

THE INFLUENCE OF COUNTRY-OF-ORIGIN INFORMATION AND OTHER STIMULUS-
DRIVEN CUES IN E-COMMERCE: THE ROLE OF NEUROMARKETING.

Jasmine Ewurabena Don-Arthur

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University of East Anglia
Norwich Business School
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Declaration

I hereby declare that this PhD thesis entitled “The Influence of Country-Of-Origin Information And Other Stimulus Driven Cues In E-commerce: The Role Of Neuromarketing.” is my own original work and has not been submitted before to any institution for assessment purposes.

I have acknowledged all sources used and have cited these in the reference section.

Abstract

This study investigates how country-of-origin (COO) information, operationalised as “made-in” labels, influences consumer visual attention for competitive local and foreign products in e-commerce alongside other salient product cues. Addressing limitations of traditional self-report methods, this research adopts a neuromarketing approach, using eye-tracking to capture real-time visual attention allocation during online product evaluation. The study is grounded in an integrated theoretical framework combining the Stimulus–Organism–Response (SOR) model, Cue Utilization Theory (CUT) and Bottom-Up Visual Attention framework. In an eye tracking laboratory, a mixed experimental design was employed to examine how variations of information in product presentation affect visual attention. Via repeated measures, the eye-tracking metric, dwell time, was used as behavioural proxies for processing across information such as COO labels, price, images, and ratings. The findings showed that attentional allocation is shaped by both information cue salience and information type. For example, product images emerged as a highly dominant visual stimuli, strongly capturing attention especially when saliently cued, while price, ratings, and descriptions exerted weaker effects and required more deliberate processing. Furthermore, COO information occupied a consistent intermediate position, maintaining stable influence on attention but neither dominating nor being fully overshadowed by other cues. These results suggest a hierarchy of cue effectiveness and indicate that salience manipulations can guide visual attention, although their effects remain modest relative to the enduring role of COO information. The findings of this research also indicate that marketers for competitive local products compared to competitive foreign options especially must adopt a multifaceted approach/strategy on product information particularly in ecommerce in emerging markets. This is because while country-of-origin (COO) cues can significantly influence consumer decisions, they do not always dominate consumer attention.

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Chapter 1

1.1 Introduction

Background of the study: competition and visibility in e-commerce

The rapid growth of e-commerce has fundamentally transformed retail markets by enabling consumers to access products from sellers across the globe with minimal effort. While this expansion has increased convenience and choice for consumers, it has also intensified competition among sellers, particularly between local businesses in developing economies and international/foreign firms from developed countries that offer similar products. On e-commerce platforms, products from these competing sellers are often displayed side by side, creating a visually crowded environment in which numerous items simultaneously compete for consumer attention. For local businesses in developing economies, this presents a critical practical challenge: how can local products attract consumer attention and compete effectively against well-established foreign brands in highly saturated online marketplaces?

This problem is especially relevant in contexts such as Ghana, where local producers increasingly rely on e-commerce platforms to reach broader markets. Although e-commerce offers these firms an opportunity to overcome traditional barriers such as limited physical distribution and marketing resources, their products often struggle to stand out visually when placed alongside foreign products especially those with stronger brand reputations. As a result, the success of local businesses in e-commerce may depend less on product availability and more on how product information is visually presented and processed by consumers.

One of the most influential pieces of product information shaping consumer evaluations in online contexts is country of origin (COO) information. COO has long been recognized as a powerful top-down cue that affects consumer perceptions, attitudes, and buying decisions. In many developing countries, consumers tend to associate foreign products particularly those from developed economies with higher quality, superior performance, and greater prestige (Nijssen and Douglas, 2011; Karaca et al., 2017). Consequently, foreign products often enjoy a systematic advantage over local alternatives, regardless of objective product attributes.

Empirical evidence supports this pattern. For example, Dogbe et al. (2019) found that although Ghanaian consumers express some degree of ethnocentrism and ideological support for local products, their actual purchase decisions are strongly driven by perceived quality, price competitiveness, and packaging. Foreign products are frequently preferred because they are assumed to offer superior quality. This creates a persistent discrepancy between consumers' stated support for local businesses and their actual buying behaviour, reinforcing the disadvantage faced by small-scale local sellers in online markets.

In e-commerce, COO information is typically communicated through simple visual labels such as "Made in Ghana" or "Made in China." These labels function as top-down cues that activate consumers' pre-existing beliefs and stereotypes about product quality. However, in online shopping environments COO cues do not operate in isolation. Instead, they appear within visually complex interfaces where multiple stimuli including product images, prices, promotions, and design elements simultaneously compete for consumers' attention. These visual features may play a decisive role in whether consumers even notice COO information in the first place.

Problem Statement

While existing research has extensively examined the effect of COO on consumer attitudes and buying intentions, much of this work treats COO as a purely cognitive or evaluative cue, as if consumers actively process this information in a deliberate, top-down manner. At the same time, a growing body of literature highlights the importance of bottom-up visual attention from, stimulus-driven visual cues such as colour, size, brightness, motion, and image salience in capturing attention in digital environments (Dertwinkel-Kalt et al., 2020; Zhang et al., 2021). Figures 1 and 2 below illustrate the difference between top down and bottom-up visual attention, respectively.



Figure 1 Illustrating the goal-oriented nature of top-down visual attention where search is intentional and attention is controlled.

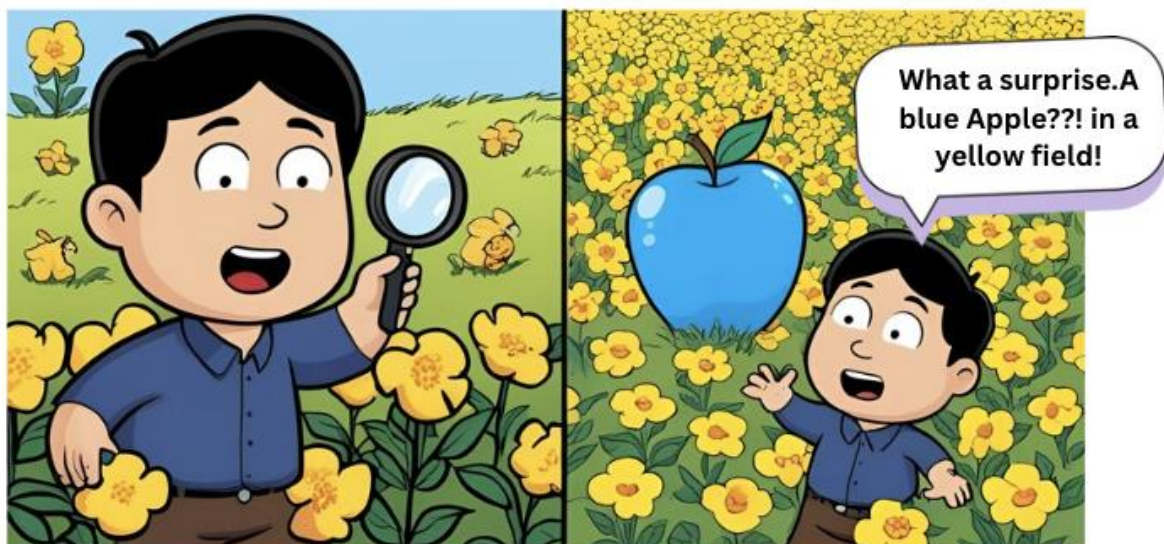


Figure 2 Illustration of bottom-up visual attention where attention is drawn in an unexpected stimulus in the visual field

In e-commerce, elements such as product images, price tags, discount labels, and promotional banners are presented in a bottom-up manner to deliberately guide consumer gaze. These cues can significantly influence which products are noticed, how long they are viewed, and ultimately which options are considered in the decision-making process (Zimmer et al., 2010).

In the context of e-commerce, where visual stimuli are abundant and competition for consumer attention is intense, the interaction between COO information (a top-down cue) and bottom-up

salient cues becomes particularly relevant. Some studies suggest that the presence of salient cues can enhance the effectiveness of COO labels by drawing attention to specific products, ultimately shaping consumer choices. For example, when a product's packaging or its placement on a website makes it visually prominent, this bottom-up salience may overshadow COO information, leading to a preference for the product regardless of its origin (Halkias et al., 2021). Conversely, when COO information itself is visually prominent, it can direct attention more effectively and sway consumer preferences (Insch and Jackson, 2013). This interaction suggests that consumer decisions in e-commerce are not driven solely by cognitive evaluations of product information. Instead, decisions are also shaped by how competing information is visually presented within the interface.

Despite these advances, there remains a research gap in understanding how top-down COO information and bottom-up visual cues jointly influence visual attention and purchase behaviour in e-commerce. Most existing studies examine these cues in isolation, failing to consider how they jointly shape consumer attention and decision-making in visually complex online settings. For instance, Bao et al. (2021) showed that COO image significantly influences purchase intention in cross-border e-commerce, yet COO is often treated independently rather than in conjunction with other visual stimuli. Their findings point to the need for research that integrates COO with bottom-up cues to better explain consumer behaviour in digital marketplaces.

Similarly, Chen and Ku (2023) found that while COO effects and customer ratings significantly influence product popularity, COO images alone do not significantly affect customer evaluations which further indicated this gap. This suggests that although COO may attract attention, its impact on consumer judgments may be moderated by other visual elements, such as product presentation and layout. Brand and Baier (2022a) likewise argue that COO should be examined in multiple-cue environments, yet empirical research rarely captures how COO competes with or is amplified by bottom-up visual cues.

Additionally, little is known about whether bottom-up visual salience can amplify, weaken, or even override the influence of COO information particularly in competitive settings where competitive local products from local businesses are directly compared with foreign products that are well known and established. Most prior studies focus either on cognitive evaluations of COO

or on visual salience effects in isolation, without integrating these two streams within a unified attentional framework.

Lastly, a critical limitation of prior research lies in its predominant focus on developed markets. Less developed regions such as Ghana remain understudied, despite offering a particularly relevant context in which foreign product bias is strong, and local businesses face structural disadvantages for offering competitive products. Consumers in developing economies may be more susceptible to foreign product cues, especially when COO labels signal origins in developed countries (Gao et al., 2019; Steenkamp and De Jong, 2010; Verlegh et al., 2005; Xie et al., 2015). Yet, there is limited empirical research examining how bottom-up visual salience influences attention and decision-making in these settings.

1.2 Research Objectives and Questions

This study addresses this gap by investigating how country of origin information (as a top-down cue) and bottom-up stimulus-driven visual cues on other information types interact to influence consumers' visual attention in e-commerce. The central objective is to examine whether strategically designed bottom-up visual elements can enhance the visibility and attractiveness of local products from developing countries, potentially mitigating the disadvantage associated with foreign COO perceptions.

By focusing on visual attention as a mediating mechanism, this research contributes theoretically to consumer behaviours literature by integrating top-down and bottom-up visual processes within an e-commerce context. Practically, the findings offer actionable insights for local businesses in e-commerce by identifying how visual presentation strategies can be leveraged to improve the competitiveness of local products in online e-commerce marketplaces. In doing so, the study provides a more nuanced understanding of how attention, and product information jointly shape consumer decision-making in digitally saturated environments.

Given the scarcity of knowledge around COO information and other information types with salient bottom-up cues (stimulus driven cues) on visual attention in ecommerce, the current study will address the following research questions:

- To what extent does COO information influence visual attention for competing (local vs. foreign) products in e-commerce?
- To what extent do salient bottom-up cues on other information types (e.g., product image, price) affect visual attention given to competing local and foreign products in e-commerce?
- Between country-of-origin information and other information types with salient bottom-up cues, what has the highest significance of visual attention in e-commerce for competing local and foreign products?

1.3 Significance of The Study

The significance of this study lies in its ability to contribute to both academic literature and practical marketing strategies. First, in contrast to previous studies, this research examines country-of-origin (COO) information at a more granular level by investigating how COO influences visual attention between two directly competing products within the same product category but from different country origins (local versus foreign). Although prior research has established that COO affects consumer evaluations and visual attention, there is limited empirical evidence examining how COO operates in competitive product settings, particularly where local and foreign products are displayed side by side.

Second, this study extends existing research by highlighting the role of salient bottom-up visual cues in shaping consumer attention when evaluating competing products from different country origins. Specifically, the study demonstrates how visual attention is allocated when bottom-up cues are used to enhance comparable information types such as product images, price information, ratings or product information for both local and foreign products. To the researcher's knowledge, this is among the first studies to examine bottom-up cue effects in directly competitive COO contexts.

Third, the study makes a key theoretical contribution by integrating country-of-origin information and bottom-up visual cues within a single analytical framework. While previous studies have examined COO effects and stimulus-driven cues largely in isolation, this research explicitly investigates their interaction in an e-commerce environment. This approach reflects real-world

digital shopping conditions, where consumers are simultaneously exposed to multiple visual and informational cues, and therefore addresses an important gap in the literature.

Fourth, the study contributes to theory by assessing the relevance of visual attention frameworks in contemporary digital environments. It advances existing models to create a conceptual model to suit bottom-up studies such as the present study. This is done by creating an integrated model between Stimulus Organism Response theory, Cue Utilization theory, Bottom-Up Visual Attention theory (Saliency Map Theory and Treisman's Approach theory). By proposing and empirically testing a non-linear relationship between top-down and bottom-up processes, this study further a more realistic representation of how consumers process competing visual information in e-commerce marketplaces.

Finally, the study has important practical implications for e-commerce marketers and local businesses. By providing empirical evidence on how COO information interacts with salient visual cues to shape attention, the findings offer actionable insights into how product displays can be strategically designed. These insights can help local sellers enhance product visibility, improve consumer engagement, and potentially mitigate foreign product bias, thereby strengthening their competitiveness in visually saturated e-commerce environments.

1.4 Structure of the Thesis

This thesis is organized into six chapters. Chapter 1 introduces the background, rationale, research objectives, and significance of the study. Chapter 2 provides a comprehensive review of the literature on visual attention, country-of-origin and neuromarketing. Chapter 3a and 3b presents the theoretical frameworks to guide the present study and hypothesis development. Chapter 4 outlines the research methodology, including the design, participants, and data collection methods. Chapter 5 presents the results of the study, including statistical analysis and interpretation. Chapter 6 discusses the findings, their implications for theory and practice, and chapter 7 covers limitations of the current research and suggestions for future research. The thesis concludes with Chapter 8 for bibliography and Chapter 9 for appendices.

Chapter 2 Literature Review

2.0 Introduction

This literature review explores the interplay between COO information and salient bottom-up cues in influencing visual attention. By examining the theoretical and empirical foundations of these constructs, the review identifies the mechanisms through which they interact and their combined impact on consumer buying decisions in e-commerce. The overarching objective is to provide a comprehensive understanding of how these elements guide visual attention, contribute to the existing body of knowledge, and inform practical applications in marketing and digital platform design. The review is structured into several key sections. Following this introduction, the conceptual foundations of visual attention, COO information, and bottom-up salient cues (both spatial and stimulus driven cues) are explored followed by empirical debates on the topics.

2.1 The Concept of Visual Attention

2.1.1 Visual Attention (VA) Defined

The term "visual attention" encompasses various interpretations across different disciplines, including psychology, marketing, and economics. These definitions from these fields which span decades of literature, exhibit commonalities and shared themes which can be looked at in 3 groups: foundational definitions of visual attention (definitions that served at the basic for understanding visual attention), definitions of visual attention post foundational definitions and digital age definitions (definitions more in line with visual attention in the digital age). These definitions are highlighted below.

2.1.1a Foundational Definitions of Visual Attention.

Visual attention's (VA) foundation can be traced back to Broadbent's work in 1958, where he proposed that VA operates as a selective process, filtering out irrelevant stimuli to focus on significant information. This initial model emphasized the idea of limited attentional resources, suggesting that attention plays a critical role in managing the richness of environmental stimuli and enabling the cognition of relevant information (Milosavljevic et al., 2011). Broadbent's conceptualization provided a platform for subsequent discussions about the selective nature of VA and laid the groundwork for more intricate models.

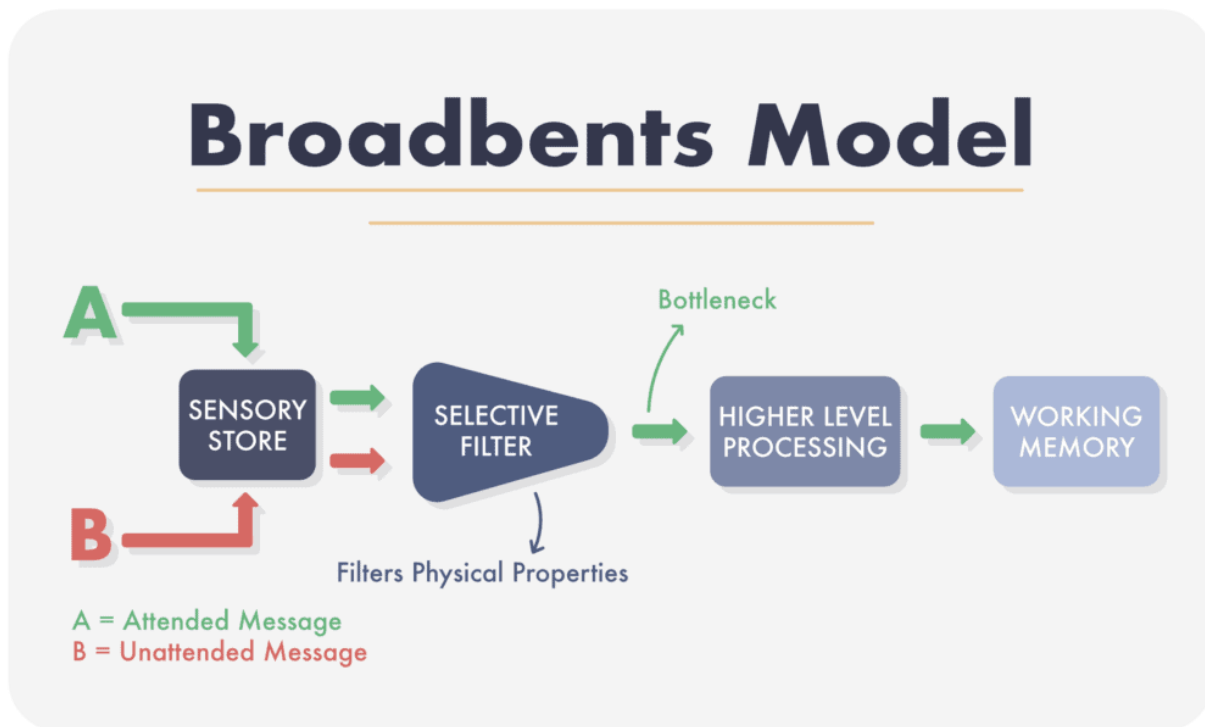


Figure 3 shows a Broadbent's theory of attention by explaining how people process information by filtering out irrelevant stimuli (Image source: <https://practicalpie.com/selective-attention-theories/>)

The understanding of attentional processes was further refined by Treisman and Gelade in 1980, who introduced the idea of feature integration theory. They posited that VA is integral not only in selecting stimuli as argued by Broadbent, but also in binding various features of an object such as color, shape, and motion into a unified percept. Their work suggested a more complex interplay between VA and perception, where VA functions to integrate features into coherent representations instead of merely filtering information (Pleyers, 2023). This shift from mere

selection to integration marked a pivotal moment in attentional research, enriching the theoretical landscape surrounding VA.

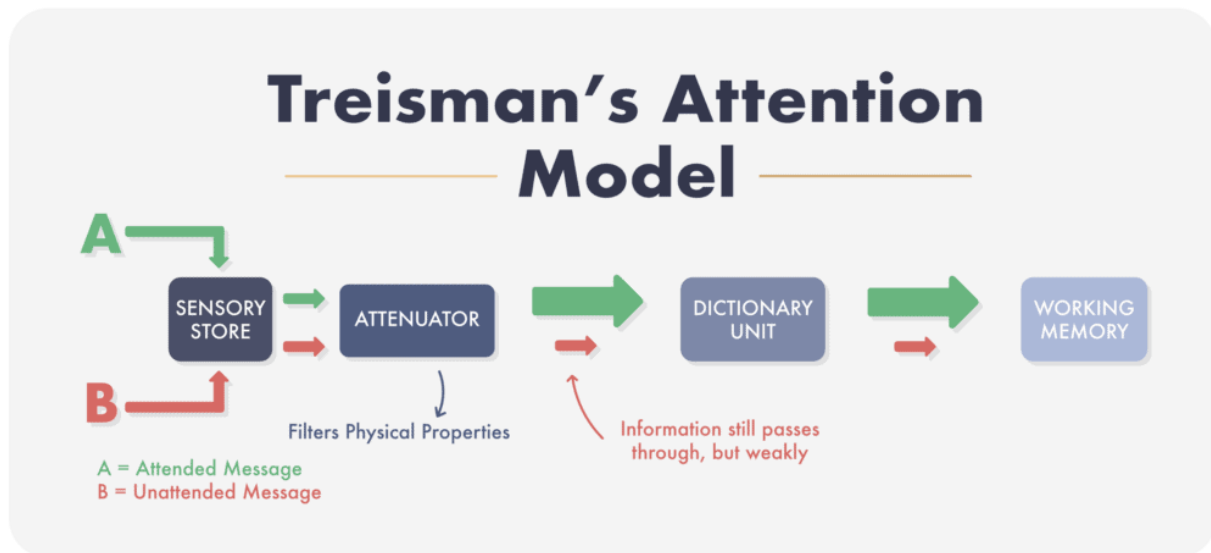


Figure 4 figure shows a Treisman's theory of attention by explaining how people attenuate information by using both useful and non-useful information (which make up the physical properties) rather than just filtering out irrelevant stimuli (Image source: <https://practicalpie.com/selective-attention-theories/>).

Building on these foundational perspectives, Desimone and Duncan's Biased Competition Model (figure 5 below) in 1995 proposed that VA functions as a competitive process, wherein multiple stimuli engage in competition for neural representation. First, multiple visual stimuli compete for VA. Second, the competition for VA is biased toward some stimuli over others. This model allowed for a more dynamic understanding of VA, suggesting that VA not only biases the competition towards goal-relevant stimuli but also modifies neural processing based on contextual priorities and established goals. As such, according to Desimone and Duncan, VA enables the optimization of cognitive resources towards stimuli deemed significant in visual contexts, reinforcing the notion of attentional competition (Pieters et al., 2010). This framework is particularly relevant in marketing, where advertisements often comprise complex visual elements such as images, text, colour, etc. that must be perceived as a unified whole. Together, these foundational models converge on the view that VA operates as a limited yet flexible mechanism that selectively prioritizes, integrates, and biases visual information, enabling coherent perception and efficient goal-directed processing within visually complex environments. Furthermore, they laid the groundwork for subsequent investigations into VA in advertising contexts, where

increased visual complexity and interactivity further shape how consumers attend to and process promotional content.

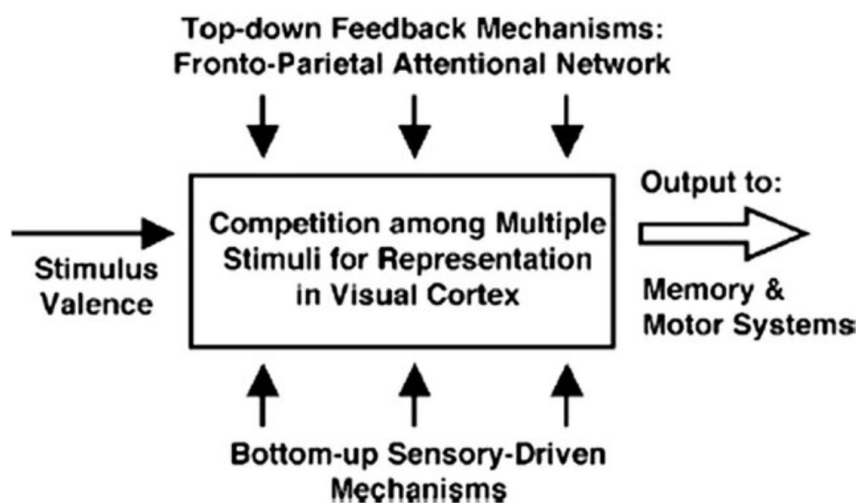


Figure 5 Biased competition model of visual attention and process of emotional information presented by Pessoa and Ungerleider (2004). Image source: https://www.researchgate.net/publication/298098022_Emotion_and_aging_The_impact_of_emotion_on_attention_memory_and_aging_The_impact_of_emotion_on_attention_memory_and_face_recognition_in_late_adulthood/figures

2.1.1b Definitions of Visual Attention Post Foundational Definitions (Centered on Advertising)

With the rise of consumer research in advertising especially in the pre digital boom era, scholars such as Pieters and Wedel (2004) introduced a context-specific definition of VA, particularly within advertising. They defined it as the degree to which consumers focus on specific elements of advertisements, influenced by factors such as brand visibility, imagery, and textual details. This shift represents a pivotal application of VA in understanding consumer buying decisions, indicating that the structure and composition of advertisements can significantly determine where and how consumers direct their attention (Boerman et al., 2014).

In their subsequent work, Pieters et al. (2010b) further elaborated that VA in advertising goes beyond the vision. Specifically, beyond vision, VA entails the allocation of cognitive resources towards visual elements in advertisements, affecting memory and decision-making processes. As such, the elements that capture VA have profound implications for buying decisions, as they shape

what consumers remember and how they respond to advertising stimuli (Q. Wang et al., 2014; X. Wang et al., 2024).

2.1.1c Definitions of Visual Attention in The Digital Era

While these advertising-centered definitions established VA as a selective and cognitively driven process shaping consumer perception and decision-making, the rapid expansion of digital media introduced new levels of visual complexity and interactivity that necessitated a reconceptualization of how VA operates in contemporary/digital marketing environments. For instance, Barnea et al. (2023) defined VA as the process of deciphering the visual complexity of product designs by consumers to directly influence consumer responses. This definition characterizes VA as the selective focus on relevant visual stimuli amidst a plethora of competing information by exploring the interplay between cognitive load and visual characteristics in consumer settings.

Unlike older definitions that primarily considered visual simplicity or feature-based attention, the digital era definitions embrace the idea that visual complexity can both capture attention and complicate cognitive processing, thereby affecting buying decisions. The analysis marks a departure from simplistic notions of VA, recognizing that modern consumers are navigating a landscape rich in visual information that may not align with traditional attentional theories.

2.1.1.1 Conceptualization of Visual Attention in The Current Study

In this study, VA is defined as the selective cognitive process through which consumers identify, prioritize, and focus on relevant visual stimuli amidst a multitude of competing information online. This definition draws upon Treisman's feature integration theory, Pieters and Wedel's work on advertising effectiveness, and contemporary understanding of the digital landscape. By integrating these perspectives, a more holistic understanding of how consumers process visual information is achieved. Specifically, incorporating Treisman's approach, which posits that VA not only selects but also integrates various features of visual stimuli into coherent perceptions, allows for an analysis of how consumers make sense of complex advertisements/stimuli. This integrative function of attention plays a crucial role in advertising, where various elements such as images, colors, and text must work together to create a unified message that resonates with consumers. Additionally, the work of Pieters and Wedel (2004) emphasizes how visual design elements

influence consumer behavior, indicating that the allocation of cognitive resources towards specific advertisements significantly impacts memory and buying decision processes (Pleyers, 2023).

Furthermore, insights from the digital perspective which highlight the evolving nature of VA in contemporary advertising consider factors that affect consumer engagement and decision-making. This is with regards to how consumers interpret and respond to visual complexity in advertising and product designs, underscoring the importance of recognizing the interplay between visual features and cognitive load (Barnea et al., 2023).

In summary, the current conceptualization of VA in this study integrates foundational theories of attention and contemporary insights into consumer behavior within the digital/online space. This multifaceted approach allows us to better understand the mechanisms driving visual engagement most especially in the digital space- which is where this study focuses on.

2.1.2 The Purposes/Goals of Visual Attention

From the definitions of VA above, according to Wolfe (2000), VA serves at least four distinct purposes in the visual system. The first purpose of VA according to Jeremy M Wolfe (2000) is data reduction / stimulus selection. Data reduction occurs because the brain is unable to simultaneously process everything in the continuous influx of information from the environment such as an e-commerce site. Hence, one of the most critical roles for VA is to filter visual information and reduce the overload of information into relevant bits based on which decisions can be made. Research shows that VA can perform this function by actively suppressing irrelevant stimuli (Wolfe,2000) or by selecting potentially relevant stimuli. In either case, VA makes it possible to use limited resources for the processing of some stimuli rather than others.

The second purpose of VA is stimulus enhancement. VA can enhance or alter the processing of the attended stimulus, allowing for ambiguity resolution and noise reduction. Stimulus enhancement can be a consequence of allocating attention to a stimulus directly (e.g. space and object-based attention) or of directing attention to some attribute of the stimulus (e.g. colour, “feature-based attention”). This allows the observer to be an active seeker and processor of information. Behaviourally, stimulus enhancement is observable in faster reaction times and higher accuracy.

The third fundamental purpose of VA is featuring binding. During the early stages of visual processing, the brain decomposes visual information into distinct dimensions such as colour and orientation. These dimensions are processed, to some extent, in separate neural areas (Wolfe, 2000). However, this functional decomposition raises a critical question: How does the brain integrate these compartmentalized features to form a coherent perception of the world? This challenge is known as the "binding problem"(Treisman and Gelade, 1980a). VA plays a pivotal role in addressing the binding problem, and researchers have proposed three primary mechanisms through which this occurs:

1. Flexible Stimulus Representation: VA enables the creation of stimulus representations that are not inherently “hard-wired” in the visual system. This flexibility allows for the combination of features that compete for attentional resources, thereby influencing perceptual outcomes in conjunction with attentional mechanisms (Humphreys, 1998, 2016).
2. Spatial and Object-Based Processing: VA functions on both spatial and object-based mechanisms. This dual functionality means that attention can be directed not only toward specific locations but also toward entire objects, thereby enhancing the perceptual processing of those objects (O’Grady and Müller, 2000).
3. Sustained Attention Requirement: To effectively process visual information, attention must remain focused on an object for a sufficient duration before shifting to another target. This highlights the importance of sustained attention in enabling coherent visual perception (Duncan, 2006, 2013; Robert Desimone and John Duncan, 1995).

The fourth purpose of VA closely related to its role in binding is visual attention’s role in object recognition. Visual recognition here can identify the perceived stimulus and not merely to be aware of the presence of a stimulus. To ‘identify the perceived stimulus’ means to be able to make wilful/intentional connections with the perceived stimuli or further process it. To be ‘aware of perceived stimuli’ is simply to notice the perceived stimuli briefly and not go ahead to process it further. Hence, since object recognition mechanisms cannot simultaneously handle every object in the field, attention serves to deliver digestible/identifiable subsets of the input for recognition.

2.1.3 Modes of Visual Attention

As previously mentioned, humans can only process a limited portion of a visual scene at any given moment. Consequently, they must make several eye fixations to comprehend complex visual environments (Wolfe, 2020). One critical component in this process is dwell time, which refers to the duration during which a viewer's gaze remains relatively stable and fixed on a specific point or area of interest (Horstmann et al., 2016). In both brick-and-mortar settings and e-commerce environments, dwell time serves as a valuable indicator, providing insights into which elements of an advertisement, product packaging, or website effectively capture and sustain consumer attention (Pieters, Wedel, and Zang, 2011). A pertinent question then arises: How do these visual processes unfold? Are there distinct stages or mechanisms involved? Do pre-existing cognitive frameworks influence the way visual information is processed? or does the nature of the stimuli itself dictate the VA process? To address these enquiries, previous research has identified two foundational mechanisms that govern VA top-down and bottom-up attention. According to Awh et al. (2012); Kim et al., (2021); Wolfe, 2000) the location and sequence of dwell times are influenced by these two mechanisms, each preceding attention in a unique way. Top-down attention is driven by preconceived goals and expectations, guiding the attention in a goal-directed manner. In contrast, bottom-up attention is stimulus-driven, automatically capturing attention based on the salient features of the visual environment. These mechanisms are considered in more detail below for a more comprehensive understanding crucial for the direction of the current study.

2.1.3.1 Top-Down Visual Attention

Top-down VA (active selection/goal-oriented selection) is the act of selecting a visual space in a wilful manner (Corbetta and Shulman, 2002a). In other words, it is when a person knows exactly what information they want and uses top-down cues to guide how they pay attention to visual information. The relevance of top-down visual orientation is that it allows consumers to focus on what is needed to complete a task such as a purchase decision without overworking the brain. It further helps consumers block out irrelevant information in the visual field that may delay thought and action processing. On the back of this, Theeuwes (2010) posited that task relevance or goal was a primary driver of top-down VA in natural tasks. Thus, with regards to decision making tasks, it is therefore expected that decision makers will attend preferentially to stimuli with higher task relevance and perhaps ignore stimuli with no or little relevance to the task. Other studies also

pushed that top-down VA was directed by an individual's mood, emotion, and task instructions, demographics, familiarity, knowledge, involvement, and heterogeneity (Awh et al., 2012; Pieters and Wedel, 2004; Simmonds et al., 2020a). In all cases, the question to be asked would be “how decision do makers know what visual stimuli cue or information is relevant for the top-down cue and attention

According to Jovancevic-Misic and Hayhoe (2009) decision makers learn to identify information relevance through practice. In their eye tracking study based in a natural environment, it was revealed that participants learned to use important events in the environment and that the time taken to use these events to guide dwell time for new tasks increases. However, once participants become familiar with the task, the process of deciding what factors to use in the environment to guide dwell time decreases. This is because, through learning, participants become more aware and comfortable in knowing what top-down environmental factors to consider in guiding VA. Gegenfurtner et al. (2011) further suggested another perspective on learning is through expertise effects on attention. Their contribution revealed that comprehension revealed through visualisation with experts have shorter dwell time durations on less relevant areas and more dwell times to the opposite. That is, participants who are already experts in a task, can quickly adopt information needed (top-down cues) to lead to more fixations on visual information relevant to them.

In both findings there is a common pattern with regards to how learning affects the use of some top-down cues which in turn affect top-down VA. They are, in VA for decision making, people with expertise to information search and novices to information on the visual stimuli who become experts through learning should increase decision efficiency. This is because with time, people know what factors to consider which match their goals and thus can direct more fixations to task relevant information and fewer dwell times to task irrelevant information as well as faster stimulus processing.

Even though these contributions offer valuable insights, they tend to portray the decision-maker as having a high degree of control over what captures their VA, which is not always the case in real-world settings. In practice, consumers' attention is shaped by a complex interaction between conscious intentions and unconscious perceptual processes. For instance, Kiefer M (2012) in examining consumer decision-making in both online and offline environments, demonstrates that

VA is influenced not only by deliberate, goal-directed behavior but also by automatic and subconscious stimuli. This implies that top-down cues—those guided by an individual’s goals, expectations, or prior knowledge are not always adopted in a fully conscious or controlled manner.

This perspective is consistent with earlier work by Hayhoe et al. (2003) who argue that top-down mechanisms in VA can guide individuals toward both relevant and irrelevant information, either voluntarily or involuntarily. Human vision does not operate as a strictly selective system from the outset; rather, the eyes initially register a broad range of visual stimuli before attention is gradually narrowed toward task-relevant elements through experience and learning. Consequently, even when individuals believe they are directing their attention strategically, they may still momentarily attend to stimuli that are not directly related to their goals. As Chandon et al., (2009a) suggest, the very presence of top-down cues in a visual environment can briefly draw attention to areas that were not consciously intended to be searched or processed.

Taken together, these perspectives suggest that top-down VA cannot be understood solely as a fully deliberate and goal-driven process. While individuals may intend to direct their gaze and attention toward task-relevant information, their visual systems remain susceptible to automatic, learned, and unconscious influences that shape what is selected. This creates a conceptual tension between how top-down attention is typically defined as voluntary and under conscious control and how it appears to operate in practice, where past experiences and habitual patterns of looking may exert an equally powerful influence. It is this tension that has given rise to a growing debate within the VA literature, particularly around whether top-down VA should be equated with goal-driven control alone or whether additional mechanisms must be acknowledged. The following section therefore examines this debate by critically engaging with the popular perception of top-down VA.

2.1.3.2 Debate on the Popular Perception of Top-Down Visual Attention

Awh et al (2012) challenge the popular school of thought on top-down VA by proposing that the definitions of top-down VA may be valid in theory more than it is in practice. This is because it leaves an explanatory gap in top-down VA specifically where certain visual selection biases cannot be fully accounted for by current goals. This gap is termed as selection history. It represents

persistent selection biases influenced by past attentional deployments, independent of top-down goals or tasks. Awh et al (2012) argue that many researchers (e.g., Hopfinger et al., 2000) highlight the goal driven/voluntary nature of top-down attentional control. However, a closer examination reveals that "voluntary" VA represents just one aspect of top-down control, rather than being synonymous with it. As such, the school of thought that positions top-down VA as goal driven is not a wholistic position. This stance is supported by Hopfinger et al. (2000) who posited that voluntary orienting is merely a component of top-down VA, implying that there are also involuntary forms of top-down visual processes. Similarly, Baluch & Itti (2011) distinguish between the two by arguing that when Top-Down VA is being considered it must be specified as wholistic top-down attention (voluntary and involuntary attention) if the research considers both. However, if a study considers one side of top-down attention (which is popularly used as voluntary (goal oriented), neglecting the involuntary side of it, it must be clearly stated as Goal Driven top-down attention. This is because the latter, which is an automatic VA influenced by expectations, knowledge, and goals, can operate independently of unconscious effort driven by selection history (involuntary top-down attention). Similarly, a classic study of contextual cuing by Chun & Jiang (1998) makes a clear distinction between top-down VA and explicit, involuntary control, where "top-down" is argued as not equivalent to "voluntary/goal driven" in common usage. They specifically argue that confusion between top-down visual processing and voluntary/goal driven top-down VA often stems from imprecise terminology used in research. Hence, terms like "goal-driven" have been employed to describe top-down VA as situations where attention is captured by stimuli that share features with a target, even though stimuli irrelevant to the task at hand may have played a role (Gaspelin et al., 2015a, 2016; Luck et al., 2021). Thus, the term 'top down' used wrongly for goal driven studies can suggest that VA is being directed voluntarily, whereas the capture may be an automatic response independent of the task's goals.

To address this confusion Awh et al. (2012), have made a clear distinction between top-down visual processing and voluntary/goal driven VA. They define top-down VA as being driven by internal factors within the observer, in contrast to bottom-up processes, which are driven by external stimuli. They argue that while certain forms of top-down control are voluntary and deliberate, others are involuntary and automatic as certain selection biases stemming from prior experiences may affect top-down VA irrespective of the task.

The researcher in this study recognizes and appreciates that top-down VA can be influenced by both voluntary and involuntary cues. This understanding leads to the assertion that these two forms of attention cannot be separated, as their interaction is essential to the natural functioning of VA. Specifically, consumers depend on both types of top-down cues to navigate their visual environment effectively. A compelling question emerges from this assertion: do goal-oriented cues elicit involuntary top-down responses, or do involuntary cues enhance the effectiveness of goal-directed attention? Additionally, it is also worth considering whether a single top-down cue could function as both voluntary and involuntary, thus impacting attention in multiple ways. This interplay suggests that top-down cue of VA necessitates an examination of the simultaneous effects of these cue types. Awh et al. (2012) and Chan et al. (2023) illustrate this perspective by asserting that while some top-down controls operate through deliberate intention, others function automatically and unconsciously, shaped by prior experiences that create selection biases influencing attention allocation. Additionally, research suggests that the influence of prior experiences and emotional responses can create automatic biases that alter how VA is allocated. For instance, Wen et al. (2023) emphasize how emotional processing can serve as a determining factor in directing VA within advertising contexts. Such findings suggest that emotional states can either reinforce goal-oriented attention or cause the goal-oriented cues to lead to involuntary cues arising from the stimuli. To this, the researcher in this study suggests that top-down attention can be voluntary or involuntary, however, the cues could potentially serve as only voluntary, only involuntary or potentially both.

2.1.3.3 Conceptualization of Top-Down Visual Attention in the Current Study

In this study, the researcher focuses the analysis on voluntary top-down VA, explicitly acknowledging that while it can be because of both voluntary and involuntary cues, the emphasis rests on cues that are intentionally selected by consumers. This specific focus arises from the understanding that voluntary cues have a profound capacity to shape the visual attentional landscape, directing consumers to prioritize stimuli that hold relevance to their needs while filtering out competing distractions. Engaging consciously with visual content allows consumers to streamline their cognitive processes, ultimately enhancing their decision-making abilities. This makes the study of voluntary VA important for understanding purchasing decisions, guided by

top-down visual processing. Additionally, by focusing on voluntary VA, the research anticipates drawing out patterns related to how marketing practitioners can design effective promotional materials that capture and retain consumer focus.

Recognizing that top-down VA can also be informed by involuntary cues, this study does not disregard their influence but rather highlights the intentional aspect of consumers' engagement with visual stimuli. Given that VA is a multifaceted construct, understanding its voluntary facet enables deeper insights into how and why consumers prioritize information differently. As elucidated in the literature, consumers' deliberate visual choices are likely motivated by a desire to maximize cognitive efficiency and outcome accuracy in their decision-making processes (Milosavljevic et al., 2011; Pleyers, 2023). This perspective aligns with findings related to visual complexity in advertisement design, which suggest that attention can be attracted to specific features, thereby affecting consumer evaluations and preferences significantly (Pieters et al., 2010a).

In summary, this study prioritizes voluntary top-down VA by isolating the impact of intentionally chosen cues and their subsequent influence on consumer purchase decision-making. By emphasizing this aspect, the researcher intends to contribute to the overarching discourse on buying decisions, providing insights into how to effectively harness top-down visual strategies to maximize engagement and facilitate informed consumer choices in an increasingly complex visual landscape. The next section therefore turns to a detailed examination of top-down cues in e-commerce, with particular attention to how selected cues, such as Country-of-Origin information, guide VA and buying decisions.

2.1.4 Top-Down Cues for Top-Down Visual Attention in Ecommerce

As earlier discussed, when consumers need to choose a product out of the many options, voluntary and involuntary top-down cues serve as information used in the purchase decision process (Awh et al., 2012; Wolfe, 2000, 2021; Wolfe and Horowitz, 2017). Some of such cues are familiarity to product (function, manufacturing), frequency of consumption (experience), familiarity/knowledge with products country of origin, made in labels, images, and other information via text which may take on the role of either or both voluntary and involuntary top-down cues. For this study, the top-

down cue Countr-of-Origin information (COO) will be explored in its voluntary form in greater detail, rather than its involuntary form beginning with a definition of COO information and its role as a voluntary top-down antecedent cue for VA in e-commerce. COO as a voluntary top-down cue is conceptualised from the phase in the buying process where consumers intentionally/voluntarily find COO information through visual search to influence their voluntary top-down VA.

2.1.4.1 The Definition of Country-of-Origin (COO)

The term "country of origin" does not lend itself to a clear definition that is widely accepted. There are several definitions spanning across decades found in literature that seem to follow a similar pattern and share some commonalities. A review is conducted on some of the earlier conceptualizations and definitions in relation to the contemporary understanding of the term, allowing the researcher in the current study to recognize the ways in which it has evolved over time. This comparative analysis not only highlights the changes in meaning but also sheds light on the intellectual trajectory of the term within various academic discourses. First, it is worth noting that the concept of COO was introduced into marketing research in the 1960s, drawing cues from social psychology research on national stereotypes. During this era, the main agenda of researchers was to establish the effects of COO and not decipher what COO really is. For example, in his seminal work, (Schooler, 1965) first found that identical products in every respect were evaluated differently by consumers based on their country of origin. Since then, the impact of cognitive, affective, and normative associations with a particular country on product evaluation and buying behaviours has led to several publications relating to COO. The figures 6 below show some definitions of COO that have appeared in literature.

