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Effects of Visual Design Elements on Consumer Attention and Purchase Intention in Café App

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Abstract

With the number of coffee shops in South Korea now exceeding 100,000 and mobile ordering continuing to expand, café applications have become vital platforms for engaging consumers. This study examines how variations in app design, one featuring a model alongside seasonal products and another displaying only the products, affect visual attention, consumer attitude, and purchase intention. Using the Tobii Pro Spectrum eye tracker, fixation duration and attention patterns were recorded, followed by a survey of 35 participants. Paired t-test results indicated that Advertisement 1 generated significantly longer fixation durations than Advertisement 2 (p = 0.024), and the seasonal menu drew more attention than the regular menu (p = 0.035). Regression analysis further revealed that attention to the seasonal menu (β = 0.761, $p < 0.001$) and Advertisement 1 (β = 0.595, p = 0.028) significantly enhanced consumer attitude, which in turn strongly predicted purchase intention (β = 0.760, $p < 0.001$). Overall, the findings underscore the importance of visually appealing, seasonally themed content and the inclusion of human imagery in boosting consumer attention and encouraging app-based purchase behavior.

Keywords: cafe apps; eye-tracking experiment; visual attention; attitude; purchase intention

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1. Introduction

South Korea's coffee market has surged—over 100,000 cafés by 2023 (Korean Statistical Information Service, 2023)—and ordering has rapidly shifted to mobile, with smart-order usage up 240% among MZ consumers and 171% among other generations from 2019 to 2022 (Shinhan Card Big Data Research Center, 2023). As in-app ordering becomes a primary touchpoint, the quality of on-screen advertising and interface design directly shapes perceptions and actions (Baek et al., 2019; Jeon, 2018). Because consumers make fast, visually driven judgments in mobile contexts, cues such as color, human imagery, and layout guide attention and emotion and, in turn, purchasing (Pieters & Wedel, 2004; Wedel & Pieters, 2017). Featuring human figures can heighten warmth, relatability, and trust—attributes especially salient for experiential categories like coffee (Kim & Lennon, 2008). Accordingly, this study examines how specific visual elements in café-app advertising influence attention and purchase intention.

Despite the growing use of café apps, few studies have examined how specific advertisement designs influence visual attention and behavioral responses. While prior research has explored consumer responses to online visual stimuli and mobile advertising, there remains limited empirical evidence integrating objective visual attention data with self-reported behavioral outcomes in the café service context.

Unlike prior studies focusing solely on self-reported data, this research integrates physiological measures to better capture subconscious attention patterns. Therefore, this study aims to fill that gap by analyzing how different visual elements in café app advertisements—particularly those featuring seasonal products—affect users' attention, attitudes, and purchase intentions. To achieve this, the study employs an eye-tracking experiment using Tobii Pro Spectrum to objectively measure gaze behavior, followed by a survey to assess consumer perceptions and intentions. By combining physiological and perceptual data, this research contributes to a deeper understanding of how visual design influences consumer engagement in mobile café platforms and provides actionable insights

for digital marketers and app designers seeking to enhance customer interaction and conversion.

2. Literature Review

2.1. Visual Attention

Visual attention plays a crucial role in how consumers process and interpret digital marketing stimuli (Yang et al., 2024), particularly within visually dense environments such as mobile café applications. In app interfaces, advertisements and menu items often compete for limited visual space, making the quality of visual design fundamental for capturing user focus. Eye-tracking has emerged as a reliable method for objectively measuring visual attention by recording eye movements, fixation counts, and durations, which serve as indicators of cognitive engagement and information processing (Wedel & Pieters, 2017). Unlike self-reported attention measures that can be distorted by recall bias or social desirability (Podsakoff et al., 2003), eye-tracking provides real-time, unbiased evidence of where and how users allocate their visual resources.

In hospitality and foodservice contexts, attention allocation is especially critical because menus and advertisements present numerous competing cues (Reale & Flint, 2016; Xu et al., 2024). Studies have shown that design elements such as icons, color schemes, and label formats significantly influence both gaze behavior and product selection. For instance, Lee and Wei (2024) found that directive allergen labels (e.g., icons) attracted faster fixations than textual labels, whereas semi-directive formats were preferred overall, indicating that visual salience and preference are not always aligned.

