post-hoc Tukey HSD test was conducted to compare the average number of fixations across the three forms of packaging imagery in order to further investigate the significant differences identified through the ANOVA analysis. This test enables a pairwise comparison of the styles, which offers a more comprehensive understanding of the differences in consumer visual engagement between each packaging design. The results of this analysis illuminate the styles that are significantly distinct and emphasize the design elements that most effectively attract attention. Table 3 provides the following information.

Table 3

Tukey HSD Analysis of Average Number of Fixations for Different the three styles of packaging imagery

Number of fixations			
Tukey HSD[a]			
Classification of instant lemongrass drink packaging imagery	N	Subset for alpha = 0.05	
		1	2
[1] Images of instant lemongrass drinks served in a cup	30	23.57	
[2] Images of instant lemongrass drinks served in a cup with steam	30		32.87
[3] Images of instant lemongrass drinks being poured into a cup	30		35.23
Sig.		1.00	.80

Table 3 shows the Tukey HSD post-hoc tests, confirming significant differences between the number of fixations in style 1 and styles 2 and 3 (p-value = 1.00). However, the subset analysis for alpha = 0.05 revealed non significant difference between style 2 and style 3 (p-value = 0.80).

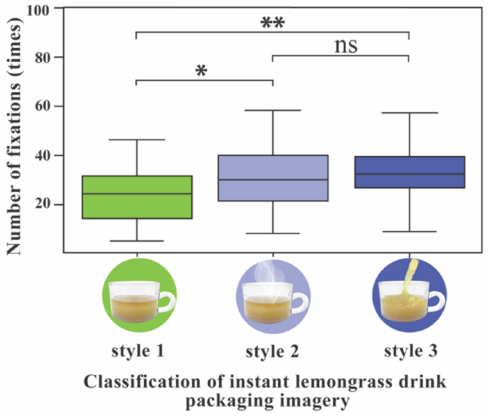
Table 4 shows the Tukey HSD post-hoc tests, confirming significant differences between the Duration of fixations in Style 1 and Styles 2 and 3 (p-value = 1.00). However, the subset analysis for alpha = 0.05 revealed non-significant difference between Style 2 and Style 3 (p-value = 0.92).

To present the data distribution and model variations in a comprehensible packaging imagery style. Consequently, a box plot illustrates the data in figure 4 and figure 5.

Table 4

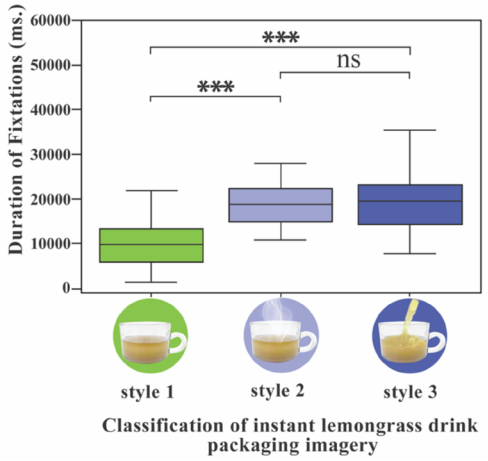
Tukey HSD Analysis of Average Duration of fixations for Different the three styles of packaging imagery

Duration of fixations			
Tukey HSD[a]			
Classification of instant lemongrass drink packaging imagery	N	Subset for alpha = 0.05	
		1	2
[1] Images of instant lemongrass drinks served in a cup	30	10003.07	
[2] Images of instant lemongrass drinks served in a cup with steam	30		19545.27
[3] Images of instant lemongrass drinks being poured into a cup	30		18929.67
Sig.		1.00	.92



» **Figure 4:** *Turkey HSD Result: Total Number of Fixations by classification of instant lemongrass drink packaging imagery*

Figure 4 shows the three styles of instant lemongrass drink packaging imagery: style 1 (images of instant lemongrass drinks served in a cup), style 2 (images of instant lemongrass drinks served in a cup with steam), and style 3 (images of instant lemongrass drinks being poured into a cup). The box plot indicates that style 3 had the highest average number of fixations, with significant differences compared to style 1 ($p < 0.01$), indicating that the dynamic pouring action effectively captures consumer attention. style, featuring a steam effect, also performed well, with a comparable number of fixations to style 3, though the difference between them was not statistically significant (ns). In contrast, Style 1, which displayed the drink in a static cup without additional dynamic or emotional elements, had the lowest fixation count and differed significantly from both style 2 ($p < 0.05$) and style 3 ($p < 0.01$). These results suggest that packaging imagery incorporating dynamic or appealing visual elements, such as pouring actions or steam effects, is more effective at attracting and maintaining consumer interest, while simpler designs may not engage as effectively.