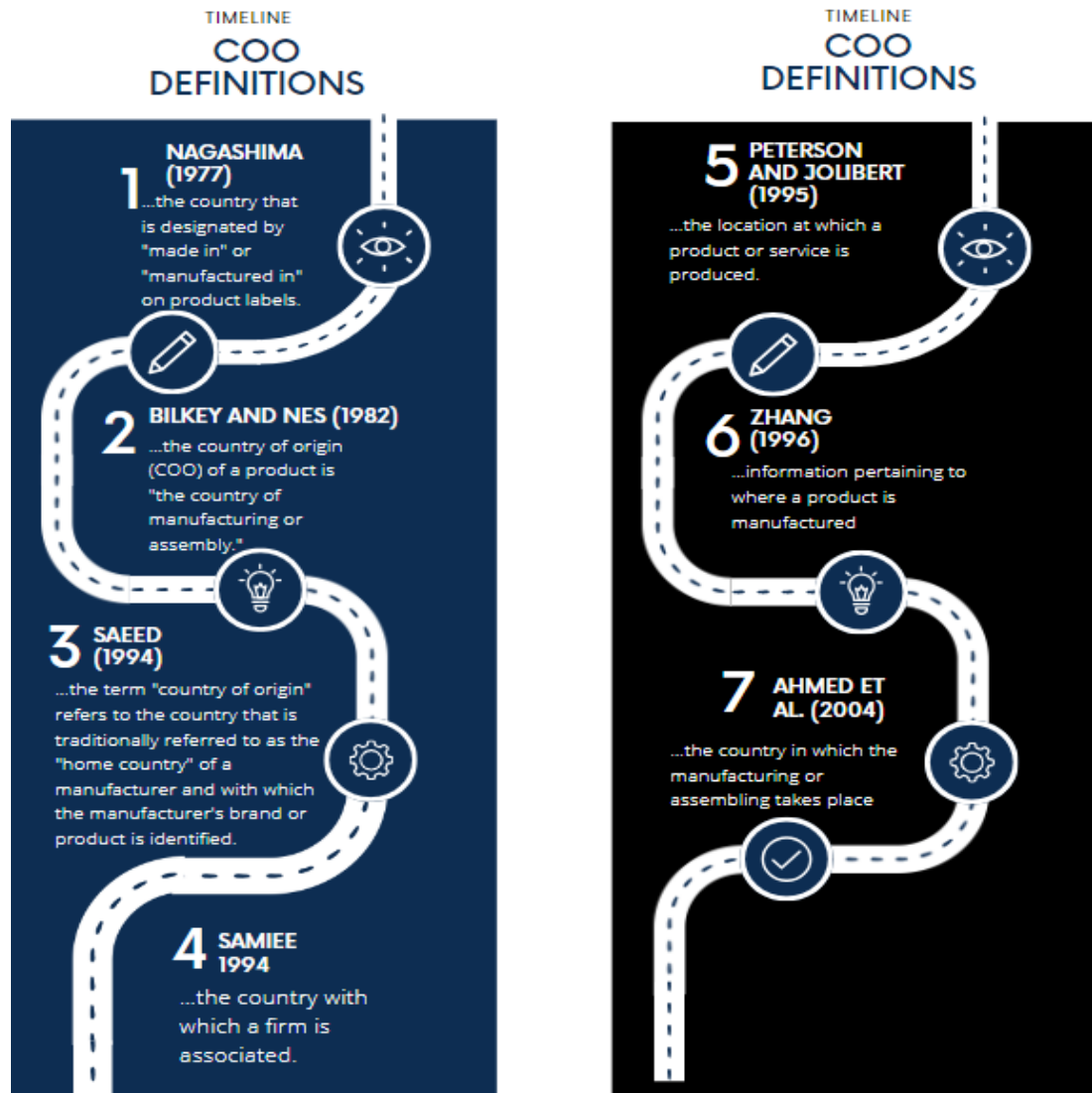


Figure 6 Showing the different definitions of COO over time

As shown in figure 6 above, Nagashima (1977) defined COO as the country that is designated by "made in" or "manufactured in" on product labels. This definition shows that the concept of country of origin predates the era of internet boom and that COO as a construct is not relatively new. Rather, the term has gained more attention in the advent of modern digitalisation and international marketing where consumers have access to varied products from different origins. Bilkey and Nes (1982) also define the country-of-origin (COO) of a product as "the country of manufacturing or assembly." To Saeed (1994), the term "country of origin" refers to the country that is traditionally referred to as the "home country" of a manufacturer and with which the manufacturer's brand or product is identified. Samiee (1994) also shares a similar view in his

definition that COO is basically a country with which a firm is associated. Peterson & Jolibert (1995) rather define COO more simplistically as the location at which a product or service is produced. In the same vein, Zhang(1996) defines COO as "information pertaining to where a product is made. More recently, Ahmed et al. (2004) define the COO as the country in which the manufacturing or assembling takes place. In view of the definitions that have been provided thus far, it is reasonable to make the inference that the term "country of manufacture/country of make" runs through all the definitions under review in the 90s (Nagashima, 1977; Bilkey and Nes, 1982; Saeed, 1994; Peterson and Jolibert, 1995; Zhang, 1996; Ahmed et al., 2004) except for the definition by Samiee (1994) and Bilkey and Nes (1982). Samiee (1994) associated 'manufacture' with the firm/association doing the manufacturing rather than the process. However, the definitions by Bilkey and Nes (1982) and Ahmed et al. (2004) further present country of assembly (COA) as another construct that is analogous to country of manufacture. The COA construct further lends credence to the meaning of the term "manufacturing" which could also mean assembling different components of different countries into a single product. To further substantiate this, Ahmed et al (2004) acknowledge that the rise of multinational corporations and the emergence of hybrid products with components sourced from a variety of countries have distorted the accuracy or validity of "made in" or "manufactured in" on labels. Pertaining to this, it underscores the extreme challenge that consumers face at times in identifying the COO of a product. This is because consumers tend to link certain popular brands with nations, even if the item under consideration was not manufactured in the specific country in which the company has its headquarters (Usunier, 2006). To support this notion, Ahmed et al (2004) previously argue with an illustration that goods manufactured by Toyota and Honda are seen as being Japanese, while fast food chains such as McDonald's and KFC which were founded in the United States are seen as American. Roger et al. (1994), however, argue that there is no discernible distinction between place of manufacture and location of assembly, and that this has no major impact on consumer product evaluation. In contrast, Saeed's (1994) introduces a more nuanced perspective by defining country of origin as the country with which a brand is associated with. In this view, COO could also be referred to as a country of brand (COB). To support this perspective, Saeed (1994) notes that some brands are strongly linked to specific countries, such as the USA for brands like IBM and Japan for brands like SONY regardless of where the products are manufactured. Another notable example is the Apple brand which is usually designed in California, USA but assembled in China. Yet, Apple is

still considered as an American brand and not a Chinese brand, even though apple products are assembled in China as shown below in figure 7.



Figure 7 A photo of iPhone back showing place of design and manufacture.

Similarly, Volkswagen (VW) has recently opened one of its assembling plants in Ghana. Yet Ghana cannot be considered as the country of origin of VW cars because they are assembled in Ghana. These examples support the position of Saeed (1994), that COO as COB has a slight distinction from country of assembly or manufacturing. Considering the arguments between COM, COA and COB is worth considering how the understanding of COO is impacted as there is a point differentiate between “made in” and “assembled”. Following the argument from Roger et al. (1994), the difference does not significantly affect consumer buying behaviour. This is because, regardless of where a product is made or assembled, according to Saeed (1994), the country of brand’s association rather plays a key role in shaping the consumers perception of the COO which further guides buying behaviour.

A critical reflection of the periodisation of COO definition reveals that since the 1950s, the notion of what a COO is has undergone constant modification (Usunier 2011). However, the conceptual

understanding of COO still has many similarities over time and so has the definition of the term. While it could be agreed that traditional definitions have identified COO as “information related to where a product is made” (Zhang 1996), more consumer-oriented definitions have defined the term as “the country with which a corporation/brand is associated” (Samiee 1994). The arguments raise several questions to why it is necessary for organisations provide information about the place of origin of their products. First, it questions if it is merely to fulfil some legal obligations by providing customers with such information so that organisations can be traced in terms of any product defects. Secondly, it also questions if providing information about product’s origin have any strategic relevance to organisations. It could be argued that while organisations are mandated by international trade law to provide customers with information about a product’s COO, the effect of such information on consumers’ buying decision is incidental and not intentional on the part of organisations. Whether organisations consider the COO information as a deliberate strategic tool to achieve a competitive advantage remains questionable. What customers do with the information when presented to them at the point of purchase is based entirely on their perception and cognitive dispositions about the country of origin. Some of such dispositions are their past experiences, value, service and engineering of the product or brand, advertising and reputation, design and style, and consumer’s profile (Balabanis et al., 2002, 2007; Tseng & Balabanis, 2011).

Consequently, in its original form, COO was a "made in" designation that identified the country of origin of a product (Zhang 1996). With time, the country of manufacture/make (COM), country of design (COD), country of parts (COP), and country of assembly (COA) were some of the additional components that were added to the COO concept over the ensuing decades as shown in the Table 1 below (Samiee 1994; Ahmed and d'Astous 1995; Nebenzahl et al. 1997; Tse and Gorn 1993; Herz 2013).

Table 1 Different Terminologies for Country of Origin

COO Terminologies	Definitions
1. Country of Design (COD)	COD is referred to as the country where the original conceptualisation and product development takes place (Ahmed and d'Astous 1995)
2. Country of Parts (COP)	COP is used for countries where products that are sourced from in order to be assembled in different country (Nebenzahl et al. 1997)
3. Country of Assembly (COA)	COA refers to the country where product parts sourced from different countries are assembled into a single unit (Ahmed et al., 2004)
4. Country of Manufacture (COM)	COM is referred to the country where the production/manufacturing takes place (Samiee, 1994)
5. Country of Brand (COB)	A brand's country is typically a single country that can be clearly identified by customers (Samiee, 2011; Kim and Park, 2017). A country of brand can be local which is a brand being of local country origin (Liu et al., 2021) or foreign which also means a brand being of foreign origin (Kim et al., 2019).

In retrospect, the varied use of these terminologies might imply they are interchangeable or carry differing connotations. However, a more detailed analyses of the terminologies suggests some slight differences between them. For instance, while country of manufacture and country of assembly suggest the exact country where the manufacturing and assembling plant is located and

the actual production takes place, Country of design (COD) suggests the country where the original product concept is designed. This is supported by the earlier examples given on Apple and Volkswagen. Reflecting on all these variations, Usunier (2006), points out the significant attention received by country of brand (COB). This is as a transition of COO definition from a COM designation to a consumer perspective where consumers now value COB more than the location of production, manufacturing, or assembly. According to Abraham & Patro (2014) this definition highlights the coping mechanism of consumers to simplify their perspective on the origin of a brand especially with hybrid origins in the process of production. It is easier to assign a product or brand with the country it is popularly known for as with the case of apple.

2.1.4.2 Country of Origin as Country of Brand

In the present study, COO is conceptualised as a country-of-brand (COB) and will be used interchangeably. This sides with the consumer perspective of the COO. COO in this perspective is considered as the country associated with the product which may not necessarily be where the product is manufactured. This approach acknowledges that the COO associated with a product might not necessarily be the location of its manufacturing; instead, it encompasses the brand's heritage, which consumers recognize as a shorthand for evaluating product quality, reliability, and authenticity. In essence, a COO could be regarded as the first country where the original prototype or actual product was designed and manufactured even though organisations may have moved their productions to different locations on strategic cost bases over time. Accordingly, throughout this study, the researcher will examine the COO as country-of-brand (COB) in the rest of this study and used interchangeably.

2.1.5 COO As a Form of Top-Down Visual Attention Cue

As defined earlier, top-down VA refers to the deliberate allocation of attention influenced by the utilization of top-down cues, to shape perception and expectations during the buying decision process. COO serves as a critical top-down cue within this context, functioning as an external signal that provides consumers with contextual information regarding the country of origin of a product. It is worth noting however, that the role of COO extends to operating as both a voluntary top-down cue where consumers deliberately seek out information regarding product origins and an involuntary cue that can guide subconscious responses to visual stimuli associated with the

product. The choice to interpret COO information as a voluntary or involuntary cue largely relies on how consumers utilize and internalize this information during their decision-making processes. Table 2 below presents perspectives and empirical findings from studies measuring how consumers discover and utilize COO as a top-down cue.

Table 2 Different Measures of COB

Num.	Author	Year	Antecedent (Measure of COB)	Online/Offline	Voluntary (explicit)/ Involuntary (implicit) cue
1	Cordell	1993; p.17	Exposure To Made in Label	Offline	Voluntary cue
2	Maheswaran	1994	Stereotypical Information	Offline	Involuntary/voluntary cue
3	Baker et al.	2002	Brand familiarity (factual relevant knowledge about a brand or product	Offline	Involuntary/voluntary cue
4	John P. Liefeld	2004	Exposure To Made in Label	Offline	Voluntary cue
5	Balabanis and Diamantopoulos	2008, (p. 60)	COO Information Salience	Offline	Voluntary cue
6	Lee and Lockshin	2011	Indirect Experience (image or perception)	Offline	Involuntary/voluntary cue
7	Herz	2013	Stereotypes	Offline	Involuntary/voluntary cue

8	Herz	2015	cultural similarity and geographical closeness of a country to the own home country	Offline		Involuntary/voluntary cue
9	Herz	2015	Awareness of emphasis on the actual COO in communication promotions.	Offline		Involuntary/voluntary cue
10	Yang et al.	2016	Halo Information	Offline and Online		Involuntary/voluntary cue
11	José Manuel Ortega-Egea	2021	Usage Experience	Offline and Online		Involuntary/voluntary cue

Notably, prior to 2016, most studies addressing COO as a voluntary top-down cue contextually defined its presentation and utilization primarily within offline environments. This observation raises pertinent questions regarding the applicability of these findings in online contexts across various digital platforms. This is because, in the realm of online shopping compared to offline contexts, the implicit representations of COO such as brand familiarity, cultural similarity to the country of origin, and associated stereotypes necessitate further examination to discern whether they function as voluntary or involuntary cues during consumer purchase decision. In other words, from a measurement perspective, the involuntary effect and use of COO information will require further probing. As a result, in the studies from the table 2 for example, where the involuntary nature of COO information was both measured with its voluntary nature, measurements of the involuntary nature of COO were often conducted after participants had been explicitly informed about the COO in the offline setting.

Given this orientation, this also leads to questions about whether COO information presented as "made in" labels, through visual exposure and salience according to Liefeld (2004) and Balabanis and Diamantopoulos (2008a), elicits similar responses as a top-down voluntary cue in online settings, given the differences in the context of visual processing and attention between online and offline platforms. Furthermore, it raises the question of whether the presentation of COO as 'made in label' affect the understanding of COO as country of assembly, country manufacturer, country of brand etc. To answer the first observation, according to Baek et al. (2019) and Brand & Baier (2022) in the online shopping environment where consumers also view and employ product information as they would offline, COO information presented as a made in label cue as is also used as a voluntary cue/involuntary cue, where consumers actively seek out these details in their buying behaviour. As such the presentation and utilization of COO in the offline context is still relevant and replicable on the online context. Accordingly, as the industry standard, especially for e-commerce platforms, is to use the term 'made in' to represent the country of origin, the term 'made in' serves as the way during shopping activity where consumers as a standard can voluntarily employ the country-of-origin information. Table 3 lists some examples of how e-commerce sites use and present COO information as a top-down voluntary cue.

Table 3 shows some e-commerce platforms and how made in labels are presented as a standard practice.

Ecommerce Platform	Presentation of COO information
Amazon	Many sellers on Amazon include the "Made in" country in the product details or under the product specifications section. Some products also have it listed in the title or details tab.
eBay:	Sellers on eBay are often required to disclose the country of origin for certain products, and you can typically find "Made in" information within the product details.
Etsy:	Many sellers on Etsy include "Made in" information, particularly if the product is handcrafted or produced in a specific region. It is usually included in the item details or description.
AliExpress:	Many listings on AliExpress include the "Made in" country either in the title or description. However, it can vary based on the seller.

Shopify:

While Shopify itself doesn't directly provide "Made in" information, merchants using the platform can choose to display this information on their product pages. It will depend on the store's individual practices.



Figure 8 screen shot from the Amazon website showing country of origin information as 'made in' under the "about this item" section of information (Image source: <https://www.amazon.co.uk>)

With regards to how the 'made in' label affect the understanding of COO as country of assembly, country of manufacturer, country of brand etc, S. Chen et al. (2020) posit that the distinction between country of manufacture, country of brand, and country of assembly is dependent of how the information is interpreted. They found that that the representation of COO significantly in the minds of consumers through perceptions regarding origin quality and risk goes beyond the 'made in' label presented as it only serves as a tool for further information processing. This position links very closely with Saeed (1994) who expressed that COO goes beyond manufacture and assembly but rather country brand associations in the mind of the consumer.

Consequently, utilization of COO as a voluntary top-down cue and involuntary top-down cue for voluntary top-down VA can be categorised into 2 groups based on similarity of results. These are: a) Product Centric COO information (PCCI): COO used as a voluntary top-down cue based on product information on packaging or promotion, b) Consumer Centric COO information (CCCI): COO as a voluntary top-down cue but further involuntarily referenced with direct/implicit experience/ consumption/ stereotypes/perception/halo information to guide the voluntary search of visual information. These are considered in further detail below:

2.1.5.1 Product Centric Country of Origin information (PCCI)

The first category, Product-centric country of origin posits the made in label as a voluntary cue to gain country of origin information about a product being considered for purchase. This is gathered by the COO information (made in label) on product packaging or product promotions (Jin and Ryu, 2019). This is because, consumers require the COO label to be used in building reliable intangible traits about the COO to guide their decisions. This is especially the case for products that people may be unfamiliar with at the voluntary visual search of information phase of buying decisions. Despite the potential use and discovery of the made in label as a tool for COO information, Alba and Hutchinson (2000) have argued that the extent to which the made in label helps to gain knowledge is limiting. This is because consumers could potentially be buying under a situation that may not allow them to find such information. Additionally, Hutchinson and Alba (1991) argue that because locating the made in label is a more intentional effort, consumers may not always seek out this information. Thus, implicit (incidental) learning is more prevalent. Furthermore, in more ecologically valid situation where shoppers search for such information at the point of sale especially for known brands or products, the made in label may not be needed as they would retrieve it spontaneously from memory” (Samiee, 2010). For example, to measure how consumers discover, and use made in label information on products, Liefield et al. (2004) reported an investigation of American and Canadian consumer acquisition of the COO label. Only 27% of the 1,248 consumers who considered the made in label indicated that their choice of purchase may have been influenced by locating the label. In contrast, while Herz and Diamantopoulos (2017) understand that consumers may indicate that they rarely consider locating the COO label, it is also very likely that, consumers are often reluctant to admit this influence. Thus, in comparing the era of Liefield study and the current digital boom, the finding of Herz and Diamantopoulos (2017) demonstrate that country-of-origin (COO) cues, such as "made in" labels are especially relevant in contexts where physical product evaluation is not possible (such as e-commerce) showing that COO information remains crucial for shaping perceived product quality and purchase decisions.

2.1.5.2 Consumer Centric Country of Origin Information (CCCI)

Unlike COO information gained from products at point of purchase, the second category of COO utilization (consumer centric country of brand information), posits that post PCCI, country-of-

origin knowledge is gained from direct and indirect experience with the country's product such as product usage and consumption. In the context of digital marketplaces, understanding how consumers gain and utilize Country of Origin (COO) information becomes even more critical, especially since direct interaction with the product is often absent. As highlighted by Jin and Ryu (2019), country of brand recognition plays a significant role in shaping consumer perceptions, especially in online shopping environments where consumers lack the ability to physically touch or interact with a product. The "Made in" label, therefore, becomes more than just a formal designation it serves as a crucial informational cue that helps guide consumers in their decision-making process. Over time, consumers accumulate knowledge through continued use or familiarity with a country's products, forming perceptions and stereotypes about the quality or characteristics of products from specific countries (Yang et al, 2016). This experience-based knowledge influences future purchasing decisions, often guided by memory or learned associations with countries, brands, or product categories. However, for consumers who lack direct experience with products from a particular country, their decisions are often influenced by stereotypes, perceptions, or halo information post made in label information gathered. As proposed by Hertz (2013) and Yanga et al. (2016), when consumers feel less knowledgeable or have no direct experience with a country's products, they tend to rely on external information or generalizations about the country. This reliance on broader perceptions, whether positive or negative, plays a significant role in shaping consumer choices. For instance, positive stereotypes associated with a country such as Germany's reputation for high-quality engineering can positively influence consumer perceptions of its products, even without prior product experience. This halo effect shows how involuntary perceptions of a country's overall image using country-of-origin information can enhance or diminish the appeal of individual products.

In summary, in e-commerce where physical interaction with products is unavailable, the influence of COO cues, using the "Made in" label, is magnified. Both Product-Centric Country of Brand Information (PCCBI) and Consumer-Centric Country of Brand Knowledge (CCCBI) help explain how consumers make decisions based on direct product experiences, prior knowledge, and national stereotypes. However, in e-commerce, the voluntary use of Product-Centric Country of Brand Information precedes the involuntary use of Consumer-Centric Country of Brand Knowledge as the made in label serves as the initial country information cue.

2.1.5.3 Current Conceptualization of COO (COB) As a Top-Down Cue in Visual Attention

In the landscape of Country of Brand (COB) information acquisition, the perspective of Product-Centric Country of origin information, particularly through the "made-in" label, emerges as the most pertinent and suitable approach for conveying country-of-origin (COO) information in e-commerce. The "made-in" label is especially salient in the context of e-commerce where physical examination of products is often limited and as such consumers must instead rely on concise, accessible cues to inform their purchase decisions. This label serves as a tangible, standardized indicator of product origin, providing clarity and reassurance to consumers navigating the inherent uncertainties of online shopping (Li et al., 2021). Additionally, the significance of the 'made-in' label in facilitating COO information acquisition cannot be overstated especially in the digital era where more consumers shop online and the knowledge of the COB, which mostly revolves around the perception of a consumer, influences the trajectory of their buying behaviour.

The voluntary use of COO information, such as the "made-in" label, is increasingly prominent in e-commerce, where brands recognize its value in differentiating products and building trust. Businesses often choose to display COO labels proactively, understanding that informed consumers may actively seek out this information to guide their choices. Research demonstrates that consumers who care about COO will voluntarily use this information in their decision-making, and brands targeting such consumers are likely to highlight COO cues regardless of regulatory requirements (Bhatt et al., 2017). This voluntary disclosure is not only a response to consumer demand but also a strategic tool for fostering transparency and enhancing brand credibility in a competitive marketplace.

While some critics have argued that alternative sources of COO information such as experiential knowledge or brand image can also shape consumer perceptions (Samiee, 2010; Samiee & Leonidou, 2011), in the context of e-commerce the immediacy and universality of the "made-in" label confer a distinct advantage. Unlike subjective, perception-based knowledge, the "made-in" label offers a consistent and objective source of COO information, accessible to all consumers irrespective of their prior experience. Moreover, the label often serves as an entry point for further consideration of implicit knowledge, such as familiarity with the country or associated stereotypes (Yang et al., 2016).

The widespread adoption and visibility of the "made-in" label across e-commerce platforms underscore its reliability as a voluntary top-down cue. This uniformity is particularly crucial in online retail, where consumers are confronted with an overwhelming array of choices and must filter information efficiently. The "made-in" label's standardized format and broad accessibility make it an indispensable tool for guiding voluntary consumer attention and facilitating informed decision-making (Wang et al., 2023).

Empirical evidence further substantiates the impact of voluntary COO disclosure. Studies indicate that providing COO information can enhance consumer confidence, enable greater control over purchasing decisions, and even support premium pricing for products from favored origins (Li et al., 2021). Additionally, the voluntary nature of COO labelling aligns with broader trends in e-commerce, where transparency and consumer empowerment are increasingly valued. By proactively offering COO information, brands not only cater to informed, COO-motivated consumers but also differentiate themselves in a crowded digital marketplace.

In summary, based on the discussion above, the Product-Centric approach to COO information with its emphasis on the "made-in" label, stands out as the most pragmatic and effective voluntary top-down visual strategy for information in the realm of e-commerce and will be the focus of the current study. This approach leverages the tangible, standardized, and widely accessible nature of the label to facilitate voluntary consumer engagement, build trust, and guide decision-making. While alternative sources of COO information may hold theoretical value, their practical relevance is limited in comparison to the concrete cues provided by the "made-in" label in the unique context of e-commerce. Thus, the current study focuses on the voluntary use of the "made-in" label as a top-down cue, positing it as the most compelling and practical avenue for understanding and leveraging COO information in online retail environments.

While the present study identifies the "made-in" label as a salient voluntary top-down cue that consumers actively utilize to guide their decision-making, this does not imply that VA in e-commerce is governed exclusively by deliberate processes. In authentic online shopping contexts, consumers are concurrently exposed to a multitude of visually salient elements that vie for attention independently of their intentions. Consequently, purchase decisions arise from the dynamic interplay between goal-directed attentional processes (top-down cues, such as country-of-origin information) and stimulus-driven visual features (bottom-up factors, including color,

contrast, and size). A comprehensive understanding of VA in digital retail environments therefore necessitates an examination of bottom-up attentional mechanisms, which is the focus of the following section.

2.1.6 Bottom-Up Visual Attention

Bottom-Up VA occurs when something salient (external) in the visual field captures a person's attention (Wedel and Pieters, 2006; Schomaker et al., 2017). For example, a customer is walking through a store browsing the aisles; when suddenly, a large shiny sale sign with bold letters that say '50% OFF' catches their attention. The customer didn't consciously plan to focus on it, but the bright color, large letters and contrast of the sign against the store's neutral background automatically draws eyes to it. Because this type of attention is bottom up, it is a more involuntary response compared to top-down VA and extremely difficult for observers to ignore (Corbetta and Shulman, 2002b; Vriens et al., 2020).

In the online space, bottom-up cues could be made evident through several attributes including position, surface size, contrast, colour, brightness, orientation, position, symmetry, reviews, arrows, etc. (Janiszewski et al., 2013; Meyerding, 2018; Milosavljevic et al., 2012a; Pieters et al., 2010a; Sun et al., 2019). Milosavljevic *et al.* (2012) for example illustrates how bottom-up attention, defined by characteristics such as brightness and contrast, impacts consumer choices. Their study demonstrates that certain items can attract more attention due to their visual properties, leading consumers to make biased decisions based on these stimuli. Kim and Lee (2021) however posit that the influence of bottom-up cues despite the characteristic would depend on their location within the visual display. That is, the closer it is to the selected task area of VA the quicker and easier it is for consumers to notice and respond to it. This was explained in the seminal study named the Posner cueing paradigm (Posner, 1980) illustrated in figure 9 below. Even though the seminar dates far back, the result of this study showed that the reaction time of the subjects in shifting attention from a top-down visual selected area in the visual field to where the bottom-up cue appeared for attention was quicker when it was within the area of first or sustained focus.

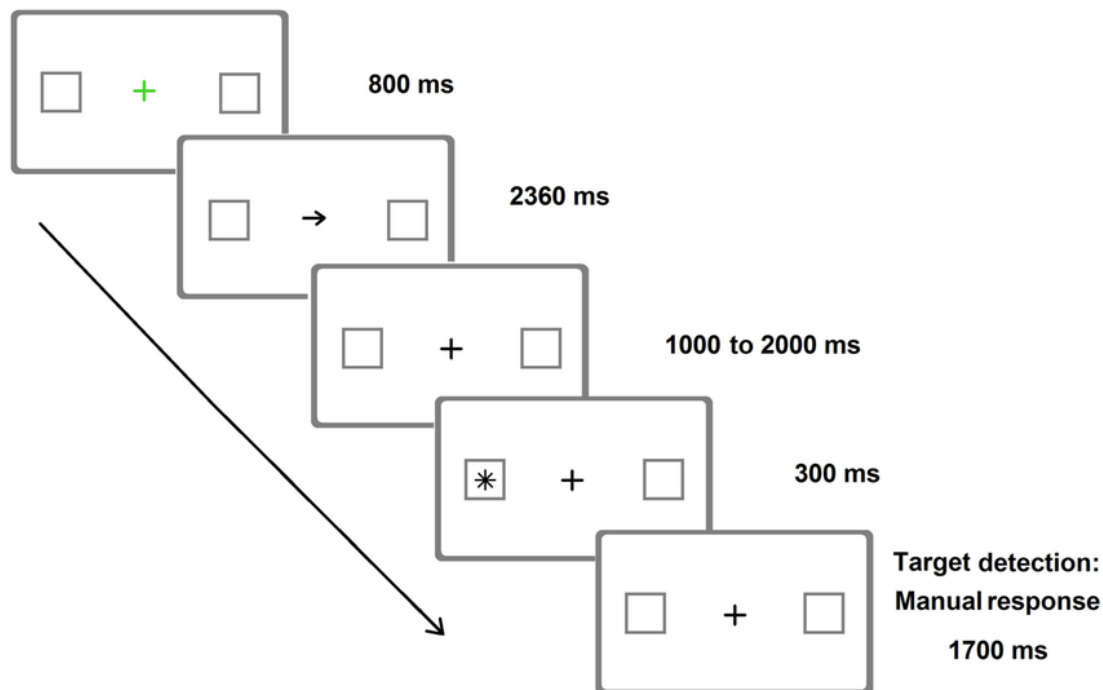


Figure 9 Posner cueing paradigm: In this paradigm, an observer is seated in front of a computer screen and fixates on the center of the screen (goal-directed attention) at the onset of a trial. Two boxes, one on the left and one on the right of the fixation point appear on the screen and after a short delay, an arrow comes up in the center, pointing either towards the left or right. The arrow indicates the target is likely to appear in the indicated location, in this case, in the left box. After this, a target is shown with asterisk in one of the two boxes, and the target appears in the cued location. This is termed as a valid trial. (Image source: https://www.researchgate.net/publication/229438863_Neglect_and_Extinction_Depend_Greatly_on_Task_Demands_A_Review/figures?lo=1)

Building on this paradigm, to shows its relevance in modern day consumer responses to stimuli, Vriens et al. (2020) further demonstrated via an experiment that when bottom-up cues in the form of salient arrows was introduced in the goal's visual area during a visual task of selecting a product, it influenced consumers to choose products that the arrows pointed to quicker. Evidently, the results of this study merge the contributions of researchers, Itti and Koch (2000); Pieters et al., (2010) by demonstrating that, the ability of bottom-up cues to effectively capture attention does not rely on one over the other in terms of saliency and position but on both.

2.1.6.1 Debate on the Popular Perception of the Bottom-Up Visual Attention

An example illustrated in figure 10 and 11 below by Luck et al. (2021) on the common understanding of the process of bottom-up attention is 'certain kinds of stimuli such as red tomato laying on bed of green lettuce or a blinking light warning of the hazard on a dark road are examples of bottom-up cues'



Figure 10 Image showing a bottom-up illustration of how a red tomato in a bed of green lettuce sets it apart and captures attention.



Figure 11 Image showing a bottom-up illustration of how a red flashlight on a dark road sets it apart and captures attention

With this, most research, particularly early ones found that abrupt onsets or stimuli that appear suddenly in an ongoing area of focus were particularly powerful in capturing VA (Yantis and Jonides, 1984). Subsequent studies, however, also found that colour singletons (items of unique

colour in a field equally coloured items) can also capture VA under certain conditions (Pashler, 1988). These studies guided the popular understanding of bottom-up VA as certain kinds of stimuli salient enough to automatically capture VA even when they are completely task irrelevant (Yantis and Jonides, 1984; Theeuwes, 1993). To assess the applicability of these early findings regarding abrupt onsets and color singletons to the online environment, recent academic studies investigated the role of abrupt onsets on VA in online settings, including how these visual stimuli affect consumer behavior and decision-making processes. One of such studies is that of Wooley et al. (2022). Their research examined how moving elements in online advertisements enhance VA. The findings reinforce the hypothesis that abrupt stimuli, which in their study was a moving object within an advertisement, play a vital role in attracting consumer attention in online attention capture. Another study is that by Kong et al. (2019) whose primary goal was to assess how different combinations of onsets of visual elements (e.g., color, text, images) in online advertisements capture attention and facilitate information recall among consumers. They also found that advertisements containing prominent visual features such as abrupt bold colours, clear text, and explicit pricing captured more attention than less dynamic advertisements.

This ideology of bottom-up VA regarding its process of capture via abrupt and salient cues to move away from a task at hand has however been challenged as not being independent of a goal (top-down visual task) but rather by the contingent involuntary orienting hypothesis (Folk et al., 1992). The Contingent Involuntary Orienting Hypothesis suggests that VA is not automatically captured by any stimulus that is simply salient (e.g., an abrupt onset or a unique color). Instead, attention is captured by a stimulus only if it matches the observer's attentional set, which refers to the specific goals or expectations that a person has at the time. In simpler terms, this hypothesis argues that automatic capture of attention by stimuli (such as bright colours or sudden movements) happens when those stimuli align with what the person is already focusing on or is implicitly prepared to attend to. It's not just the stimulus's salience (how much it stands out) that matters, but also whether the stimulus fits the mental "framework" or "set" that the observer is using to guide their attention at that moment. This paradigm can also be linked back to the Posner cueing task. For example, if one is looking for a specific kind of shape in a task (say a unique shape), the brain might start paying attention to all things that stand out (unique), and not just the shape that is being looked for. So, even if a brightly coloured object isn't what is supposed to be found, it might still grab VA because the brain is tuned to notice things that are different or stand out. In this case,

visual attention gets pulled toward the bright color, but only because the activity of looking for something unique made the brain more sensitive to things that are unique or different. As such “Stimuli not exhibiting these properties (characteristics of uniqueness in the visual field) will not involuntarily summon attention” (Folk *et al.*, 1992). The contingent involuntary orienting hypothesis provides two key points. First, when there is no specific task, the visual system may fall back on default settings, which give priority to certain types of stimuli even without a clear task. For example, suppose one is browsing a news website without a particular interest in any topic. In the absence of a specific task, the website's layout might make certain elements stand out, such as a large, red "Breaking News" banner or an image of an ongoing disaster. These stimuli (bright color, bold text, and images) will capture a person's attention even though they aren't actively searching for this information. Second, if the target's location is known beforehand, attention will not be drawn to stimuli in other locations (Gaspelin *et al.*, 2016; Luck *et al.*, 2021). This point refers to the phenomenon where attention is more efficiently directed to a specific location when you already know where to look. In this scenario, if you're primed with prior knowledge of where the target will appear, irrelevant stimuli in other locations won't distract you, as your attention is focused and goal directed. For instance, if a person is shopping online for a specific pair of shoes and they know that they are listed on a particular section of the website (e.g., under “Men’s Shoes” on the left side), their attention will be drawn directly to that section. They won't be distracted by flashy ads or promotions that may appear in other sections of the website, such as pop-up banners for unrelated items. Because the goal (finding shoes) and the target's location (specific webpage) are known, irrelevant stimuli won't capture your attention.

Theeuwes (1993) however opposes this hypothesis with the stimulus-driven selection hypothesis which states that the item with the greatest physical saliency automatically drives automatic bottom-up VA no matter what a person is trying to focus on or the task at hand. In other words, this attention shift happens without any control or intention from the person. Theeuwes argument is relevant however more specifically to the period time of the contributions where offline shopping was King. This is because, more recent studies suggests that while salient stimuli still play a role, user intent (shopping goals) and website design are stronger drivers of VA in the online shopping context (Li *et al.*, 2020; Wang *et al.*, 2022; Saar-Slevin and Koutstaal, 2021). That is, if a shopper knows exactly what they are looking for online, they can hardly be distracted by bottom-up cues. These studies, however, do not dismiss the power of a salient stimuli as argued by

Theeuwes as they still play a role in directing attention even when users have a search goal. Rather, they argue that while salient stimuli (such as flashing banners, bright colours) can still capture attention, they are less likely to override a user's focus on the task at hand compared to online shoppers are just casually browsing without a clear goal to buy a specific item.

Notably, the arguments from all scholars point the result of VA being captured. This leads one to question how attention is truly being captured by the most noticeable thing or if the person's focus was set up that way by the task. Another challenge is knowing if attention was really captured by a noticeable item. For example, if a flashy object doesn't slow down response time to the target, it might mean it didn't capture VA, but it could also mean VA was briefly grabbed and then quickly shifted away before responding to the task.

To overcome some of these challenges, there is significant progress in literature that has been made. First, researchers have identified experimental design features that minimize the implicit task demands that cause biased attention setting towards salient stimuli (Leber and Egeth, 2006). For example, progress in the bottom-up VA debate is the creation of measures that make it easier to measure VA driven by stimulus. One of such is the use of eye tracking to capture overt attention, the shortest latency fixation/dwell time (fixation is when the gaze is directed to a specific area of stimuli for a brief period of time) and saccade (rapid movements of the eyes that change the point of fixation) durations which are so fast that it is implausible that covert attention was directed to a different area prior to the saccade or fixation (Henderson, 2003; Schütt et al., 2019).

In summary, the key areas addressed in the debate of bottom-up attentional capture can be described by two statements: firstly, certain kinds of stimuli (for example abrupt onsets, colour and shape singletons) can automatically generate an attentional signal with or in absence of a specific goal attention setting (stimulus driven). Secondly the capture of a salient singleton or cue can be prevented if the attention control system is configured to the task and as such VA is programmed to look for cues similar or equal to the task. Although there are still areas of debate, agreement on these two statements by researchers on both sides represents progress toward a resolution of the bottom-up VA debate and will be useful for focusing the field on mechanisms that can satisfy both statements.

2.1.6.1a Bottom-Up Cue Suppression

One cannot, however, fully work with the current perspectives without questioning the possibility of deliberately ignoring a bottom-up cue. Concurrently, there are studies that have shown that under certain conditions, salient colour singletons do not capture attention and are in fact proactively suppressed (Gaspelin and Luck, 2018a; Theeuwes, 2023; Wang and Theeuwes, 2020). For example, the study by Gaspelin and Luck (2018a) sought to understand the mechanisms behind attentional suppression of salient stimuli when they are not relevant to ongoing tasks. The study found that when cues were deemed irrelevant to the task, participants were able to suppress visual attentional capture, suggesting that task context plays a vital role in attentional allocation. Belopolsky and Theeuwes (2010) and Belopolsky et al. (2010) also found that salient bottom cues can be proactively suppressed when their presence is predictable within a task context. This means that in their study, participants were able to lessen the interference caused by distractors before they appeared, indicating a level of mental preparation and control. Such results have led to the signal suppression hypothesis, which describes how attentional control mechanisms can hinder or block the capture of attention.

It is worth noting however that even though the signal can be suppressed, it does not imply that it did not capture attention at all. For example, when participant in Belopolsky et al. (2010) study saw the cues, the results also showed that the bottom-up cue was indeed attention-grabbing (salient), but whether it captured attention or was suppressed depended on the task demands. Wang and Theeuwes, (2020) further posit that participants suppress attention capture by cues, but this seems to work only when the cue salience is relatively low compared to the task demands. Gaspelin et al. (2015b) further examined this by using extremely short probe stimulus durations (less than 100 ms) and still found strong evidence that suppression of the bottom-up cues equated to VA duration on them and as such still captured brief attention. The findings of these studies strongly support two key points. First, the results show that bottom-up cues when salient automatically produce a priority signal, meaning they generate what Sawaki and Luck (2010) called an “attend-to-me” signal. This was evident because there would be no need for suppression if the cue did not trigger this signal. Second, the results align with the idea that task-dependent control mechanisms can influence whether attention capture happens or if suppression occurs. Whether attention is captured or suppressed depends largely on whether the task encourages a focus on cues for longer period or shorter period. Additionally, Stilwell and Gaspelin (2021) suggests that suppression of a

feature, such as color, is likely influenced by implicit memory (selection history) rather than explicit goals. For example, when people are familiar with a cue, they can develop the tendency to easily suppress a cue. This suggests that task goals are important in shaping selection history (For instance, participants can't ignore a specific color just by being told about it; it takes time to learn to ignore or attend to it through repeated exposure) which drives largely unconscious suppression processes. Despite this, suppression can also be controlled for over time with repeated exposure to a cue. For example, if the distractor color is cued on a trial-by-trial basis, participants are unable to ignore and suppress it, and it ends up capturing attention (Cunningham and Egeth, 2016; de Vries et al., 2019).

In conclusion, while the evidence strongly supports the idea that attention captured by bottom-up cue is modulated by task demands and selection history, the exact role of explicit goals in feature-based suppression remains unresolved. Some studies (e.g., Wang and Theeuwes, 2020) have shown that participants can proactively suppress attention capture by cues, but this seems to work only when the cue salience is relatively low. Also, repetition of cues can modulate suppression. The remaining question is whether proactive control of attention is strong enough to prevent capture by highly salient stimuli, such as abrupt onsets. There is yet to be research done to clarify these issues especially in e-commerce, but the current evidence supports the idea that proactive control can influence feature-based suppression under certain conditions especially in e-commerce where bottom-up cueing could be employed.

2.1.6.2 Types of Bottom-Up Cues: Goal Driven Spatial Cue and Stimulus Driven Cue in E-commerce

There are two types of bottom-up cues that may be acknowledged or suppressed visually by consumers in e-commerce. They are goal driven-spatial cues and stimulus driven spatial cues. These cues are elaborated on below.

2.1.6.2a Goal Driven Spatial Cue in E-commerce

Built on the premise of the contingent involuntary orienting hypothesis (Folk et al., 1992) and the spatial cueing paradigm (which states that, a given stimulus would capture VA only if it matched the attentional set, and the cases of automatic capture of salient stimuli are the result of tasks that

implicitly encouraging an attentional set that favours these stimuli), spatial cueing is the strategic placement and design of visual elements to direct consumer attention to features on an e-commerce site related directly to a shopping task as well as enhance the shopping experience (Wang et al., 2023; Harrison et al., 2023). The effectiveness of spatial cues is often linked to their ability to create a coherent visual hierarchy that directs users' top-down visual focus on key bottom-up elements, thereby facilitating decision-making processes (Hansen et al., 2015).

In ecommerce, as shown in figure 12 below visual spatial cues manifest in several ways such as visually appealing product images to create an inviting feature (Ghavamipoor et al., 2017), the layout of product images, and the placement of call-to-action buttons can guide users' attention and influence their interactions with the site (Zhao et al., 2021), Contrast (the difference in luminance or colour that makes an object distinguishable from its background) (Ngo and Spence, 2010), well-structured layout design that prioritizes key products and categories (AlSalem, 2023), colour scheme to evoke emotions such as brand quality (e.g., green) and trust (e.g. Blue) (Yoo et. Al, 2023; Harrison and Davies, 2013), typography to facilitate information processing, personality and credibility as goals set by consumers during purchasing (Huang and wang,2022); and interactive effects such as animations for higher engagement and immersive shopping (animated elements, such as banners or product videos) can draw the eye and encourage engagement (Yim et al., 2017).