Further, Kim et al. (2018) reported that physical activity–based labeling formats generated higher visual engagement and healthier menu selections compared to numeric calorie indicators. Jeon et al. (2021) found that upper menu boards and textual content received more fixations than images in food stall settings, highlighting the impact of layout and positioning on consumer gaze. Complementing these findings, Yang (2012) challenged assumptions about “sweet spots” in menu scanning patterns, revealing that actual gaze paths are more

varied than previously believed. Collectively, these studies confirm that visual attention is not merely a precursor to consumer decision-making but a measurable cognitive process that reflects engagement, preference, and judgment.

2.2. Consumer Attitude

Beyond visual engagement, consumer attitude functions as a psychological mediator linking perceptual responses to behavioral outcomes such as purchase intention (Bramwell & Alletorp, 2001; Confente & Vigolo, 2018; Loureiro, 2015; Yeung & Leung, 2007). In hospitality research, attitude has been shown to capture both affective and cognitive evaluations of service experiences. Yilmazel (2024) found that perceived restaurant quality influenced revisit intention and electronic word-of-mouth behavior, with consumer attitude moderating this relationship. Similarly, Johns and Pine (2002) emphasized that attitudes in foodservice consumption are shaped not only by tangible product attributes but also by emotional, cultural, and experiential factors.

In digital contexts, persuasive visual cues—such as appealing imagery, balanced layouts, and perceived benefits—have been found to significantly affect consumer attitudes and purchase intentions (Pillai et al., 2022). Human imagery in advertisements, in particular, attracts fixations and fosters emotional engagement due to people's innate tendency to focus on faces, thereby enhancing trust and warmth perceptions (Rosbergen et al., 1997). These findings suggest that well-designed visual elements can shape not only immediate attention but also favorable evaluative responses toward brands or platforms (Kim & Hyun, 2024). Consumer attitude is an evaluative disposition toward using online food-delivery services, shaped by e-service quality, trust, perceived food quality, and convenience/time-saving motives. In this context, attitude acts as a pivotal mediator transmitting these motivations to the intention to order (Al Maalouf et al., 2024).

2.3. Purchase Intention

Behavioral intention represents an individual's motivational state indicating the likelihood of performing a specific behavior in the future (Ajzen, 1991). It serves as a bridge between attitude and actual behavior, reflecting how personal evaluation, perceived control, and social influence translate into planned action. Within consumer research, behavioral intention has been widely applied to predict diverse decision-making contexts such as travel choices, technology adoption, and food consumption (Chen et al., 2025; Ju et al., 2025; Zhu et al., 2024). Thus, understanding behavioral intention provides valuable insights into how internal psychological factors and external design stimuli interact to drive consumer engagement and purchasing behavior.

Purchase intention, as a specific form of behavioral intention, represents a consumer's likelihood or willingness to buy a specific product or service, often shaped by attitudes, perceived value, and contextual stimuli (Ramírez-Correa et al., 2020). In the food and beverage industry, especially for coffee and café products, purchase decisions often merge functional motives with emotional and moral considerations. Research on specialty and organic coffee has demonstrated that the Theory of Planned Behavior (TPB) provides a robust framework for explaining these intentions, emphasizing the influence of attitude, subjective norms, and perceived behavioral control (Wibowo et al., 2022). Beyond rational factors, consumers' moral values and social consciousness—such as environmental care and corporate social responsibility—can strengthen purchase intention by adding ethical meaning to consumption. These findings suggest that purchasing decisions for café beverages are not purely utilitarian but reflect personal identity, sustainability beliefs, and social influence.

As the café industry becomes increasingly digital, technology-mediated environments further shape how purchase intentions are formed. Mobile apps now serve as major purchase channels, integrating visual design, user interface quality, and perceived value as key determinants of consumer behavior. Hsu and Lin (2016) found that perceived value, stickiness, and social influence significantly affect in-app purchase intention, indicating that

emotional attachment and peer identity enhance the motivation to transact digitally. Similarly, Wang et al. (2022) showed that users' trust, price value, and ease of use positively influence attitudes toward mobile food-ordering apps, which in turn predict continued usage and purchase intention. Visual and navigational design have also been highlighted as crucial to conversion: Kapoor and Vij (2018) identified visual appeal and information clarity as the most influential mobile app attributes that drive consumer choice in online food delivery platforms. Moreover, Okumus and Bilgihan (2014) argued that restaurant and café apps that incorporate nutritional transparency, enjoyment, and self-efficacy can motivate users to make healthier, more deliberate food and drink purchases. In food-app settings, perceived value—mediated by trust—significantly increases purchase intention, whereas perceived quality shows no direct effect on intention (Lima et al., 2024). Thus, design strategies that heighten trust signals may convert attention into value perceptions more effectively than quality cues alone.