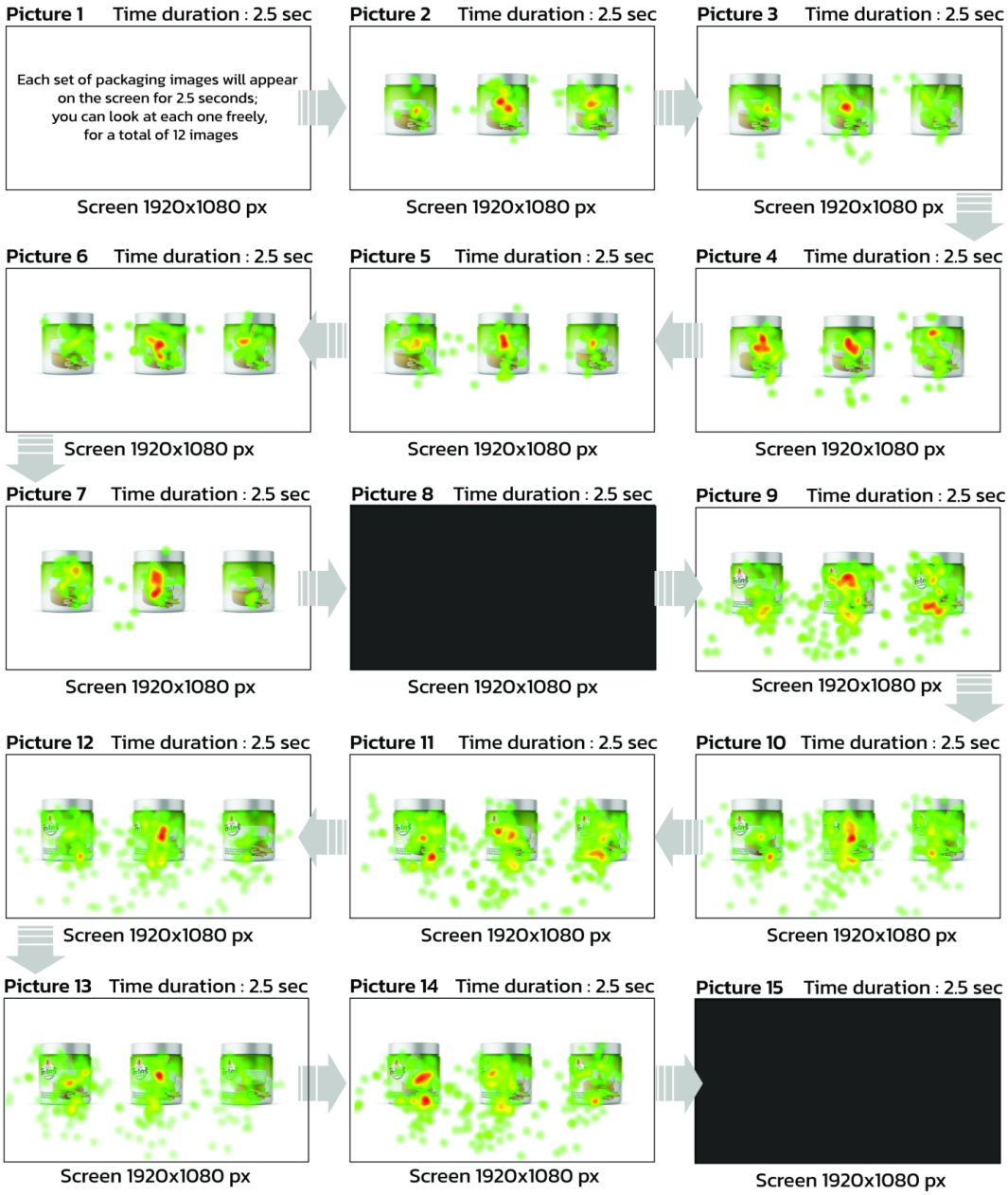


» **Figure 5:** *Turkey HSD Result: Duration of Fixations by classification of instant lemongrass drink packaging imagery*

Figure 5 shows the three styles of instant lemongrass drink packaging imagery: style 1 (images of instant lemongrass drinks served in a cup), style 2 (images of instant lemongrass drinks served in a cup with steam), and style 3 (images of instant lemongrass drinks being poured into a cup). The box plot indicates the duration of fixation (ms.) for each style, revealing that style 2 (the steam effect) had the highest average fixation duration, with significant differences from style 1 ($p < 0.001$) and style 3 ($p < 0.001$). style 3 (pouring effect) showed a slightly shorter duration; however, it was not significantly different from style 2 (ns). style 1, the simplest imagery, had the shortest average fixation duration, with it significantly lower than both style 2 ($p < 0.001$) and style 3 ($p < 0.001$). These findings suggest that packaging imagery featuring dynamic or emotionally engaging elements, such as a cup with steam (style 2) or drinks being poured into a cup (style 3), can capture consumer attention for longer, while simpler designs (style 1) are less effective in maintaining engagement. This emphasizes the importance of incorporating visually compelling features to enhance consumer interest in product packaging.