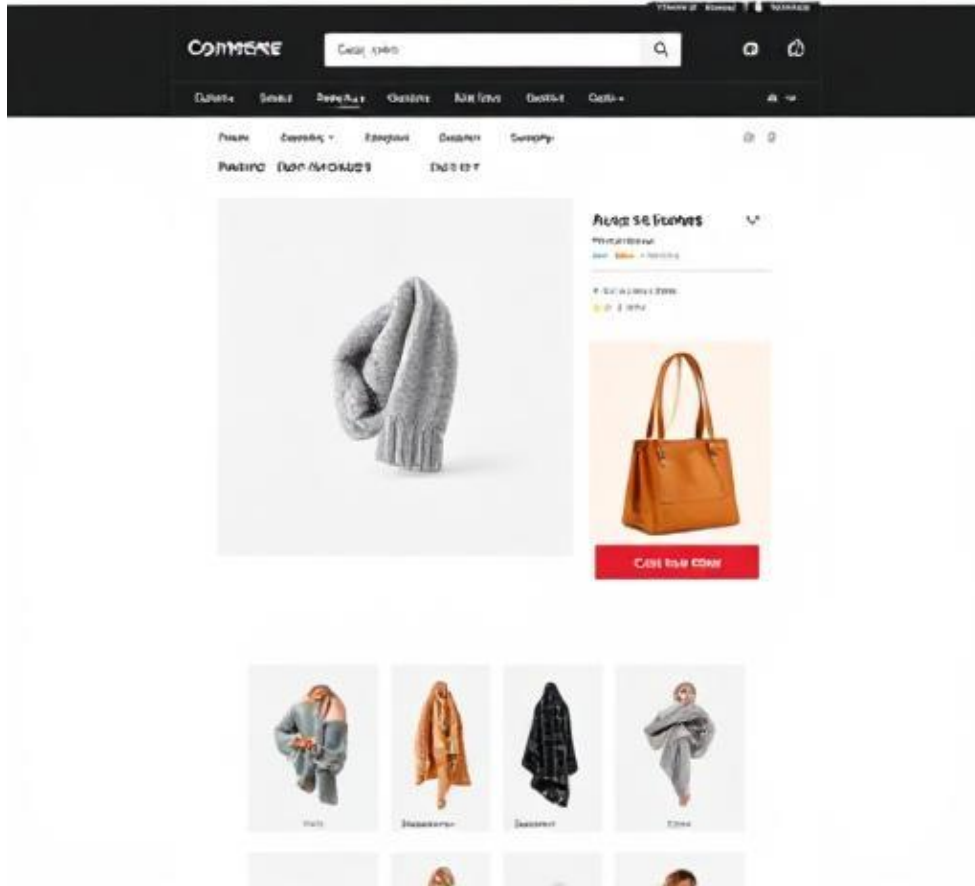


Figure 12 shows an e-commerce product page in where the layout of product images, and the placement of call-to-action buttons can guide users' attention and influence their interactions with the site.

The effectiveness of spatial cues in e-commerce can be explained by several interrelated mechanisms. First, visual spatial cues are adept at capturing consumer attention and directing it toward specific products or areas of a website- elements such as contrasting colours, dynamic images, and engaging layouts create focal points that naturally draw consumers in (Huang and Wang, 2022). In addition to their attention-grabbing qualities, these cues also foster emotional engagement, as visually appealing product displays can evoke feelings of warmth and familiarity, thereby enhancing emotional connections and generating positive associations with both the brand and the product (Yoo et al., 2023). Furthermore, spatial cues play a crucial role in improving memory and recall, as research indicates that sensory spatial cues establish strong associations in memory, allowing consumers to more readily remember products when making purchasing decisions (Ghavamipoor et al., 2017)

The underlying mechanisms for spacial cues are effective, but research suggests that often “context” in which it is applied will drive the extent to which spatial cues might work. For instance, one ongoing debate concerns the relative effectiveness of various visual spatial cues. While some studies emphasize the importance of visual spatial cues in enhancing purchase intentions, others argue that auditory and olfactory cues (olfactory cues refer to the strategic use of scents and aromas to influence consumer perceptions, emotions, and behaviours) may have a more significant impact in specific contexts. For instance, Hultén (2012) highlights the importance of olfactory cues in physical retail environments, while suggesting that their effectiveness may not translate directly to e-commerce. This raises questions about the situational relevance of different cues and their varying impacts on purchasing decisions. For example, Sohn et al. (2017) from their study perceived visual complexity of spatial cues across various online shopping tools (mobile devices) revealed that perceived visual spatial complexity and satisfaction depends on the mobile device individuals use to visit an online shop. Zhuang (2021) further argues that the effectiveness of spatial visual cues may vary across different cultural contexts. For example, color preferences and associations may differ significantly across cultures, impacting the effectiveness of visual spatial cues in e-commerce. Furthermore, the influence of individual characteristics, such as decision-making styles and cognitive processing may cause consumers to respond differently to visual spatial cues, impacting their engagement and purchase intentions (Zhang et al., 2021). Li et al., (2022) also questions whether spatial cues truly reflect a consumer need via attention and choice. In other words, do visual spatial cues increase the likelihood of an impulse buy rather than what a consumer truly intends to purchase especially in contexts where tactile feedback is lacking as it is in ecommerce (Floh and Madlberger, 2013). With this, Yang (2021) adds that specific online spatial cues can indeed lead to heightened emotional engagement, which may drive impulsive buying behaviours.

While it is acknowledged that visual spatial cues can significantly influence consumer decision-making, the degree of their effectiveness is highly context dependent (e.g Vermeir, 2020). As such, the current thesis contends that spatial cues only exert a strong influence under certain conditions specifically, when consumers’ attentional sets are aligned with these cues or when the task at hand implicitly encourages attention to such stimuli. Conversely, in situations where spatial cues do not match the consumer’s attentional priorities, or where attention to these cues is actively suppressed, their impact is diminished. This aligns with the spatial cueing paradigm, which posits that the

automatic capture of attention by salient stimuli is contingent upon the relevance of those stimuli to the consumer's current goals or tasks, a phenomenon particularly pertinent in e-commerce environments (Chang and Egeth, 2019; Cosman et al., 2018a; Feldmann-Wüstefeld et al., 2015). Furthermore, individual differences including geographic location (Xiao et al., 2019), personality traits (Manna, 2019), and shopping motivations (Boardman and McCormick, 2019, 2021) act as important moderators or mediators, further shaping how and when spatial cues influence consumer engagement and purchase intentions.

2.1.6.2b Stimulus Driven Spatial Cue in E-commerce

Whereas goal driven spatial cues (commonly referred to as spatial cues) help orient attention to a particular area in the environment, improving detection or processing of targets that appear at that location, stimulus-driven spatial cues (commonly referred to as stimulus-driven cues) are defined as abrupt visual elements that capture attention due to their inherent salience or distinctiveness, independent of the user's goals or intentions Theeuwes (1993). Stimulus-driven cues are especially effective at capturing attention quickly and can influence responses even when their predictive value is low (Wright and Richard, 2003). The concept of stimulus-driven cues attention in e-commerce is grounded in the idea that certain visual characteristics can automatically draw users' focus, potentially leading to impulsive purchasing decisions (Geng and Mangun, 2011). For instance, an abrupt flashing banner or an unexpected prominently displayed discount tag can serve as a stimulus-driven cue that compels users to engage with the content, regardless of their initial shopping intentions (Shen and Paré, 2012).

One aspect spatial stimulus driven cues are how it manifests itself. This is often referred to as visual salience. Visual salience plays the central role in employing spatial stimulus driven cues in ecommerce. Visual salience refers to the properties of a stimulus that make it stand out from its surroundings, thereby capturing attention. Factors contributing to visual salience include color, brightness, contrast, and motion (Bucker and Theeuwes, 2017). In e-commerce, visual salience can be strategically employed to draw consumers' attention to specific products or promotions, price, image etc. (Bucker and Theeuwes, 2017). For instance, using abrupt bright colours for "Sale" tags or animated graphics can enhance the visibility of certain items, increasing the likelihood of consumer engagement (Feenders et al., 2017). The role of visual salience in the stimulus driven

cue strategy is particularly relevant in e-commerce, where consumers are often bombarded with numerous visual elements on a single webpage. By leveraging visual salience with stimulus driven cues, e-commerce platforms can effectively guide consumers' attention toward desired products or actions, in a visual stimulus to help in making a purchase or signing up for a newsletter for example (Feenders et al., 2017). Figure 13 below shows an illustration of a stimulus driven cue on a shopping website.

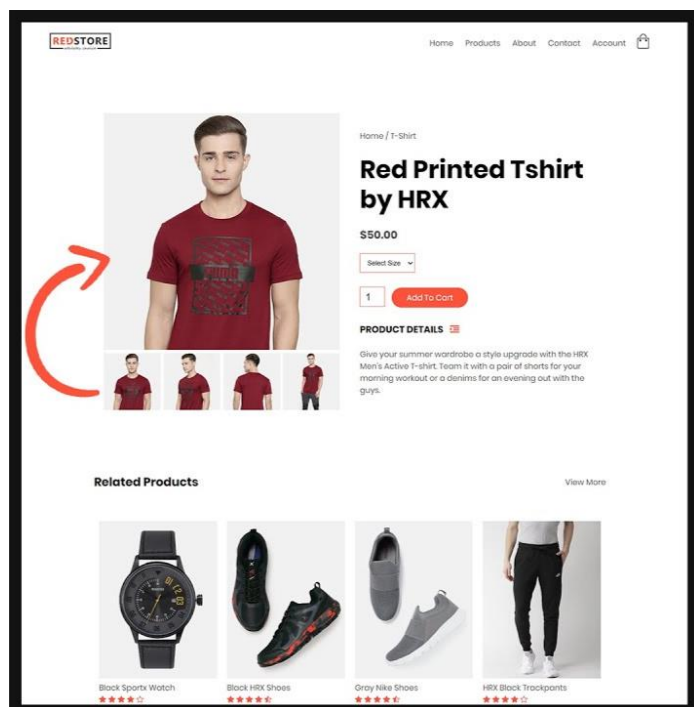


Figure 13 Source: morioh.com: an illustration of a spatial stimulus driven cue on a shopping website. Via an arrow directing attention to image

Arguments On Stimulus Driven Spatial Cues

While stimulus-driven cues can enhance consumer engagement, their effectiveness is not guaranteed and depends on several contextual factors. Wong et al. (2021) emphasize that attentional mechanisms largely drive the shift in visual focus toward a cued stimulus, and that the context in which a stimulus appears such as the webpage layout and overall design in e-commerce can significantly influence how effective these cues are in capturing consumer attention and shaping purchase decisions. Additionally, the predictability of cues is another critical factor. Jingling et al. (2012) found that the multiple-cue effect does not occur solely due to the presence of stimulus-driven cues; rather, it emerges when these cues reliably indicate where a target is likely

to appear. This suggests that consumers are not simply reacting to salient stimuli but are also integrating their expectations and prior experiences when processing cues. Therefore, successful e-commerce design must recognize the dynamic interplay between stimulus-driven and goal-directed (top-down) attention, as consumers' responses to visual cues are shaped not only by the cues themselves but also by the broader context and their own anticipatory frameworks. Zhao et al. (2021) supports this argument by adding that stimulus-driven cues may vary across different consumer segments. They found that factors such as age, cultural background, and shopping preferences can influence how individuals respond to visual stimuli.

While the existing literature underscores the potential of stimulus-driven cues to enhance consumer engagement, it also reveals several significant gaps that warrant further exploration. Most notably, there is a lack of comprehensive understanding regarding how specific contextual variables as stimulus-driven cues shape VA and thus purchase decisions. While some studies, such as Wong et al. (2021), acknowledge the influence of webpage design, there remains a significant need for empirical research that systematically examines how particular design elements like color schemes, font styles, and imagery modulate the effectiveness of these cues across varied consumer groups. Existing research tends to focus on broad environmental or spatial factors, often overlooking the nuanced ways in which these visual elements interact with stimulus-driven attention to affect purchase decisions specifically VA (Chandon et al., 2009; Hutchinson and Turk-Browne, 2012). Addressing these gaps is essential for advancing our understanding of how stimulus-driven cues can be optimally leveraged in diverse and dynamic e-commerce settings. Additionally, the predictability of cues, as highlighted by Jingling et al. (2012), suggests that consumers' prior experiences and expectations can significantly shape their responses. However, to the current researcher's knowledge, the literature lacks a comprehensive framework that integrates these factors into a cohesive understanding of consumer purchase decisions in e-commerce settings. Moreover, the findings of Zhao et al. (2021) regarding the variability of responses to stimulus-driven cues across different consumer segments raise questions about the generalizability of existing theories. It indicates that research should delve deeper into the nuances of how demographic factors, such as age and cultural background, influence the effectiveness of stimulus driven visual stimuli. Investigating this dynamic could provide valuable insights into how marketers can design more effective interventions that align with consumers' evolving preferences and behaviours.

Table 4 Showing the Differences Between Spatial Cues and Stimulus Driven Cues

Aspect	Stimulus-Driven Cues	Spatial Cues
Nature	Involuntary, bottom-up	Can be voluntary (top-down) or involuntary (bottom-up)
Trigger	Salient external events	Signals indicating a location (can be symbolic or direct)
Attention Shift	Automatic	Can be automatic or intentional
Example	Flash of light, abrupt sound	Arrow pointing to a location, flashing box
Role in Attention	Captures attention quickly	Directs attention to specific spatial locations

2.1.6.2c The Relationship Between Spatial and Stimulus-Driven Cues

While spatial cues (bottom-up cues that help orient attention to a particular area in the environment, improving detection or processing of targets that appear at that location) and stimulus-driven cues serve (bottom-up cues that trigger an attentional shift without conscious intention, relying on sensory activity generated by the cue's onset) different functions, they can interact in meaningful ways within the e-commerce environment. Spatial arrangements can enhance the effectiveness of stimulus-driven cues by strategically placing them in areas of high visibility (Ede et al., 2020). For instance, an abrupt brightly coloured "Buy Now" button placed at the top of a product page can leverage both its spatial positioning and its stimulus-driven characteristics to maximize consumer engagement (Freyberg et al., 2015). Conversely, poorly designed spatial layouts can diminish the impact of stimulus-driven cues, leading to missed opportunities for consumer interaction (Geng and Mangun, 2011). Additionally, the interplay between these cues can influence cognitive processing and emotional responses, ultimately affecting purchasing decisions (Jung et al., 2019). For instance, spatially organized product displays that incorporate salient stimulus-driven cues can enhance consumers' emotional engagement and lead to higher conversion rates (Feenders et al., 2017). Furthermore, the distinction between these cues (where spatial cues orient attention to a particular area in the environment, improving detection and stimulus driven cues trigger an attentional shift without conscious intention, relying on sensory activity generated by the cue's onset) is crucial for understanding how consumers allocate their attention in complex visual environments. Research indicates that consumers often rely on both types of cues when navigating e-commerce platforms, with spatial cues guiding their initial exploration and stimulus-driven cues capturing their attention during decision-making (Longstreet et al., 2022; Yang and Burwell, 2020).

This dual reliance underscores the importance of integrating both spatial and stimulus-driven strategies in e-commerce design to optimize user experience and drive sales. In the current study, the focus will be on examining how salient stimulus-driven cues influence consumer VA and engagement. Spatial cues will be included in the website simulation design and layout to create a realistic and user-friendly browsing experience that supports effective information orientation and usability of stimulus driven cues; however, these spatial cues will not be the primary subject of analysis (Yang and Burwell, 2020).

Summary

The preceding discussion on spatial and stimulus-driven cues highlights the complex interplay of bottom-up mechanisms in shaping consumer VA within e-commerce environments. While spatial cues guide users toward specific areas and stimulus-driven cues capture attention automatically, both types of cues collectively influence information processing, emotional engagement, and ultimately purchasing behavior. Understanding these attentional processes is critical, yet traditional behavioural measures alone may provide only a partial picture of how consumers interact with digital interfaces. This gap underscores the growing relevance of neuromarketing, which leverages neuroscientific tools and methods to examine cognitive and emotional responses that underlie consumer decision-making, including VA. By integrating insights from neuromarketing with knowledge of spatial and stimulus-driven cues, researchers can obtain a more comprehensive understanding of how digital design elements capture attention, guide exploration, and influence consumer engagement. The following sections therefore introduce the concept of neuromarketing, its theoretical and practical significance, and the principal techniques used to investigate attention and decision-making in digital retail contexts.

2.2 The Concept of Neuromarketing

2.2.1 Introduction

Neuromarketing is gaining attention and becoming an invaluable tool for understanding consumer behaviour such as VA especially on the digital platforms such as ecommerce. There is supporting evidence for the increasing prominence of neuromarketing as a field of study in the growing number of publications as well as the increasing number of agencies that offer neuromarketing as

a service (Plassmann, Ramsay and Milosavljevic, 2011). As a result of the fast popularity of neuromarketing, an association called the Neuromarketing Science and Business Association was founded in 2012 to promote the field of neuromarketing, educate people about it as well as connect people in the field (NMSBA,2020).

Given its expanding influence, it is essential to examine why neuromarketing has become so relevant in today's marketplace, how it is defined within academic and industry contexts, and the various methods and approaches that constitute the field. The following sections will explore the relevance of neuromarketing, provide a clear definition, and outline the main types of neuromarketing techniques currently employed to gain deeper insights into consumer attention and decision-making.

2.2.2 Relevance of Neuromarketing

For decades, traditional marketing research tools were aimed to explain and predict the effectiveness of advertising campaigns. Since emotions are strong mediators of how consumers process messages, understanding and modelling cognitive responses to selling messages has always been a methodological challenge (Poels and Dewitte, 2019; Teixeira et al., 2012). For instance, researchers have primarily relied on consumers' abilities to report how they feel about a particular piece of advertising, either in a confidential setting such a face-to-face interview, a survey, or in a group setting such as a focus group (Sharma et al., 2014). Unfortunately, these methods have considerable limitations. First, they assume that people can describe their own cognitive process which has many subconscious components. Secondly, numerous factors motivate research participants to distort the reporting of their feelings, including incentives, time constraints, or peer pressure (Gorgiev, 2020). Due to the challenges of these conventional techniques, it is believed to be necessary to integrate other disciplines with marketing to enable a more detailed understanding of marketing within the cognitive sphere operates with the growing interest in neuroscience and the remarkable discoveries of it applied into other fields, neuromarketing is considered as the next revolutionary shift in marketing(Kotler, 2020).

Neuromarketing is especially relevant in the study of consumer online buying behaviour because it adapts methods and theories from neuroscience and integrates them with methods and theories from marketing to help gain access to otherwise hidden information (decisions made subconsciously). Such information materializes through the observation of neural processes

without asking people directly for their thoughts, feelings, memories, evaluations, or decision-making strategies. For example, Archer et al (2016) from the foundational work of Smith & Ellsworth (1985) observed the multidimensional nature and the complexities of understanding human emotions which contribute to percentage of subconscious decision making. They found that each emotion is made up of six cognitive “building blocks”, called appraisals: self-accountability, pleasantness, certainty, anticipated effort, attention and situational control. Hence, using tools such as questionnaires which are not able capture consumer subconsciousness poses some limitations for studying online behaviour when purchase decisions are being made. Consequently, numerous scholars in neuromarketing have published both conceptual (C et al., 2007; Garcia and Saad, 2008) and review (Fortunato et al., 2014; Plassmann et al., 2012) articles within this field. Nevertheless, there is a scarcity of studies that have convincingly offered empirical findings on the topic (Alsmadi and Hailat, 2021) and even fewer have been published in the leading academic journals of marketing science (e.g., Journal of Marketing, Journal of Marketing Research, Marketing Science). This phenomenon may stem from the uncertainties surrounding neuromarketing, including the academic validity of neuroscience measurement methods in enhancing marketing theory, ethical dilemmas related to the application of these methods, and the practical value of these methods as viable tools for marketing practice (Murphy et al., 2008). Despite these challenges, the influential role of neuromarketing literature in educating marketing researchers, has led many scholars to call for more programmatic and integrative research in neuromarketing for its study to emerge as a full-fledged area of marketing science, especially in mainstream marketing research (Breiter et al., 2015; Lee et al., 2018).

Within the context of the current study, neuromarketing’s capacity to measure cognitive building blocks is crucial for understanding the consumer decision-making process in VA. Accordingly, the following section presents a definition of neuromarketing and reviews some of the key neuromarketing pathways developed over time.

2.2.3 Definition of Neuromarketing

Neuromarketing is an interdisciplinary field that merges neuroscience with marketing principles to better understand consumer purchase decision processes. The term itself was first introduced in the early 2000s by Smidts (2002) when he published his article "Kijken in het brein" ("Looking

into the brain"), which, when translated into English, became "Looking into neuromarketing"—thus coining the term for the first time in the field. It has since evolved to encompass various methodologies and applications aimed at deciphering the complex interactions between consumers' neurological responses and their purchasing decisions (Fisher et al., 2010; Kajla, 2023).

At its core, Fortunato et al (2014) define neuromarketing as a technique of neuroscience that identifies the cortical regions responsible for behaviours and processes during decision making, and as a research tool for observing the reactions of the brain during sustained market stimulus by the consumer. This definition implies that, first, neuromarketing draws on neuroscience and, two, neuromarketing is viewed as a research tool for studying behaviours/processes through brain imaging. Neuromarketing has also been defined as the application of neuroscientific methods to analyze and understand human decision making in relation to markets and marketing exchanges (Babiloni, 2015; Panda et al., 2023). This definition underscores the purpose of neuromarketing to gain insights into the cognitive and emotional processes that drive consumer preferences and decision-making. This definition also emphasizes two critical aspects: it shifts the focus of neuromarketing from merely being a tool for commercial interests to a broader understanding of consumer decision making, and it expands the scope of research beyond traditional consumer decision making studies (Babiloni, 2015; Eser et al., 2011). By employing techniques such as functional magnetic resonance imaging (fMRI) and electroencephalography (EEG), researchers can observe real-time brain activity in response to marketing stimuli, providing a deeper understanding of how consumers engage with brands and products (Murphy et al., 2008; Alsharif et al., 2022).

It is important to note however that while neuromarketing involves the application of neuroscientific theories and techniques to generate insights into consumer behavior across both commercial contexts (e.g., retail marketing) and non-commercial ones (e.g., social marketing) (Ramsøy, 2015), it must be clearly differentiated from related fields. Consumer neuroscience, for instance, focuses on employing neuroscience to enhance our understanding of consumer psychology and behaviour (Plassmann et al., 2015) whereas neuroeconomics seeks to interpret economic decision-making processes through the study of neural activity associated with such decisions (Nemorin et al., 2017). Despite these distinctions, all three domains neuromarketing, consumer neuroscience, and neuroeconomics share a common foundation as forms of non-clinical

research, targeting healthy populations. This contrasts with neurology, which investigates individuals with neurological disorders (e.g., injuries, trauma, tumours), and neuroscience, which explores the nervous systems of a wide array of species, from simple organisms like jellyfish and leeches to complex mammals and primates (Plassmann et al., 2012b)

Following the existing definitions of neuromarketing in literature above, the working definition neuromarketing in the present thesis is conceptualized as the use of technique of neuroscience that identifies and records the visual patterns responsible for consumer decision making via neuroscientific research tools for observing the visual reactions sustained on stimulus to drive preferences and decision-making; whereby the knowledge resulting from neuromarketing investigation contributes to the development and advancement of marketing theory and the planning and implementation of marketing strategies, with (e.g., to analyse and influence VA to products information) and without (e.g., to influence behavior for a social good) commercial marketing goals . This definition reflects the VA focus central to the current study. The subsequent section explores the various types of neuromarketing based on the tools employed to investigate different decision-making processes.

2.2.4 Types of Neuromarketing According to Methods

Neuromarketing can be categorised into two: 1) Neuromarketing that records neural activity inside the brain, and 2) neuromarketing that records neural activity outside the brain. Figure 14 below summarizes the various methods. Some of these which are most used will be considered in more detail after.

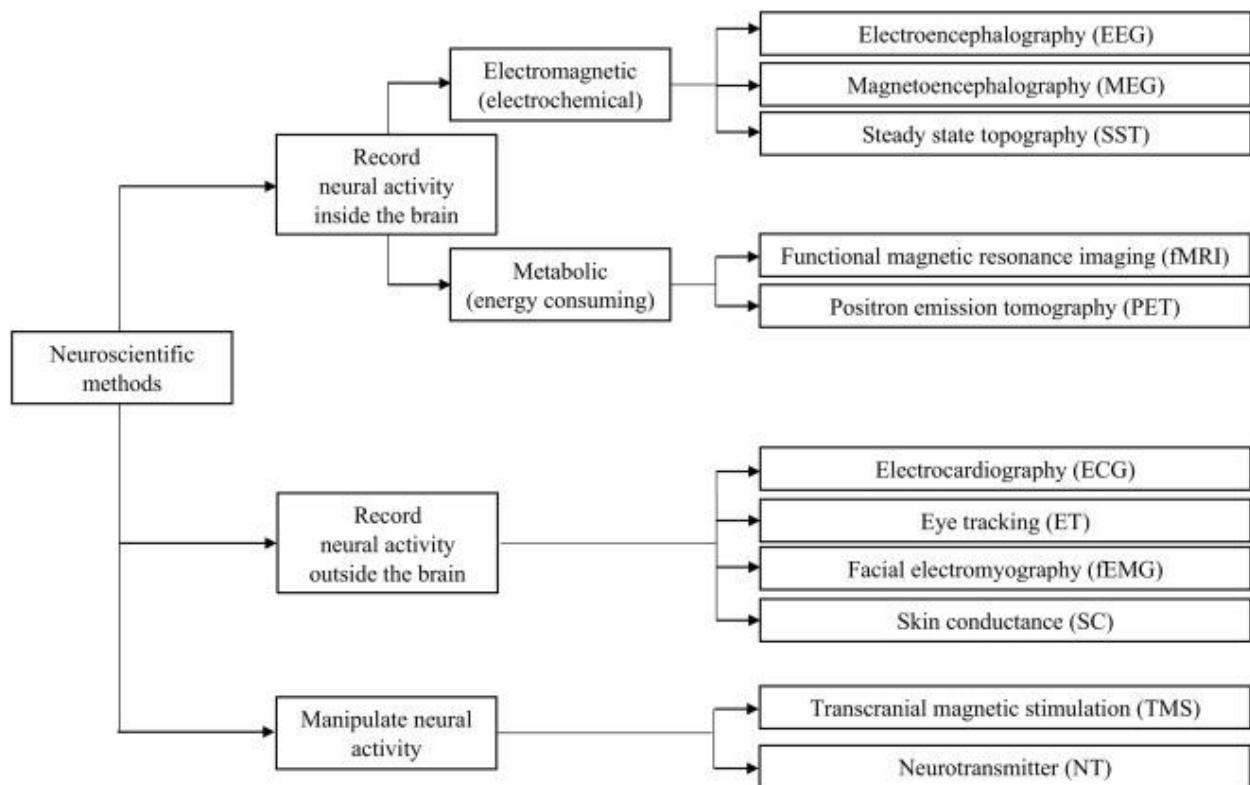


Figure 14 Summary of the types of neuromarketing according to their methods. Image Source: <https://www.sciencedirect.com/science/article/pii/S0148296318302716#bb0585>

2.2.4.1 Neuromarketing with Electroencephalography (EEG)

This is one of the most widespread instruments in used for the first time in 1920, by Hans Berger. The researcher designed an instrument capable of recording the electrical signals naturally issued by the brain (Morin,2011). More specifically, it measures the change in the electrical potential on the cortex of the brain that happens because of a group of neurons transmitting information (Ohme, Reykowska, Wiener and Choromanska, 2019). EEG measures variations in brain activity (figure 15 below) second by second by inserting electrodes on the surface of the head, but it is unable to pinpoint the location of these changes (Sebastian, 2014). However, the more sensors there are, the better the monitorization of the whole brain activity. Marketers may now use wireless EEG caps to monitor customers' brain activity in their real environs and gain insights into their attentional and emotional reactions when they interact with brands outside of the lab thanks to recent advancements in this technology (Harris, Ciorciari and Gountas, 2018).



Figure 15 image showing a study participant wearing the EEG instrument.



Figure 16 the image shows how the brain readings are recorded and presented by an EEG on the screen (image source: Neurensics neuro market research)

2.2.4.2 Neuromarketing With fMRI (Functional magnetic resonance imaging or fMRI)

fMRI is the best neuromarketing technique for predicting consumer behaviour, such as buying behaviour and sales. fMRI is the only technique that measures conscious and unconscious emotions, thoughts, and reason (Neurensics,2024). In advertising, fMRI measures the unconscious emotions and reactions activated by ads for optimisation, to derive pattern of neural associations in the brain of the consumer unique to a brand, as well as test the direct influence from marketing communications on associations made in a customer's brain (Neurensics,2024).

To understand how the fMRI works, activations due to response to stimuli causes blood to accumulate in an activated area of the brain (figure 17 below). As a result of this mechanism, the fMRI detects the active cortical regions. The signal provided by the fMRI on the computer screen is shaped like a stain and is called BOLD (Blood Oxygen Level Dependent) analysed using 3D technology. By means of the fMRI, one can measure the increase of the oxygen level in the brain's

blood flow to show high involvement or reaction to stimuli (Harrell, 2019). Unlike electroencephalography, which can record the brain's responses in milliseconds, the fMRI has a 5-second delay, caused by the time that the blood required by the brain needs to get in the area recently activated by a marketing stimulus being presented (Ariely and Berns, 2010).

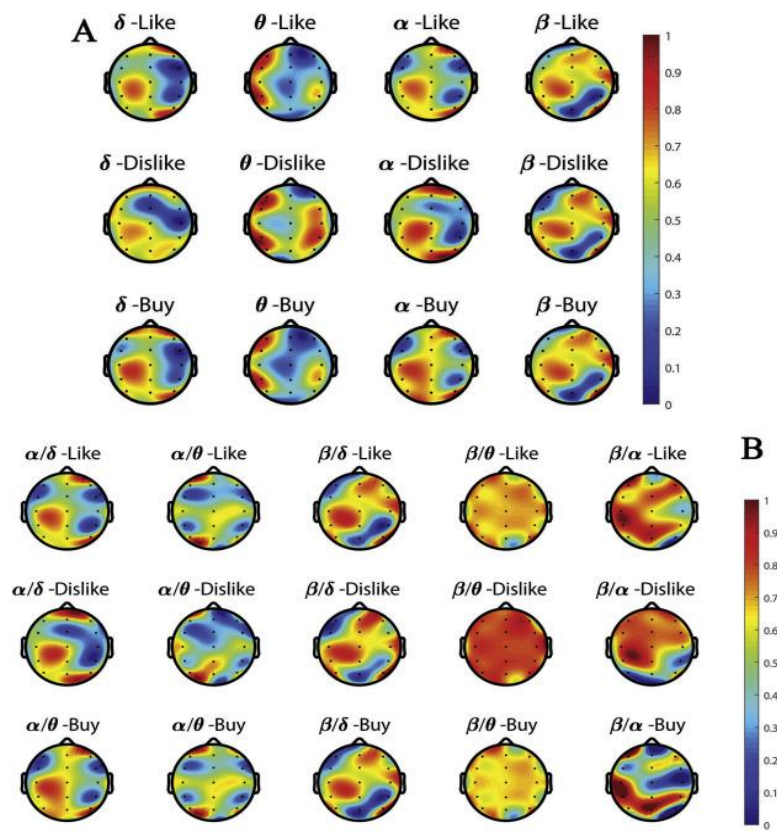


Figure 17 Image Source: Golnar-Nik et al. (2019) This image is an example of the application of EEG power for the prediction and interpretation of consumer decision-making: A neuromarketing study. The image shows EEG for differences between “Buy”, “Like” and “Dislike” conditions according to the features extracted based on the MRIs. The areas with the highest red colour indicate high levels of dislike to the stimuli presented.

2.2.4.3 Neuromarketing With Facial Coding

By finding a certain pattern in the facial expressions that is associated with an emotion, a technique known as facial coding may be used to interpret the micro-movements in the facial expressions as a reaction to a specific marketing stimulus. It is conducted by having a specialised camera that can detect the movements of the facial muscles. Facial coding has been used successfully to predict the effects of video commercials to ascertain emotional response, advertisement likeability, as well as brand likeability and purchase intention (Mahieu et al., 2019). Face expressions are an

autonomic response that a person cannot consciously control. Dr Paul Ekman (1978) studied the micro-movements of the facial muscles when a person experiences a different emotion, and he identified a distinct pattern in those movements that are specific for each of the eight basic emotions under Facial Action Coding System (FACS) (Figure 18 below): happiness, sadness, anger, fear, surprise, disgust, contempt, and embarrassment. Each of these emotions is characterized by a unique combination of facial muscle movements, which can be systematically coded using FACS and is still used by recent studies. For instance, as shown in Figure 18 below, studies found that happiness is often associated with the raising of the corners of the mouth and the crinkling of the eyes, while sadness may involve the lowering of the mouth corners and the drooping of the eyelids (Wibowo et al., 2019; Höfling and Alpers, 2023; and Van der Schalk et al., 2011). Additionally, it was found that facial recognition provided information independent of self-reported bias. The significance of Ekman's research lies not only in the identification of these emotions but also in the implications for understanding human communication and social interaction. By establishing a standardized method for coding facial expressions, FACS has enabled researchers to objectively analyze emotional expressions in various contexts, including clinical settings, marketing, and interpersonal communication (Bartlett et al., 1999; Deramgozin, 2023).

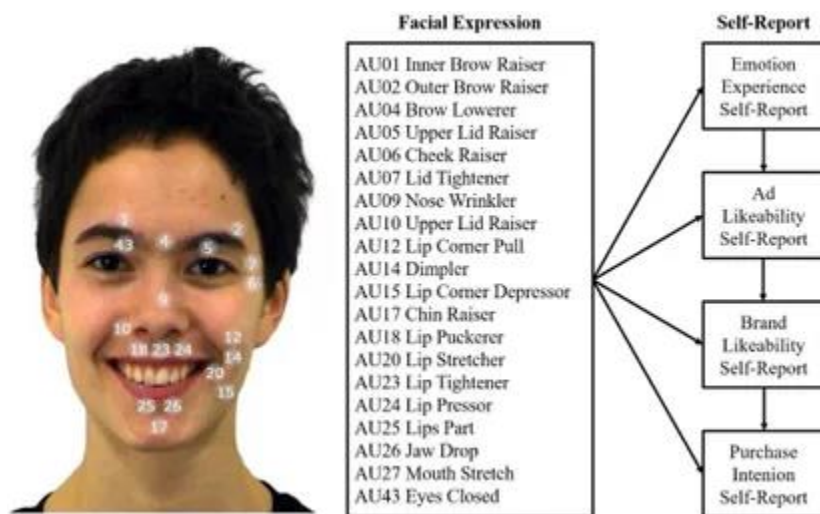


Figure 18. Image Source: Höfling and Alpers (2023) and Van der Schalk et al., (2011)

2.2.4.4 Neuromarketing with Galvanic Skin Response (GSR)

A physiological response of arousal levels to any given stimuli is known as the galvanic skin response (GSR) (Figure 19 below). The brain's autonomic electrodermal activity response to the stimulation of the sweat glands is not subject to conscious control. It is considered a proxy for emotional engagement with the stimuli that is being presented. It is often used in combination with other neuromarketing methods to provide more contextualised interpretation of the study results. In advertising research, the measurement of GSR has been scarce. Some advertising researchers, while testing other emotion measurement methods, have used GSR measurement merely as a validation tool (Bolls et al., 2001). Based on interviews with market researchers who have applied GSR on one hand and practitioner case studies on the other hand, LaBarbera and Tucciarone (1995) concluded that, overall, GSR seems to predict market performance better than self-report measures. They formulated important guidelines concerning equipment and statistical formulas that need to be taken into consideration when designing GSR research. Moreover, LaBarbera and Tucciarone (1995) argued that many previous studies in advertising (mostly conducted during the 1960s) failed to identify any effects of GSR because they lacked adequately sensitive equipment and accurate statistical protocols. Therefore, these researchers were unable to separate “noise” from true arousal response. Also, individual variation is apparent when analysing GSR. Fortunately, today, technological advancements and more complex statistical programs help to overcome such difficulties. The major limitation of GSR that remains unsolved is that it cannot determine the direction or the valence of an emotional reaction. It merely measures the degree of arousal, which can be in valence (Ohme et al., 2010).



Figure 19 Image shows GSR tool on a study participant. Image source: Bryn Farnsworth (2021): Imotions: What is GSR (galvanic skin response) and how does it work?

2.2.4.5 Neuromarketing with Heart Rate and Respiration

Heart rate and respiration measures are used measuring emotional responses. Both heart rate and respiration are controlled by the autonomic nervous system and are out of conscious control of a person. As such, they represent a reliable measure of the change in a person's emotional reaction to a stimulus (Baumgartner et al., 2006). Specific patterns in these physiological responses have been associated with different arousal states, such as excitement, anxiety, fear, etc. (de Melo et al., 2010).

2.2.4.6 Neuromarketing with Implicit Associations Test

The Implicit Association Test (IAT) gauges how automatically implicit attitudes are evaluated in relation to certain traits (Greenwald et al., 1998). People behave in a way that is consistent with their attitudes about that conduct, according to the basic theoretical tenet of the IAT (Ajzen and Fishbein, 1977). Additionally, although self-reporting methods can reveal explicit sentiments, a substantial amount of research has shown that they can be deceptive (Hsu, 2017).

2.2.4.7 Neuromarketing with Ocular dynamics

At present, this can be done utilising eye-tracking (illustrated in figure 20 below). As the name suggests, eye tracking could simply be described as the process of tracking the eye movement on a visual scene. From a marketing perspective, it is one way by which a consumer's unconscious purchase processes through vision can be tracked and measured before showing purchase intent. This is an experimental method of recording eye motion and gaze location, saccade, and fixation across time and task. It is a common and much less invasive way of observing the allocation of VA over a period and has been ascribed to as the eye movement controlling the brain (Bell et al.,2020). Improvements in technology have made it possible to determine the direction of a gaze with high levels of accuracy by measuring the corneal reflection of an infrared light relative to the pupil. Its great propriety is the objectivity of automatic detection, which increases reliability and reduces variability in consumer studies. Metaphorically defined as “a window into neurological function and processes”, this method has multiple applications, especially in package design and advertising research (online, print, television, and out-of-home media) (Imai et al 2019).



Figure 20 The image shows an eye tracker worn by a participant for a desktop eye tracking exercise.

Eye-tracking studies have long been associated with decision making. This is because eye tracking provides data that makes it possible for choices and purchase intention to be directed by altering the visual characteristics of an advertisement, such that it ‘pops out’ and catches the attention of consumers (Milosavljevic et al., 2012b). One of the most recent eye-tracking studies by Monteiro

et al. (2020) to explore the role that VA to wine labels had on purchase intention, revealed through eye tracking that the amount of VA given to a bottle influenced consumer purchases. According to their study, it was possible to highlight areas of attention that the consumers paid attention to even more (product characteristics and pictorial elements) to secure attention and purchase intention for wine. To support this, Borgmeier & Westenhoefer (2009) in a randomised experiment examined if altering food labels had any influence on VA through eye-tracking and thus purchase intention. The results of their study which echoed the results of Bialkova et al. (2014) showed that different label formats suited different subjects in their sample and influenced visual evaluation and the final food product opted for. Their observations that different label formats suited different subjects and influenced visual evaluation and final product choice through eye tracking was primarily attributed to individual differences in how consumers visually process and respond to label design elements. Their eye-tracking study found that VA to specific label features—such as product characteristics and pictorial elements varied across participants, leading to different preferences and purchase intentions. It is however worth noting that the eyes of consumers targeted at a point in a visual stimulus could be a result of pre-existing motives or beliefs about a product. Such beliefs could be the perception consumers have about a product's origin and its effect can be revealed through eye tracking. This is supported by the eye-mind theory which has been used to support VA and eye-tracking studies (Just and Carpenter, 1980). It is based on the relationship between working memory and attention: “The eye–mind theory assumption posits that there is no appreciable lag between what is being fixated and what is being processed” (Just and Carpenter, 1980). This assumption has significant implications for research in reading, VA, and consumer behavior in decision making. First it implies that researchers can reliably use eye-tracking data to infer what information a person is actively processing (Nayeon and Hyunsoo,2021). For example, when a reader fixates on a word or image, it is assumed that their cognitive resources are focused on that specific element (Carpenter, 1980). Second, longer fixations or gaze durations indicate increased cognitive processing demands, such as when encountering unfamiliar words, integrating complex information, or making inferences (Hessels et al.,2024). Third, theory provides a foundation for using eye movement patterns to study how people read, comprehend, or make decisions in real time, making eye-tracking a powerful tool for understanding underlying cognitive processes (D. Chen and Wang, 2022; H.-C. Chen et al., 2022; T. Chen, Samaranayake, Xiongying, et al., 2022)

Liu et al. (2022) conducted an eye-tracking study (figure 21 below) to find out the influence that Country of Origin information had on the visual processing of wine labels from New Zealand. The results of their study revealed that the presence of New Zealand on the label as a country-of-origin information caused subjects to pay more attention to the year of production as well as the brand name especially with subjects that knew about wine from New Zealand. Furthermore, the study participants devoted more VA to the New Zealand wine label and were consequently more likely to select it for purchase. This preference was further reinforced during a taste test, where participants reported enjoying the wine more when they were aware it was from New Zealand. This effect is attributed to their existing positive perceptions and prior knowledge about New Zealand wines, which influenced both their attention to the label and their overall product evaluation.

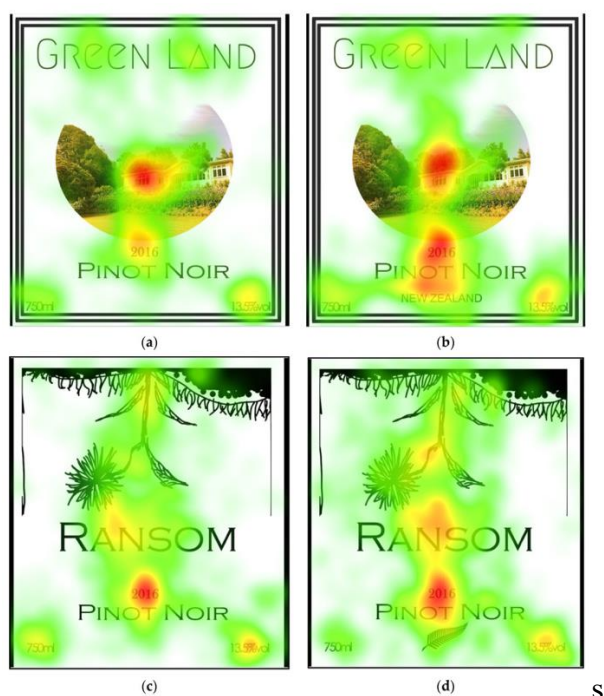


Figure 21 The image shows heat maps showing distribution of fixations for when a label was present versus when it was absent for participants during an experiment. Image Source: Liu et al. (2022): Influence of Label Design and Country of Origin Information in Wines on consumers visual, sensory and emotional responses.

2.2.5 Neuromarketing in The Current Study

Building on the understanding of attentional processes and the utility of neuromarketing, the present study examines how country-of-origin (COO) information, specifically “made-in” labels, and other saliently cues information types influence consumer VA and engagement in an e-

commerce context. Neuromarketing approaches allow researchers to observe underlying cognitive processes directly by measuring physiological responses associated with perception, attention, and decision-making. Among these methods, eye-tracking provides a reliable indicator of attentional allocation by capturing dwell time, which reflect underlying neural processes involved in visual information processing (Wedel and Pieters, 2008). From a neuroscience perspective, VA reflects the allocation of perceptual resources to competing stimuli within the visual field. In digital environments where multiple cues are presented simultaneously, attention is distributed dynamically depending on both informational relevance and the visual prominence of specific elements. In the present study, these attentional processes are examined empirically using eye-tracking, which allows the researcher to observe how consumers allocate dwell times across competing product cues under different experimental conditions. By measuring variations in dwell time across manipulated stimuli, eye-tracking provides an observable behavioural proxy of the underlying attentional processes through which consumers process country-of-origin information and other product attributes.

In the context of the present study, COO information functions as a top-down, goal-directed cue, guiding consumers' evaluation and decision-making processes by signaling perceived quality, trustworthiness, or brand reputation (Verlegh et al., 2005; Verlegh and Steenkamp, 1999). However, VA in online environments is rarely guided by cognitive evaluation alone. Instead, attentional allocation emerges from the dynamic interaction between top-down cues and bottom-up stimulus-driven features such as product images, price highlights, ratings, and product details. This interaction becomes particularly relevant in screen-based environments such as e-commerce platforms, where consumers are exposed to dense visual information within a limited display space. Compared to natural scenes, VA on digital interfaces tends to be more dispersed due to the presence of multiple competing stimuli, each designed to attract user attention. This phenomenon is illustrated in Figure 22, which contrasts eye movement patterns in natural scenes with those observed on screen-based environments (Pedersen, 2025).