3. Methodology

3.1. Research Design

This study adopted a quantitative experimental design that integrates eye-tracking technology with a self-administered survey to examine the effects of visual design elements in café mobile applications on consumer attention, attitude, and purchase intention. The study followed a sequential mixed-method approach, where the objective eye-tracking data were first collected to measure visual attention patterns, followed by a questionnaire to capture participants' subjective perceptions and behavioral intentions. This two-step design ensured a comprehensive understanding of both the unconscious and conscious aspects of consumer responses to digital advertising stimuli.

The overall research framework was grounded in the Stimulus–Organism–Response (S-O-R) model (Mehrabian & Russell, 1974; Wang & Sparks, 2016), in which visual design elements (stimuli) were expected to influence users' psychological and emotional states (organism),

represented by attitude, leading to behavioral outcomes such as purchase intention (response). The integration of both physiological (eye-tracking) and perceptual (survey) data allowed for triangulation, strengthening the validity of the findings.

3.2. Experimental Stimuli and Materials

The visual stimuli consisted of four key design variations: (1) Advertisement 1, featuring a human model holding a seasonal beverage with promotional text ("Spring Seasonal Menu"); (2) Advertisement 2, displaying only the beverage products without a model; (3) a Seasonal Menu image showing limited-time drinks with vibrant seasonal colors; and (4) an Original Menu image representing the regular product line. All images were designed to resemble authentic café app layouts to ensure ecological validity. Stimuli were developed by authors, maintaining uniform background color, font style, and resolution to minimize confounding variables.

3.3. Participants

A total of 35 participants were recruited through university bulletin boards and social media posts. All participants were university students aged between 19 and 30 years, representing the MZ generation (Millennials and Gen Z) who are the primary users of mobile café applications (Hua et al., 2024). Eligibility criteria required participants to (a) have prior experience using mobile ordering or café-related apps, and (b) possess normal or corrected-to-normal vision. Participation was voluntary, and all subjects provided informed consent before taking part in the experiment.

3.4. Eye-Tracking Experiment

Eye-movement data were collected using the Tobii Pro Spectrum Pro 1200Hz eye tracker, known for its high temporal precision and accuracy in recording fixation and saccade data. The experiment was conducted in a controlled laboratory setting with neutral lighting and minimal distractions. Participants were seated approximately 60 cm from the display monitor

and instructed to view each stimulus naturally, as if browsing an actual café application. A standard five-point calibration was performed before each session to ensure data accuracy.

Each participant viewed the four stimuli consecutively while the eye tracker recorded metrics such as fixation duration (ms) and fixation count, which served as indicators of visual attention. After completing the eye-tracking session, participants filled out a structured questionnaire measuring attitude toward the app (e.g., "I find the app design appealing") and purchase intention (e.g., "I would like to purchase a drink through this app") on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

3.5. Data Analysis

All statistical analyses were conducted using IBM SPSS Statistics 26.0, while the eye-tracking data were processed and refined through Tobii Pro Lab software. To begin, Areas of Interest (AOIs) were manually defined for each experimental stimulus to represent key visual components within the advertisements and menus. In the café app advertisements, AOIs were designated for the model's face, product image, and promotional text, while in the menu stimuli, AOIs encompassed the seasonal beverage section, original beverage section, and menu label areas. The AOIs were determined based on the design composition and theoretical relevance to user decision-making cues, ensuring that visual data corresponded precisely to the intended elements of interest.

From these AOIs, fixation metrics—including total fixation duration (in seconds) and fixation count—were extracted for each participant. Fixation duration was used as the primary indicator of visual attention, as longer fixation times reflect greater cognitive processing and engagement with the stimulus content. Outlier values and incomplete data caused by calibration loss or tracking interruptions were removed to maintain data integrity. The refined fixation dataset was then exported from Tobii Pro Lab and integrated into SPSS for statistical analysis.