In order to augment statistical and graphical assessments of consumer interest in three packaging imagery styles, it is imperative to investigate the spatial distribution of attention across design elements. The "duration of fixation" (ms.) of packaging styles that captivated consumers was depicted in heat maps. These heat maps suggest that the participants is paying attention to the areas of interest (AOIs) in packaging design. This approach elucidates the impact of visual element design and placement on consumer engagement. The gaze behavior of customers is influenced by the location of the screen and visual indicators, as illustrated in Figure 6.

Figure 6 shows heat maps of data comparing the attention of the testers on the packaging styles, namely, the average duration of fixations (ms.) per person, for a total of 30 people and three styles, and the point of the area on the screen that the participants looked at. The results confirm that the central positioning of fixation hotspots (red areas) primarily attracts more attention, irrespective of the packaging style. However, fixation patterns adjust to the positioning of packaging styles on the left or right side of the screen, indicating that specific visual elements within the design can draw focus even when the style is not centrally placed. Additional findings reveal that areas containing key visual elements, such as logos or dynamic elements like drinks served in a cup with steam, consistently produce longer durations of fixations, reinforcing the importance of visual stimuli in capturing consumer attention. This demonstrates the combined effect of screen placement and engaging visual elements feature on consumer gaze behavior, providing valuable insights for optimizing packaging design and positioning strategies.



» **Figure 6:** *A visual diagram of heat maps (duration of fixations) obtained for model packaging images*

Table 5 shows the summary of the data of those who chose the packaging imagery styles that most influenced their consumer choice. shows that style 2, the images of instant lemongrass drinks served in a cup with steam, was the most chosen style. From interviews about the reasons for participants who chose style 2, which were images of instant lemongrass drinks served in a cup with steam, chose it because of the warm feeling felt when looking at it with their eyes, which is related to the preference to consume tea while it is hot rather than cold, and the feeling of being close lemongrass drinks served in a cup with steam, was the most chosen style. From interviews about the reasons for choosing each style, it was found that the participants who chose style 1, which were images of instant lemongrass drinks served in a cup, chose it for its simplicity.

A total of two participants chose this style of imagery. Meanwhile, the participants who chose style 2, which were images of instant lemongrass drinks served in a cup with steam chose it because of the warm feeling felt when looking at it with their eyes, which is related to the preference to consume tea while it is hot rather than cold, and the feeling of being close to a product as if it is in front of you, which is related to distance unlike other styles of images. There was a total of 15 participants who chose this imagery. Finally, the participants who chose style 3 chose it because of the refreshing feeling that could be felt by looking at it with their eyes, which is related to the preference for consuming tea while it is cold rather than hot, and the sensation of the movement of water that attracts the eye. There was a total of 13 participants who chose this imagery.

Table 5

Consumer's choice of packaging imagery style

Consumers' choice					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	[1] Images of instant lemongrass drinks served in a cup	2	6.7	6.7	6.7
	[2] Images of instant lemongrass drinks served in a cup with steam	15	50.0	50.0	56.7
	[3] Images of instant lemongrass drinks being poured into a cup	13	43.3	43.3	100.0
	Total	30	100.0	100.0	

Discussion

This research looks at how the style of images on the packaging of an instant lemongrass drink affects people's attention using eye-tracking technology and an analysis of the number of fixations to see how much attention people pay to it before they decide to buy it. This research fits with the work of Gofman et al. (2009), who discovered that using eye-tracking technology to study how people see packaging could help the researchers find the most interesting parts. It was found that images of instant lemongrass drinks served in a cup with steam and images of instant lemongrass drinks being poured into a cup resulted in a dynamic emotion.

This type of imagery can attract more attention from consumers than packaging imagery that results in a calm emotion, using more detailed packaging imagery can add interest to the product, according to a study by Gvili et al. (2015). While the number of fixations of consumers in a large number of products may be due to high interest in the product, the number of fixations may be caused by a certain uncertainty about a product that may be less interesting or by consumers revisiting a previous product of interest; alternatively, there may be a smaller number of fixations for a longer viewing period compared to other products. Re-examination is a process where consumers quickly review the information or details of a product to gain a better understanding before moving on to another one. The results show that the numbers of views of the three packaging imagery styles are significantly different, which is also in line with the concept of Gofman et al. (2009), who explain that images with increased movement are more attractive.