(representative images)

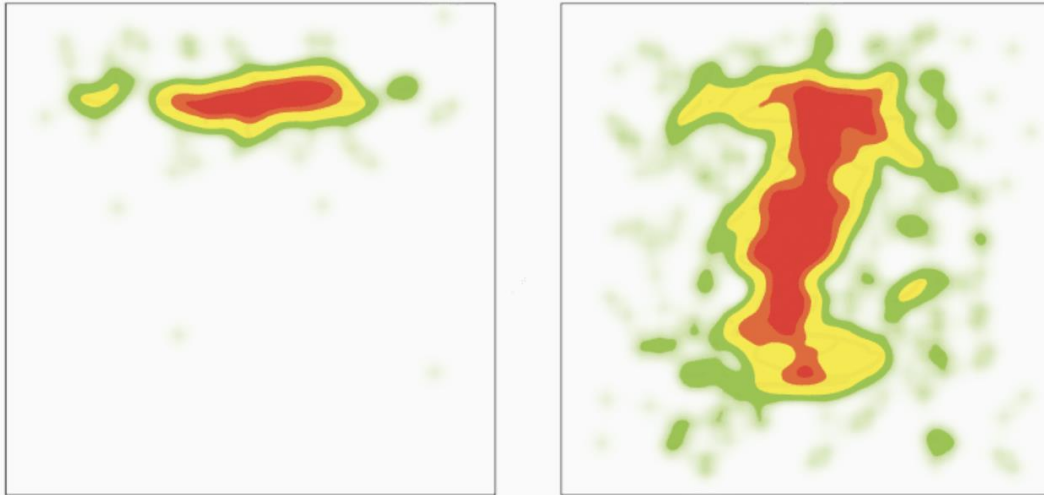


Figure 22 image on the left showing eye movements in the natural scene and image on the right shown eye positions on screen. image source: imotions.com

Despite the growing body of research on neuromarketing and VA, limited attention has been given to how COO cues interact with other stimulus-driven elements in e-commerce environments to influence VA and buying decisions. Integrating neuromarketing techniques into the present study therefore enables a more nuanced examination of how multiple product cues compete for attentional resources during online product evaluation.

Within this research, the neuromarketing tool of ocular dynamics, specifically eye-tracking, is employed to observe real-time attentional allocation in response to “made-in” labels and other stimulus-driven cues in an e-commerce settings. Through this approach, the study investigates not only whether consumers notice COO information and other salient cues, but also how attention to these cues translates into deeper engagement that may ultimately influence buying decisions (Rayner, 2009). By integrating neuromarketing methods with established consumer behaviour theories, the present research provides a neuroscientifically informed explanation of how stimulus-driven visual cues and informational signals jointly influence attentional engagement in online retail environments.

The use of neuromarketing in this context is supported by numerous studies examining VA in online and offline purchasing environments (Liu et al., 2022; Monteiro et al., 2019; Sun et al.,

2021; Zhang et al., 2021; Zhou et al., 2023). These studies demonstrate that combining top-down and bottom-up cues with neuromarketing provides a rigorous framework for understanding the cognitive and emotional processes underlying buying decisions.

Table 5 Summary of Foundational and Conceptual Views of Visual Attention

Author(s) & Year	Discipline / Context	Key Concept / Theory	Definition / View of Visual Attention	Key Contribution to VA Literature	Relevance to Current Study
Broadbent (1958)	Cognitive Psychology	Filter Model of Attention	Visual attention is a selective filtering process that screens out irrelevant stimuli to focus on important information.	Introduced the idea of limited attentional capacity and selection as a core function of attention.	Provides foundational understanding of VA as a selective cognitive process.
Treisman and Gelade (1980)	Cognitive Psychology	Feature Integration Theory (FIT)	Visual attention integrates multiple features (e.g., colour, shape, motion) into a unified percept.	Shifted VA from simple filtering to feature binding and perceptual integration.	Informs how consumers integrate multiple visual elements in complex ads.
Desimone and Duncan (1995)	Neuroscience / Cognitive Psychology	Biased Competition Model	Visual stimuli compete for neural representation, with attention biasing processing towards goal-relevant stimuli.	Introduced competition and neural bias as mechanisms of attention.	Explains how multiple ad elements compete for consumer attention.
Pieters and Wedel (2004)	Marketing / Advertising	Advertising Attention Model	VA is the degree to which consumers	First major contextualisation of VA in	Core theoretical basis for studying VA

			focus on specific ad elements such as brand, text, and images.	advertising research.	in marketing contexts.
Pieters et al. (2010a)	Marketing / Advertising	Cognitive Resource Allocation	VA involves allocating cognitive resources to visual ad elements, affecting memory and decisions.	Linked VA directly to memory and consumer decision-making.	Supports the link between VA and purchase behaviour.
Wang et al. (2014; 2024)	Digital Marketing	Attention and Memory	Visual attention shapes what consumers remember and how they respond to digital ads.	Empirically validated the memory–attention relationship.	Reinforces importance of VA in digital consumer behaviour.
Barnea et al. (2023)	Digital Consumer Research	Visual Complexity Theory	VA is the process of deciphering visual complexity in product designs under cognitive load.	Introduced visual complexity as both attention-capturing and cognitively demanding.	Highly relevant to digital and e-commerce environments .
Humphreys (1998; 2016)	Cognitive Psychology	Flexible Stimulus Representation	Attention enables flexible combinations of competing features.	Emphasised adaptability of attentional mechanisms.	Supports feature integration in complex visual stimuli.
O’Grady and Müller (2000)	Cognitive Neuroscience	Spatial & Object-Based Attention	Attention operates both on spatial locations and entire objects.	Demonstrated dual mechanisms of attentional focus.	Explains how consumers attend to entire products or specific areas.
Duncan (2006; 2013)	Cognitive Neuroscience	Sustained Attention	Attention must be sustained over	Highlighted temporal	Links to dwell time in digital

			time for effective perception.	dimension of attention.	environments .
Pieters, Wedel and Zang (2011)	Marketing / Eye-tracking	Visual Engagement	Dwell time indicates which ad elements sustain attention.	Linked eye movements to advertising effectiveness.	Justifies use of dwell time as key VA indicator.
Awh et al. (2012)	Cognitive Psychology	Top-down vs Bottom-up Attention	VA is guided by goal-driven (top-down) and stimulus-driven (bottom-up) mechanisms.	Formalised dual-process model of attention.	Framework for explaining consumer attention mechanisms.
Kim et al. (2021)	Digital Attention Research	Attention Control	Visual attention sequence is shaped by both internal goals and stimulus salience.	Extended dual-process theory to digital contexts.	Supports digital applicability of top-down/bottom-up VA.
Wolfe (2020)	Visual Search	Multiple Fixations	Humans need multiple fixations to understand complex scenes.	Reinforced importance of sequential attentional processing.	Relevant to scanning behaviour on websites and ads.

Table 6 Summary of Top-Down Visual Attention Literature

Author(s) & Year	Discipline	Key Concept	Definition / View	Key Findings	Relevance to Current Study
Corbetta and Shulman (2002)	Cognitive Neuroscience	Goal-directed attention	Top-down attention is the voluntary, goal-oriented selection of visual space.	Attention is guided by internal goals rather than stimulus salience.	Theoretical basis for voluntary top-down attention.
Theeuwes (2010)	Cognitive Psychology	Task relevance	Goals and task demands drive	Decision-makers attend more	Supports goal-driven consumer

			attentional deployment.	to task-relevant stimuli.	attention in purchasing.
Awh et al. (2012)	Cognitive Psychology	Top-down control	Attention is influenced by goals, mood, emotion, and prior experience.	Top-down attention is not purely voluntary.	Introduces complexity into voluntary/involuntary distinction.
Pieters and Wedel (2004)	Marketing	Advertising attention	Attention is guided by consumer goals and brand familiarity.	Top-down attention affects memory and ad effectiveness.	Links cognitive theory to marketing context.
Simmonds et al. (2020)	Consumer Research	Individual differences	Attention varies by knowledge, involvement, and demographics.	Visual attention is heterogeneous across consumers.	Supports consumer segmentation logic.
Jovancevic-Misic and Hayhoe (2009)	Eye-tracking	Learning & practice	Attention improves through learning and environmental familiarity.	Experts process visual scenes more efficiently.	Explains learning effects in online shopping.
Gegenfurtner et al. (2011)	Educational Psychology	Expertise effects	Experts show shorter dwell times on irrelevant areas.	Expertise enhances selective attention.	Relevant for experienced online shoppers.
Hayhoe et al. (2003)	Visual Cognition	Natural vision	Top-down cues may guide attention involuntarily.	Visual capture precedes conscious control.	Challenges purely voluntary models.
Chandon et al. (2009)	Consumer Behaviour	Unconscious attention	Consumers attend to stimuli without conscious intent.	Attention is partly automatic.	Justifies involuntary top-down effects.

Kiefer (2012)	Consumer Psychology	Unconscious influence	Visual attention is shaped by conscious and unconscious cues.	Consumers do not fully control attention.	Supports dual-process view of top-down attention.
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Table 7 Summary of Core Theories of Bottom-Up Visual Attention Literature

Author(s) & Year	Discipline	Key Concept	Definition / View	Key Contribution	Relevance to Study
Corbetta and Shulman (2002)	Cognitive Neuroscience	Stimulus-driven attention	Bottom-up attention is an involuntary response to salient external stimuli.	Distinguished bottom-up from top-down systems.	Theoretical anchor for involuntary attention.
Wedel and Pieters (2006)	Marketing	Visual salience	Salient stimuli automatically capture consumer attention.	Introduced bottom-up attention into marketing.	Justifies salience in e-commerce.
Itti and Koch (2000)	Vision Science	Saliency maps	Attention driven by low-level features (colour, contrast, motion).	Computational model of bottom-up attention.	Explains why visual design matters.
Theeuwes (1993)	Cognitive Psychology	Stimulus-driven selection	Most salient object captures attention regardless of goals.	Strong salience-based theory.	Baseline for stimulus dominance.
Yantis & Jonides (1984)	Cognitive Psychology	Abrupt onset	Sudden stimuli automatically attract attention.	First evidence for involuntary capture.	Supports online banners/animations.
Pashler (1988)	Visual search	Colour singletons	Unique colours	Extended abrupt onset logic.	Relevant to e-commerce UI design.

Schomaker et al. (2017)	Cognitive Neuroscience	Salient events	capture attention. Visual system prioritises unexpected stimuli.	Neural grounding of capture.	Supports involuntary capture online.
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Table 8 Summary Bottom-Up Attentional Capture

Author(s) & Year	Position	Key Concept	Core Argument	Relevance
Theeuwes (1993)	Stimulus-driven	Salience dominance	Salient stimuli always capture attention.	Strongest salience position.
Folk et al. (1992)	Contingent capture	Attentional set	Only stimuli matching goals capture attention.	Opposes pure salience.
Gaspelin et al. (2016)	Hybrid	Goal-matching	Capture depends on task relevance.	Supports integrated model.
Luck et al. (2021)	Hybrid	Conceptual critique	Salience alone insufficient.	Strengthens theoretical precision.
Chan et al. (2023)	Dual-process	Hybrid control	Both goal and salience interact.	Aligns with e-commerce logic.
Baluch and Itti (2011)	Integrated	Holistic capture	Bottom-up includes top-down biases.	Supports your synthesis.

Table 9 Signal Suppression & Bottom-Up Cue Suppression

Author(s) & Year	Concept	Key Finding	Contribution	Relevance
Gaspelin and Luck (2018a)	Signal suppression	Salient distractors can be suppressed.	Introduced suppression mechanism.	Explains ignoring ads.
Belopolsky et al. (2010)	Predictable cues	Expected distractors suppressed.	Proactive control.	Online banner blindness.
Wang and Theeuwes (2020)	Salience threshold	Suppression works only for low salience.	Limits suppression.	Explains flashing ads.
Sawaki and Luck (2010)	Attend-to-me signal	Salient cues generate priority signal.	Shows capture occurs before suppression.	Supports brief capture.
Stilwell and Gaspelin (2021)	Selection history	Suppression driven by learning.	Memory-based control.	Relevance to repeated e-commerce exposure.

Cunningham and Egeth (2016)	Trial learning	Repeated cues harder to suppress.	Dynamic suppression.	Explains habituation.
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Table 10 Bottom-Up Visual Attention in E-Commerce

Author(s) & Year	Context	Bottom-Up Cue	Key Finding	Relevance
Milosavljevic et al. (2012)	Online choice	Brightness, contrast	Salient items bias decisions.	Core behavioural evidence.
Janiszewski et al. (2013)	Web design	Position, size	Visual layout drives attention.	UI justification.
Sun et al. (2019)	E-commerce	Colour, layout	Saliency increases click-through.	Supports design logic.
Vriens et al. (2020)	Online tasks	Arrows	Salient arrows speed decisions.	Posner in e-commerce.
Kim and Lee (2021)	Product search	Location	Saliency depends on proximity.	Supports spatial argument.
Wooley et al. (2022)	Online ads	Motion	Moving objects capture gaze.	Abrupt onset online.
Kong et al. (2019)	Digital ads	Colour, text	Bold elements enhance recall.	Marketing relevance.

Table 11 Spatial vs Stimulus-Driven Cues

Aspect	Spatial Cues	Stimulus-Driven Cues
Nature	Can be voluntary or involuntary	Purely involuntary
Trigger	Location signals	Salient sensory events
Control	Partly top-down	Bottom-up only
Example	CTA button placement	Flashing banner
Attention	Guided	Captured
Type		
Ecommerce	Navigation	Impulse
Role		engagement

Table 12 Goal-Driven Spatial Cues in E-Commerce

Author(s) & Year	Spatial Cue	Mechanism	Key Effect
Hansen et al. (2015)	Visual hierarchy	Organises attention	Improves decisions
Ghavamipoor et al. (2017)	Product images	Emotional engagement	Improves recall
Zhao et al. (2021)	CTA placement	Spatial guidance	Increases conversion
Ngo and Spence (2010)	Contrast	Perceptual salience	Enhances visibility
Yim et al. (2017)	Animation	Engagement	Sustains attention
Huang and Wang (2022)	Typography	Cognitive fluency	Increases credibility
AlSalem (2023)	Layout	Usability	Enhances exploration

Table 13 Stimulus-Driven Spatial Cues in E-Commerce

Author(s) & Year	Cue Type	Key Finding	Relevance
Theeuwes (1993)	Abrupt onset	Automatic capture	Foundational
Shen and Paré (2012)	Flash banners	Trigger impulse	Online relevance
Bucker and Theeuwes (2017)	Colour/motion	Visual salience	Design logic
Feenders et al. (2017)	Sale tags	Boost engagement	Marketing tactic
Wright and Richard (2003)	Low predictability	Still captures attention	Supports salience
Geng and Mangun (2011)	Salience maps	Neural grounding	Cognitive basis

Table 14 Interaction Between Spatial & Stimulus-Driven Cues

Author(s) & Year	Key Finding	Concept
Ede et al. (2020)	Spatial position amplifies salience	Cue interaction
Freyberg et al. (2015)	Position + flash maximises attention	Synergy
Jung et al. (2019)	Enhances emotional engagement	Affective processing
Longstreet et al. (2022)	Spatial guides, stimulus captures	Dual mechanism
Yang and Burwell (2020)	Both used in navigation	Integrated model

Table 15 COO vs Bottom-Up Salient Cues

Author(s) & Year	Cue Compared	Key Finding	Concept
Herz (2015)	COO	Activates memory schemas	Top-down bias
Zhang et al. (2021)	COO vs price	COO dominates	Superiority effect
Liu et al. (2022)	COO vs design	COO overshadows	Visual dominance
Halkias et al. (2021)	COO vs images	Images compete	Salience conflict
Balabanis and Diamantopoulos (2008)	COO labels	Requires conscious search	Effortful cue
Bucker and Theeuwes (2017)	Visual salience	Drives attention first	Salience priority
Clemes et al. (2021)	Product info	Images & price dominate	Core e-commerce cues

Table 16 Emergence and Relevance of Neuromarketing

Author(s) & Year	Discipline	Core Argument	Key Contribution
Plassmann et al. (2011)	Marketing / Neuroscience	Traditional methods insufficient	Introduced neuroscience to marketing
Poels and Dewitte (2019)	Consumer psychology	Emotions hard to self-report	Limits of surveys
Teixeira et al. (2012)	Advertising	Emotional engagement drives impact	Attention–emotion link
Sharma et al. (2014)	Marketing methods	Self-report biased	Methodological critique
Gorgiev (2020)	Behavioural science	Social desirability bias	Reporting distortion
Kotler (2020)	Marketing theory	Marketing needs neuroscience	Paradigm shift
Lee et al. (2018)	Consumer neuroscience	Neuro methods enhance theory	Field consolidation

Table 17 Conceptual Foundations of Neuromarketing

Author(s) & Year	Definition Focus	Key Elements	Contribution
Smidts (2002)	Coined term	“Looking into the brain”	Origin of field
Fortunato et al. (2014)	Neural regions	Brain–stimulus mapping	Tool-based definition
Babiloni (2015)	Decision processes	Neural basis of choice	Cognitive orientation
Panda et al. (2023)	Market exchanges	Emotional + cognitive	Broad application
Ramsøy (2015)	Applied neuroscience	Commercial & social	Expands domain
Plassmann et al. (2015)	Consumer neuroscience	Psychological focus	Field differentiation
Nemorin et al. (2017)	Neuroeconomics	Economic behaviour	Disciplinary contrast
Eser et al. (2011)	Behavioural	Beyond commercial aims	Social relevance

Chapter 3a Theoretical Frameworks and Conceptual Model

3.1 Introduction

This chapter presents the theoretical foundations underpinning the study, outlines the conceptual model, and reviews relevant empirical and theoretical literature that explains the anticipated relationships among the study variables. Specifically, it examines three key theoretical perspectives that inform the central aim of this research: Cue Utilisation Theory, the Stimulus–Organism–Response (S–O–R) Theory, and Bottom-Up VA Theory. Consumer perceptions and evaluations in e-commerce environments are substantially shaped by the informational and sensory cues available on digital platforms. Accordingly, these frameworks provide a basis for understanding how consumers interpret, process, and respond to diverse forms of information and stimuli encountered in online retail settings. Furthermore, given the extensive empirical evidence highlighting the pivotal role of VA in consumer information processing, these theories offer insight into how consumers allocate gaze and cognitive resources across competing stimuli. They also provide a conceptual foundation for explaining the mechanisms that direct attention toward salient cues within complex and information-rich ecommerce environments.

3.2 Theoretical Frameworks

3.2.1 Cue Utilization Theory (CUT)

Cue Utilization Theory (CUT) originates from the foundational work of Olson and Jacoby (1972), who proposed that consumers rely on product-related cues as inferential signals when evaluating quality under conditions of uncertainty. The theory is grounded in the assumption that consumers seldom possess complete information about a product's true quality; therefore, they use observable cues as diagnostic indicators to reduce ambiguity and guide decision-making. These cues function as informational shortcuts that assist consumers in forming quality perceptions, attitudes, and buying intentions. CUT is included in this study because it explains how consumers interpret intrinsic and extrinsic cues on e-commerce platforms under uncertainty, providing the inferential foundation for the sequential attention–evaluation process.

A central assumption of CUT is that consumers are boundedly rational decision-makers who interpret available information through perceptual and cognitive constraints. Because individuals cannot process all available information exhaustively, they selectively attend to and interpret cues they perceive as meaningful. Importantly, CUT does not assume that cues must be accurate reflections of objective quality; rather, their influence depends on perceived diagnosticity. Thus, purchase decisions are driven not by objective product quality per se, but by the cues consumers notice, interpret, and weight during evaluation.

As such, CUT distinguishes between intrinsic cues and extrinsic cues. Intrinsic cues are product-related attributes that are physically inherent to the product (e.g., image, design, colour, texture), whereas extrinsic cues are externally associated attributes (e.g., price, brand name, country-of-origin) (Veil et al., 2006). When intrinsic attributes are difficult to evaluate directly particularly in online environments consumers rely more heavily on extrinsic cues as heuristic substitutes (Mo et al., 2020; Wang et al., 2016). More recent research (e.g., Kakaria et al., 2024) reinforces this position, demonstrating that cue reliance intensifies under conditions of information asymmetry and digital shopping contexts.

Beyond the basic intrinsic–extrinsic distinction, subsequent research has extended CUT by examining the psychological conditions under which different cue types are relied upon and potentially misinterpreted. Empirical evidence demonstrates that consumers are not always able to accurately evaluate either intrinsic or extrinsic cues prior to purchase, and in some cases even post-consumption evaluations remain biased (Alba and Hutchinson, 2000). Such inaccuracies may stem from limited understanding, information cue inaccessibility, low self-confidence, or misinterpretation of available signals. Under these circumstances, intrinsic product attributes are frequently discounted in favour of extrinsic cues perceived to be more reliable (Rao & Monroe, 1988). Critically, cue effects may extend beyond cognitive inference to shape perceptual experience itself. For example, Wansink (2000) found that participants reported differences in taste and texture in identical products when labelling implied the presence of ingredients. Such findings reinforce the core premise of CUT: consumers rely on cues they believe to be diagnostic, even when those cues do not objectively reflect product quality.

A key extension of CUT concerns the role of consumer knowledge, particularly the distinction between objective and subjective knowledge as conceptualised by Alba and Hutchinson (2000). Objective knowledge refers to accurate, verifiable information stored in long-term memory and developed through extensive category experience. In contrast, subjective knowledge reflects consumers' self-assessed expertise or perceived familiarity with a product class. Empirical evidence suggests that consumers frequently overestimate their expertise, creating a discrepancy between perceived and actual knowledge levels (Alba and Hutchinson, 2000). This miscalibration can distort cue interpretation and lead to improper weighting of both intrinsic and extrinsic attributes. Consumers possessing high levels of objective knowledge tend to differentiate more effectively between relevant and irrelevant attributes, focusing primarily on intrinsic cues that directly signal product performance (Brucks, 1985; Park et al., 1994). While extrinsic cues are not entirely disregarded, they are incorporated only when they are genuinely predictive of quality (Rao and Olson, 1990). However, even highly knowledgeable consumers are not immune to bias; strong prior beliefs may occasionally result in suboptimal cue weighting despite substantial expertise. In contrast, consumers relying predominantly on subjective knowledge lack the informational depth necessary to accurately interpret intrinsic attributes. These individuals often recall only limited brand or attribute information and use familiarity as a proxy for expertise (Raju et al., 1995). Because they may struggle to identify performance-relevant characteristics, extrinsic signals such as brand name, price, or country-of-origin become especially influential heuristics. Consequently, subjective knowledge is associated with greater reliance on extrinsic cues and an increased likelihood of misjudging product quality. Confidence further moderates these processes, as low-confidence consumers defer to external signals, while high-confidence consumers may adhere to prior beliefs irrespective of contradictory evidence (Jamil et al., 2022). Conversely, highly confident consumers often develop stable attitudes that resist change, sometimes maintaining beliefs irrespective of contradictory evidence. Importantly, confidence does not necessarily equate to objective expertise; highly confident individuals may still rely heavily on subjective knowledge. The interaction between knowledge type and confidence level therefore determines the relative weighting of intrinsic and extrinsic cues. When objective knowledge and high confidence coexist, intrinsic cues are more likely to dominate evaluations. However, when knowledge is limited or primarily subjective, extrinsic cues frequently become the principal basis of judgment.

Collectively, these extensions demonstrate that CUT operates not merely as a structural distinction between cue types, but as a dynamic framework moderated by cognitive capability, metacognitive awareness, and self-belief. Cue utilisation is therefore contingent upon both the informational environment and the consumer's internal resources. This however highlights CUT's limitation: while it explains cue weighting, it does not specify which cues capture attention first.

In visually complex environments such as e-commerce platforms, cue utilisation is shaped by VA processes. Cue influence is inherently sequential: cues must first be detected, then attended to, subsequently interpreted, and ultimately weighted in forming evaluations. If a cue fails to attract attention, it cannot exert inferential influence. Krüger et al. (2017) extend CUT by emphasising the role of salience, arguing that cues differ not only in informational value but also in salience. Their findings suggest that visually salient cues enhance processing fluency and increase the likelihood of influencing judgments. This perspective aligns with VA research demonstrating that salient environmental features guide search processes and bias cognitive processing (Chan & Hayward, 2013). In online retail environments, elements such as arrows, highlighting, product imagery, and informational prominence function simultaneously as perceptual and inferential cues. While prior CUT research has extensively examined cue type and consumer characteristics, relatively limited work has integrated cue utilisation theory with real-time measures of VA in digital choice environments. Also, there is limited research regarding the limitation of CUT with specifying specify which cues capture attention first.

Applying Cue Utilisation Theory to the present research suggests that country-of-origin (COO) information and visually salient cues on other product information operate as distinct yet interacting signals during product evaluation. COO functions primarily as an extrinsic quality cue, requiring visual detection and cognitive interpretation before influencing judgment. In contrast, salient indicators (e.g., arrows) on other intrinsic cues (e.g., product images and descriptive attributes) and extrinsic information types (e.g., price, ratings, and country-of-origin (COO) information) represent perceptually driven cues that may automatically guide bottom-up VA toward specific areas of interest. When examined using eye-tracking metrics such as dwell time, CUT provides a robust framework for understanding how variations in VA allocation reflect underlying cue utilisation processes. Specifically, the theory predicts that cues attracting greater VA are more likely to be utilised in forming visual product evaluations. Differences in dwell time across areas of interest therefore indicate differential cue weighting during decision-making. By

integrating CUT with VA mechanisms, the present study advances the theory by addressing its limitation into a digital, perceptually driven context and provides empirical insight into how COO against saliently cued intrinsic and extrinsic information compete and interact during online consumer choice.

3.2.2 Stimulus-Organism- Response Theory (SOR)

The Stimulus–Organism–Response (SOR) theory, developed by Mehrabian and Russell (1972), originates from environmental psychology and provides a process-based explanation of how environmental cues influence behavioural outcomes through internal psychological mechanisms. Moving beyond simple behaviourist stimulus–response formulations, SOR posits that environmental stimuli (S) do not directly cause behavioural responses (R); rather, their effects are mediated by the organism (O), which comprises the individual’s cognitive appraisals and affective states. Behaviour is therefore understood as the outcome of internally processed environmental information. SOR is adopted in this study to explain the internal cognitive–affective mechanisms that connect cue detection (CUT) with evaluative engagement, providing a justification for examining bottom-up dwell time beyond mere VA.

Within consumer research, the SOR framework has been widely employed to explain how retail atmospherics, product presentation, and digital interface characteristics shape decision-making processes. For instance, Jeong et al. (2009) demonstrated that perceived product features act as environmental stimuli that activate internal evaluative and emotional mechanisms, which subsequently guide behavioural intentions. In digital commerce environments, website attributes including visual design, imagery, layout complexity, and informational cues function as structured environmental stimuli capable of shaping consumers’ cognitive–affective states prior to behavioural enactment. In the present study, the e-commerce product page constitutes the primary environmental stimulus (S). Visual elements embedded in product presentations represent external cues that attract perceptual resources and initiate internal processing. Importantly, SOR theory conceptualises the organism (O) as a multidimensional construct encompassing both cognitive evaluations (e.g., perceived attractiveness, usefulness, familiarity) and affective reactions (e.g., interest, desire, pleasure). These internal states represent the mediating mechanism through which visual stimuli exert influence on visual attentional engagement.

A central contribution of the current research lies in operationalising the organismic state through VA metrics, specifically, dwell time. Rather than treating VA as a purely mechanical response, the current study conceptualises prolonged dwell time as an indicator of intensified cognitive elaboration and/or affective engagement. In this sense, VA functions as an observable manifestation of internal processing depth. Longer dwell times suggest heightened evaluative scrutiny, greater emotional resonance, or increased perceived desirability, thereby reflecting the organism component of the SOR chain.

This conceptualisation is supported by prior empirical work. Couperus (2011) demonstrates that perceptual load influences selective attention, indicating that attentional allocation reflects underlying cognitive processing demands. Similarly, Gögler et al. (2017) show that emotional reactions significantly shape engagement, as sustained attention often signals heightened interest and potential product preference. Within digital consumption contexts, dwell time provides a behavioural proxy for evaluative engagement with products, rather than a direct measure of selection.

Beyond purely visual characteristics, the present study incorporates additional stimulus-level variables, information relevance, product familiarity, and purchase frequency. Within the SOR structure, these variables operate as differentiated environmental stimuli that may alter the intensity and valence of organismic responses. For instance, familiar products may reduce cognitive load yet enhance affective certainty, whereas unfamiliar or infrequently purchased products may stimulate more extensive information processing. These variations in stimulus characteristics are expected to produce distinct patterns of internal cognitive–emotional activation, observable through differences in dwell time. Consistent with SOR assumptions, the organism is not a passive intermediary but an active interpreter of environmental cues. Individual differences, prior experience, and contextual expectations shape how stimuli are appraised and emotionally encoded. Consequently, variation in dwell time across consumer segments reflects heterogeneity in organismic processing rather than mere exposure effects. Behavioural responses, therefore, emerge from the interaction between environmental stimuli and internally constructed meaning.

SOR theory provides a robust framework for mapping these mechanisms, yet it does not differentiate between bottom-up and top-down attentional processes, nor does it specify which

stimulus features reflexively capture attention. Integrating SOR with bottom-up VA theory (elaborated on further in this chapter) which explains reflexive attentional capture, linking SOR's internal organismic processing with the sequential attention mechanism described in CUT, addresses this limitation by linking stimulus-driven salience to organismic engagement.

Applying the SOR framework (figure 23 below) within the confines of the current study, e-commerce visual stimuli and product-related characteristics (S) are proposed to influence consumers' internal cognitive–affective states (O), which are operationalised through VA metrics (R) (dwell time). These organismic processes serve as a proxy for evaluative engagement and inferred product preference, rather than direct selection. In this way, VA functions as the organismic mechanism connecting perceptual salience to evaluation.

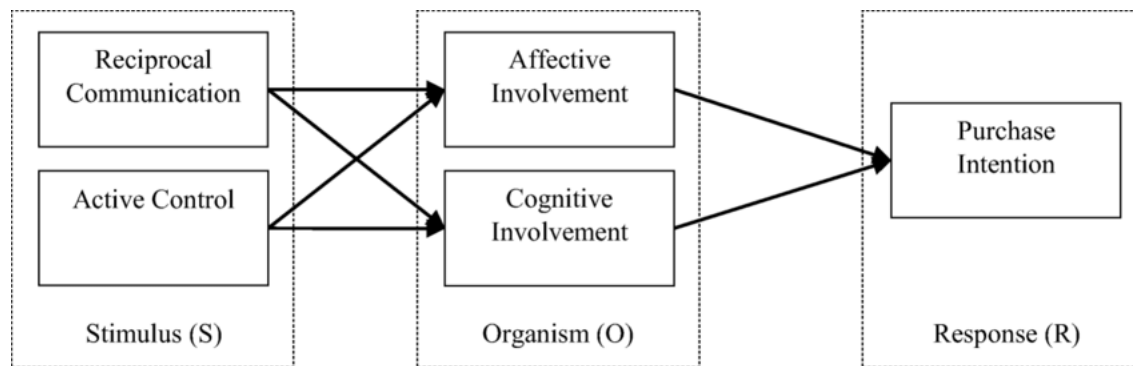


Figure 23. S-O-R Model in the context of E-Commerce sites (Mehrabian and Russell's, 1974)

3.2.3 Bottom-Up Visual Attention Theory

Although no single unified theory exclusively defines bottom-up VA, the concept is grounded in a complementary body of research spanning cognitive psychology, neuroscience, and consumer behaviour. In the present study, Bottom-Up VA Theory is conceptualised as an integrative framework explaining how stimulus-driven visual features automatically capture perceptual resources and initiate downstream evaluative processing. Bottom-up attention refers to the reflexive allocation of attention toward salient environmental stimuli (stimulus driven cues), independent of deliberate goals or intentions. Empirical research substantiates the centrality of stimulus-driven attentional capture. Theeuwes (2010) for example demonstrates that salient stimuli attract attention independently of task goals, while Huang and Pashler (2007) show that such capture occurs even when counterproductive to intentional objectives. More recent findings

(e.g., Zhao et al., 2021) further confirm that salient visual elements systematically guide gaze allocation and increase the likelihood of subsequent cognitive and affective processing. Collectively, these findings reinforce the reflexive and automatic nature of bottom-up attention.

In this study, Bottom-Up VA Theory complements CUT and SOR by identifying which cues attract attention first and how these cues are translated into cognitive–affective engagement. A comprehensive understanding of bottom-up attention theory can be derived from the integration of three complementary theoretical perspectives: Feature Integration Theory, Saliency Map Theory, and Visual Attention Theory.

As earlier mentioned, Feature Integration Theory, proposed by Treisman and Gelade (1980b), provides the foundational perceptual mechanism underlying bottom-up attention. The theory posits that visual processing begins with a pre-attentive stage in which basic features (e.g., colour, orientation, intensity) are processed automatically and in parallel across the visual field. Stimuli possessing distinctive features “pop out,” capturing attention without conscious effort. Attention is then required to bind these features into a coherent perceptual object. This framework explains why salient product elements in digital environments attract early perceptual resources prior to deliberate evaluation. Building on this perceptual account, the Saliency Map model developed by Itti and Koch (2000) conceptualises bottom-up attention as a competitive computational process. According to this model, visual features are integrated into a “saliency map” that encodes the relative conspicuity of locations within the visual field. The most salient regions win the competition for attentional selection, determining where gaze is directed first. This model provides an explanation for stimulus-driven attentional capture and explains how visual features translate into observable dwell time behaviour. While Feature Integration Theory explains how features are detected, and Saliency Map Theory explains how they compete for selection, Visual Attention Theory (VAT) by Pieters and Wedel (2004) extends these mechanisms into applied consumer contexts. VAT conceptualises VA as a measurable allocation of processing resources that can be inferred through eye-tracking metrics such as fixation duration and dwell time. Within this framework, bottom-up processes represent the automatic component of attention that precedes and shapes higher-order evaluative processing.

In the present study, bottom-up VA is operationalised using eye-tracking metrics, including dwell time duration. These measures represent behavioural manifestations of the underlying saliency-driven selection process described by Feature Integration Theory and Saliency Map Theory and conceptualised within VAT as the allocation of visual processing resources. Prolonged dwell time on salient product features reflects intensified perceptual and cognitive engagement, heightened affective activation, or increased perceived desirability. Furthermore, bottom-up attention operates dynamically over time. Initial dwell times are largely determined by perceptual salience, consistent with the saliency map framework, while subsequent attention may be maintained, amplified, or attenuated depending on emergent evaluative responses. Dwell time therefore allows the current study to capture the unfolding of stimulus-driven attentional capture into deeper engagement. Importantly, although bottom-up VA is stimulus-driven, its magnitude can be moderated by individual-level variables such as product familiarity and purchase frequency. Highly familiar products may reduce the novelty-based salience advantage predicted by Feature Integration Theory, whereas unfamiliar stimuli may intensify pre-attentive capture. Thus, stimulus-driven mechanisms and consumer characteristics interact to shape attentional allocation.

By integrating Feature Integration Theory (perceptual detection), Saliency Map Theory (attentional competition), and VAT (behavioural allocation and measurement), the present study advances a unified Bottom-Up Visual Attention Theory. Within this integrated framework, salient environmental stimuli (S) generate differential activation on a perceptual saliency map, reflexively capturing attention. This attentional allocation is operationalised through dwell time and fixation metrics (O), reflecting evaluative engagement, rather than direct product choice (R). This process-oriented perspective positions bottom-up VA as the core mechanism linking salient environmental cues to cognitive–affective engagement in digital consumption contexts.

3.2.4 Integration of Frameworks for Conceptual Framework Development

In accordance with the assumptions of Cue Utilisation Theory (CUT), Stimulus–Organism–Response (SOR) Theory, and the Bottom-Up Visual Attention framework, this study conceptualises VA as the central outcome of exposure to salient e-commerce product cues. Rather than measuring product choice directly, the present research positions dwell time as a behavioural

manifestation of evaluative engagement and inferred product preference within a digitally mediated environment (e-commerce).

Consistent with CUT, consumers rely on cues as inferential signals when evaluating product quality under uncertainty. In online retail contexts, where physical inspection is absent, cue utilisation becomes particularly salient. Intrinsic cues (e.g., product images and descriptive attributes) provide performance-related information, while extrinsic cues (e.g., price, ratings, and country-of-origin (COO) information) function as heuristic signals that guide inference. However, CUT asserts that cues must first be detected and attended to before they can influence evaluation. Thus, cue influence is inherently sequential: detection → attention → interpretation → weighting.

Integrating Bottom-Up Visual Attention Theory strengthens this sequential logic. Drawing on Feature Integration Theory and Saliency Map Theory, visually distinctive elements (e.g., arrows, highlighting, prominence) generate greater perceptual contrast and therefore receive higher activation on the perceptual saliency map. These salient cues reflexively capture VA independent of deliberate goals. In the present study, enhanced salience (e.g., arrows placed next to specific information types) is expected to increase dwell time relative to non-enhanced conditions. This effect is hypothesised to occur across both local and foreign product conditions, though magnitude may differ depending on cue type and consumer familiarity.

Within the SOR framework, the e-commerce product page constitutes the stimulus (S). Salient cues including product images, price, product details, ratings, and COO information represent structured environmental stimuli competing for attentional resources. The organism's processing and response (O) is operationalised as VA allocation, measured through dwell time metrics. These measures reflect the depth of cognitive-affective engagement activated by stimulus exposure. Longer dwell times indicate intensified perceptual processing, evaluative elaboration, and potential preference formation. The response (R), in this study, is not overt product selection, but observable attentional engagement, which serves as a proxy for inferred preference.

The framework further proposes that COO operates as a distinct extrinsic cue whose presence or absence alters attentional allocation. When COO information is present, it competes with other extrinsic cues (e.g., price or ratings) for visual dominance. When absent, attentional resources may redistribute toward remaining cues. Consequently, differences in dwell time across local and

foreign product conditions are expected depending on whether COO information is displayed and whether other cues are perceptually enhanced.

Additionally, product familiarity and purchase frequency are conceptualised as moderating variables. These consumer characteristics influence the strength of bottom-up attentional capture. Highly familiar products may attenuate novelty-driven salience effects, reducing dwell time differences between enhanced and non-enhanced cues. Conversely, unfamiliar or infrequently purchased products may amplify stimulus-driven capture, increasing dwell time on salient elements.

In summary, the integrated model proposes that intrinsic and extrinsic cues (CUT)

- Compete for perceptual dominance via bottom-up mechanisms
- Activate differential attentional allocation (SOR organism)
- Observable as variations in dwell time (response proxy)
- Moderated by product familiarity and purchase frequency
- Influenced by the presence or absence of COO across local and foreign products

Thus, VA operates as the central mediating mechanism linking cue salience and evaluative engagement within digital product environments.

Table 18 showing construct of mapping for conceptual model

Theory / Framework	Core Construct	Operationalisation in Study
Cue Utilisation Theory	Intrinsic cues	Product images, product details
Cue Utilisation Theory	Extrinsic cues	Price, ratings, COO
Bottom-Up Visual Attention	Salience	Arrows / visual enhancement vs non-enhanced condition
Bottom-Up Visual Attention	Attentional capture	Dwell time
SOR Theory	Organism (cognitive–affective engagement)	Depth of processing inferred from dwell time
Response (Proxy)	Attentional engagement / inferred preference	Relative dwell time across product areas
Moderators	Consumer characteristics	Product familiarity, purchase frequency, information relevance
Experimental Condition	COO presence vs absence	Local vs foreign products with/without COO

3.2.5 Figure Conceptual Framework Diagram

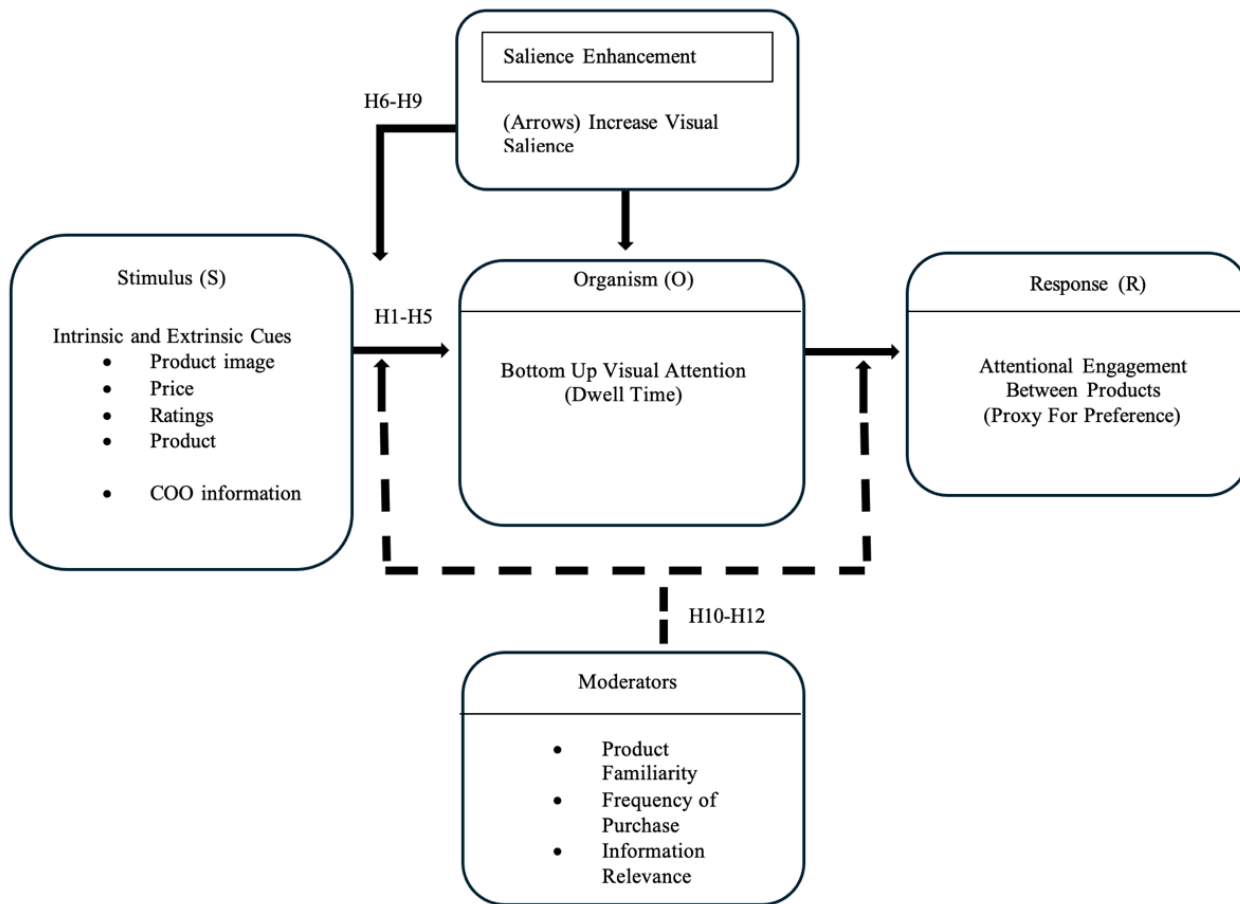


Figure 24 Conceptual Framework Diagram

Chapter 3b Hypothesis Development

3.0 Introduction

This chapter develops the hypotheses guiding the present study by examining how consumers allocate VA to competing cues in e-commerce environments. The chapter conceptualizes country-of-origin (COO) information and other product-related attributes as key stimuli that influence VA. It integrates insights from visual attention theory, SOR theory, CUT and prior empirical research to explain how cues shape VA allocation. Building on this foundation, the chapter systematically derives hypotheses concerning the effects of COO information, the role of other salient cues, and the moderating influence of contextual and participant-related factors

3.3 The Relationship Between Country-of-Origin Information and Visual Attention

VA plays a central role in consumer decision-making in e-commerce environments. Because online shopping eliminates physical inspection, product evaluation is predominantly guided by visually presented cues embedded within digital interfaces. Within such environments, the configuration of visual stimuli determines how consumers allocate limited attentional resources during product inspection.