Descriptive statistics were computed to summarize participant characteristics and attention data. Paired-sample t-tests were employed to compare fixation durations between the two

advertisements (Advertisement 1 vs. Advertisement 2) and between the two menu types (Seasonal vs. Original). To further investigate relationships among key variables, multiple linear regression analysis was conducted to test the effects of fixation duration on attitude, followed by a simple linear regression to assess the impact of attitude on purchase intention. Significance levels were set at $p < 0.05$ for all analyses.

The combined approach of physiological measurement and behavioral data analysis provided a robust examination of how users visually and cognitively engage with café app content. By linking eye-tracking metrics with attitudinal outcomes, the study not only captured real-time attention patterns but also revealed how design features shape user perceptions and behavioral tendencies.

4. Results

4.1. Heatmap Results

Figure 1 presents the heatmaps of visual attention for the two café app advertisements. The color intensity represents fixation density, with red areas indicating the highest concentration of gaze points. As shown, Advertisement 1 (left), which features a model holding a beverage alongside the “Spring Seasonal Menu” text, elicited more concentrated visual attention around the model’s face and the upper section of the screen. In contrast, Advertisement 2 (right), which displays only the products without a human model, demonstrated a more dispersed pattern of attention, primarily focused on the beverage images and text banners. These results indicate that human imagery in the advertisement successfully captured and maintained user attention, suggesting the model acted as a visual anchor that directed users’ gaze before moving toward the menu area.

Figure 1. Heatmap Result

4.2. Paired t-test Results

Table 1 shows the paired t-test results comparing mean fixation duration times between Advertisement 1 and Advertisement 2. Advertisement 1 recorded a higher mean fixation duration (M = 1.072, SD = 0.643) than Advertisement 2 (M = 0.775, SD = 0.565), and this difference was statistically significant (t = 2.369, p = 0.024). This suggests that the inclusion of a model in the advertisement enhanced sustained visual attention, making the ad more engaging and effective at retaining user focus.

Similarly, Table 2 compares the fixation duration on the Seasonal Menu versus the Original Menu. The results indicate that the Seasonal Menu (M = 0.912, SD = 0.847) attracted significantly longer fixation durations than the Original Menu (M = 0.534, SD = 0.482), with a significant difference (t = 2.191, p = 0.035). This finding implies that the seasonal promotion captured more visual interest, likely due to its novelty, vibrant colors, and limited-time appeal.

Table 1. Paired t-test Results - Advertisement 1 and Advertisement 2 Duration Time

	Mean	**Standard Deviation**	***t*-value**	***p*-value**
Advertisement 1 Duration Time	1.072	0.643	2.369*	0.024
Advertisement 2 Duration Time	0.775	0.565		

Note. *$p < 0.05$.

Table 2. Paired t-test Results - Seasonal and Original Menu Duration Time

	Mean	**Standard Deviation**	***t*-value**	***p*-value**
Seasonal Menu Duration Time	0.912	0.847	2.191*	0.035
Original Menu Duration Time	0.534	0.482		

Note. *$p < 0.05$

4.3. Linear Regression Analysis Results

To examine the influence of visual attention on consumer attitude, a multiple linear regression analysis was conducted using fixation duration times for the four visual elements (Advertisement 1, Advertisement 2, Seasonal Menu, and Original Menu) as predictors. The results, presented in Table 3, show that the model was statistically significant ($F = 6.060$, $p < 0.05$) and explained 61.8% of the variance in attitude (Adjusted $R^2 = 0.516$). Among the predictors, fixation duration on Advertisement 1 ($\beta = 0.595$, $p < 0.05$) and on the Seasonal Menu ($\beta = 0.761$, $p < 0.001$) had significant positive effects on consumer attitude. In contrast, the fixation durations for Advertisement 2 and the Original Menu were not statistically significant predictors. These findings suggest that advertisements featuring human imagery and seasonally themed menu content are more effective in enhancing consumers' favorable evaluations of the café app.