In terms of the results of the fixation duration analysis, it was found that the images of instant lemongrass drinks served in a cup with steam had the longest duration of fixations. Next were the images of instant lemongrass drinks being poured into a cup, and images of instant lemongrass drinks served in a cup, respectively. This is in line with the concept of Köster & Mojet (2015), whose results show that the packaging imagery plays an important role in attracting consumers to look at it for a long time and retaining their attention. Vyas & Bhuvanesh (2015) state it is also important to make a good first impression on consumers. Kovačević & Brozović (2018), in line with the findings of Gil-Pérez, Rebollar & Lidón (2020), found that animated or highly detailed images could generate attraction and elicit positive responses from consumers. This is in line with the concept of Rolls, Rowe & Rolls (1982), who states that the appearance of the food that consumers see affects human consumption behavior. When the duration of a consumer's long-term gaze on one product is less than that on another, it may be because the product is very attractive at first, which makes interest in the brand last for a long time, but unlike with other products, there is no need to go back and look at it again. The packaging imagery of these other products can be looked at for a long time.

The analysis showed that there was an effect on customers' choosing when there was a considerable average duration of fixations on the packaging of a product, which was consistent with the concepts of Rebollar et al. (2015) and Clement et al. (2017), who state that the image on the packaging affects consumers' purchasing decisions, and Sielicka-Różyńska, Jerzyk & Gluza (2021), who state that packaging with different designs has a greater effect on consumers' purchasing decisions than the time it takes to look at the product. The concept of Fenko, Nicolaas & Galetzka (2018) shows that interest in health labels on packaging can predict consumers' health food choices, which is consistent with the findings of this study, which finds that the duration of looking at the packaging imagery has effects on the purchase decision, and consistent with the study by Huang, Peng & Wan (2021), which found that the design of the colors and flavors of the packaging can significantly influence a consumer's search for information, so taking longer to look at the packaging affects a consumer's purchase decision. According to the findings of this study, the duration of viewing packaging imagery has effects on purchasing decisions. However, we conducted a more thorough investigation of the proportion of packaging styles with the longest duration that participants viewed in relation to the packaging style that most influenced consumers' purchasing decisions using the one-proportion z-test. Our findings indicated that there was no consistency. During the test, participants observed the packaging designs on the screen and inquired about their differences.

It demonstrates that consumers are in the process of searching for products for an extended period of time, which may be a result of comparing similar products.

However, they are not always interested in making a purchase. This implies that the most effective strategy may not be to adopt a similar packaging design strategy or to create a counterfeit product. This is consistent with the findings of a study conducted by Melendrez-Ruiz et al. (2022) on the impact of gazing patterns on purchase decisions. The potential for confusion among comparable products exists if the product displays a similar pattern. It is a result of purchasing motivation and complicates decision-making. In this research, it was also found there were various additional factors, including consumer behavior and personal taste, which influenced the results. As stated in the conclusion, regarding the reason for choosing imagery, the personal preference to drink something while hot led to some participants paying attention to the image with steam because it gives a warm feeling.

Meanwhile, the preference for consuming products while cold led other participants to choose the image with pouring water because it gives a refreshing feeling. This is consistent with the research by Chynal et al. (2016), who found that the use of EEG could help in the analysis of the relationship between brain responses and purchase decisions. The analysis concluded that the use of eye-tracking technology was an effective tool to analyze consumer behavior.

Additionally, the results of this study are consistent with the study by Tonkin, Ouzts & Duchowski (2011) in the field of using eye-tracking technology to analyze consumer interest and evaluate the effectiveness of packaging, which shows that this context of research and evaluation in different environments can result in consistent research results. This is especially true in terms of the impact on consumers' purchasing decisions. The use of real and virtual environments in the research of Tonkin, Ouzts & Duchowski (2011) gave results consistent with research using laboratory environments.

Conclusion

The findings of this study emphasize the critical role of packaging imagery in influencing consumer interest and choice, particularly in the context of instant lemongrass drink packaging. Among the three styles examined, the imagery of a drink served in a cup with steam not only showed the highest average fixation duration but also emerged as the most preferred style, as revealed through consumer surveys. This style's ability to evoke warmth and emotional engagement underscores the importance of dynamic emotional packaging imagery and visually compelling elements in packaging design.

Additionally, the study highlights that images of instant lemongrass drinks being poured into a cup on packaging are also effective in capturing attention due to their dynamic emotion, offering an alternative for designers aiming to appeal to consumers.

Statistical analyses, including ANOVA and Tukey HSD tests, demonstrated significant differences in fixation metrics across the styles, reaffirming that the design of visual elements profoundly impacts consumer gaze behavior. The variability in fixation patterns further reflects diverse consumer preferences, shaped by individual experiences and emotional responses. By integrating eye-tracking technology with consumer surveys, this research provides actionable insights for packaging designers and marketers, enabling them to align their strategies with consumer behavior and optimize product visibility and appeal in competitive markets.

These findings contribute to the broader understanding of how visual stimuli in packaging can be tailored to enhance consumer engagement, reinforcing the strategic importance of thoughtful and targeted design elements in fostering brand differentiation and loyalty.

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