The present study draws on the Stimulus–Organism–Response (SORR) framework to explain how country-of-origin (COO) information influences VA. As already discussed on the SOR model, environmental stimuli (S) affect internal organismic states (O), which subsequently shape behavioural responses (R). In online retail contexts, product attributes presented on screen constitute environmental stimuli. The inclusion or exclusion of COO information—operationalised as “Made in” labels therefore represent a modification of the stimulus environment. Within this framework, VA is conceptualised as the organismic state. It reflects the allocation of cognitive resources toward specific elements within the visual field and can be objectively captured through eye-tracking metrics such as fixation duration and dwell time. Because attention is selective and capacity-limited, any alteration in stimulus configuration is expected to influence how attentional resources are distributed. The presence of a COO label introduces an additional informational element into the product display, thereby increasing the complexity and prominence of the visual stimulus.

Empirical research provides consistent support for the influence of COO information on attentional processes. Eye-tracking studies demonstrate that COO labels are detected by the majority of consumers and receive fixation durations sufficient to alter information processing patterns (Halkias et al., 2021). Importantly, these effects occur even when consumers are not explicitly instructed to search for COO information, suggesting that the mere presence of the cue systematically modifies visual engagement. Such findings reinforce the S–O linkage: changes in the environmental stimulus are associated with measurable changes in organismic processing.

Although earlier research relying on self-reported data produced mixed conclusions regarding the importance of COO information, more recent neurophysiological and eye-tracking methodologies reveal consistent effects on VA allocation (Herz, 2017; Zhang et al., 2021; Liu et al., 2022). These findings indicate that COO cues exert implicit influences on cognitive processing, even when consumers claim that COO is not a decisive factor in their evaluations.

Cross-cultural and cross-category studies further demonstrate the robustness of this relationship. Research examining country logotypes and product labels consistently reports increased fixation counts and longer dwell times when COO cues are present, independent of consumer nationality, product familiarity, or shopping goals (Bao et al., 2021). These results suggest that COO information functions as a stable and influential stimulus across contexts.

A related concept emerging from this body of work is the COO superiority effect, which refers to the tendency for COO-related cues to dominate VA relative to other product attributes in digital environments (Liu et al., 2022; Zhang et al., 2021). Empirical evidence indicates that the presence or absence of COO information can reshape the allocation of attention across competing cues such as price, ratings, or product details. This suggests that COO cues do not merely add informational content but may reorganise the structure of visual processing during product evaluation. Importantly, from an SOR perspective, the attentional effect of COO information is expected to occur irrespective of the product type (e.g. whether the product is local or foreign). At the initial stage of processing, attention is allocated in response to stimulus presence rather than evaluative valence. The inclusion of a COO label alters the visual stimulus configuration by introducing an additional informational element, thereby increasing the likelihood that attentional resources are directed toward the labelled product. Differences in subsequent evaluations may emerge at later stages of processing; however, the present study isolates the organismic stage by focusing specifically on VA.

Taken together, theoretical reasoning grounded in the SOR framework and converging empirical evidence suggest that the presence of COO information increases VA in e-commerce environments. Accordingly, the following hypotheses are proposed:

H1a: The presence (vs. absence) of country-of-origin information increases VA toward local products.

H1b: The presence (vs. absence) of country-of-origin information increases VA toward foreign products.

3.4 Top-Down Country of Information Cues and Other Bottom-Up Salient Stimulus Driven Cues (BUSDC) in E-commerce:

3.4.1 Country-of-Origin as a Top-Down Informational Cue

Country-of-origin (COO) information is consistently identified in the literature as a salient extrinsic cue that influences consumer perceptions and purchase decisions (De Nisco and Oduro, 2022; Oduro, 2023). As a top-down cue, COO operates through the activation of selective memory and stored associations related to a product's national origin (Herz, 2015). When consumers encounter COO information, it triggers previously formed beliefs concerning product quality, authenticity, technological advancement, or symbolic meaning associated with that country. These activated schemas subsequently guide evaluative judgments and attention allocation.

The influence of COO is particularly pronounced in e-commerce environments, where consumers are unable to physically inspect products and must rely heavily on informational cues for assessment (Bao et al., 2021). In such contexts, COO functions as a proxy for quality and trustworthiness, reducing uncertainty inherent in online transactions. Due to its standardized and universally recognisable format, COO is often regarded as one of the most salient product identifiers in digital marketplaces, exerting significant influence on evaluations and purchase intentions (Liu et al., 2022; Zhang et al., 2021).

However, prior research also suggests that the presence or absence of COO information can alter patterns of VA. Liu et al. (2022) and Zhang et al. (2021) demonstrate that COO cues influence the allocation of gaze to other product attributes, reinforcing earlier conceptualisations of the "Superiority Effect," whereby COO may dominate or overshadow alternative informational cues. This dominance implies that once noticed, COO can structure subsequent information processing,

potentially biasing evaluation either favourably or unfavourably depending on the perceived reputation of the country (Herz, 2015).

Despite this established influence, e-commerce product pages present multiple competing informational elements. Therefore, it becomes necessary to consider how COO operates within a broader multi-cue environment in which other salient stimulus-driven cues simultaneously attract attention.

3.4.2 Product Image as a Cue

In e-commerce environments, visual presentation plays a pivotal role in capturing consumer attention. VA research demonstrates that visual attributes such as colour contrast, size, spatial positioning, and prominence strongly influence gaze allocation and dwell time (Henderson, 2003; Ngo & Spence, 2010). Within online retail interfaces, product images are typically centrally positioned and visually dominant, making them primary candidates for initial fixation (Creusen and Schoormans, 2005; Orquin et al., 2020; Rihn et al., 2019). Bottom-up salient stimulus-driven cues (BUSDC), including vivid imagery and prominent visual design elements, enhance the perceptual visibility of product information and prioritise stimulus signals, often independent of consumers' prior expectations (Shen and Paré, 2012). Empirical studies examining e-commerce environments have found that product images significantly capture consumer attention and increase engagement (Barbierato et al., 2023; Y. Chen et al., 2018; Himawari et al., 2018; Liu et al., 2022; Monteiro et al., 2019; Pleyers, 2023). Unlike COO, which relies on cognitive activation of associative memory, product images operate at a perceptual level and may capture attention even before origin information is consciously processed. Consequently, product image is expected to positively influence VA allocation for both local and foreign products.

Based on these arguments, the present study hypothesises that:

H2a: Product image positively influences VA (dwell time) for local products in e-commerce.

H2b: Product image positively influences VA (dwell time) for foreign products in e-commerce.

3.4.3 Price as a Cue

Price represents a central and diagnostic attribute in online consumer decision-making. In e-commerce settings, price information is frequently designed to stand out visually through font size,

colour differentiation, or spatial emphasis. VA literature indicates that numerical information can attract dwell time due to both perceptual distinctiveness and decision relevance (Ngo and Spence, 2010; Henderson, 2003). Research examining e-commerce platforms confirms that price significantly influences attention allocation and purchase behaviour (Behe et al., 2015; Menon et al., 2016). As a functional cue, price enables value comparison across alternatives and often serves as a primary decision anchor. Importantly, while consumers may recognise the relevance of COO labels, such cues often require deliberate effort to locate and cognitively process (Balabanis & Diamantopoulos, 2008b; Conci & Zellin, 2021; Mandler et al., 2023). In contrast, price information is typically more immediately accessible and visually prominent. Therefore, price may capture attention more effortlessly than COO information, hence the current study proposes that:

Accordingly:

H3a: Price positively influences VA (dwell time) for local products in e-commerce.

H3b: Price positively influences VA (dwell time) for foreign products in e-commerce.

3.4.4 Ratings as a Cue

Product ratings function as heuristic indicators of collective consumer evaluation and reduce uncertainty in online shopping contexts. Often presented using graphical star icons or highlighted numerical scores, ratings are designed to be visually distinctive and quickly interpretable (Chen et al., 2022; Pascucci et al., 2022). E-commerce studies consistently demonstrate that ratings attract attention and influence decision outcomes (Alam & Elaasi, 2016; Clemes et al., 2021; Jia et al., 2023; Zhang et al., 2014; Zhu & Zhang, 2010). As social proof cues, ratings may capture attention through implicit processing mechanisms, encouraging reliance on aggregated consumer feedback (Halkias et al., 2021; Kostyk et al., 2017; Mousavi et al., 2024; Pascucci et al., 2022). In contrast to COO, which may activate country-based biases including foreign bias under certain conditions (Christian & Wang, 2022; Farina et al., 2024; Gineikiene et al., 2016; Reeck et al., 2012; Harrigan et al., 2021), ratings provide product-specific evaluative information that operates independently of origin associations. Therefore, ratings is expected to positively influence VA allocation for both local and foreign products, hence this study proposes that:

H4a: Ratings positively influences VA (dwell time) for local products in e-commerce.

H4b: Ratings positively influences VA (dwell time) for foreign products in e-commerce.

3.4.5 Product details as an Informational Cue

Product details provide detailed specifications and functional information that support consumer evaluation (Behe et al., 2015). Although textual information may not always capture initial attention as rapidly as visual elements, eye-tracking research suggests that descriptive content sustains attention during later stages of evaluation (Clemes et al., 2021; Zhang et al., 2021). In shopping spaces like e-commerce environments, consumers frequently consult product details to confirm expectations formed through images, price, or ratings (Brucks, 1985; Chang and Wildt, 1994; Meyvis and Janiszewski, 2002; Schoormans & Robben, 1997). Moreover, VA research indicates that attention allocation is determined by stimulus natural salience and relevance (Bucker and Theeuwes, 2017; Feenders et al., 2017). Thus, when product details are presented and relevant to consumers, they may command sustained dwell time irrespective of COO classification.

Therefore, this study proposes that:

H5a: Product details positively influences VA (dwell time) for local products in e-commerce.

H5b: Product details positively influences VA (dwell time) for foreign products in e-commerce.

3.4.6 The Role of Other Stimulus Driven Cues on Visual Attention to Country-of-Origin Information and Other Information Cues

Although prior literature establishes the salience of country-of-origin (COO) information and its potential “superiority effect” in shaping evaluation (Zhang et al., 2021; Liu et al., 2022), e-commerce interfaces are inherently multi-cue environments in which several informational elements compete simultaneously for limited VA. VA theory posits that attentional resources are finite and distributed competitively across stimuli (Bucker and Theeuwes, 2017; Feenders et al., 2017). When one stimulus becomes highly salient, it may capture a disproportionate share of visual allocation, thereby reducing attention available for competing cues.

In the present study, two categories of cues compete within the e-commerce interface:

- Cue 1: Bottom-up stimulus-driven salient cues on product image, price, ratings, and product details enhanced with visual markers (arrows))
- Cue 2: Country-of-origin (COO) information

The central theoretical assumption is that increasing the perceptual salience of bottom-up cues reallocates VA away from COO information. While COO may guide evaluation once noticed, it often requires deliberate effort to locate and process (Balabanis and Diamantopoulos, 2008; Conci and Zellin, 2021; Mandler et al., 2023). In contrast, stimulus-driven cues capture attention more automatically (Shen and Paré, 2012). Accordingly, when product images, price, ratings, or product details are made highly salient (e.g., via arrows or visual highlighting), they are expected to increase their share of dwell time, thereby reducing dwell time allocated to COO information. This competitive allocation mechanism may attenuate the dominance of COO and potentially reduce its “superiority effect,” particularly in contexts where COO perception are unfavourable. This dynamic is especially relevant for foreign and local products, where COO information can strongly influence perceptions and decisions.

Thus, the present study proposes that bottom-up salient cues moderate attention to COO information through an inverse attentional trade-off mechanism.

As such:

Product Image Salience

H6a: Product image salience will moderate the relationship between COO and VA (dwell time) for local products, such that dwell time on COO will decrease when product image is saliently cued.

H6b: Product image salience will moderate the relationship between COO information and VA (dwell time) for foreign products, such that dwell time on COO will decrease when product image is saliently cued.

Ratings Salience

H7a: Ratings salience will moderate the relationship between COO information and VA (dwell time) for local products, such that dwell time on COO information will decrease when product ratings are saliently cued.

H7b: Ratings salience will moderate the relationship between COO information and VA for foreign products, such that dwell time on COO will decrease when ratings are saliently cued.

Price Salience

H8a: Price salience will moderate the relationship between COO information and VA (dwell time) for local products, such that dwell time on COO information will decrease when price is saliently cued.

H8b: Price salience will moderate the relationship between COO information and VA (dwell time) for foreign products, such that dwell time on COO information will decrease when price is saliently cued.

Product details Salience

H9a: Product details salience will moderate the relationship between COO information and VA (dwell time) for local products, such that dwell time on COO information decreases when product details is saliently cued.

H9b: Product details salience will moderate the relationship between COO information and VA) dwell time for foreign products, such that dwell time on COO information decreases when product details is saliently cued.

3.4.7 The Moderating Role of Participant Heterogeneity

Participant-related characteristics may moderate the relationship between marketing stimuli and consumers' VA responses. Factors such as product familiarity, purchase frequency, and the perceived relevance of product information to the consumer's decision-making process can influence how individuals allocate attention to competing stimuli in a shopping environment. For example, using eye-tracking data, Simmonds et al., (2020) found that prior brand usage moderates the effect of VA on advertising recall, with increased attention improving recall primarily among non-users and light users rather than heavy users. Consumers who are more familiar with a product category or who purchase it more frequently may rely on prior knowledge and therefore process product information differently compared with less experienced consumers

Chenet al. (2022) using eye-tracking methods suggests that individual differences among consumers significantly influence VA patterns during shopping tasks. For example, consumer characteristics such as prior experience, product knowledge, and demographic differences can affect fixation duration, gaze patterns, and the elements of a display that receive attention. These findings indicate that attention allocation is not determined solely by stimulus characteristics but is also shaped by the cognitive and experiential background of the viewer. Similarly, Pšurný et al. (2024) via neuromarketing research demonstrates that consumer perceptions and attentional responses to online purchase cues vary depending on individual decision-making characteristics, suggesting that user-related factors influence how marketing stimuli are processed in digital environments. Furthermore, studies in retail and visual merchandising contexts show that consumer values, motivations, and familiarity with products lead to different visual search strategies and attention patterns, reinforcing the idea that participant characteristics moderate how visual stimuli influence preferences and decision-making (Rahmat and Li, 2025).

Given these insights, the present study considers participant-related factors as potential moderators in the relationship between stimulus presentation and VA. As such the following hypotheses are proposed.

H10a. Product familiarity will moderate the relationship between saliently cued stimuli and VA such that product familiarity will lead to less dwell time on salient cues for local products.

H10b. Product familiarity will moderate the relationship between saliently cued stimuli and VA such that product familiarity will lead to less dwell time on salient cues for foreign products.

H11a. Frequency of purchase will moderate the relationship between saliently cued stimuli and VA such that frequency of purchase will lead to less dwell time on salient cues for local products.

H11b. Frequency of purchase will moderate the relationship between saliently cued stimuli and VA such that frequency of purchase will lead to less dwell time on salient cues for foreign products.

H12a. Information relevance will moderate the relationship between saliently cued stimuli and VA such that information relevance will lead to less dwell time on salient cues for local products.

H12b. Information relevance will moderate the relationship between saliently cued stimuli and VA such that information relevance will lead to less dwell time on salient cues for foreign products.

Summary

While the literature confirms the salience of both COO and bottom-up stimulus-driven cues in e-commerce settings, a critical gap remains. To the current researcher's knowledge, no prior study has empirically examined the relative attentional influence of COO information compared to other salient stimulus-driven cues within the same e-commerce interface for competitive local and foreign products. VA research suggests that perceptually salient stimuli can prioritise dwell time allocation and potentially overshadow less visually prominent information (Bucker and Theeuwes, 2017; Feenders et al., 2017). Although consumers may acknowledge the importance of COO labels, these cues often require intentional effort to identify (Balabanis and Diamantopoulos, 2008; Conci and Zellin, 2021; Mandler et al., 2023). In contrast, BUSDC capture attention more automatically (Shen and Paré, 2012). Therefore, it is theoretically plausible that salient product images, competitive pricing, ratings, and descriptive information may attract substantial VA even in the presence of COO cues. This dynamic raise important questions regarding the allocation of attention across competing cues and whether bottom-up salience may influence or redistribute attention that might otherwise be guided by origin-based associations. By examining the independent effects of product image, price, ratings, and product details salience on dwell time for both local and foreign products, this study advances understanding of how attention is distributed in multi-cue ecommerce environments and lays the foundation for subsequent examination of interactive or moderating effects.

Chapter 4 Methodology

4.0 Introduction

This chapter begins by outlining the philosophical underpinnings that inform the research approach, ensuring alignment with the overarching research questions. It then details the research design and strategy, offering a rationale for the methodological choices made in the context of the study's objectives and the existing literature.

Subsequent sections address the procedures for ensuring research validity and describe the structure and execution of both the pre-test and the main experiment. This includes information on participant sampling, experimental design, and the development of stimuli, with particular attention given to the simulation of e-commerce product pages. The chapter further elaborates on the measures employed, data collection protocols, sampling techniques, and the analytical approaches used to interpret the findings.

By systematically presenting and justifying each methodological decision, this chapter aims to provide a clear and replicable account of the research process. The structure of the chapter (illustrated in figure 25 below) is as follows: Section 4.1 discusses the research philosophy; Section 4.2 outlines the research design; Section 4.3 presents the research strategy; Section 4.4 addresses research validity; Section 4.5 describes the pre-test procedures, including participant recruitment, experimental design, and stimuli; Section 4.6 details the main experiment, covering data collection, sampling, and experiment design; Section 4.7 explains the measures used; and Section 4.8 discusses the analytical approach.

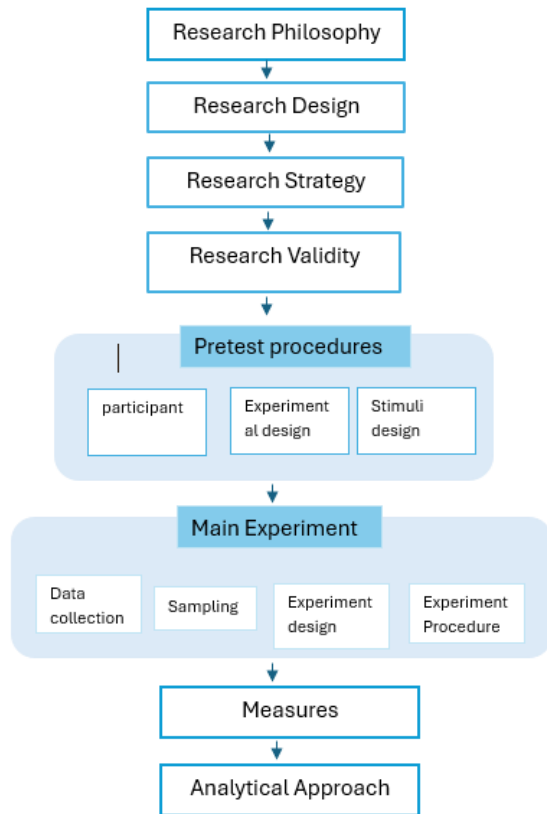


Figure 25 flow chart summary of the methodological chapter

4.1 Research Philosophy

4.1.1 Ontological and Epistemological Position of The Study

The philosophical stance underpinning this study is positivism, which is grounded in the belief that reality exists independently of human perception and can be objectively observed and described (Park, Konge and Artino, 2020). This position is aligned with an objectivist ontology, where social phenomena are considered external to, and independent of, individual consciousness (Lucarelli et al., 2024). In this research, constructs such as country-of-origin knowledge and stimulus-driven cues are conceptualised as objective features of the consumer environment, existing irrespective of individual beliefs or interpretations.

Epistemologically, positivism holds that knowledge is best gained through empirical observation and logical reasoning, favouring the identification of regularities and causal relationships (Park et al., 2020). This stance assumes that the researcher can remain detached and neutral, minimising personal bias and ensuring that findings reflect the reality under investigation rather than the

subjective views of the researcher (Lucarelli et al., 2024). In adopting this position, I recognise my role as that of an objective observer, committed to ensuring transparency and replicability in the research process.

Recent peer-reviewed studies in consumer research have demonstrated the value of a positivist philosophical approach. For example, Monteiro et al. (2019) adopted a positivist stance in their investigation of how VA to wine labels influenced consumer responses, treating attention as an observable and measurable phenomenon. Similarly, Borgmeier & Westenhoefer (2009) applied a positivist perspective to examine the impact of food labelling on consumer choices, focusing on observable behaviours and outcomes. These studies illustrate how a positivist philosophy can support the investigation of stimulus-driven effects on consumer attention and behaviour by prioritising objectivity and empirical evidence.

While alternative philosophical perspectives, such as interpretivism, offer valuable insights into the subjective and contextual aspects of consumer experience, the present study is concerned with the existence and influence of observable phenomena. By adopting a positivist stance, this research is positioned to contribute objective and generalisable insights into how country-of-origin information and stimulus-driven cues shape VA in e-commerce contexts.

4.2 Research Design

This study employs an explanatory (causal) research design, which is widely recognised in consumer behaviour literature as the most appropriate approach for establishing cause-and-effect relationships between variables. The primary objective is to examine how country-of-origin information and salient stimulus-driven cues (independent variables) influence VA (dependent variables). Experimental research is particularly suited for this purpose because it allows for the manipulation of independent variables and the observation of their effects on specific outcomes, while controlling for extraneous factors (Morales et al., 2017). Additionally, Morales et al. (2017) argue that experiments in consumer research are especially valuable when actual behaviour is measured, as this enhances the realism and validity of causal claims. For instance, Chandon et al. (2009b) conducted an eye-tracking experiment to investigate how the number and position of shelf facings affect brand attention and evaluation at the point of purchase. Their findings demonstrated

that experimental methods could provide detailed insights into the mechanisms underlying consumer VA and choice, supporting the use of experiments for causal inference in consumer research.

A review of recent literature also shows that experiments are among the most prevalent methods in leading consumer behaviour journals when the research aim is to uncover causal mechanisms (Peighambari et al., 2016). For example, Peighambari et al. (2016) analysed articles published in top consumer behaviour journals and found that experimental designs were frequently used to test the effects of marketing stimuli on consumer decision-making, highlighting their centrality for explanatory research in this field. They posit that experiments enable researchers to systematically manipulate marketing variables and observe corresponding changes in consumer responses, which is critical for drawing valid causal inferences.

By adopting an explanatory design and experimental methods, this study aligns with best practices in consumer behaviour research related to decision making for investigating the causal effects of information cues. This approach not only provides methodological rigour but also ensures that the findings contribute robustly to the understanding of how COO information and other salient stimuli shape consumer VA.

4.3 Research Strategy

Considering the present study objectives, philosophical position and research design, quantitative strategy was seen as the appropriate strategy for the current study as it is rooted in the positivist paradigm, which holds that reality can be observed objectively and that empirical data can be used to identify and measure relationships between variables (Bryman and Bell, 2015).

The principal aim of this research is to examine the causal relationships between the independent variables specifically, Country of Origin information and salient bottom-up cues—and the dependent variable, VA. The appropriateness of quantitative methods for examining causal relationships is well established in the literature, with numerous studies employing quantitative designs to test hypotheses and establish cause-and-effect relationships (Matthews and Ross, 2010; Bryman and Bell, 2015; Hair et al., 2016; Ahmad et al., 2019). For example, Hair et al. (2016) provide comprehensive guidelines on using multivariate data analysis to test complex relationships among variables, while Ahmad et al. (2019) demonstrate the application of quantitative methods

to analyze the impact of social media adoption on business performance, using statistical tools to draw causal inferences.

In line with this, to achieve the study objectives, the current study seeks to deduce research data gathered to numerical indices to make statistical inferences using the IBM SPSS Statistics tool for mixed repeated measure ANOVA with related samples. This was well suited for examining the influence of multiple independent variables on dependent outcomes and for testing the strength and significance of hypothesised relationships.

In summary, the quantitative research strategy is justified for this study due to its capacity to objectively test hypotheses and establish causal relationships between variables, a position supported by both methodological literature and precedents in similar research contexts. The use of quantitative strategy ensures analytical objectivity, and the potential for generalisation, all of which are essential for achieving the aims of this research.

4.4 Validity

Ensuring the validity and reliability of research findings is fundamental for producing results that are both accurate and generalizable (Cook et al., 1990; Robson and McCartan, 2015). Validity refers to the extent to which a study accurately measures what it intends to measure, while reliability concerns the consistency of these measurements across time and contexts (Cook et al., 1990). Laboratory experiments, as employed in this study, are widely recognized as a rigorous method for testing causal hypotheses due to their high degree of control over extraneous variables (Cook et al., 1990; Saunders et al., 2019). This controlled environment allows for precise manipulation of independent variables and accurate measurement of dependent variables, thereby enhancing internal validity—the confidence that observed effects are indeed caused by the experimental manipulation (Neeson, 2024). This condition stems from Shadish et al. (2002) contribution where they posit that three conditions must be met to infer causality for internal validity. First the cause must precede the effect; second, the cause and effect must be related; and third, alternative explanations must be ruled out. Thus, Laboratory-based randomized controlled trials (RCTs) such as the present study, are especially effective in meeting these criteria because they allow researchers to control the sequence of events, ensure consistent exposure to stimuli, and systematically eliminate confounding variables for internal validity (Cook et al., 1990).

Recognizing the limitations of laboratory experiments in terms of external validity, the current study adopted several strategies to enhance the generalizability of its findings. First a diverse sample (later detailed in 4.6.2 below) was recruited, encompassing variations in age, gender, education, and employment, thereby increasing the likelihood that results can be applied to the broader Ghanaian population (Murad et al., 2018; Cook et al., 1990). While not all lifestyle-related variables could be controlled outside the laboratory, this diversity supports the external applicability of the results. To further strengthen validity and reliability, the study implemented random allocation of participants to experimental conditions and randomized the presentation of stimuli, thus controlling for learning effects and other potential validity threats (Cook et al., 1990). The use of standardized procedures throughout the experiment also enhances replicability and reliability (Neeson, 2024).

Consequently, the current researcher acknowledges the issue of external validity with regards to controlled lab experiments and their applicability to the real world (which is this case a quasi-experiment solves). However, quasi-experiment might be more appropriate in the context of applied organizational research (Reichardt, 2002). Furthermore, organizational obstacles to quasi experiments are many (Pawson, 2013) and require a flexible approach to designing and interpreting interventions (Robson and McCartan, 2015).

In conclusion, the current research seeks to provide an initial insight on the relationship between the variables of the study (with established theory) to serve as a basis for future out of lab (field) or real-world studies. As such even though internal validity is of higher importance in the current study, external validity is achieved with a diverse sample, and by randomly allocating participants to two sets of experimental stimuli with a between group to control validity threats (Cook et al., 1990). Additionally, the presentation of stimuli is randomized as well to control the validity issue of learning. Finally, the study is carried out in a laboratory, to control external factors that may threaten internal validity. These strategies have been adopted and recommended from past studies like the current study. For example, Cook et al. (1990) emphasize the critical importance of internal validity in laboratory studies. Their work highlights that random allocation of participants to experimental and control groups, as well as careful control of extraneous variables, are essential for establishing causal relationships between variables. These practices help minimize bias and confounding factors, ensuring that observed effects are a result of the manipulated variables rather than external influences. In addition, Murad et al. (2018) research underscores the value of using

diverse samples to enhance the generalizability of findings. More specifically, Barbierato et al. (2023) whose study was to analyze how consumers' VA to wine label design correlates with their preferences using quantitative eye-tracking metrics to understand which design proposal has greater visual salience in a controlled lab also underscore the value of using diverse samples to enhance the generalizability of findings.

4.5 Pre-Test

The purpose of a pretest is to help identify potential confounding variables that may influence the results of the study. C. Mariano & D. Ancheta (2021) emphasize that by obtaining a pretest measure of the outcome of interest prior to administering treatment, researchers can better control individual differences that might affect the results. This control is essential for ensuring that the observed effects are genuinely due to the intervention rather than pre-existing differences among participants. Moreover, pretests can enhance the reliability and validity of the experimental findings. By establishing a baseline, pretests allow for a more accurate measurement of the treatment effects, as changes can be directly attributed to the intervention rather than extraneous variables. In a study by Wahyuni et al. (2024), who investigated the effectiveness of project-based learning on students' speaking performance and speaking skills using a one-group pretest-posttest experimental design indicated that the existence of a pretest prior to treatment enhances the accuracy of results by providing a reference point against which treatment effects can be evaluated. This is echoed in research by Piri Rajh (2022), who in the digital context explored consumer decision making for digital products by adopting the pretest mechanism. This was to categorize distinct consumer types based on their decision-making approaches. This categorization allowed the researchers to identify which characteristics are predominant in specific product categories, enhancing understanding of how decision-making varies across different consumer segments. They posited that the pretest further helped in improving internal validity and structuring the learning environment for the research. Another vital contribution regarding pretests is made by Aribarg and Foutz (2009) who investigated how consumers make choices involving complementary products. Their research employs a category-based screening approach, using initial pre-tests to narrow down product pairs for deeper evaluation. This two-stage decision strategy enhanced comprehension of how consumers navigate categories before making final selection decisions, thus further informing the selection of product types in their research.

In line with the previous studies, the current study conducted a pretest in an eye tracking lab to check for the accurate arrangement of stimuli presentation, investigate whether the variables of the study captured VA and response as designed to, and to test whether the product category selected was ideal amongst the subjects. The Eyelink 1000+ was used to collect eye tracking data during the pretest.

4.5.1 Participants

For internal validity of the current study, 5 Ghanaian men and women with normal or corrected to normal between the ages of 28 and 43 were recruited for the pretest. The sample size for this test is justified by other similar pretest studies (Adewumi and Miyapuram, 2022). As this study seeks to focus on Ghanaian consumers, the group were true representation of participants who are to take part in the actual experiment. Furthermore, the age range fall within the youth demographic particularly prominent in online shopping behaviors in Ghana Boyetey and Antwi (2021). They highlight that a large segment of the population is young, which correlates with a higher propensity for online shopping. Similarly, Jibril et al. (2020) note that younger consumers are more likely to adopt online retail due to the convenience and accessibility it offers. Participants recruited were monetarily compensated for their time and effort. The university ethics committee approved the study.

4.5.2 Participant Experiment Design

A mixed experimental design, incorporating both between-subject and within-subject components, was adopted to investigate the visual relationships between the variables in the current study within a controlled e-commerce environment. This design approach aligns with experimental structures employed by (H.-C. Chen et al., 2022; Huang and Ho, 2015; Pascucci et al., 2022), particularly in eye-tracking research examining attentional allocation across manipulated visual stimuli.

The between-subject component of the design involved the manipulation of country-of-origin (COO) label presence. Participants were randomly assigned to one of two experimental conditions to control exposure to “Made in” information across local and foreign product displays. This allocation ensured that the presence versus absence of COO label information was not confounded by repeated exposure within the same individual, thereby strengthening internal validity and causal

inference regarding COO effects. The within-subject component consisted of repeated exposure to multiple product stimuli under varying salience manipulations. Each participant viewed all 56 product slides, each containing five predefined Areas of Interest (product image, price, ratings, product details, and “Made in” label). VA was measured repeatedly across these AOIs using dwell time metrics. This repeated-measures structure enabled examination of systematic shifts in attentional allocation within the same individual across competing cues and stimulus configurations.

The integration of between-subject manipulation and within-subject repeated measurement allowed the study to (1) compare attentional patterns across experimental COO conditions, and (2) detect within-participant attentional trade-offs between salient stimulus-driven cues and COO information. By leveraging within-subject variability while controlling between-group exposure differences, the mixed design enhanced statistical efficiency and provided a robust framework for identifying attentional redistribution patterns under controlled salience manipulations.

4.5.3 Stimuli Design (E-commerce website product pages simulation)

The Experiment builder software designed by SR Research was used to design product pages from an e-commerce website. Inspiration for the layout with regards to image, text and other website features was taken from Amazon and Jumia which are shopping platform popular to the participants.

4.5.3.1 Product Page Design

The product pages were designed in Adobe illustrator and Canva. They presented two types of products in the drinks category. Namely, local products and foreign products. Under these two categories, the images of the following drinks were used:

1. local and foreign wine
2. local and foreign whisky
3. local and foreign beer.

Each of the above products had the following information which further served as the Areas of Interest (AOIs) for the current study.

1. Product image

2. Price
3. Product information
4. Product ratings
5. Made in label information for products where COO information was present.

Other features present on the product page but not AOIs were:

1. Website name
2. Menu bar
3. Bottom runner
4. Header.

Other stimuli designed other than the products pages were:

1. The welcome page
2. Practice experiment instruction page
3. Stimuli activity practice page
4. Actual experiment instruction page

4.5.3.2 Stimuli Arrangements

The stimuli were presented on a desktop were as follows:

1. The welcome page
2. Practice experiment instruction page
3. Stimuli activity practice page
4. Actual experiment instruction page
5. End of activity page.

4.5.4 Pre-Test Experiment Procedure

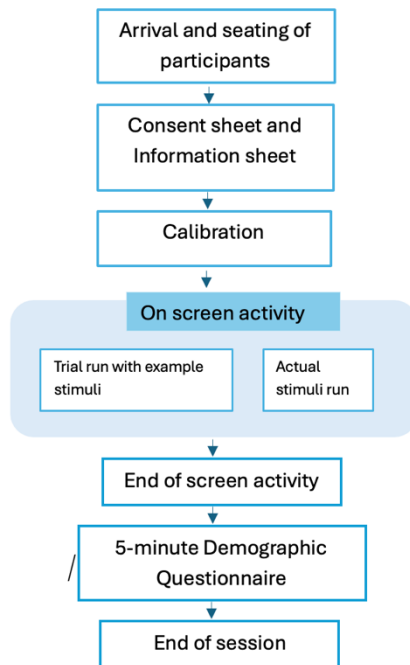


Figure 26 Flow chart of pretest procedure

The pretest procedure adopted by Simonetti & Bigné (2023) and Liu et al. (2022) was adopted to guide the process.

Participants were invited one after the other to the eye tracking lab. Upon arrival, participants were sat Infront of desktop and eye tracking device. The researcher then talked through the devices present and the use of each. This was to help participants familiarize themselves with the lab. The consent sheet and information sheet were read out with the participants and questions asked for clarification or understanding. Once a participant was happy to proceed, the researcher adjusted the participant head onto the camera head support, calibration and started the screen activities. This was to ensure the participants were positioned at the correct angle for accurate data collection while being recorded (Barbierato et al., 2023; Cortinas et al., 2019). Sequentially, the practice stages were done and then the actual stimuli were presented. For the 5 areas of interest, a total of 56 slides were presented to participants (these included 6 product pages with no salient cues, 40 slides of the same products but with salient cues for each AOI, and 1 end page slide). The average time recorded per participant was 15 minutes.

After the on-screen activity, participants were given a QR code to scan onto a 5-minute questionnaire. The questionnaire captured their demographic data as well as closed ended data on the on-screen activity. Once this was completed, participants were given £20 as appreciation for their time.

4.6 Actual Experiment Structure

4.6a Overview

The study employed a mixed experimental design, incorporating both between-subject and within-subject components. This structure allowed simultaneous examination of (1) differences in attentional allocation across experimentally assigned COO conditions, and (2) systematic within-participant shifts in attention across multiple competing cues under salience manipulations.

Between-Subject Component

The between-subject manipulation concerned the presence versus absence of country-of-origin (COO) label information. Participants were randomly assigned to one of two experimental conditions to prevent carryover or learning effects related to COO exposure.

- Condition A: Local products with “Made in” label; foreign products without label
- Condition B: Local products without label; foreign products with label

This allocation ensured that COO label visibility was experimentally controlled across participants, thereby isolating its effect on attentional allocation and preventing repeated exposure to both label conditions within the same individual.

Within-Subject Component

The within-subject component involved repeated exposure to multiple product stimuli. Each participant viewed 56 product slides presented in randomized order. Each slide contained five predefined Areas of Interest (AOIs): Product image, Price, Ratings, Product details, “Made in” label. By measuring attentional allocation repeatedly within the same participant, the design controlled for individual differences in baseline VA tendencies

4.6.1 Data collection

For this study, the researcher mainly relied on primary sources of data. Primary data collection, characterized by its specificity and relevance, is essential for obtaining firsthand insights directly related to the research question at hand. This is particularly important in consumer research where nuanced understanding is critical. The significance of primary data acquisition is validated by Nyilasy et al. (2014) who noted in their study on the insights into consumer reactions to greenwashing required context-specific data that only primary sources can. As a result, they the direct feedback and behavioural responses derived from primary data collection in their study illustrated the complexities of consumer attitudes that secondary data might have missed. Furthermore, Pappas et al. (2016) study examined online shopping behaviours using primary data to analyze cognitive and affective perceptions effectively. Their use of firsthand consumer insights illustrated a growing recognition of the need for primary data in unpacking multi-faceted behavioural phenomena. Specifically, by directly exploring cognitive and emotional dimensions, they underscore the limitations of secondary data, thereby reinforcing the argument for prioritizing primary data collection.

Consequently, for the present study, where eye tracking data was needed to answer the research questions, the data had to be gathered primarily from selected research participants for the purpose of meeting it as well as the specific research objectives which form the basis of inquiry. Comparing primary data to secondary data, existing secondary data would not have met the specific objectives for this study. Two types of primary data were collected in the current study. Eye tracking data through an eye tracker and structured questionnaires. This is also justified by eye tracking studies. For example, the study by Liu et al, (2021) aimed to evaluate the influence of origin information on Pinot Noir wine labels using eye-tracking and its associations with purchase intent, and hedonic and subconscious emotional responses used primary data collection to be able to meet the objectives of th study specifically related to the study sample considered. Adewumi and Miyapuram (2022)also aimed at investigating the role of colour temperature and price as determinants of shopping behaviour on ecommerce websites, where red and blue represented the warm and cool temperature dimensions respectively. Thus, primary eye tracking data was collected as the stimuli designed was specific and reactions had to be observed first hand.

4.6.1a Eye-Tracking Tool

Specifically, the current study used the EyeLink 1000 plus eye tracker. This was because the EyeLink 1000 Plus is the world's most precise and accurate video-based eye tracker, sampling binocularly at up to 2000 Hz. It is highly customisable, with multiple mount options, interchangeable lenses, and head-fixed and head-free tracking modes. The ability of the tracker is evidenced in the work by Wei et al (2019) who looked at investigating consumer preferences for production process labelling using VA data. In this study, the EyeLink 1000 plus was utilized to assess how VA influences consumer preferences and willingness to pay for products with varying labelling strategies. The researchers opted for the EyeLink 1000 due to its ability to provide detailed VA metrics that are critical in understanding consumer decision-making, which is often driven by the visual aspects of product information. Another study by Gong et al. (2021) described an interactive eye-tracking system using the EyeLink 1000 plus to measure visual fixations in medical contexts, illustrating the device's adaptability beyond traditional consumer psychology applications (Gong et al., 2021). Such versatility supports its use in consumer research, where understanding VA during advertisements for example can yield crucial insights into consumer purchase decisions. Since the study aims at understanding the consumer online behaviour from a neuromarketing perspective, this eye-tracking device was used for the data collection process carried out in a lab to record VA of the study participants while they navigated the e-commerce website product pages. Specifically, the EyeLink 1000 plus was used to accurately record the dwell times of participants as they responded to the visual stimuli.



Figure 27 Showing how participants are positioned on to head brace for EyeLink 1000 Plus to capture eye tracking data as stimuli is displayed on the screen.



Figure 28 Showing EyeLink 1000 Plus to capture eye tracking data as stimuli is displayed on the screen and set up in actual lab used for the current study

4.6.1b Questionnaires

In addition to the eye-tracking device used in the study as stated above, the current researcher further used structured questionnaires design in Qualtrics as research instrument to determine whether the results of the eye-tracking experiment would be reflected in the product choice decision of participants. Since the reasoning behind the decision on product choice requires the conscious effort as well as the unconscious visual processes of participants, the use of the research questionnaires sought to examine whether participant's COO knowledge and salient bottom-up cues from the e-commerce webpage did have influence on their product choice. As observed by Landwehr et al. (2011) and Roopa and Rani, (2012), questionnaires are frequently used in quantitative marketing research and social research, involving series of questions asked to individuals to obtain statistically useful information about a given topic. Also, Graham and Jeffery (2011) investigation into nutrition label viewing during food purchase decision making employed eye tracking to identify which components of nutrition labels attracted consumer attention. Following the eye-tracking session, participants answered questionnaires that delved into their understanding and perceptions of the nutritional information, thus linking VA to cognitive processing for more context when evaluating food products.

The use of questionnaires in this study was considered appropriate by the researcher since the outcomes of the questionnaire administration is expected to provide further explanation to the data gathered through observation made from the eye tracking study. Participants were asked to respond to some statements such as to “to what extent is price important for local product purchases?” based on a Likert Scale of 1 – 5 (1: strongly disagree, 2: disagree, 3: neither agree nor disagree, 4: agree, and 5 strongly) to compare the response to the eye tracking data on price for local products.

4.6.2 Sample and Sample Size

For internal validity of the current study, eye tracking data of 20 Ghanaian men and women with normal or corrected eye vision between the ages of 28 and 43 were recruited for the test excluding those with missing eye tracking data samples. The sample size for this test is justified by other eye tracking studies on consumer decision making (Reutskaja et al., 2011). As this study seeks to focus on Ghanaian consumers, the group were true representation of participants who are to take part in the actual experiment. Furthermore, the age range fall within the youth demographic particularly prominent in online shopping behaviors in Ghana (Boyete & Antwi, 2021). They highlight that a

large segment of the population is young, which correlates with a higher propensity for online shopping. Similarly, (Reutskaja et al., 2011) note that younger consumers are more likely to adopt online retail due to the convenience and accessibility it offers.

The majority of the 20 participants were women (75%), while men represented only 25% of the sample. The age distribution was as follows: 45.83% of the participants were between 25 and 40 years old, 37.5% were between 41 and 64 years old, and only 16.66% of the participants were aged between 18 and 24 years old. All participants were Ghanaians who have excellent proficiency (both writing and speaking) of English currently living in the UK for not more than 6 months. In terms of education levels, 70.83% of the participants were educated to higher education levels (i.e., Bachelors, Masters, and PhDs) in various disciplines, and the educational levels of the rest ranged between secondary and vocational education. All the participants were familiar with the product category as the products selected are highly popular in Ghana. None of the 20 participants had ever participated in eye tracking studies before. Participants recruited were monetarily compensated for their time and effort. The university ethics committee approved the study.

4.6.2a Suitability of Sample Size

The present research adopts an exploratory, theory-driven experimental design aimed at identifying underlying attentional mechanisms within a controlled ecommerce environment. Consistent with the Stimulus–Organism–Response (S–O–R) framework, Cue Utilisation Theory, and Bottom-Up Visual Attention Theory, the study examines how visually salient environmental cues (Stimuli) influence observable attentional allocation, operationalised through eye-tracking metrics. The primary objective is the research seeks to identify whether stimulus-driven salience manipulations alter dwell time allocation between competing cues (e.g., product image, ratings, price, and country-of-origin information). As such, the analytical emphasis lies in detecting patterned differences in attentional distribution across controlled conditions rather than testing population-level effect sizes.

Exploratory experimental research aimed at uncovering processing mechanisms frequently relies on smaller but tightly controlled samples, particularly where high-resolution behavioural data are

generated per participant. In this context, statistical power derives not solely from the number of participants but also from the large volume and structure of repeated observations generated per participant. With this, eye-tracking studies in consumer research commonly employ sample sizes ranging between 15 and 30 participants, particularly in studies involving within-subject experimental designs (Andersson et al., 2010; Holmqvist et al., 2011; Ko et al., 2024). This convention reflects the high-density nature of eye-tracking data, where each participant produces multiple fixation events, dwell time recordings, and area-of-interest (AOI) observations across stimuli especially for repeated measure experiments such as the present study (Andersson et al., 2010; Ko et al., 2024).

Unlike survey-based designs in which each participant contributes a single attitudinal datapoint per construct, eye-tracking generates repeated behavioural measurements across multiple stimuli and conditions. Consequently, the effective analytical dataset comprises numerous dwell time and AOI-level observations nested within individuals. This repeated-measures structure substantially increases sensitivity to within-condition differences and reduces error variance associated with between-subject heterogeneity and increases the statistical power of analyses (Carter and Luke, 2020; Holmqvist, 2011).