A simple linear regression was then conducted to determine the effect of consumer attitude on purchase intention. As shown in Table 4, the model was significant (F = 45.174, p < 0.001), explaining 57.8% of the variance in purchase intention (Adjusted R^2 = 0.565). The results indicate that attitude had a strong and positive effect on purchase intention (β = 0.760, p < 0.001), demonstrating that users who evaluated the app more positively were also more likely to express higher purchase intentions. Overall, the regression results confirm that visual attention to human-centered and seasonal design elements enhances positive attitude, and that attitude serves as a key driver of purchase intention within mobile café applications.

Table 3. Results of Linear Regression Analysis toward Attitude

Model	Unstandardized Coef.		Standardized Coef.	*t*-value
	B	Std. Error	Beta	
(Constant)	3.398	0.268		12.679
Advertisement 1 Duration Time	0.644	0.265	0.595	2.432*
Advertisement 2 Duration Time	0.319	0.214	0.318	1.489
Seasonal Menu Duration Time	1.172	0.263	0.761	4.450***
Original Menu Duration Time	-0.083	0.159	-0.095	-0.522

Note. Dependent Variable: Attitude; R^2 = 0.618, Adjusted R^2 = 0.516, F = 6.060; *p < 0.05, ***p < 0.001.

Table 4. Results of Linear Regression Analysis toward Purchase Intention

Model	Unstandardized Coef.		Standardized Coef.	*t*-value
	B	Std. Error	Beta	
(Constant)	1.324	0.363		3.646
Attitude	0.659	0.098	0.760	6.721***

Note. Dependent Variable: Purchase Intention; R^2 = 0.578, Adjusted R^2 = 0.565, F = 45.174; ***p < 0.001.

From a practical standpoint, these findings offer valuable implications for marketers and designers of café mobile apps. First, incorporating visually engaging seasonal elements and using relatable human models in promotional materials can enhance user attention and foster more favorable attitudes. Second, as attitude significantly predicts purchase intention, investing in visually optimized app advertisements can directly contribute to higher sales conversions. Ultimately, this study highlights the importance of integrating consumer psychology and visual design in app-based marketing strategies to better align with the preferences of digitally engaged users, especially those in the MZ generation who are driving the growth of mobile café consumption.

5. Discussion and Implications

This study examined how visual design elements in café application advertisements influence consumer attention, attitude, and purchase intention using eye-tracking and survey methods. The findings revealed that advertisements featuring a human model and seasonally themed menu designs elicited higher fixation durations, more favorable attitudes, and stronger purchase intentions. These results align with prior research emphasizing the role of visual stimuli in attracting gaze and shaping consumer evaluation (Pieters & Wedel, 2004; Kim & Lennon, 2008). The human figure functioned as a visual anchor, directing users' attention and evoking emotional engagement, while the seasonal content created novelty and temporal relevance that enhanced appeal. The regression results further demonstrated that visual attention positively influenced attitude, and that attitude significantly predicted purchase intention, confirming the mediating role of affective evaluation in digital consumer behavior.

5.1. Theoretical Implications

This study aimed to investigate how visual design elements in café application advertisements—specifically the presence of human models and seasonal menu imagery—affect consumers' visual attention, attitude, and purchase intention. Using an eye-tracking experiment combined with survey data, the results revealed clear evidence that human-

centered and seasonally themed visuals significantly enhanced both attention and favorable evaluations, leading to higher behavioral intention. These findings emphasize the psychological importance of visual stimuli in shaping user experience and decision-making in digital consumption contexts. This study extended the S–O–R framework to café-app advertising by evidencing a perceptual–affective pathway in which human-centered and seasonal cues (S) heighten visual attention (O) that, via attitude, increases purchase intention (R). This AOI-level linkage provides a multimethod template for connecting specific interface elements to behavioral intentions in m-commerce

The heatmap and fixation analyses indicated that advertisements featuring a model (Advertisement 1) attracted stronger and more focused visual attention compared to product-only designs (Advertisement 2). This pattern supports existing evidence that human figures act as visual anchors and emotional triggers (Rosbergen et al., 1997; Pieters & Wedel, 2004), capturing attention more efficiently due to humans' innate social cognition tendencies. Eye-tracking studies consistently show that faces naturally guide gaze orientation and elicit emotional engagement, and this research extends that understanding to mobile café advertising. In digital interfaces where consumers are bombarded with competing visual elements, incorporating a human presence can help establish relatability and encourage deeper cognitive processing.