In the current exploratory study, a mixed experimental design was employed, incorporating both between-subject and within-subject components. The primary country-of-origin (COO) manipulation was assigned between participants, while attentional responses were measured repeatedly within participants across multiple stimuli. Specifically, participants were randomly assigned to one of two experimental conditions: half of the participants were exposed to local products containing “Made in” label information and foreign products without such label information, while the remaining participants viewed the reverse configuration. This between-subject allocation ensured that exposure to COO label presence versus absence was experimentally controlled and not confounded by repeated exposure effects.

Simultaneously, the study incorporated a within-subject repeated-measures structure. Each participant viewed 56 product slides, each containing five defined areas of interest (product image, price, ratings, product details, and “made in” label), resulting in 280 AOI-level dwell time observations per participant. With a total sample of 20 participants, this yielded over 5,600 dwell time observations across the experiment. These observations were nested within individuals and

analysed within a mixed-effects framework that preserved statistical independence at the participant level while leveraging within-subject variability to detect systematic shifts in attentional allocation under different salience manipulations.

To further assess the adequacy of the sample size, a sensitivity power analysis (in parameter and value table below) was conducted using G*Power 3.1 (Faul et al., 2007). The analysis was performed for paired comparisons corresponding to the Wilcoxon Signed-Rank Test, using the parametric equivalent of a matched-pairs t-test. With a significance level of $\alpha = 0.05$, statistical power of 0.80, and a sample size of $N = 20$ participants, the analysis indicated that the study is capable of detecting effect sizes of approximately Cohen's $d = 0.66$ (equivalent to $r \approx 0.31$), representing a medium effect size according to Cohen (1988). Given that the present study employs repeated-measures eye-tracking data in which each participant contributes multiple dwell time observations across stimuli and areas of interest, the design further enhances statistical sensitivity by reducing between-participant variability. Consequently, the sample size is considered adequate for detecting exploratory meaningful differences in attentional allocation across experimental conditions. Furthermore, the analysis did not rely on twenty independent datapoints; rather, it utilised a structured dataset of repeated, randomised attentional responses, allowing examination of both between-condition differences (COO exposure) and within-condition attentional trade-offs. This mixed design enhanced statistical efficiency by controlling for individual-level differences in baseline visual scanning tendencies, learning (product familiarity), and attentional allocation patterns.

Parameter	Value
Statistical test	Paired comparison (Wilcoxon equivalent)
Sample size	20
Alpha	0.05
Desired power	0.80
Detectable effect size $r \approx$	$r \approx 0.31$

From a theoretical standpoint, Bottom-Up Visual Attention Theory posits that salient visual features reflexively capture attention via perceptual competition mechanisms (Feature Integration Theory; Saliency Map Theory). These processes occur at early stages of perceptual encoding and

are observable through measurable fixation behaviour. Because stimulus-driven attentional capture operates at the perceptual level, its detection does not require large population samples; rather, it requires precise behavioural measurement under controlled visual conditions. In this study, bottom-up salience manipulations (visual cue enhancements) were experimentally controlled, thereby strengthening causal inference. The sample size is therefore evaluated in relation to experimental control and repeated behavioural measurement, not survey generalisability

In summary, given the exploratory orientation and mechanism-testing objective, findings were interpreted as evidence of patterned attentional dynamics within the experimental context. Assertions are restricted to the identification of stimulus-driven attentional trade-offs under controlled conditions. Broader population-level generalisation is not asserted. Instead, the study provides theoretically grounded, behaviourally measured insights intended to inform future confirmatory research employing larger samples. The use of twenty participants is consistent with established eye-tracking research practices in experimental consumer studies, particularly those employing repeated-measures designs. The sample size is appropriate for detecting attentional allocation patterns within a controlled S–O–R framework and aligns with the study’s exploratory, mechanism-focused objectives.

4.6.3 Sampling Technique

The size of the sample and how it is chosen have implications for confidence one can have in collected data as well as the extent to which such data can be relied on and generalized (Maxwell, 2021; Onwuegbuzie and Collins, 2015). Following this logic, the current researcher had to consider carefully how the nature of the participants could be included in the study. The participants needed to conduct this study had to be Ghanaians. Considering the location of the study (i.e. Norwich, United Kingdom), it was difficult to sample the participants all at once. To meet participants, the researcher had to design paper and paperless fliers to institutions such as churches, universities and local shops where Ghanaian consumer are likely to shop. After a month of handing out fliers, 5 Ghanaians from a church initially reached out and expressed interest in the study. Once they were registered, a purposeful linear snowballing sampling technique was adopted

with the 5 to reach out more Ghanaians in the region until all 20 participants were sampled. The total time to sample participants was 4 weeks. This is discussed later in this thesis.

This process is typical when compared to other studies that employed snowballing. For example, for DINC (2024) study on the influence of social media influencers on consumers' decision-making concerning restaurant choices, the snowball sampling technique was employed to gather data from individuals who follow these influencers. Initial respondents likely those engaged with social media and its impact on consumer choices were then asked to refer others who fit the same criteria, thereby expanding the participant pool.

To control the likelihood of the snowballed participants being biased due to familiarity with the referrer, a Linear snowball sampling where one person could be referred for the study per participant was used. Also, participants referred could not be family member (IDs were used to ensure this) or friends. This sampling technique under non- probability sampling is justified by studies such as the research by Vashistha et al. (2015) who elaborated on expanding the reach of snowball sampling, emphasizing its utility in approaching populations that are otherwise challenging to survey. They acknowledge that while snowball sampling may introduce limitations regarding random selection and potential biases, it remains indispensable through linear approaches in gathering data from marginalized groups, which is often critical in marketing to underrepresented demographics. Also, in an investigative study of fine dining restaurants in China, researchers Chen et al. (2019) used two sampling methods purposeful and linear snowball sampling to collect data from diners in Taipei. This approach helped them reach participants who might be hard to find with standard methods, especially those with specific dining habits. By using rolling snowball sampling, they could expand their participant group through referrals, leading to a more diverse and representative sample.

4.6.4 Stimuli Design (E-commerce website product pages simulation)

As with the pre-test, the stimuli were designed with the Experiment builder software by SR Research. Product display stimuli were designed to simulate realistic e-commerce interfaces while maintaining experimental control. Inspiration for the website was taken from Amazon and Jumia which a shopping platform popular to the participants. Each slide maintained consistent structural formatting, ensuring that any observed differences in attentional allocation were attributable to experimental manipulations rather than layout variability. Bottom-up salience was manipulated

through controlled visual enhancements (arrows) applied to specific cues (e.g., image, price, ratings, product details). These enhancements increased perceptual conspicuity while preserving ecological plausibility. All slides contained identical AOI categories to maintain structural consistency across exposures. The experimental stimuli were randomized to reduce order effects and mitigate systematic scanning biases.

4.6.4.1 Product Page Design

The product pages were designed in Adobe Illustrator and Canva and comprised realistic, high-resolution photographs of products. They presented two types of products in the drinks category. Namely, local products and foreign products (figure 29 to 31 below show some examples). Under these two categories, the images of the following drinks were used:

1. local and foreign wine
2. local and foreign whisky
3. local and foreign beer.

Product Category Selection: These categories were chosen because they represent the most widely consumed and globally recognized segments in both local and foreign contexts, as identified in international market analyses and segmentation studies. This approach aligns with prior research that investigates consumer attitudes and preferences across multiple beverage types to ensure comprehensive coverage of the market (Shapiro, 2013; Montero Filho and Sousa Oliveira, 2022).

Local vs. Foreign Product Comparison: The distinction between local and foreign products is a well-established variable in consumer research, particularly in studies examining country-of-origin effects, ethnocentrism, and switching behavior. For example, the study by Diamantopoulos et al. (2011) explored the relationship between country-of-origin image and brand image as determinants of purchase intentions. The study illustrated how perceptions of product origin affect consumer decision-making processes on preferences for local versus imported products. Similarly, Xie et al. (2018) considered local market knowledge for foreign firms striving for competitive advantage. This is because according to their study, an understanding how both local and foreign

products are perceived in a particular market allows informed selections that exemplify the dynamic interaction between consumer preferences.

Criteria for Product Image Selection: First for representativeness, products were selected to represent typical offerings in each category (wine, whisky, beer) for both local and foreign brands, ensuring that the stimuli were realistic and relevant to participants' market experiences (Barbierato et al., 2023). Secondly market presence was considered. Only products with established market presence and consumer familiarity were chosen, reflecting the approach used in international drinks market analysis and segmentation studies. Thirdly for visual consistency, high-resolution, realistic images were used to maintain consistency and control for visual bias, as recommended in experimental design literature (Liu et al., 2022).



Figure 29 Showing local wine(A) and foreign wine (B) used for the current study



Figure 30: Showing local whiskey/gin (A) and foreign whiskey/gin (B) used for the current study



Figure 31 Showing local beer (A) and foreign beer (B) used for the current study

Each of the above products had the following information with further served as the Areas of Interest (AOIs) for the current study.

1. Product image
2. Price
3. Product information/details
4. Product ratings
5. Made in label information for products where COO information was present.

Other features present of the product page but not AOIs were:

Website name


1. Menu bar
2. Bottom runner
3. Header.

Other stimuli designed other than the products pages were:

1. The welcome page
2. Practice experiment instruction page
3. Stimuli activity practice page
4. Actual experiment instruction page

4.6.4.2 On Screen Stimuli Arrangements

Inspired by the eye-tracking experimental study on the influence of background visual effects on consumer purchase behavior by Zhao and Chiu (2024), the stimuli were presented on a desktop were as follows in the following order:

Group	Sequence of Stimuli
condition local products with COO information and foreign products with no COO information. For reverse group. Condition was reversed for the same stimuli.	1. The welcome Page  <p style="font-size: small; color: red; text-align: center;">NOTE: Always press 'enter' to always view the next screen. However On a choice screen press 'a or b' to view the next screen.</p>
	2. Practice experiment instruction page

Let Us Practice



Imagine you are shopping online for the products that will appear on your screen.

Engage with them as you normally would when you are shopping.

When you see A and B appear on your screen, press A or B on the keyboard to select the product you want to buy.

NOTE: Always press 'enter' to always view the next screen. However On a choice screen press 'a or b' to view the next screen.

3. Stimuli activity practice page



A

B

4. Actual experiment instruction page

NOW, LET'S DO SOME SHOPPING !



IN THE NEXT ACTIVITY, IMAGINE YOU ARE SHOPPING ONLINE FOR A PRODUCT.

A SERIES OF PRODUCTS WILL APPEAR ON YOUR SCREEN. ENGAGE WITH THEM AS YOU DO WHEN YOU NORMALLY SHOP.

WHEN YOU SEE THE LETTERS A AND B ON YOUR SCREEN, TYPE A OR B TO CHOOSE THE PRODUCT YOU PREFER.

NOTE: Always press 'enter' to always view the next screen. However On a choice screen press 'a or b' to view the next screen.

5. Actual experiment screen activity

Local and foreign drinks with no salient cues (6 slides per participant).

Local and foreign drinks with salient cues (36 slides per participant)

6. End of activity page.

4.6.5 Experiment Procedure

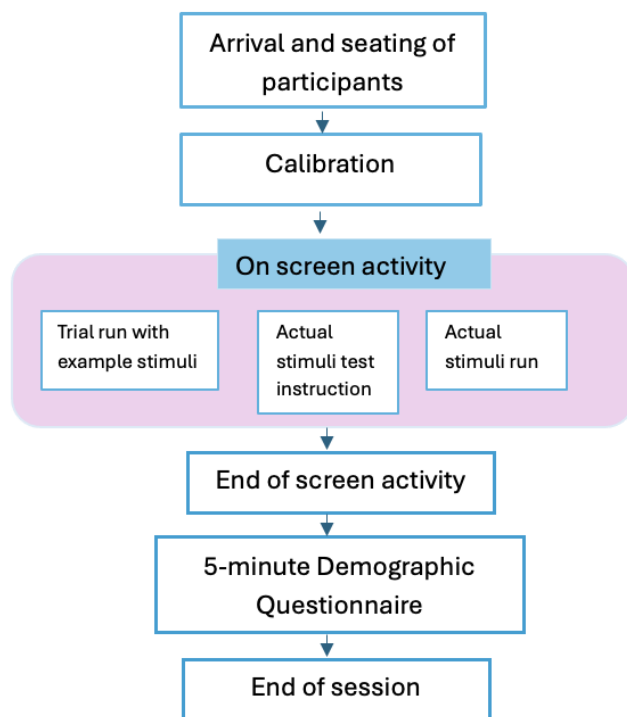


Figure 32 Flow chart of experiment procedure

The procedure for the experiment was adapted from previous eye tracking studies by researchers Benn et al. (2015) who analyzed how consumers visually engage with information when shopping for groceries online and Halkias et al. (2021) who examined how consumers visually process country-of-origin (COO) labels on product packaging

Participants in the current study were invited one after the other to the eye tracking lab. Upon arrival at an agreed time slot, participants were sat Infront of desktop and eye tracking device. The researcher then talked through the devices present and the use of each. This was to help participants familiarize themselves with the lab. The consent sheet and information sheet were read out with the participants and questions asked for clarification or understanding. Once the participant was happy to proceed, the researcher adjusted the participant head onto the camera head support and started the screen activities. Eye calibration was done to the center of the screen as shown in the figure 33 below.



Figure 33 showing footage of eye calibration

To begin the screen activity, Participants were first instructed that they would be completing a simulated online shopping task that involves making choices from various products. The instructions were: “Imagine you are making one of your regular grocery shopping trips. Your shopping list includes several product types or categories. You will be shown product sets for each type. For each product set you see, engage with it as you normally would. To view the next product, press the enter key. To decide between two products on the choice slide, Press A or B to select”. Sequentially, the practice stages were done and then the actual stimuli were presented. For the 6 areas of interest, a total of 56 slides were presented to participants (The average time recorded per participant was 15 minutes. While they were performing the tasks, the researcher for this study was observing and taking notes of their task performance using the evaluator’s computer screen. After the on-screen activity, participants were given a QR code to scan onto a 5-minute questionnaire. The questionnaire captured their demographic data as well as closed ended data on the on-screen activity. Once this was completed, participants were given £20 as appreciation for their time.

4.7 Measures

4.7.1 Visual Attention (Dwell Time)

VA was measured using dwell time. Dwell time is a significant measure in eye-tracking research, particularly because it provides valuable insights into consumer VA and engagement with stimuli. This metric reflects the total time a viewer spends fixating on a specific area of interest (AOI) and is crucial for understanding the depth of attention given to visual elements, which in turn influences consumer decision-making. Berni et al. (2022) further emphasized the importance of dwell time in user-centric research, noting that it serves as a significant indicator of attention distribution across various stimuli, which is particularly relevant in design and consumer marketing contexts. The analysis of dwell time can therefore reveal the most compelling features that capture a consumer's interest, aiding marketers in creating more effective advertising and product designs. Also, dwell time lends itself well to non-parametric data analysis methods, especially in studies where sample sizes can be small or variable-as it is in the present study. Mould et al. (2012) and Benn et al. (2015) describe nonparametric method for classifying eye fixations and its relevance. They present that nonparametric method that is validated against expert classifiers and demonstrates robustness dwell time measurements in limited sample sizes.

To measure and Dwell Time (DT) eye tracking data was generated on the SR Research data viewer software where these parameters were set and extracted into an excel report. Each area of interest had a DT measure set to it and extracted for all the participants. In line with the standard methods of visualizing eye-tracking data, heat-map graphics were obtained, in which the accumulated fixations of participants on each area of the stimulus were plotted

4.7.2 Product Familiarity

Product familiarity was measured using an adapted 5-point Likert scale by Dangelico et al. (2024) where their study looked at how product familiarity is a crucial component influencing consumer intentions towards sustainable biscuit purchases. The researchers utilized a Likert scale to quantify this construct, providing a means to assess consumers' familiarity with the product through a structured questionnaire. Specifically, they adopted a seven-point Likert scale, where respondents could express their level of agreement ranging from "strongly disagree" to "strongly agree" regarding various statements measuring their familiarity with sustainable biscuits, aligning with

standard practices in consumer behavior research. Soliman (2015) also investigated the relationship between product familiarity and perceived risk across different product classes using various scales, including the Likert scale. The Likert scale's application allowed for nuanced measurements of respondents' familiarity levels, which could then be correlated with their perceptions of risk regarding different product classes, such as goods and services. The findings highlighted how familiarity correlates with consumer perceptions of risk in decision-making context.

In the present study, to measure product familiarity, participants were asked the extent to which they were familiar with the products ranging from 1 (not familiar at all) to 5 extremely familiar. The question ‘*How familiar are you with the following products?*’ had the list of the 6 products shown on the screen for participants to respond to.

4.7.3 Frequency of Purchase

Frequency of purchase was measured on a single item using an adapted 5-point Likert scale. In the present study, participants were asked to indicate their frequency of purchase with the question “how often you purchase these products online where 1 is “not at all” and 5 is “all the time.”

This method of measurement is widely used in literature. For example, Lin et al. (2025) investigated the factors that impact consumers' willingness to pay a premium for organic food and their subsequent purchase frequency. By employing a Likert scale, purchase frequency was assessed allowing respondents to indicate how often they purchased organic food products. The findings revealed that green consumption values significantly affect both willingness to pay a premium and purchase frequency, with notable differences observed between generations. Martin et al. (2015) investigated how online customer experience is influenced by factors such as purchase frequency and perceived risk. To measure various constructs, including purchase frequency, the study employed Likert-scale items within their survey instrument. By this they demonstrated that frequent shoppers tend to have different experiential states compared to infrequent shoppers, affecting their satisfaction and likelihood of repurchasing.

Table 19 Table Summary of Eye Tracking Measures, Stimuli, Illustrative diagrams Used in Experiment Mapping Directs to Hypotheses

Measure	Stimuli	AOI	Manipulations	Illustration	Related Hypotheses	Related Theory
Dwell Time	Ecommerce product page (local product)	Made in label	COO Label Presence vs Absence (Between-subject manipulation)		H1a	SOR theory, CUT
Dwell Time	Ecommerce product page (foreign product)	Made in label	COO Label Presence vs Absence (Between-subject manipulation)		H1b	SOR theory, CUT
Dwell Time	Ecommerce product page (local product)	Product image	Product Image (no salience (arrows))		H2a	SOR Theory, CUT
Dwell Time	Ecommerce product page (foreign product)	Product Image	Product Image (no salience (arrows))		H2b	SOR Theory, CUT
Dwell Time	Ecommerce product page (local product)	Price	Price (no salience (arrows))		H3a	SOR Theory, CUT
Dwell Time	Ecommerce product page (foreign product)	Price	Price (no salience (arrows))		H3b	SOR Theory, CUT
Dwell Time	Ecommerce product page (local product)	Ratings	Ratings (no salience (arrows))		H4a	SOR Theory, CUT

Dwell Time	Ecommerce product page (foreign product)	Ratings	Ratings (no salience (arrows))	H4b	SOR Theory, CUT
Dwell Time	Ecommerce product page (local product)	Product details	Product details (no salience (arrows))	H5a	SOR Theory, CUT
Dwell Time	Ecommerce product page (foreign product condition)	Product details	Product details (no salience (arrows))	H5b	SOR Theory, CUT
Dwell Time	Ecommerce product page (local product)	COO and Product Image	Product Image Salience × COO Condition (Moderation Effect)	6a	Cue Utilisation Theory; SOR Theory; Bottom-Up Visual Attention Theory
Dwell Time	Ecommerce product page (foreign product)	COO and Product Image	Product Image Salience × COO Condition (Moderation Effect)	6b	Cue Utilisation Theory; SOR Theory; Bottom-Up Visual Attention Theory
Dwell Time	Ecommerce product page	COO and Price	Price Salience × COO Condition (Moderation Effect)	7a	Cue Utilisation Theory; SOR

	(local product)					Theory; Bottom-Up Visual Attention Theory
Dwell Time	Ecommerce product page (foreign product)	COO and Price	Price Salience × COO Condition (Moderation Effect)	7b		Cue Utilisation Theory; SOR Theory; Bottom-Up Visual Attention Theory
Dwell Time	Ecommerce product page (local product)	COO and Ratings	Ratings Salience × COO Condition (Moderation Effect)	8a		Cue Utilisation Theory; SOR Theory; Bottom-Up Visual Attention Theory
Dwell Time	Ecommerce product page (foreign product)	COO and Ratings	Ratings Salience × COO Condition (Moderation Effect)	8b		Cue Utilisation Theory; SOR Theory; Bottom-Up Visual Attention Theory
Dwell Time	Ecommerce product page (local product)	COO and Product details	Product details Salience × COO Condition (Moderation Effect)	9a		Cue Utilisation Theory; SOR Theory; Bottom-Up

Dwell Time	Ecommerce product page (foreign product)	COO and Product details	Product details Salience × COO Condition (Moderation)	9b	Visual Attention Theory Cue Utilisation Theory; SOR Theory; Bottom-Up Visual Attention Theory
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4.8 Analytical Approach

The analytical approach for this eye-tracking experiment employed a systematic examination of visual engagement metrics, appropriate data transformation, and robust statistical analysis to uncover meaningful patterns in consumer behaviour toward local and foreign alcoholic beverage stimuli in an e-commerce environment. Data were analysed using statistical techniques appropriate for mixed experimental designs involving both between-condition and within-participant comparisons. Given that each participant viewed multiple stimuli and Areas of Interest (AOIs), the nested structure of repeated AOI observations within participants was considered in the analytical framework.

Comparisons were conducted to assess:

- Between-condition differences in attentional allocation (COO group allocation ie. Products with and without COO information)
- Within-participant trade-offs between the other areas of interest, namely, product image, price, ratings, and product details.
- Interaction effects between salience manipulation of product image, price, ratings, and product details and COO conditions across local and foreign product categories

Prior to inferential testing, assumption checks and data screening procedures were conducted to ensure robustness and reliability of the findings

4.8.1 Data Collection and Key Metrics Focus

In conducting this eye-tracking experiment, the study focused primarily on dwell time as the central metric for understanding how consumers visually engage with beverage stimuli.

Dwell time refers to the total amount of time participants spend viewing a defined Area of Interest (AOI) during stimulus exposure. This metric provides important insights into VA allocation and cognitive processing of product information.

Dwell time has been widely used in consumer behaviour and marketing research as a reliable indicator of attentional engagement research (Rayner, 2009). Pieters and Wedel (2007) emphasised the importance of measuring consumer attention through physiological data such as eye-tracking, which captures underlying cognitive processes beyond self-reported measures. For example, Pieters and Wedel (2007) demonstrated that dwell time effectively captured attention to different elements of online banner advertisements. Similarly, Venkatraman et al. (2015) highlighted the value of physiological measures in neuromarketing research, showing that consumers spent longer viewing images of healthier food options even when their self-reported preferences indicated otherwise. In addition, Kong et al. (2019) found that higher dwell times on web advertisements were associated with improved brand recall and purchase intentions.

In the present study, dwell time was recorded for several predefined Areas of Interest (AOIs) representing key product information elements commonly displayed on e-commerce platforms. These included:

- Product image
- Price information
- Customer ratings
- Product details
- Country-of-origin (COO) information

These AOIs allowed the study to evaluate how different types of product information influence VA across both COO conditions for local and foreign products. Consistent with prior eye-tracking

literature, dwell times exceeding 100 milliseconds were considered indicative of meaningful visual processing (Balabanis and Diamantopoulos, 2004).

4.8.2 Data Transformation and Processing (Clearing)

Raw eye-tracking data were exported to R statistical software for preprocessing and transformation. The data were initially structured in long format, where each row represented an observation of dwell time for a specific AOI and participant. To facilitate comparative analysis across conditions and product categories, the dataset was transformed into wide format using the `pivot_wider()` function from the `tidyverse` package. This transformation enabled clearer comparison of VA metrics across different stimulus conditions and product origins.

The wide data format enhanced the identification of patterns between local and foreign product categories and improved data visualisation and statistical analysis. Data transformation procedures are commonly employed in eye-tracking research to facilitate the analysis of complex gaze data structures. For example, Lohse (1997) highlighted the importance of specialised data processing when analysing visual scanning behaviour in retail environments. In their study examining consumer search patterns in supermarket aisles, data restructuring enabled clearer identification of gaze behaviour across product displays. Similarly, Field et al. (2012) emphasised the flexibility of R for handling complex datasets and conducting statistical analysis in behavioural and physiological research.

Prior to statistical analysis, the dataset was also screened for potential data quality issues including:

- Missing dwell time observations
- Tracking loss
- Extreme outliers in dwell time

4.8.3 Statistical Analysis Framework

Following data transformation and cleaning, statistical analyses were conducted using IBM SPSS Statistics. Given that eye-tracking data frequently exhibit non-normal distributions, skewness, and heterogeneity of variance, non-parametric statistical tests were employed. As with the present study, eye tracking data small sample size sensitivity often necessitate non-parametric approaches to maintain statistical validity. Finally, the analysis of VA paired with the multiple variable

complexity across different product categories (wine, whisky, beer) and origins (local vs. foreign) benefits from the flexibility of non-parametric methods in handling complex interactions. As a result, these tests are appropriate when the assumptions of parametric methods cannot be satisfied. Normality of dwell time distributions was examined using Shapiro–Wilk tests and visual inspection of histograms and Q plots. Because the distribution of dwell time data deviated from normality, non-parametric methods were selected to ensure the robustness of statistical inference. The primary statistical procedures used in this study were:

- Wilcoxon Signed-Rank Test
- Friedman Analysis of Variance (ANOVA)

These tests were selected due to their suitability for within-participant comparisons involving repeated measures. The Wilcoxon Signed-Rank Test was used to examine paired differences in dwell time between experimental conditions. The Friedman ANOVA was used to evaluate differences in dwell time across multiple AOIs, including product image, ratings, price, and product details. The Friedman test serves as the non-parametric equivalent of a repeated-measures ANOVA and is suitable when comparing more than two related conditions.

The use of non-parametric methods in this study aligns with prior eye-tracking research in marketing. For example, Mansor et al. (2022)) used the Wilcoxon signed-rank test to examine how different Areas of Interest influence consumer attention toward green and non-green products. Similarly, Reutskaja et al. (2011) as employed non-parametric methods to analyse search dynamics in consumer choice processes using eye-tracking data. by Chandon et al. (2009c) also applied Friedman ANOVA in examining the impact of shelf layout on VA and brand evaluation at the point of purchase.

4.8.4 Multiple Comparisons and Correction Procedures

Where Friedman ANOVA indicated statistically significant differences across AOIs, post-hoc pairwise comparisons were conducted using the Wilcoxon Signed-Rank Test. To control for the increased risk of Type I error associated with multiple comparisons, a Bonferroni correction was applied to adjust the significance threshold.

The adjusted significance level was calculated as: $\alpha_{\text{adjusted}} = 0.05 / \text{number of pairwise comparisons}$. Only comparisons meeting the adjusted significance threshold were considered statistically significant.

4.8.5 Significance Level and Effect Size Reporting

All statistical tests were conducted using a two-tailed significance level of $\alpha = 0.05$. In addition to p-values, effect sizes were calculated to provide a more comprehensive interpretation of the results. For the Wilcoxon Signed-Rank Test, effect sizes were calculated using rank-biserial correlation, which provides an estimate of the magnitude of differences between paired observations. For the Friedman ANOVA, Kendall's W was reported as an effect size measure, reflecting the degree of agreement or association among ranked observations across multiple conditions. Reporting effect sizes alongside significance tests is recommended in behavioural research as it provides additional insight into the practical significance of observed effects.

Chapter 5 Analyses

5.0 Introduction

This section will first report the descriptive results of the current study. The tables show the demographic distribution of the present study as well as the data collected post the eye tracking screen activity to provide more contextual information about the product familiarity, frequency of purchase and relevance of information cues (product image, rating, price, product information, delivery information, payment method and country of origin information) for the different product categories and types (local and foreign products). Following this, the statistical method of analyses for the eye tracking data will briefly be explained and results for the current study reported.

5.1 Demographic Characteristics of Participants

Table 20: Demographic Characteristics of Participants

Variable		Frequency	Percentage
Gender	Male	12	60
	Female	8	40
Education	High School	2	10
	Vocational	1	5
	Bachelor	10	50
	Masters	6	30
	Doctorate/Professional	1	5
Marital Status	Single	7	35
	Married	13	65
Employment	Full Time	4	20
	Part Time	3	15
	Student	10	50
	Homemaker	1	5
	Self Employed	2	10

The study included a total of 20 participants, all of whom were Ghanaians. The participants had an average age of 31.25 years. In terms of gender distribution, the majority of participants were male, accounting for 60% of the sample, while the remaining 40% were female. Regarding educational attainment, a significant proportion (85%) of the participants reported having a bachelor's degree or a higher level of qualification. Marital status data revealed that 65% of the participants were married. In terms of employment status, half of the participants (50%) identified as students, while 20% were engaged in full-time employment.

Table 21: Knowledge of E-commerce Shopping

Question	Response			
	Beginner	Intermediate	Advanced	Expert
How do you consider yourself in e-commerce?	1(5%)	4 (20%)	10 (50%)	5 (25%)

From the table 21 above, 75% of the study sample reported that they have advanced/expert knowledge in e-commerce shopping. This sample is appropriate for the current study.

5.2 Results Familiarity with Products (Hypothesis 10)

Table 22: Familiarity with Products

Question	Response		
	Not Familiar	Slightly Familiar	Very Familiar
How familiar are you with the following products?			
a. Star Beer	1 (5%)	1 (5%)	18 (90%)
b. Heineken Beer	2 (10%)	2 (10%)	16 (50%)
c. Palmie Palm Wine	9 (45%)	4 (20%)	7 (35%)
d. Blue Nun Wine	15 (75%)	0 (0%)	5 (25%)
e. Kasapreko Gin	1 (5%)	2 (10%)	17 (85%)
f. Jonnie Walker	4 (20%)	0 (0%)	16 (80%)

From the table 22 above, participants in the current study are familiar with both the local and foreign products. For example, between the local beer (star beer) and the foreign beer (Heineken beer), 90% of the participants were familiar with the local beer and 80% with the foreign beer. In the wine category, participants also showed close familiarity between the local wine (Palmie) with 35% and the foreign one (blue nun) with 25%. Finally, between the local gin (Kasapreko) and foreign gin (Johnnie Walker), 17% of the participants were familiar with Kasapreko and 16% with

Johnnie Walker. The high familiarity of the products is important for this study as it indicates that participants will not find them foreign and easily engage with them as they would in a natural situation.

5.3 Results for Frequency of Purchase (Hypothesis 11)

Table 23: Frequency of Purchase in E-commerce

Question	Response		
	Not At All	Not Often	Often
How often do your purchase this product online?			
a. Star Beer	16 (80%)	2 (10%)	2 (10%)
b. Heineken Beer	14 (70%)	4 (20%)	2 (10%)
c. Palmie Palm Wine	13 (65%)	2 (10%)	4 (20%)
d. Blue Nun	17 (85%)	0 (0%)	3 (15%)
e. Kasapreko	12 (60%)	4 (20%)	4 (20%)
f. Johnnie Walker	16 (80%)	0 (0%)	4 (20%)

From table 23, results indicate that even though participants may be familiar with the products as well as experts in e-commerce, they do not often purchase then products in ecommerce. This is important for the current study because their previous experience in e-commerce will not interfere with the experimental design of the current study in which these products as considered. This additionally indicates that parcipants did not have past learning bias and the results of the study can be attributed to stimuli design.

5.4 Results for Effects of Information Cues in E-commerce (Hypothesis 12)

Table 24: Effects of Information Cues in E-commerce

Question	Response		
	Not At All	Little Extent	Some Extent
To what extent do the following influence your product choice?			
a. Product Image	1 (5%)	4 (20%)	15 (75%)
b. Ratings	1 (5%)	5 (25%)	14 (70%)
c. Price	3 (15%)	3 (15%)	14 (70%)
d. Product Information	3 (15%)	3 (15%)	14 (70%)
e. Made In Label	2 (10%)	3 (15%)	15 (75%)

From Table 24, the results indicate that all information cues influence a product choice of participants in the current study. This result is important for this study because it implies that from the participants self-reported perspective, when the information cues are saliently cued, it is very likely that participants in the current study will engage with them as they highly rely on such information to make a choice. The results also serve as a good comparison for how it is reflected visually through the eye tracking response collected in the current study. The cross-tabulation tables below provide an even more detailed insight into what extent these information cues are important for local and foreign products (drinks).

5.5 Cross Tabulation of Local and Foreign Products with Relevance of Product Image

Table 25: Crosstabs (Product Familiarity and Product Image Relevance)

		Product Image		
Product		Not at all	Little Extent	To a Large Extent
Star	Not at all	0 (0%)	1 (5%)	0 (0%)
	Slightly Familiar	0 (0%)	0 (0%)	1 (5%)
	Very Familiar	1 (5%)	3 (15%)	14 (70%)
Heineken	Not at all	0 (0%)	1 (5%)	1 (5%)
	Slightly Familiar	0 (0%)	1 (5%)	1 (5%)
	Very Familiar	1 (5%)	2 (10%)	13 (65%)
Palmie	Not at all	0 (0%)	1 (5%)	8 (40%)
	Slightly Familiar	1 (5%)	0 (0%)	3 (15%)
	Very Familiar	0 (0%)	3 (15%)	4 (20%)
Blue Nun	Not at all	1 (5%)	3 (15%)	11 (55%)
	Slightly Familiar	0 (0%)	0 (0%)	0 (0%)
	Very Familiar	0 (0%)	1 (5%)	4 (20%)
Kasapreko	Not at all	0 (0%)	0 (0%)	1 (5%)
	Slightly Familiar	0 (0%)	1 (5%)	1 (5%)
	Very Familiar	1 (5%)	3 (15%)	13 (65%)
Johnnie	Not at all	0 (0%)	1 (5%)	3 (15%)
Walker				
	Slightly Familiar	1 (5%)	3 (15%)	12 (60%)
	Very Familiar	1 (5%)	4 (20%)	15 (75%)

From Table 25, the results indicate that between the local and foreign products, product image was largely used especially when familiarity with products was very high. The result also show that product image will be considered even when there is a slight familiarity. This result is important for this study because it implies that from the participants self-reported perspective, when the product image is saliently cued, it is very likely that participants in the current study will engage with them as they highly rely on it to make a choice. The results also serve as a good comparison for how it is reflected visually through the eye tracking response collected in the current study.

5.6 Cross Tabulation of Local and Foreign Products with Relevance of Ratings

Table 26: Crosstabs (Product Familiarity and Ratings Relevance)

		Ratings		
Product		Not at all	Little Extent	To a Large Extent
Star	Not at all	0 (0%)	1 (5%)	0 (0%)
	Slightly Familiar	0 (0%)	0 (0%)	1 (5%)
	Very Familiar	1 (5%)	4 (20%)	13 (65%)
Heineken	Not at all	0 (0%)	1 (5%)	1 (5%)
	Slightly Familiar	0 (0%)	1 (5%)	1 (5%)
	Very Familiar	1 (5%)	3 (15%)	12 (60%)
Palmie	Not at all	1 (5%)	1 (5%)	7 (35%)
	Slightly Familiar	0 (0%)	1 (5%)	3 (15%)
	Very Familiar	0 (0%)	3 (15%)	4 (20%)
Blue Nun	Not at all	1 (5%)	4 (20%)	10 (50%)
	Slightly Familiar	0 (0%)	0 (0%)	0 (0%)
	Very Familiar	0 (0%)	1 (5%)	4 (20%)
Kasapreko	Not at all	0 (0%)	0 (0%)	1 (5%)
	Slightly Familiar	0 (0%)	1 (5%)	1 (5%)
	Very Familiar	1 (5%)	4 (20%)	12 (60%)
Johnnie	Not at all	0 (0%)	1 (5%)	3 (15%)
Walker				
	Slightly Familiar	0 (0%)	0 (0%)	0 (0%)
	Very Familiar	1 (5%)	4 (20%)	11 (55%)

From Table 26, the results indicate that between the local and foreign products, ratings was largely used especially when familiarity with products was very high. The result also show that ratings will be considered even when there is a slight familiarity. This result is important for this study because it implies that from the participants self-reported perspective, when the ratings is saliently cued, it is very likely that participants in the current study will engage with them as they highly

rely on it to make a choice. The results also serve as a good comparison for how it is reflected visually through the eye tracking response collected in the current study.

5.7 Cross Tabulation of Local and Foreign Products with Relevance of Price

Table 27 Crosstabs (Product Familiarity and Price Relevance)

		Price		
Product		Not at all	Little Extent	To a Large Extent
Star	Not at all	0 (0%)	1 (5%)	0 (0%)
	Slightly Familiar	0 (0%)	0 (0%)	1 (5%)
	Very Familiar	3 (15%)	2 (10%)	13 (65%)
Heineken	Not at all	1 (5%)	1 (5%)	0 (0%)
	Slightly Familiar	0 (0%)	1 (5%)	1 (5%)
	Very Familiar	2 (10%)	1 (5%)	13 (65%)
Palmie	Not at all	2 (10%)	1 (5%)	6 (30%)
	Slightly Familiar	1 (5%)	0 (0%)	3 (15%)
	Very Familiar	1 (5%)	1 (5%)	5 (25%)
Blue Nun	Not at all	3 (15%)	2 (10%)	10 (50%)
	Slightly Familiar	0 (0%)	0 (0%)	0 (0%)
	Very Familiar	0 (0%)	1 (5%)	4 (20%)
Kasapreko	Not at all	0 (0%)	0 (0%)	1 (5%)
	Slightly Familiar	0 (0%)	1 (5%)	1 (5%)
	Very Familiar	3 (15%)	2 (10%)	12 (60%)
Johnnie	Not at all	1 (5%)	1 (5%)	2 (10%)
Walker				
	Slightly Familiar	0 (0%)	0 (0%)	0 (0%)
	Very Familiar	2 (10%)	2 (10%)	12 (60%)

From Table 27, the results indicate that between the local and foreign products, price was largely used especially when familiarity with products was very high. The result also show that price will be considered even when there is a slight familiarity. This result is important for this study because it implies that from the participants self-reported perspective, when the price is saliently cued, it is

very likely that participants in the current study will engage with them as they highly rely on it to make a choice. The results also serve as a good comparison for how it is reflected visually through the eye tracking response collected in the current study.

5.8 Cross Tabulation of Local and Foreign Products with Relevance of Product Information

Table 28: Crosstabs (Product Familiarity and Product Information Relevance)

		Product Information		
Product		Not at all	Little Extent	To a Large Extent
Star	Not at all	0 (0%)	1 (5%)	0 (0%)
	Slightly Familiar	0 (0%)	0 (0%)	1 (5%)
	Very Familiar	3 (15%)	2 (10%)	13 (65%)
Heineken	Not at all	1 (5%)	0 (0%)	1 (5%)
	Slightly Familiar	0 (0%)	1 (5%)	1 (5%)
	Very Familiar	2 (10%)	2 (10%)	12 (60%)
Palmie	Not at all	1 (5%)	2 (10%)	6 (30%)
	Slightly Familiar	1 (5%)	1 (5%)	2 (10%)
	Very Familiar	1 (5%)	0 (0%)	6 (30%)
Blue Nun	Not at all	2 (10%)	2 (10%)	11 (55%)
	Slightly Familiar	0 (0%)	0 (0%)	0 (0%)
	Very Familiar	1 (5%)	1 (5%)	3 (15%)
Kasapreko	Not at all	0 (0%)	0 (0%)	1 (5%)
	Slightly Familiar	1 (5%)	0 (0%)	1 (5%)
	Very Familiar	2 (10%)	3 (15%)	12 (60%)
Johnnie	Not at all	1 (5%)	1 (5%)	2 (10%)
Walker				
	Slightly Familiar	0 (0%)	0 (0%)	0 (0%)
	Very Familiar	2 (10%)	2 (10%)	12 (60%)

From Table 28, the results indicate that between the local and foreign products, product information was largely used especially when familiarity with products was very high. The result also show that product information will be considered even when there is a slight familiarity. This result is

important for this study because it implies that from the participants self-reported perspective, when the product information is saliently cued, it is very likely that participants in the current study will engage with them as they highly rely on it to make a choice. The result also show that product information will be considered even when there is a slight familiarity. The results also serve as a good comparison for how it is reflected visually through the eye tracking response collected in the current study.

5.9 Testing and Statistical Tab

Nonparametric tests are particularly suitable for the repeated measures design and small sample size of the experiment. Wilcoxon and Friedman tests handle small sample sizes effectively, making them ideal for practical applications in experiments (Zimmerman, 2011; Uma Maheswari et al., 2018). The Wilcoxon signed-rank test is commonly used for assessing differences between paired samples, especially when the normality assumption for parametric tests (like the paired t-test) is not met, as is often the case with small samples (Field, 2020). The Friedman ANOVA was used to test differences in dwell times across the four interest areas (IAs) without limiting the analysis to pairwise comparisons. This test was appropriate for Hypothesis 2-5, which examined overall differences in attention to cues product image, price, rating, and product details considered collectively. For comparisons involving two related samples (Hypotheses 1, 6, 7, 8, and 9), the Wilcoxon signed-rank test was used to assess differences in dwell times between specific conditions (local products with COO information and foreign products with COO information) (Tables 29,30,31 and,32 below)

Table 29 Wilcoxon report summarising dwell times on COO information for local products and foreign products.

Product Type	Interest Area 1	N	M	SD	Z	P
Local Product	Coo Information	9	267.851	522.397	-1.718	.086
Foreign Product	Coo Information	9	315.424	323.899	-2.401	.016

Table 30 Descriptives summarizing dwell times on non-cued product image, ratings, price and product information for local products and foreign products

Product Type	Interest Area (Not Cued)	N	M	SD
Local Product	Product image	9	1163.182	837.372
	Ratings	9	575.970	530.902
	Price	9	718.697	517.965
	Product information	9	2637.181	4131.434
Local Product	Product image	9	1096.407	664.219
	Ratings	9	243.370	195.853
	Price	9	390.222	211.200
	Product information	9	1191.593	3518.802

Table 31 Friedman ANOVA and Post Hoc Pairwise Comparisons for Dwell Time Across Product Information Types

Product Type	χ^2	df	p-value	Significant Pairwise Differences (Bonferroni-adjusted)
<i>Foreign</i>	16.24	3	.001	Product Image > Price ($p = .005$)
<i>Local</i>	20.36	3	<.001	Product Image > Price ($p = .004$); Product Image > Product Details ($p = .018$)

Table 32 Wilcoxon Paired Samples Comparison of Dwell Time (in ms) Between COO and Other Product Elements for Local and Foreign Products

Product Type	Comparison Pair	Variable 1	Mean (Ms)	Sd (Ms)	Variable 2	Mean (Ms)	Sd (Ms)	Z	P-Value
Local	COO vs. Product Image	COO	267.852	522.397	Product Image	1219.296	672.72	-2.547	.008
	COO vs. Ratings	COO	267.852	522.397	Ratings	450.593	677.247	-1.599	.110
	COO vs. Price	COO	267.852	522.397	Price	505.185	351.523	-1.481	.139
	COO vs. Product Details	COO	267.852	522.397	Product Details	2334.259	2185.208	-2.310	.021
Foreign	COO vs. Product Image	COO	315.424	323.899	Product Image	1710.061	1501.134	-2.490	.013
	COO vs. Ratings	COO	315.424	323.811	Ratings	437.849	406.231	-0.800	.424
	COO vs. Price	COO	315.424	315.424	Price	600.849	438.637	-1.511	.131
	COO vs. Product Details	COO	315.424	323.811	Product Details	2889.545	2585.346	-2.401	.016

5.10 Statistical Results

5.10.1 Hypothesis 1

H1a: The presence (vs. absence) of country-of-origin information increases VA toward local products.

H1b: The presence (vs. absence) of country-of-origin information increases VA toward foreign products.

The results of the eye-tracking data analysis are presented in Table 29 above. To assess the differences in dwell time based on the presence of country of origin (COO) information, a Wilcoxon Signed-Rank Test was conducted.

Local Products

For local products, the analysis revealed that the mean dwell time for COO information when no additional visual cues were present was 267.85 milliseconds (SD = 522.40), compared to 255.08 milliseconds (SD = 473.33) when a cue was present. Though this difference was not statistically significant ($z = -1.718$, $p = .086$), it suggests a slight trend toward a higher dwell time when no cues were provided, thus providing preliminary support for the hypothesis (H1a), which posits that COO positively affects dwell time. The observed dwell times fell within the recognized threshold of more than 100 milliseconds and less than 500 milliseconds, consistent with previous literature (Balabanis and Diamantopoulos, 2004).

Foreign Products

In contrast, for foreign products, the Wilcoxon Signed-Rank Test indicated a significant difference in dwell times. The mean dwell time for COO information when no additional cues were present was significantly higher at 315.42 milliseconds (SD = 323.90) compared to 86.41 milliseconds (SD = 60.81) when cues were present. This difference was statistically significant ($z = -2.401$, $p = .016$), thereby supporting the hypothesis (H1b) that COO positively affects dwell time. Similar to the local product findings, many dwell times were within the accepted range of greater than 100 milliseconds and less than 500 milliseconds, corroborating insights from the existing literature (Thoumrunroje et al., 2024; Balabanis & Diamantopoulos, 2004).

In summary, this analysis indicates that while local products did not show a significant difference in dwell time, foreign products demonstrated a statistically significant preference in dwell time toward COO information when no additional cues were present. The heatmaps below (figures 34 to 39) present an illustration of the above results across the different products both local and foreign.

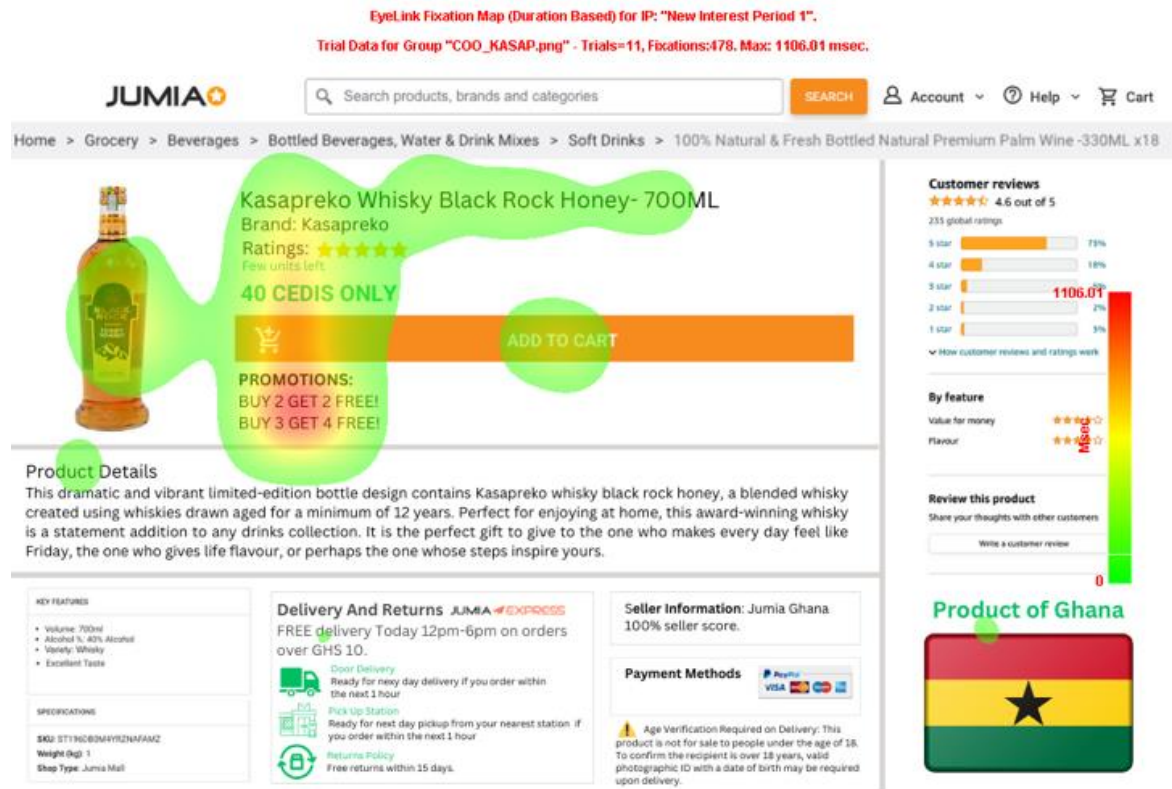


Figure 34 Showing dwell time with the made in label for the local gin/whiskey. The heat maps is colour graded from green to red, where green indicated attention captured but less dwell time, orange indicates medium dwell time and red indicates high dwell time.



Figure 35 Showing dwell time with the made in label for the local wine. The heat maps is colour graded from green to red, where green indicated attention captured but less dwell time, orange indicates medium dwell time and red indicates high dwell time.

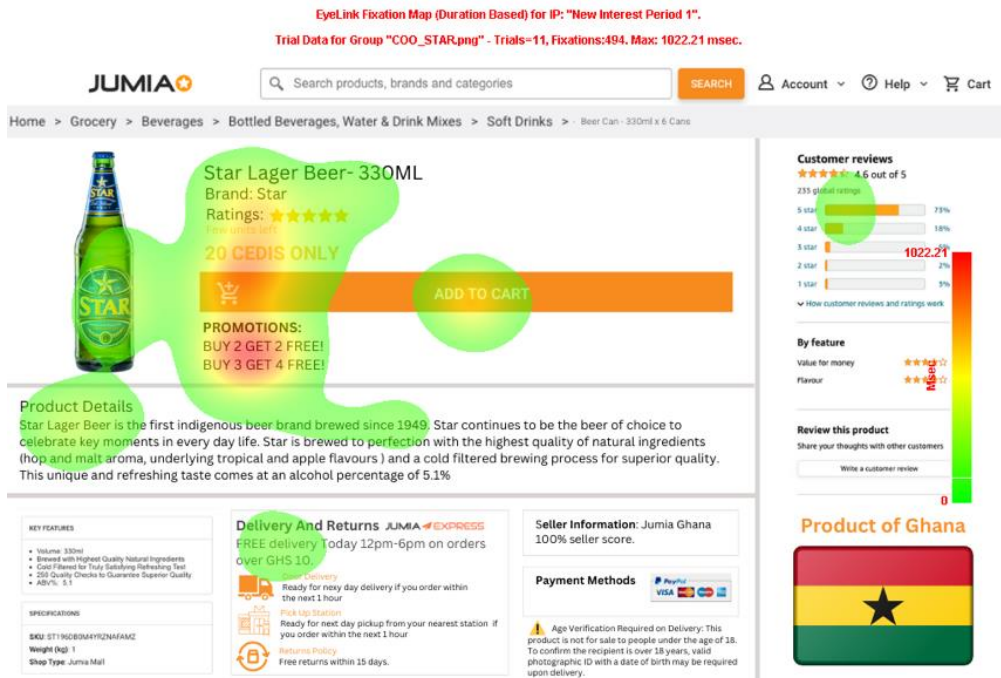


Figure 36 Showing dwell time with the made in label for the local beer The heat maps is colour graded from green to red, where green indicated attention captured but less dwell time, orange indicates medium dwell time and red indicates high dwell time.

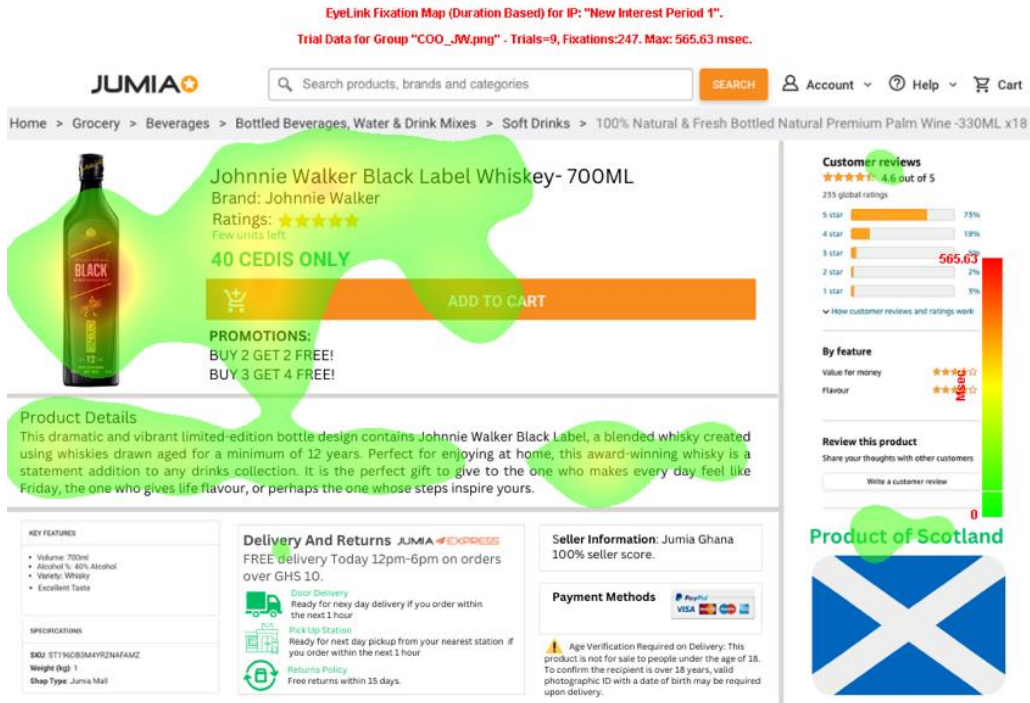


Figure 37 Showing dwell time with the made in label for the foreign whiskey. The heat maps is colour graded from green to red, where green indicated attention captured but less dwell time, orange indicates medium dwell time and red indicates high dwell time.

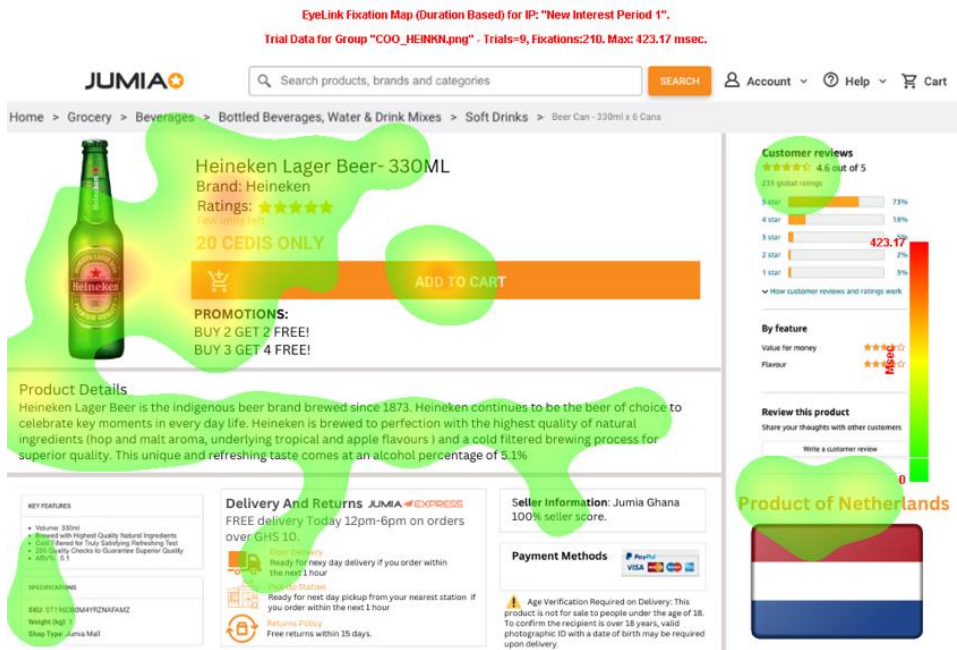


Figure 38 Showing dwell time with the made in label for the foreign beer.

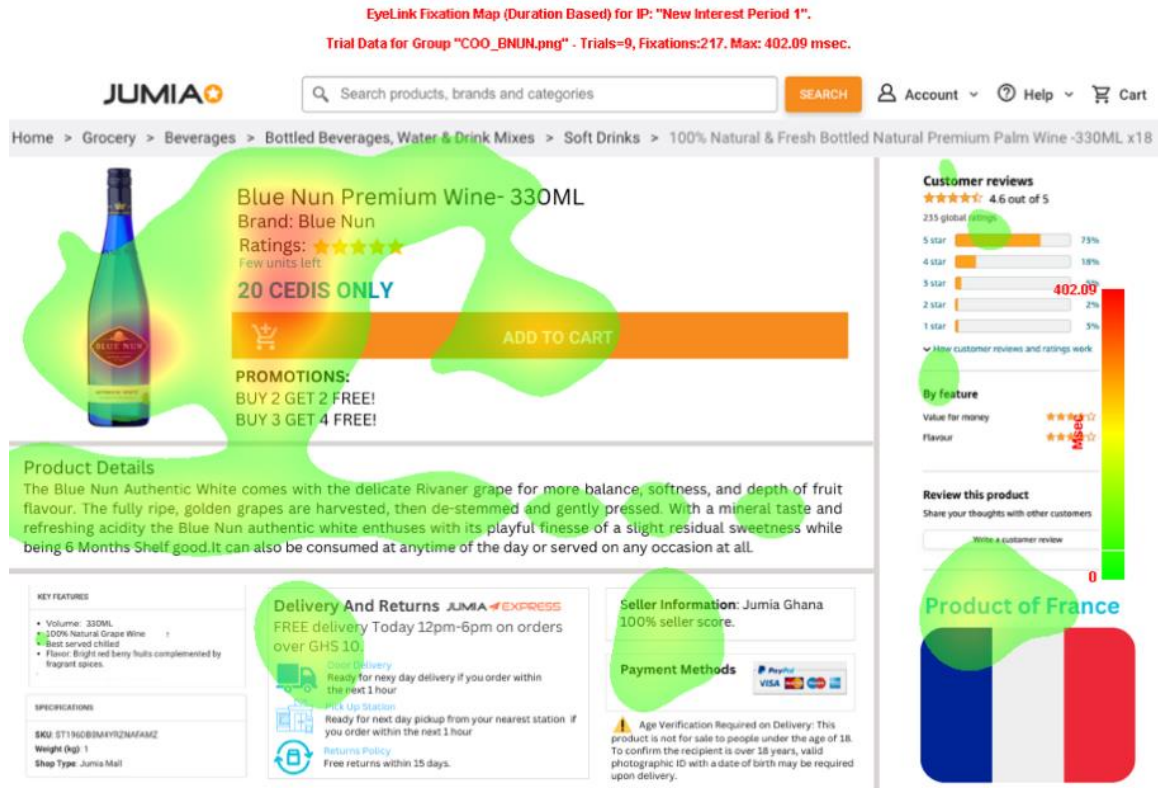


Figure 39 Showing dwell time with the made in label for the foreign wine. The heat maps is colour graded from green to red, where green indicated attention captured but less dwell time, orange indicates medium dwell time and red indicates high dwell time.

5.10.2 Hypothesis 2-5

H2a: Product image positively influences VA (dwell time) for local products in e-commerce.

H2b: Product image positively influences VA (dwell time) for foreign products in e-commerce

H3a: Price positively influences VA (dwell time) for local products in e-commerce.

H3b: Price positively influences VA (dwell time) for foreign products in e-commerce.

H4a: Ratings positively influences VA (dwell time) for local products in e-commerce.

H4b: Ratings positively influences VA (dwell time) for foreign products in e-commerce.

H5a: Product details positively influences VA (dwell time) for local products in e-commerce.

H5b: Product details positively influences VA (dwell time) for foreign products in e-commerce.

To examine how participants allocated VA across product information types, as well as how differently it was done, a Friedman ANOVA was conducted separately for local and foreign products, focusing on four key areas of interest: product image, ratings, price, and product details. Descriptive analyses of each is summarised in Table 30 above.

For foreign products, the analysis revealed a statistically significant difference in dwell time across the four information types, $\chi^2(3) = 16.24$, $p = .001$. Post hoc comparisons using Wilcoxon signed-rank tests with Bonferroni correction indicated that dwell time on product image was significantly greater than on price, $z = 3.701$, $p < .001$, adjusted $p = .005$. However, no other pairwise comparisons reached significance following adjustment.

For local products, the Friedman test also showed a statistically significant difference in dwell time across the four areas, $\chi^2(3) = 20.36$, $p < .001$. Follow-up Wilcoxon tests revealed that participants spent significantly more time viewing product image compared to both price ($z = 3.710$, $p < .001$, adjusted $p = .004$) and product details ($z = 3.328$, $p < .001$, adjusted $p = .018$). The comparison between product image and ratings did not yield a statistically significant difference after correction. These results suggest that product images consistently captured the most VA, particularly when compared to pricing and detailed information, across both local and foreign product conditions (see Table 15 above).

Summary of Results

In summary, the analysis indicates that product image consistently captures the most VA compared to pricing and detailed information in both local and foreign product conditions. Other types of product information, such as ratings, did not show a statistically significant effect on VA compared to product images in this study. However, the descriptives summarised in table 14 above such as the mean for each AOI provides evidence that the AOIs were viewed. Also, although only specific pairwise comparisons between product image and other AOIs were significant after Bonferroni correction, these comparisons do not indicate that no attention was given to the other AOIs.

Instead, this suggests a difference in magnitude, where product images tend to capture more attention. Thus, generally, the overall hypotheses, which posit that product image, ratings, price, and product information positively affect VA, are generally supported. The heatmaps below (figures 40-45) present an illustration of the above results.



Figure 40 Heatmap showing dwell time with product image, rating, price, and product information/details for the local wine. The heat maps is colour graded from green to red, where green indicated attention captured but less dwell time, orange indicates medium dwell time and red is the highest dwell time.

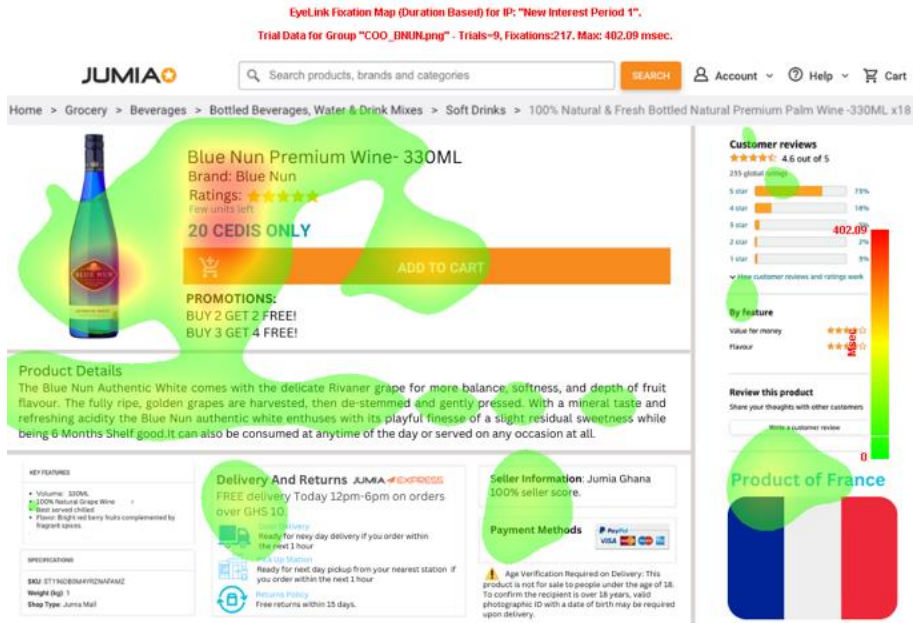


Figure 41 Heatmap showing dwell time with product image, rating, price, and product information/details for the foreign wine. The heat maps is colour graded from green to red, where green indicated attention captured but less dwell time, orange indicates medium dwell time and red is the highest dwell time.

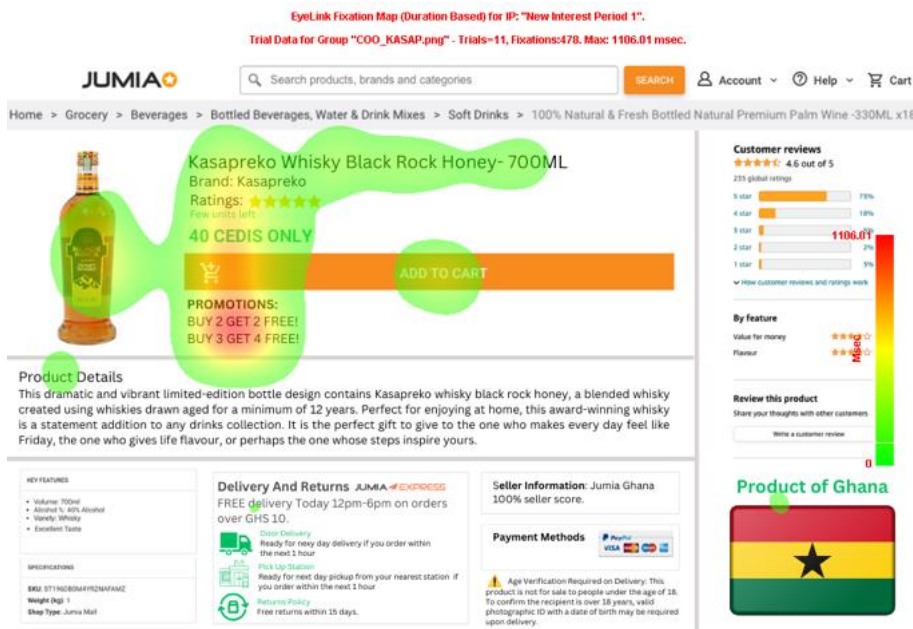


Figure 42 Heatmap showing dwell time with product image, rating, price, and product information/details for the local gin/whiskey. The heat maps is colour graded from green to red, where green indicated attention captured but less dwell time, orange indicates medium dwell time and red is the highest dwell time.

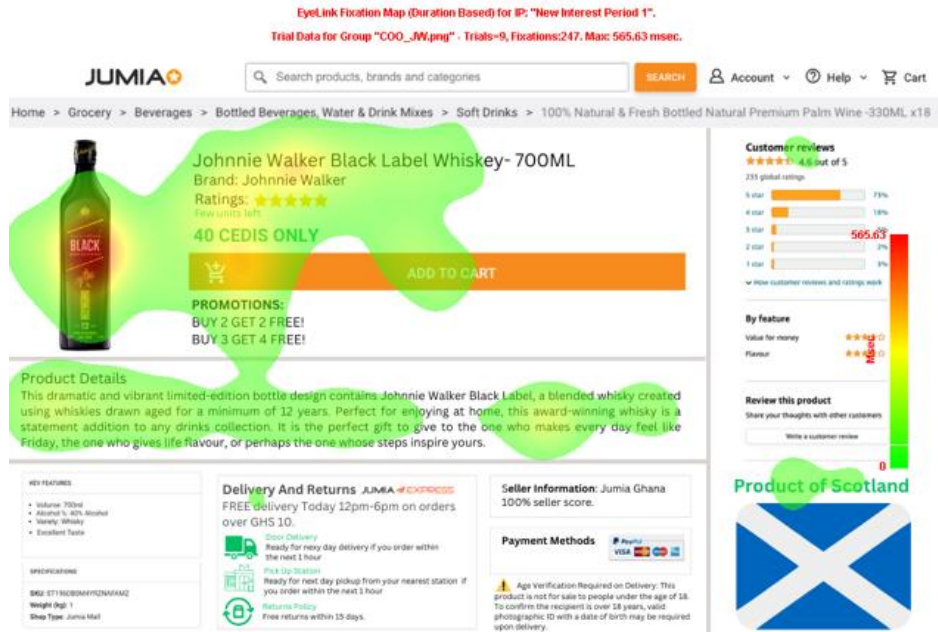


Figure 43 Heatmap showing dwell time with product image, rating, price, and product information/details for the foreign whiskey/gin. The heat maps is colour graded from green to red, where green indicated attention captured but less dwell time, orange indicates medium dwell time and red is the highest dwell time.

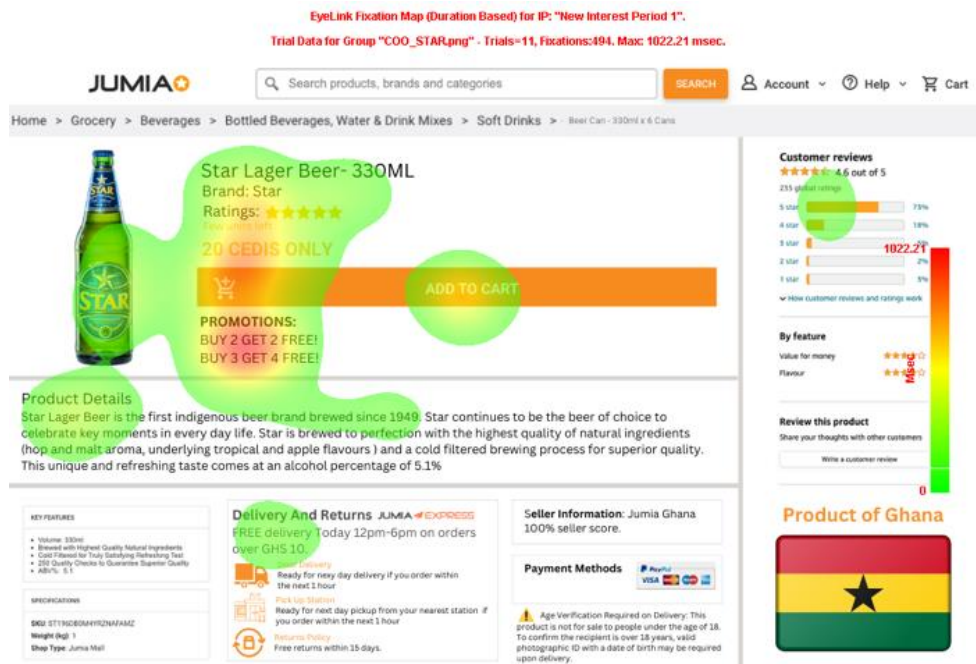


Figure 44 Heatmap showing dwell time with product image, rating, price, and product information/details for the local beer. The heat maps is colour graded from green to red, where green indicated attention captured but less dwell time, orange indicates medium dwell time and red is the highest.

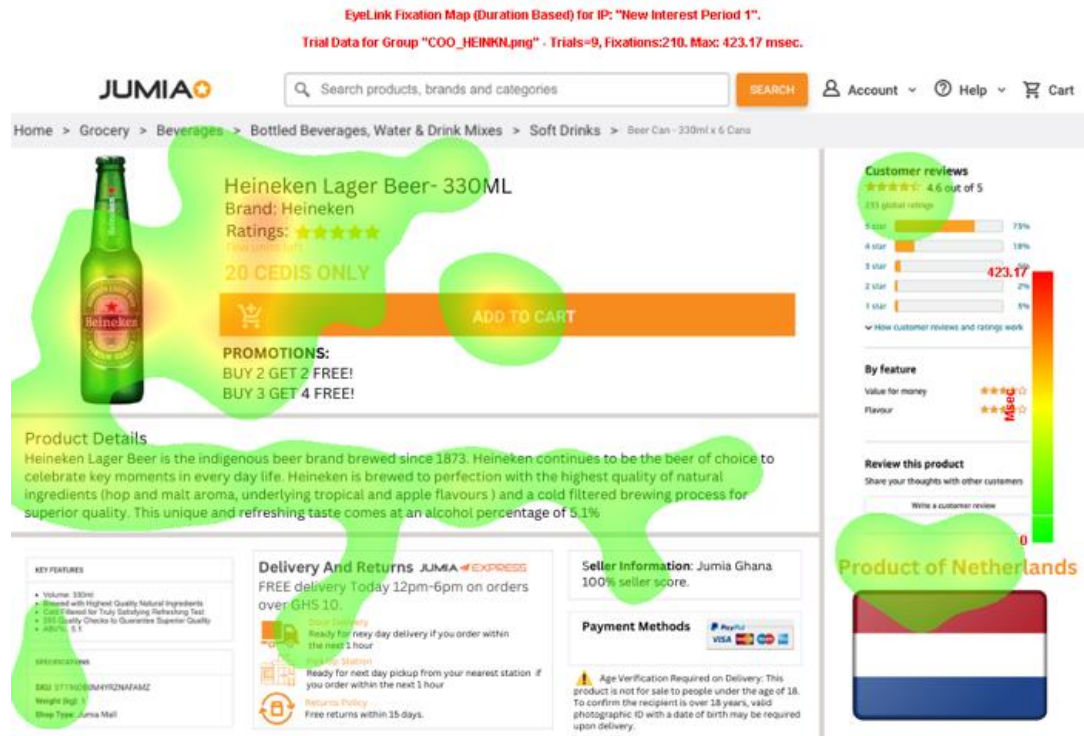


Figure 45 Heatmap showing dwell time with product image, rating, price, and product information/details the foreign beer. The heat maps is colour graded from green to red, where green indicated attention captured but less dwell time, orange indicates medium dwell and red is the highest.

5.10.3 Hypothesis 6

H6a: Product image salience will moderate the relationship between COO and VA (dwell time) for local products, such that dwell time on COO will decrease when product image is saliently cued.

The results of the Wilcoxon signed rank test demonstrate that the dwell time for local products significantly increased when participants were exposed to salient product images, compared to uncued conditions above. Specifically, this increase in dwell time was observed to rise from a mean (M) of 224.778 milliseconds with a standard deviation (SD) of 202.074 to a mean (M) of 1219.296 milliseconds with a standard deviation (SD) of 672.721. The statistical significance of this increase was confirmed, attaining a z-value of 2.666 with a corresponding p-value of .008, which indicates a statistically significant difference with significance set at 0.05.

Furthermore, comparisons between the dwell times on the product image and the COO information yielded noteworthy results. The dwell time on product images (M=1219.296, SD=672.721) was significantly greater than the dwell time associated with COO information (M=267.852, SD=522.397). This comparison also returned a significant z-value of -2.547 with a p-value of .011, thereby confirming the hypothesis that product images exert a more substantial effect on dwell time relative to COO information.

Moreover, while there was a report of a slight increase in the dwell time associated with COO observations from an initial mean of 267.851 milliseconds (SD=522.397) to a mean of 267.852 milliseconds (SD=522.397) when product images were cued, this increase was insignificant and does not denote a meaningful change.

In conclusion, the results provide robust support for Hypothesis 6a. The findings reveal that salient product images significantly enhance the dwell time of participants in comparison to COO information, underscoring the critical role of visual cues in consumer VA and engagement with local products. The heatmaps below (figures 46-48) illustrate the findings.

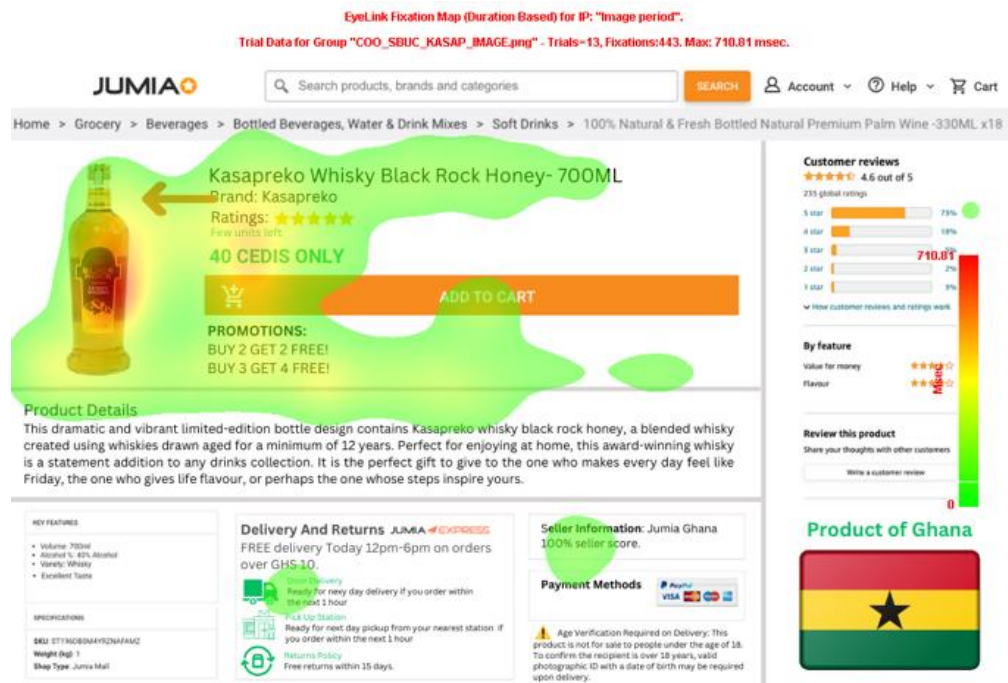


Figure 46 Heatmap showing dwell time between COO Information and product image when product image is Cued for the local gin/whiskey. The heat maps is colour graded from green to red, where green indicated attention captured but less dwell time, orange indicates medium dwell time and red is the highest dwell time.

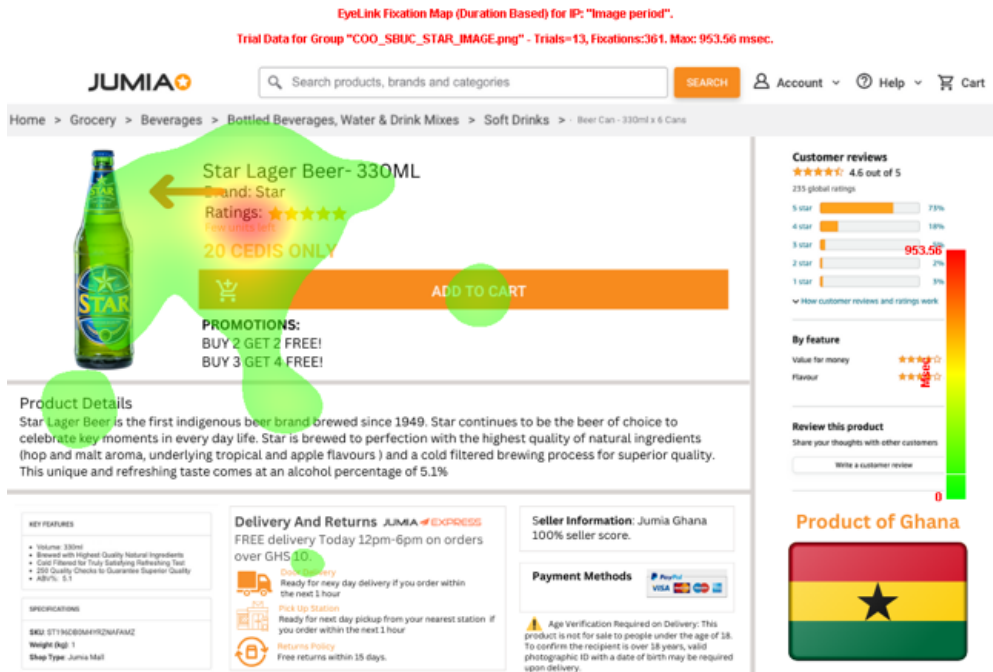


Figure 47 Heatmap showing dwell time between COO Information and product image when product image is Cued for the local beer. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

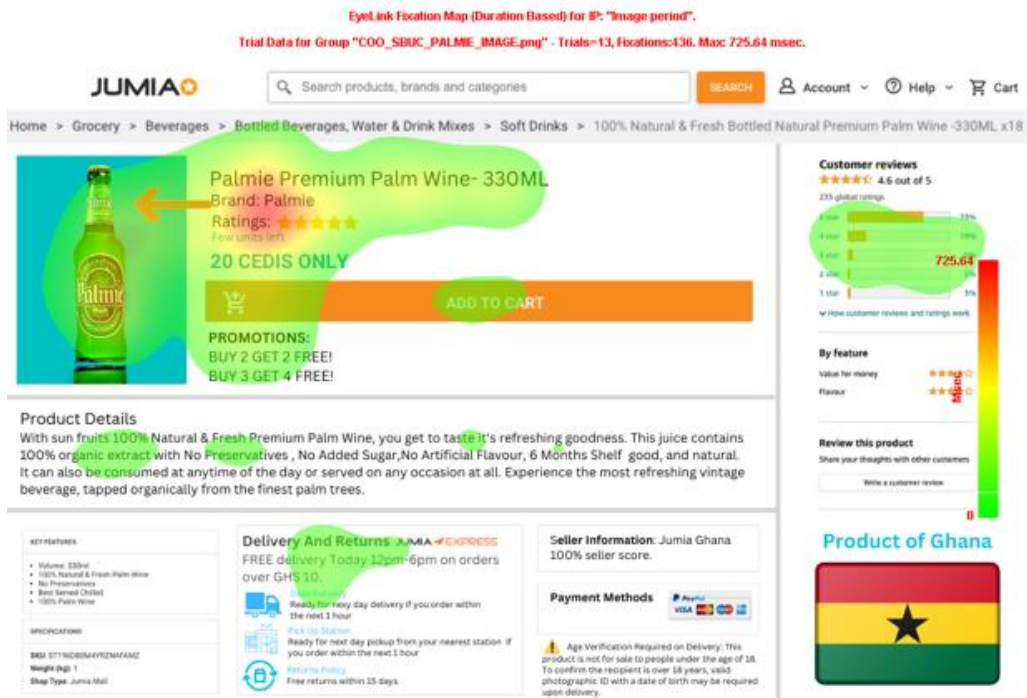


Figure 48 Heatmap showing dwell time between COO Information and product image when product image is Cued for local wine. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

H6b: Product image salience will moderate the relationship between COO and VA (dwell time) for foreign products, such that dwell time on COO will decrease when product image is saliently cued.

The result showed that when participants viewed foreign products with COO information, there was a statistically significant increase in dwell time when product images were saliently cued: the mean dwell time increased from ($M = 272.897$) milliseconds ($SD = 296.237$) to ($M = 1710.061$) milliseconds ($SD = 1501.134$). This change was found to be statistically significant ($z = 2.934$), ($p = .003$).

Moreover, it was observed that when the product image was cued, the mean dwell time significantly exceeded the dwell time allocated to the COO information alone. Specifically, the mean dwell time for the salient cueing of the product image was ($M = 1710.061$) milliseconds ($SD = 1501.134$), compared to the mean dwell time on COO information, which was ($M = 315.424$) milliseconds ($SD = 323.899$). This difference was statistically significant, with ($z = -2.490$), ($p = .013$).

These findings support the acceptance of hypothesis 6b, indicating that while product images significantly attract attention, it exceeds the consideration of COO information with foreign products.

Summary of Results for Hypothesis 6

When product images were saliently cued, both local and foreign products received significantly higher dwell times on product images compared to their associated country-of-origin (COO) information. Notably, foreign products attracted the highest mean dwell time on product images ($M = 1710.061$ ms, $SD = 1501.134$), exceeding that of local products ($M = 1219.296$ ms, $SD = 672.721$).

In contrast, when examining dwell times on COO information under the same salient image cue condition, local products received a marginally higher mean dwell time ($M = 267.852$ ms, $SD = 522.397$) compared to foreign products ($M = 315.424$ ms, $SD = 323.899$), though this difference was not statistically significant (Zhu et al., 2023).

These findings suggest that while product images generally commanded more attention than COO labels across both product types, foreign products captured greater attention through their visual images, whereas local products received relatively more attention to their COO information.

Nevertheless, COO information attracted substantially less attention overall, underscoring the dominant influence of product imagery in visual engagement. The heatmap (figures 49-51) below present a visual of the dwell time when product image was cued.



Figure 49 Heatmap showing dwell time between COO Information and product image when product image is Cued for foreign gin/whiskey. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.



Figure 50 Heatmap showing dwell time between COO Information and product image when product image is Cued for foreign beer. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

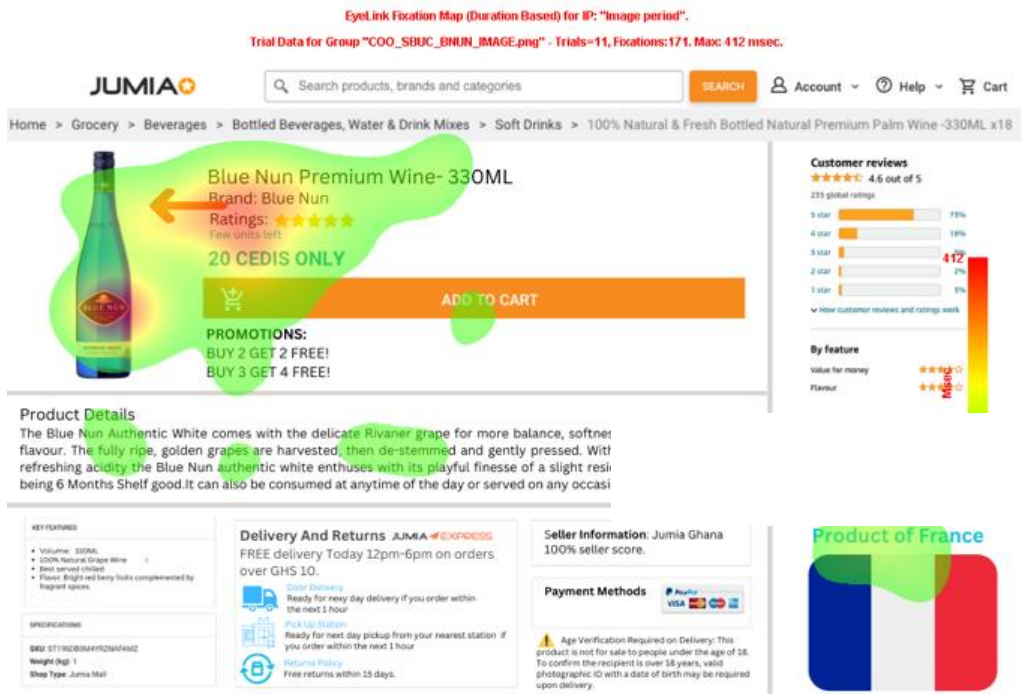


Figure 51 Heatmap showing dwell time between COO Information and product image when product image is Cued for foreign wine. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time

5.10.4 Hypothesis 7

H7a: Ratings salience will moderate the relationship between COO information and VA (dwell time) for local products, such that dwell time on COO information will decrease when product ratings are saliently cued.

The analysis revealed that when participants viewed local products with COO information and the rating was saliently cued, the dwell time did not significantly increase. Specifically, the mean dwell time for cued ratings was ($M = 450.593$) milliseconds ($SD = 677.247$), which was not significantly higher than the mean dwell time when ratings were not cued (hypothesis 2) ($M = 144.422$) milliseconds, $SD = 163.596$). The results indicated ($z = 2.100$), ($p = .036$), suggesting that while there was a moderate increase in dwell time, it did not reach statistical significance at the conventional alpha level of 0.05.

Furthermore, when examining the dwell time associated with cued ratings, it was also found that this dwell time ($(M = 450.593)$ milliseconds, $SD = 677.243$) was not significantly greater than the

dwelling time allocated to COO information ((M = 267.852) milliseconds, SD = 522.397). The Wilcoxon signed-rank test yielded ($z = -1.599$) and ($p = .110$), indicating that the difference in dwelling times lacked statistical significance.

In conclusion, these findings provide evidence that the hypothesis positing that saliently cued ratings would substantially increase dwelling time for ratings with local product while decreasing it for COO information was not supported. The heatmap below (figure 52-54) provides a visual presentation of dwelling across the stimuli when ratings were cued.