Similarly, the longer fixation durations on seasonal menus compared to regular ones highlight the effectiveness of novelty, color contrast, and temporal relevance in stimulating consumer engagement. These findings align with marketing theories of temporal framing and scarcity appeal, which suggest that limited-time and context-specific offers enhance perceived value and urgency (Aggarwal & Vaidyanathan, 2003). In a café app environment, where users make quick visual and behavioral decisions, the seasonal framing of menus serves not only as an aesthetic enhancement but also as a behavioral cue prompting purchase action.

Regression results further revealed that fixation duration on human-centered and seasonal visuals positively predicted consumer attitude, while attitude itself emerged as a strong

determinant of purchase intention. This finding reinforces the Stimulus–Organism–Response (S-O-R) model (Mehrabian & Russell, 1974), demonstrating that external stimuli such as visual design elements (S) influence internal emotional and cognitive states (O), which in turn lead to behavioral responses (R). Specifically, the model confirms that visual attention represents an initial sensory engagement process that activates positive emotional evaluations, ultimately translating into higher intention to purchase.

Furthermore, the observed mediating effect of attitude underscores its pivotal role in digital consumer behavior. Consistent with prior findings (Loureiro, 2015; Confente & Vigolo, 2018), this study suggests that favorable attitude formation is a key psychological mechanism that bridges perception and action. Attitude does not form merely through rational evaluation but through affective responses triggered by design aesthetics, warmth, and perceived creativity. In the context of café applications, a well-designed advertisement can thus shift the user's cognitive and emotional state toward a brand, enhancing not only purchase intention but also long-term brand preference and loyalty.

Overall, these results contribute to a deeper understanding of how visual communication, emotional engagement, and consumer cognition interact within mobile service environments. The study empirically demonstrates that visual attention is not an isolated perceptual response but an integral part of the broader decision-making process. By integrating eye-tracking measures with self-reported attitudes, this research bridges the gap between objective observation and subjective evaluation, offering a comprehensive model of how consumers experience and respond to digital café advertisements.

5.2. Practical Implications

From a managerial and industry perspective, this study provides several practical insights for marketers, café operators, and mobile app designers. As competition intensifies in the coffee industry and digital engagement becomes a key driver of sales, creating visually compelling and psychologically resonant advertisements is essential for influencing consumer attention and purchase decisions.

First, the findings highlight the importance of human-centered visuals in mobile café advertisements. The inclusion of a model, barista, or relatable character helps humanize the brand and creates a sense of warmth and familiarity, which encourages users to engage more deeply with the app interface. In practice, café brands can feature smiling staff members or customers enjoying beverages to strengthen emotional connections and foster brand trust. Such imagery is particularly effective in digital spaces where physical interaction is limited, helping bridge the emotional gap between the brand and consumer.

Second, seasonal and time-limited visual content should be strategically incorporated into café app marketing. The study demonstrates that users pay greater attention to seasonally themed menus—such as spring or holiday promotions—because they evoke novelty and urgency. App designers and marketers can capitalize on this by updating visuals regularly according to seasonal events, cultural holidays, or local trends. This not only sustains user curiosity but also reinforces the perception that the brand is dynamic, responsive, and culturally aware.

Third, marketers should invest in visual hierarchy and layout optimization to guide user gaze effectively. Elements such as balanced composition, color contrast, and the placement of promotional messages can determine whether users notice and process key information. For instance, placing the most appealing image (e.g., the model's face or product close-up) in the upper-central region—where users naturally fixate—can enhance message recall and product recognition.

Finally, the results emphasize the strategic role of attitude formation in driving purchase intention. Since positive attitude is shaped through emotionally engaging and visually satisfying experiences, marketers should focus on creating holistic digital environments that combine aesthetic pleasure, intuitive usability, and consistent brand storytelling. This is especially relevant for the MZ generation (Millennials and Gen Z), who dominate café app usage and value both visual appeal and convenience. By integrating interactive features, personalized recommendations, and visually engaging seasonal campaigns, brands can deepen user loyalty and stimulate repeat purchase behavior.

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