Figure 52 Heatmap showing dwell time between COO Information and ratings when ratings image is Cued for the local gin/whiskey. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

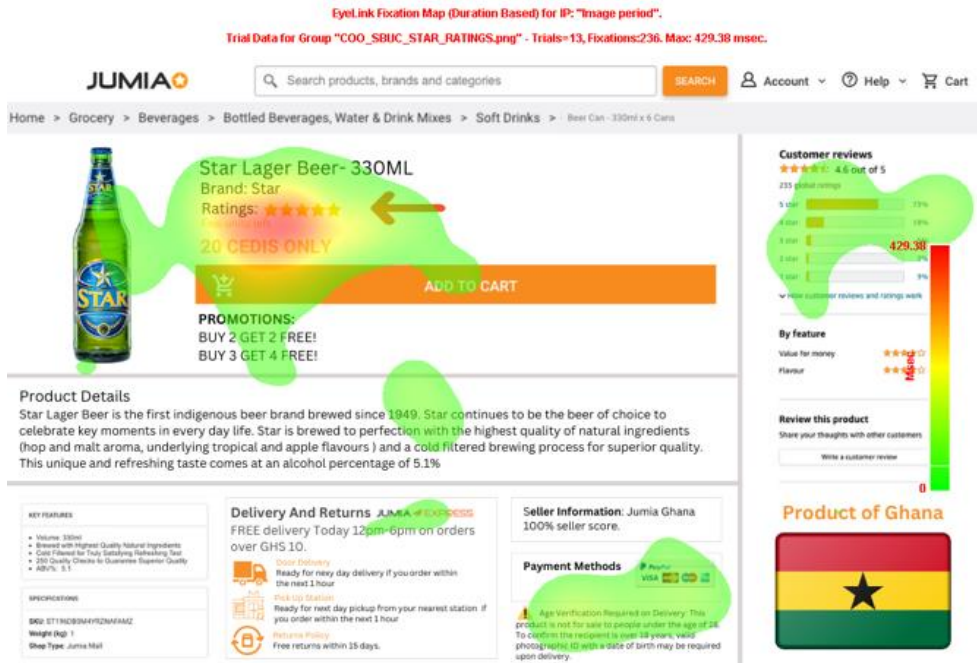


Figure 53 Heatmap showing dwell time between COO Information and ratings when ratings image is Cued for the local beer. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

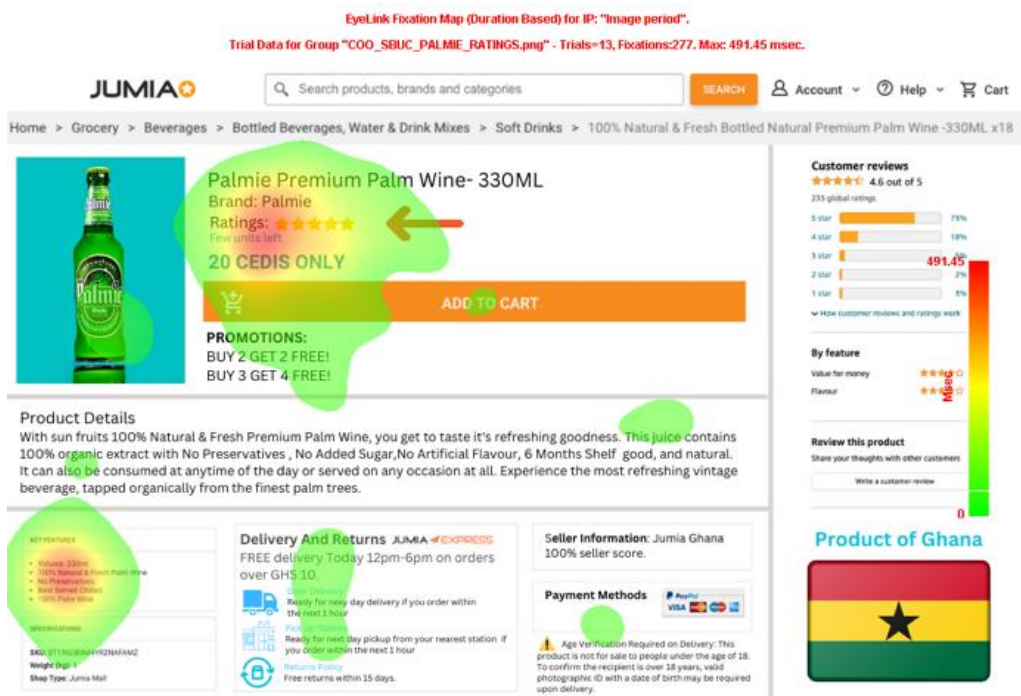


Figure 54 Heatmap showing dwell time between COO Information and ratings when ratings is Cued for the local wine. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

H7b: Ratings salience will moderate the relationship between COO information and VA (dwell time) for foreign products, such that dwell time on COO information will decrease when product ratings are saliently cued.

The analysis demonstrated that when participants viewed foreign products with COO information and the rating was saliently cued, the dwell time did not significantly increase. Specifically, the mean dwell time for cued ratings was ($M = 437.849$) milliseconds ($SD = 406.231$), which did not show a significant difference from the mean dwell time when ratings were not cued ($M = 313.255$) milliseconds, ($SD = 350.674$). The results yielded a z-value of 0.800 and a p-value of 0.424, indicating no statistically significant increase in dwell time due to salient cueing.

Additionally, when assessing dwell time for cued ratings compared to that of COO information, it was found that this dwell time ($M = 437.849$) milliseconds, ($SD = 406.229$) did not significantly exceed the dwell time for COO information ($M = 315.424$) milliseconds, ($SD = 323.811$). The Wilcoxon signed-rank test results produced a z-value of -0.800 and a p-value of 0.424, confirming the lack of significant difference between these groups.

In conclusion, these findings suggest that the hypothesis 7b asserting that saliently cued ratings would enhance dwell time for foreign products while decreasing attention to COO information is unsupported.

Summary of Results for Hypothesis 7

The results suggest that during salient cue conditions, local products received slightly higher dwell times on product images compared to foreign products. However, this difference was not statistically significant and thus does not provide strong support for either hypothesis. When comparing dwell time on country-of-origin (COO) information under the same salient cue conditions, foreign products received numerically higher dwell times than local products, although this difference was also not statistically significant. These findings indicate a dissociation: local products drew more attention to their images, while foreign products attracted slightly more attention to their COO labels. Nonetheless, none of these differences reached statistical significance.



Figure 55 Heatmap showing dwell time between COO Information and ratings when ratings is Cued for the foreign gin/whiskey. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

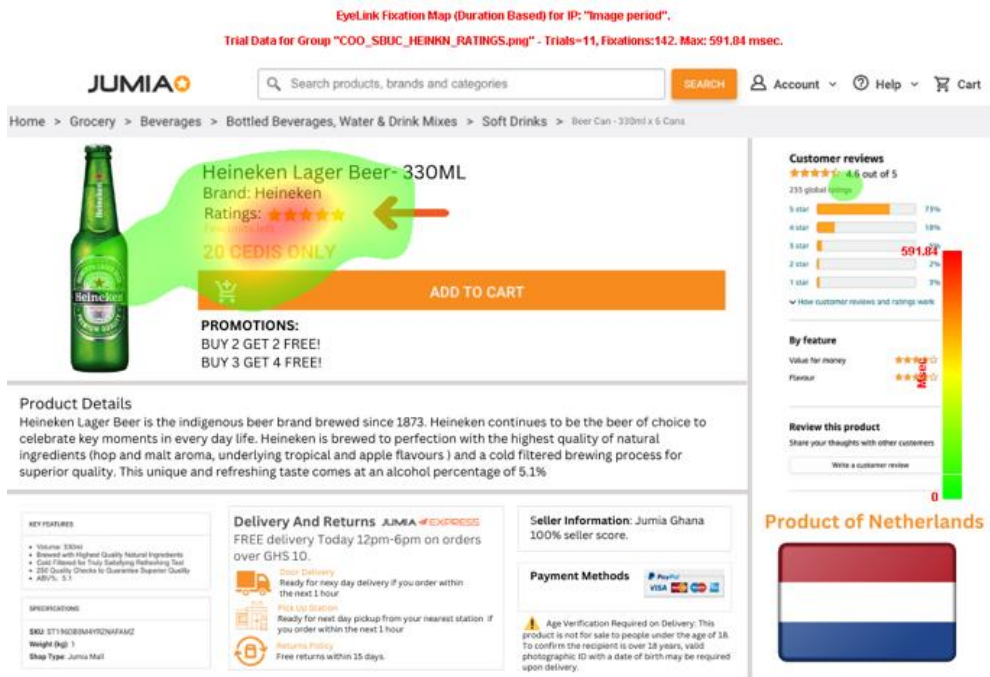


Figure 56 Heatmap showing dwell time between COO Information and ratings when ratings is Cued for the foreign beer. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.



Figure 57 Heatmap showing dwell time between COO Information and ratings when ratings is Cued for the foreign wine. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

5.10.5 Hypothesis 8

H8a: Price salience will moderate the relationship between COO information and VA (dwell time) for local products, such that dwell time on COO information will decrease when price is saliently cued.

The Wilcoxon signed rank results indicated that when participants viewed local products with COO information and the price was saliently cued, the dwell time did not significantly increase. Specifically, the mean dwell time for cued pricing was ($M = 505.185$) milliseconds ($SD = 351.523$), which did not significantly differ from the mean dwell time recorded when price was not cued ($M = 257.926$) milliseconds, $SD = 209.735$). The analysis yielded a z-value of 2.073 and a p-value of 0.038, suggesting a marginally significant difference that does not favor the hypothesis due to the context of the results.

Furthermore, the dwell time associated with the cued pricing ($M = 505.185$) milliseconds, $SD = 351.523$) was also not significantly greater than the dwell time for COO information ($M =$

267.852) milliseconds, SD = 522.397). The resulting statistics showed a z-value of -1.481 and a p-value of 0.139, indicating lack of significance in the difference between these groups.

In conclusion, these results suggest that while the change in dwell time for cued pricing shows a degree of change, the evidence is not robust enough to support the hypothesis. Therefore, hypothesis 8a is not supported.

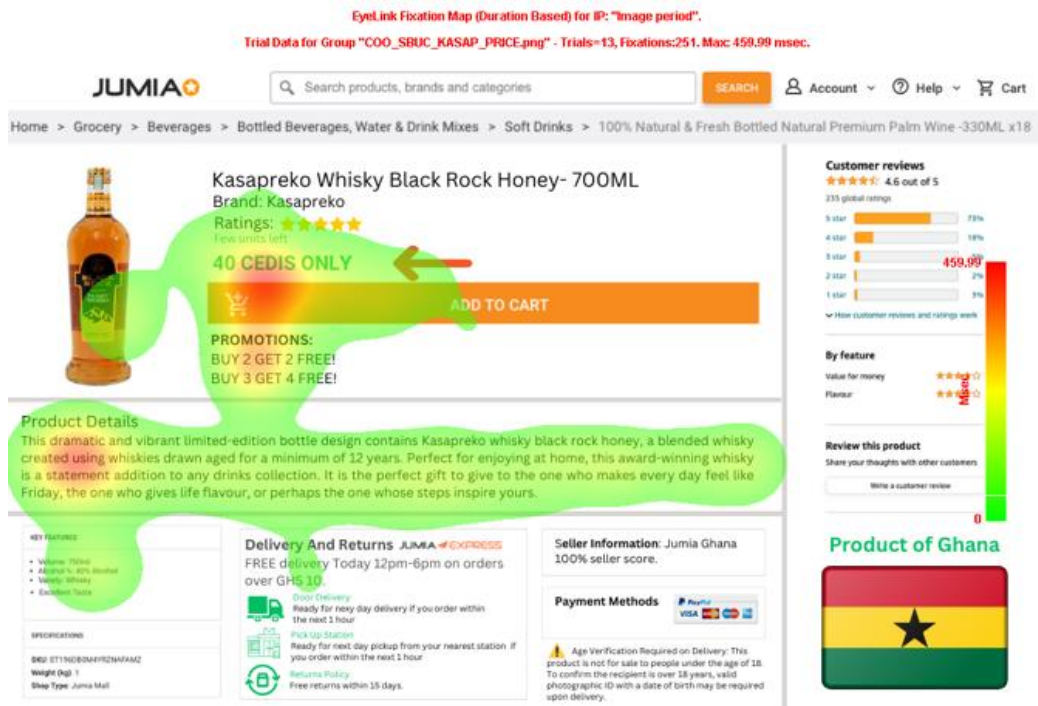


Figure 58 Heatmap showing dwell time between COO Information and price when price is Cued for the local gin/whiskey. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

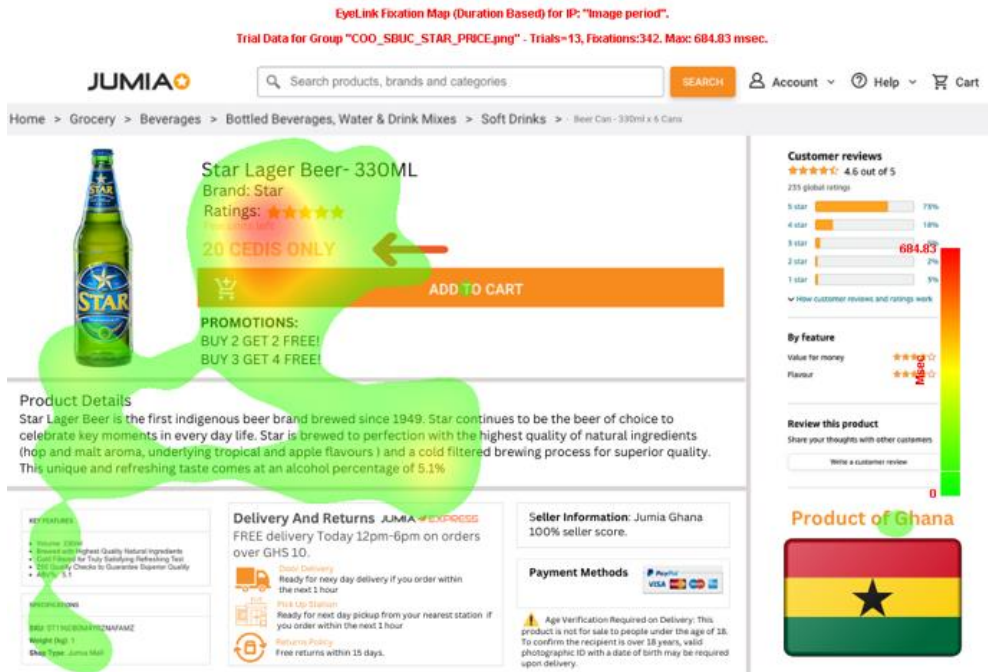


Figure 59 Heatmap showing dwell time between COO Information and price when price is Cued for the local beer. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.



Figure 60 Heatmap showing dwell time between COO Information and price when price is Cued for the local wine. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

H8b: Price salience will moderate the relationship between COO information and VA (dwell time) for foreign products, such that dwell time on COO information will decrease when price is saliently cued.

The results indicated that participants exhibited significantly greater dwell time when the price of foreign products was saliently cued ($M = 600.849$ ms, $SD = 438.637$), compared to when it was not ($M = 329.242$ ms, $SD = 228.266$). This difference was statistically significant, $z = 2.134$, $p = 0.033$, falling below the conventional alpha threshold of 0.05.

However, when comparing dwell time between the saliently cued price and the country-of-origin (COO) information for foreign products, no significant difference emerged. Although the mean dwell time for price ($M = 600.849$ ms, $SD = 438.637$) exceeded that for COO information ($M = 315.424$ ms, $SD = 323.811$), this difference was not statistically significant, $z = -1.511$, $p = 0.131$.

In summary, these findings offer partial support for Hypothesis 8b. While making the price salient significantly increased attention toward price for foreign products, this increase did not surpass attention directed toward COO information to a statistically significant degree.

Summary for Hypothesis 8

The analysis of dwell times for country-of-origin (COO) information reveals that foreign products (Hypothesis 8b) received marginally higher attention compared to local products (Hypothesis 8a). While neither hypothesis demonstrated statistically significant dominance of COO attention over cued pricing, foreign products showed a numerically greater focus on COO details.

This suggests that participants allocated more VA to COO information for foreign products, though the difference did not reach statistical significance in direct comparisons with pricing cues. When comparing the dwell time on price with salient cues between local and foreign products: foreign products received the highest dwell time on price when the price was saliently cued, with a mean dwell time that exceeded that of local products by approximately 95 milliseconds. This difference was statistically significant for foreign products, indicating that making the price salient increased attention to price more for foreign products than for local products.

Overall, the results indicate that foreign products may elicit greater consumer attention, particularly when price is made salient, whereas COO information—although slightly more attended to in foreign products did not significantly capture attention over pricing in either case.



Figure 61 Heatmap showing dwell time between COO Information and price when price is Cued for the foreign whiskey/gin. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.



Figure 62 Heatmap showing dwell time between COO Information and price when price is Cued for the foreign beer. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

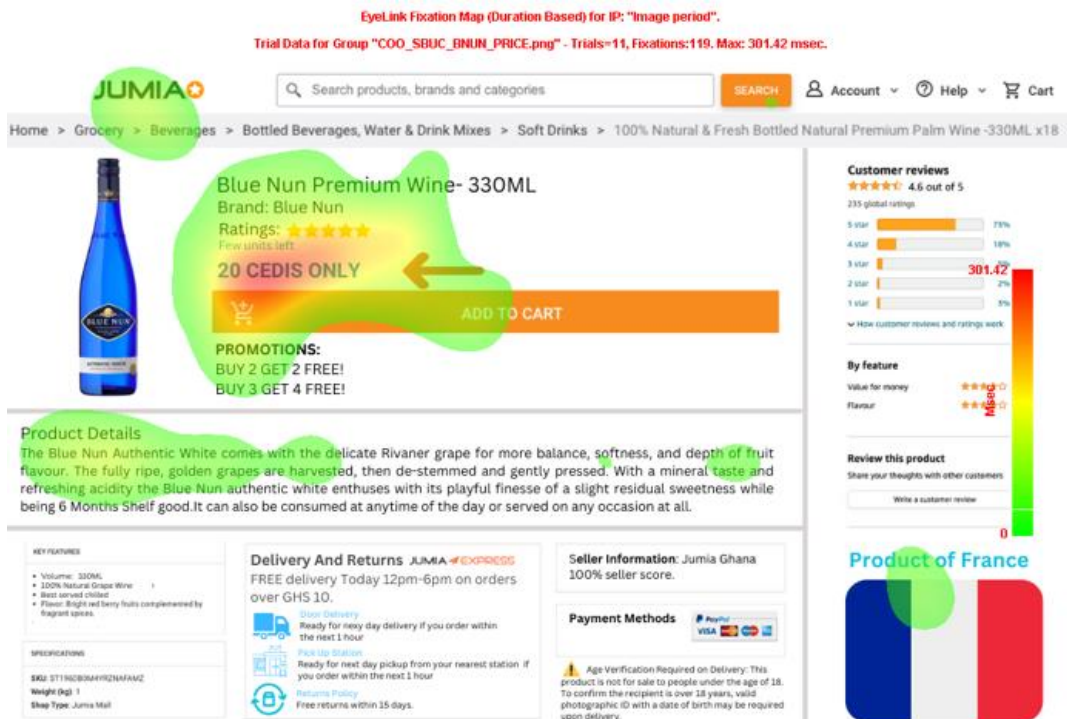


Figure 63 Heatmap showing dwell time between COO Information and price when price is Cued for the foreign wine. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

5.10.6 Hypothesis 9

H9a: Product details salience will moderate the relationship between COO information and VA (dwell time) for local products, such that dwell time on COO information will decrease when product details is saliently cued.

The results of this hypothesis are presented in Table 48. The findings from the Wilcoxon signed-rank test demonstrated that when participants viewed local products with COO information, the average dwell time significantly increased when product details were saliently cued. Specifically, the mean dwell time under the cued condition was ($M = 2334.259$) milliseconds ($SD = 2815.208$), which contrasted with the non-cued condition where the mean dwell time was ($M = 350.919$) milliseconds ($SD = 824.233$). The analysis yielded a z-value of (2.310) and a p-value of (0.021), indicating a statistically significant increase in dwell time for cued product details.

Moreover, the dwell time associated with saliently cued product details ($(M = 2334.259)$ milliseconds, $SD = 2815.208$) was found to be significantly higher than the mean dwell time allocated to COO information ($(M = 267.852)$ milliseconds, $SD = 522.397$). The Wilcoxon signed-rank test provided a z-value of (-2.310) and a p-value of (0.021) for this comparison, emphasizing that participants allocated more attention to product details in the presence of salient cues than to the COO information.

Consequently, these results provide robust support for hypothesis 9a, demonstrating that saliently cued product details lead to increased dwell time on product details for local products compared to COO information.

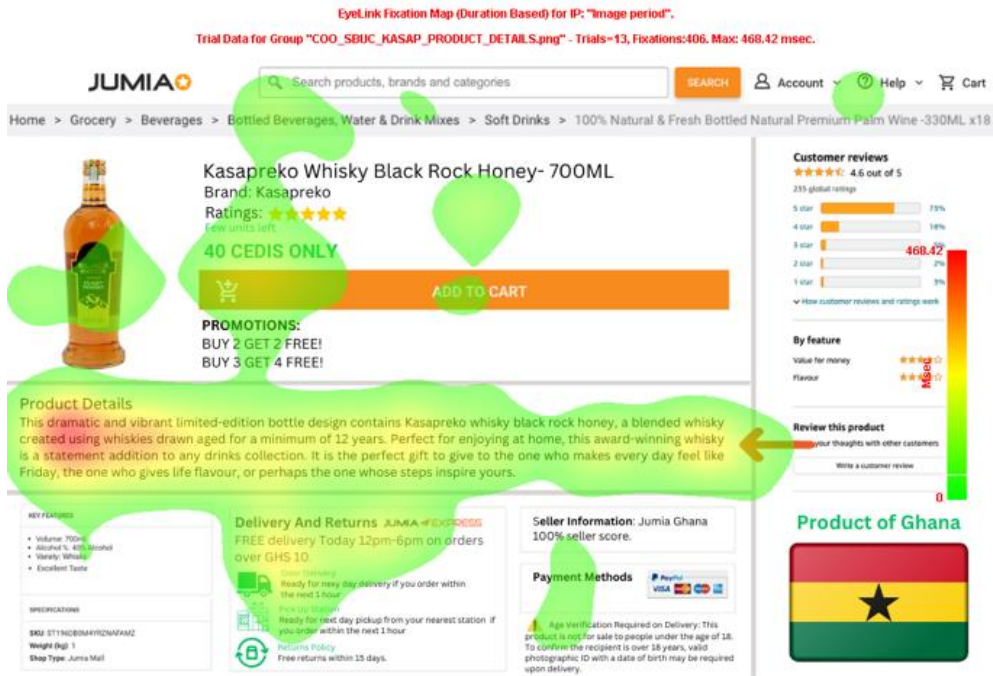


Figure 64 Heatmap showing dwell time between COO Information and product details when product detail is cued for the local gin/whiskey. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time



Figure 65 Heatmap showing dwell time between COO Information and product details when product detail is Cued for the local beer. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time



Figure 66 Heatmap showing dwell time between COO Information and product details when product detail is cued for the local wine. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

H9b: Product details salience will moderate the relationship between COO information and VA (dwell time) for foreign products, such that dwell time on COO information will decrease when product details is saliently cued.

The analysis utilizing the Wilcoxon signed-rank test revealed that when participants viewed foreign products with COO information and product details were saliently cued, the mean dwell time significantly increased. Specifically, the mean dwell time for the cued condition was ($M = 2889.545$) milliseconds ($SD = 2585.345$), which was notably higher than the mean dwell time recorded when product details were not cued ($(M = 985.376)$ milliseconds, $SD = 1510.188$). This increase was statistically significant, as indicated by a z-value of (1.956) and a p-value of (0.050). Furthermore, the dwell time associated with saliently cued product details ($(M = 2889.545)$ milliseconds, $SD = 2585.346$) was significantly greater than the dwell time for COO information ($(M = 315.424)$ milliseconds, $SD = 323.811$). This difference yielded a z-value of (-2.401) and a p-value of (0.016), confirming that participants allocated more attention to product details compared to COO information when product details were made salient.

Based on these findings, hypothesis 9b is supported. The results demonstrate that saliently cued product details lead to increased dwell time on product details for foreign products attention compared to COO information.

Summary of Hypothesis 9

Comparing the two hypotheses, foreign products received a higher mean dwell time on product details when saliently cued compared to local products. Thus, it can be concluded that foreign products garnered greater attention when product details were saliently cued, reflecting a stronger engagement compared to local products.

Also, based on the data, foreign products received a higher mean dwell time on COO information compared to local products. This indicates that participants allocated more VA to COO information for foreign products, albeit both products did not achieve statistically significant differences in attention when compared to cued product details.

The findings from hypotheses 9a and 9b provide substantial support for the proposed effects of saliently cued product details on dwell time for both local and foreign products. For local products, the analysis revealed a significant increase in dwell time on product when saliently cued, surpassing the dwell time allocated to Country-of-Origin (COO) information, with a significant p-value of 0.021. Similarly, for foreign products, the dwell time also significantly increased with salient cueing compared and exceeded the dwell time on COO information with a p-value of 0.016. These results underscore the influence of salient cues in directing consumer attention towards product details over COO information, thereby affirming both hypotheses



Figure 67 Heatmap showing dwell time between COO Information and price when product detail is Cued for the foreign whiskey/gin. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

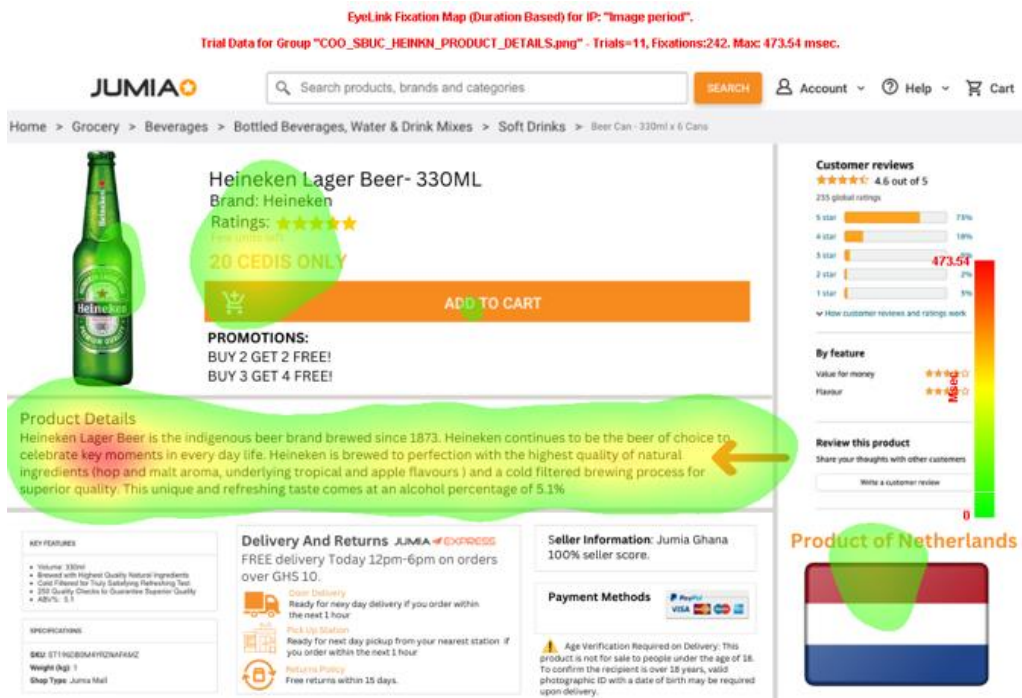


Figure 68 Heatmap showing dwell time between COO Information and price when product detail is Cued for the foreign beer. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.



Figure 69 Heatmap showing dwell time between COO Information and price when product detail is Cued for the foreign wine. The heat maps is colour graded from green to red. The greener the heat, the less the dwell time.

Table 33 Summary of Hypotheses

Hypothesis	Relationship	Result
H1a	COO → Attention (Local)	Not significant
H1b	COO → Attention (Foreign)	significant
H2a	Product Image → Attention (Local)	supported
H2b	Product Image → Attention (Foreign)	supported
H3a	Price → Attention (Local)	supported
H3b	Price → Attention (Foreign)	supported
H4a	Ratings → Attention (Local)	Not significant
H4b	Ratings → Attention (Foreign)	Not significant
H5a	Product details → Attention (Local)	supported
H5b	Product details → Attention (Foreign)	supported
H6a	Image Salience × COO (Local)	supported
H6b	Image Salience × COO (Foreign)	supported
H7a	Rating Salience × COO (Local)	Not supported
H7b	Rating Salience × COO (Foreign)	Not supported
H8a	Price Salience × COO (Local)	Not supported
H8b	Price Salience × COO (Foreign)	Partial support
H9a	Description Salience × COO (Local)	supported
H9b	Description Salience × COO (Foreign)	supported

Chapter 6 Discussion

6.1 Introduction

At the core of consumer buying decision research, lies the interaction between salient stimuli present in digital buying environments like ecommerce and how these stimuli impact buying decision-making. Particularly in e-commerce, the interplay of country-of-origin (COO) information and other visual key stimuli that guide consumer attention has become increasingly crucial. The present study unfolds in a contemporary market landscape, characterized by the globalization of e-commerce and the nuanced perceptions held by consumers regarding local and foreign products. Established literature identifies COO information as a salient factor in consumer decision-making, especially in developing economies where foreign products are often preferred due to perceived quality advantages. However, the contribution of the present research emphasizes not just the isolated effects of COO information or other visual cues, but the complex interactions between these variables that ultimately shape VA in an e-commerce context. Specifically, the present study questioned:

- To what extent does COO information influence VA for competing (local vs. foreign) products in e-commerce?
- To what extent do salient bottom-up cues on other information types (e.g., product image, price) affect VA given to competing local and foreign products in e-commerce?
- Between country-of-origin information and other information types with salient bottom-up cues, what has the highest significance of VA in e-commerce for competing local and foreign products?

This chapter discusses the findings from the eye-tracking experiment, which investigated the impact of country-of-origin (COO) information and other product information, namely, product image, ratings, price, and product details, on VA in e-commerce which were saliently cued. It specifically focused on local and foreign products. The results of the study showed that some salient cues played a significant role on VA (dwell time) between the local and foreign products. Additionally, the results demonstrated that salient cues had the ability to overcome the visual bias (superiority effect) of the country-of-origin information. This phenomenon aligns with the broader

understanding of attention allocation in decision-making, as highlighted in existing cognitive behavioural studies which posit that salient, attention-grabbing cues can dictate consumer focus more than cognitive factors like COO labels. Furthermore, it calls attention to the increasing complexity of consumer behavior in digital environments, where visual stimuli can lead to an unexpected re-evaluation of preferences that may not typically align with traditional COO biases. Findings of this study emphasize the necessity for marketers to design platforms that not only provide clear COO information but also optimize visual elements that capture and hold consumer VA. By considering the interplay of these factors, e-commerce marketers can create more engaging shopping experiences that resonate with consumers, particularly in markets where cognitive biases towards country of brand origin significantly influence purchasing behavior. These results also suggest an essential pathway for future inquiry, where further explorations into the dynamics of visual stimulus processing and its impacts on consumer decision-making can yield foundational insights critical for the evolving landscape of e-commerce.

Structure of Chapter

In this chapter, the influence of COO information is first discussed. This is followed by the influence of other information cues and then lastly the interplay of COO information (top-down cues) and salient stimulus driven cues on product image, price, ratings and product details are discussed.

6.2 The Influence of Country-of-Origin Information on Visual Attention

The hypothesis under consideration was developed based on the literature indicating that in e-commerce, country-of-origin (COO) labels, particularly "Made in" labels, serve as powerful information cues that influence consumer perceptions and buying behavior (Nijssen and Douglas, 2011). Evidence suggests that the effect of the "Made in" label, whether emphasized or not, influences consumer behavior in e-commerce in VA studies (Zhang et al., 2021; Liu et al., 2022). This effect has further been proven to lead to bias in visual preference between local and foreign products. Thus, on e-commerce sites, consumers tend to rely on the "Made in" label as a top-down voluntary and involuntary guide that captures attention and shapes their visual navigation on the site (Zhang et al., 2021; Liu et al., 2022). This study took it a step further that this effect would also reflect in competing local and foreign products considered for the current study.

6.2.1 Foreign Products

The findings from this study unequivocally indicate that when it comes to foreign products, country of origin (COO) information plays a critical role in enhancing VA, particularly when presented in isolation (devoid of competing salient cues on elements like price, promotions or extensive customer reviews). Participants consistently exhibited longer dwell times on the "Made in" label, demonstrating that COO information serves as a dominant focal point in their evaluation process. Thus, it is evident that consumers employ COO labels as a powerful heuristic to assess product quality in the face of uncertainty. In the e-commerce arena, where tactile assessment and direct product experiences are absent, COO information acts as an essential proxy for otherwise hidden attributes such as durability, reliability, and craftsmanship. This behavior aligns with the principles of signaling theory (Kirmani & Rao, 2000), which asserts that consumers rely on observable external markers to draw informed conclusions about the quality of products.

Furthermore, the reliance on COO labels is undoubtedly amplified for foreign products, given the significant information asymmetry which may be associated with unfamiliar brands. In situations where consumers possess limited knowledge or experience with a product, extrinsic cues such as COO information gain crucial diagnostic power, guiding VA and shaping evaluations (Magnusson et al., 2014). COO labels not only capture attention but also serve a vital risk-reduction function, empowering consumers to mitigate perceived risks linked to purchasing unfamiliar or foreign goods. Importantly, the influence of COO is contingent on the informational density of the product display. In environments with less competing cues, COO information emerges as the primary anchor for consumer judgment. This is consistent with cue-utilization theory, which clearly states that consumers will rely more heavily on available extrinsic cues when intrinsic attributes, such as direct product experience, are lacking or insufficient.

In summary, the increased VA directed toward COO labels for foreign products signifies a strategic allocation of cognitive resources and reflects adaptive consumer behavior aimed at optimizing decision-making processes in uncertain and potentially high-risk shopping environments.

6.2.2 Local Products

Unlike the significant impact observed for foreign products with competitive offerings, country of origin (COO) information did not exert a meaningful influence on VA for local products. While participants occasionally glanced at COO labels, heatmap and dwell time analyses clearly showed that these cues did not capture or hold attention effectively. This reinforces the notion that consumer familiarity (which was the case as participants self-reported familiarity with the local products) with local products significantly reduces the relevance of COO information during visual searches and evaluations. When consumers have established knowledge and positive associations with a brand or product category in the past, they could confidently rely less on external indicators like COO labels (Liu et al., 2022; Schlegel & Keim, 2021). Instead, their evaluations are predominantly shaped by intrinsic attributes such as product design, performance features, and brand reputation.

This behavioural pattern aligns seamlessly with the research by Balabanis and Diamantopoulos (2008), which demonstrates that familiarity strongly moderates the significance of extrinsic cues in consumer evaluations. Essentially, the more familiar consumers are with a product, the less they feel the need to seek out or process COO information during their purchasing decisions.

Moreover, in situations where other cues such as price, customer ratings, and detailed product details are present, attention becomes a scarce cognitive resource. In these information-rich environments, consumers engage in strategic visual searches (Pieters & Warlop, 1999), decisively prioritizing the cues they deem most relevant to their purchasing objectives. Given the comparatively low perceived attention of COO information for competitive local products, as well as the element of familiarity, it is entirely expected that dwell times on COO labels were notably minimal.

These results further validate visual attention theory, which asserts that goal-relevant stimuli are prioritized over secondary cues. For local products, the familiarity consumers possess diminishes the perceived necessity to verify the product's origin, leading to a deliberate deprioritization of COO labels in the visual search process. This behavior underscores the dominant role of consumer familiarity in influencing attentional dynamics and shaping decision-making processes in the e-commerce.

6.2.3 Summary

The findings highlight the context-dependent nature of country-of-origin (COO) information in shaping VA within e-commerce environments. While COO information significantly attracted attention for foreign products, their influence was notably weaker for local products despite the competitive offerings. With product familiarity reported by the participants as a factor in product evaluation, this suggests that the effectiveness of COO information was strongly moderated by consumer familiarity and perceived product risk.

For foreign products, the COO label functioned as a salient heuristic, guiding attention and supporting quality assessments in situations characterized by uncertainty and limited prior knowledge. In contrast, for local products, consumers relied less on COO information due to their existing familiarity with the products. As a result, VA was directed toward other information types which were perceived as more diagnostically relevant during the decision-making process.

These findings reinforce established theories in consumer behaviour, including cue-utilization theory and signaling theory, which suggest that consumers rely more heavily on extrinsic cues when intrinsic product knowledge is limited. In the context of developing markets such as Ghana, where foreign goods are often associated with higher status or superior quality, COO information may therefore play a particularly important role when consumers evaluate unfamiliar products.

Overall, the results demonstrate that COO information do not exert a uniform influence on consumer VA between competitive local and foreign brands. Instead, their impact depends on product familiarity, perceived risk, and the presence of other informational cues within ecommerce product pages. These insights contribute to a deeper understanding of how COO information operates within visually complex e-commerce interfaces and highlight the importance of strategically deploying origin cues in online retail settings.

Having established the context-dependent role of COO information in guiding VA, the next section examines how other information types such as product images, price, customer ratings, and product detail information shape consumer attention patterns within e-commerce environments.

6.3 The Effect of Other Cues (Product Image, Price, Ratings, Product Details)

The present study also investigated how other product information affect dwell time when viewing online products. The findings of this study showed that product images are the single most powerful driver of VA in the Ghanaian e-commerce context. Across both competitive local and foreign product categories, product images consistently attracted the highest dwell times compared to the other information types namely, price, ratings, product details. However, a critical distinction emerged: foreign products received significantly more dwell time on their product images than local products.

6.3.1 The Prominence of Product Image

The significance of product images in e-commerce is well documented in the literature. Product images are often the first and most fixated-upon elements in online shopping environments, where visual presentation substitutes for the physical interaction that consumers experience in traditional retail settings. The visual richness of product imagery increases consumer involvement and positively influences both product evaluation and purchase intention. Consequently, visual presentation particularly compelling product imagery plays a central role in shaping consumer choice in e-commerce environments, where images become the primary means through which consumers assess and compare products. This emphasis on visual cues aligns with research by Sears et al. (2019) whose study highlighted the strong influence of images on VA and their connection to emotional responses during online product evaluation

Consistent with these finding, the results of the current study indicate that the disparity of product image is not simply a function of consumer bias but is deeply rooted in the perceived and actual differences in visual presentation between local and foreign goods. Foreign products in Ghana are widely regarded as having superior packaging and more professional, attractive imagery. This perception is reinforced by empirical evidence where studies of Ghanaian shopkeepers and consumers consistently highlight that foreign products' packaging and visual appeal act as a "silent salesman," drawing attention and building trust even before any textual information is considered (Odonkor, 2020; Dogbe et al., 2019; Anning, 2019; Ocran et al., 2019).The higher dwell time observed on foreign product images in this study is therefore a direct reflection of the aspirational and trustworthy signals these visuals convey to Ghanaian consumers.

In contrast, local products, while still benefiting from the attention-grabbing power of product images, lagged behind their foreign counterparts. The study's eye-tracking data revealed that local product images, though the most viewed element among available options, attracted less sustained VA. This finding aligns with broader market insights which posit that local packaging is often described as "shabby," lacking in vital information, and visually unappealing (Decardi-Nelson, 2012). Such shortcomings not only diminish the perceived value of local products but also fail to instil the same level of consumer confidence or excitement as foreign goods. As a result, even when local products are displayed with competitively good images, the quality and professionalism of those visuals are often perceived insufficient to compete for consumer attention.

These findings also highlight the conditional nature of visual dominance to product image in e-commerce. While product images are unrivalled in capturing initial attention, their effectiveness is contingent on execution - especially on relevance matter greatly. For local brands, this presents both a challenge and an opportunity. By investing in professional, high-resolution photography and more appealing packaging, they can begin to close the attention gap with foreign competitors (M. Kim & Lennon, 2008). This pattern underscores the imperative that visual stimuli are paramount in shaping the e-commerce shopping.

6.3.2 The Limited Impact of Ratings, Price, and Product Details

Although product images stood out as the primary driver of VA among Ghanaian online shoppers, this study found that other typical informational elements such as ratings, price, and detailed product details in ecommerce had only a marginal effect on consumer VA. This trend was observed for both local and foreign products and can largely be explained by the distinctive contextual and perceptual realities within developing-country e-commerce environments.

A key reason for the limited influence of ratings and reviews in Ghana's online retail sector can be attributed the widespread scepticism and lack of trust among consumers. Numerous studies and industry insights suggest that similar to shoppers in many emerging markets, Ghanaian consumers often question the authenticity of online reviews, suspecting that they may be manipulated or fabricated by sellers (Danquah & Dong, 2018; Quintus et al., 2024; Tran et al., 2022). Unlike in more established e-commerce markets, where verified reviews significantly impact purchasing

behavior, consumers in Ghana often view ratings with suspicion, treating them as unreliable indicators of product quality.

These findings challenge the commonly held belief that ratings and reviews universally drive online purchasing decisions. Research increasingly shows that the effectiveness of online reviews largely depends on consumers' perceptions of their trustworthiness (Pfeuffer & Phua, 2022). Consumers are much more likely to be influenced by reviews they perceive as credible. Supporting this, Rosania & Wilujeng (2023) emphasize the need for strategies such as authenticating reviews, encouraging genuine feedback, and fostering brand transparency to overcome trust barriers and enhance the impact of reviews on purchasing decisions.

While price remains an important factor in consumer decision-making, the current study revealed that it does not initially draw VA among online shoppers in Ghana. Although earlier research highlights the strong price sensitivity driven by economic conditions, eye-tracking data in this study clearly shows that price becomes relevant only after a product passes an initial "attractiveness filter" (Menon et al., 2016). Visual appeal and emotional resonance primarily drive this filter. Price information typically enters consideration only after a product's image captures consumer interest, positioning price as a secondary, rational factor rather than a primary attention-grabber. Furthermore, given the common acceptance of higher prices for foreign goods based on perceived quality differences, consumers are generally less deterred by price in the early stages of browsing.

Furthermore, engagement with detailed product information was also minimal. Although online platforms provide extensive product specifications and descriptions, the study found that consumers often skim this content during browsing sessions. Prior research suggests that the cognitive effort required to process detailed information acts as a deterrent, especially when easier-to-digest alternatives like compelling visuals or trusted word-of-mouth recommendations are available (Pieters and Wedel, 2007). Additionally, the predominance of mobile browsing among consumers in Ghana exacerbates this trend, with users favouring the immediacy and simplicity offered by images.

In summary, the limited impact of ratings, price, and product information in capturing consumer VA in e-commerce is the result of a complex interplay between trust issues, cognitive preferences,

digital literacy, and cultural buying habits. This study clearly demonstrates that in Ghana's e-commerce landscape, product images dominate consumer attention, while ratings, price, and detailed descriptions have minimal influence. Consequently, e-commerce platforms and retailers operating in developing markets may benefit from prioritising strong visual presentation while simultaneously implementing strategies aimed at strengthening trust and credibility within online review systems.

6.3.3 Summary

This results of the current study makes an important methodological and empirical contribution to the understanding of VA in e-commerce by systematically isolating the effects of product image, price, ratings, and product information across competitive local and foreign products. By ensuring that all products whether local or foreign were presented with equal visual and informational prominence, the research eliminated confounding factors related to presentation quality. This approach allowed for a clearer assessment of how consumers in developing markets such as Ghana allocate VA within a controlled online shopping environment. The findings consistently demonstrate that product images dominate VA, even when competing informational cues are equally visible and standardized. This suggests that the primacy of visual stimuli in online shopping is not solely a function of superior image quality or packaging design but reflects the inherent cognitive efficiency and emotional immediacy of visual information compared to textual or numerical cues.

At the same time, ratings, price, and detailed product information exert comparatively limited influence on initial VA. Rather than acting as primary attention drivers, these cues appear to function as secondary evaluative tools that consumers may consider only after a product has attracted initial interest through its visual presentation. This pattern highlights the important distinction between VA capture and decision evaluation in the online shopping process.

Overall, the findings indicate that for competitive products, the dominance of product images in e-commerce reflects fundamental characteristics of consumer attention and information processing. For local products operating on e-commerce in developing markets, this underscores the importance of prioritising strong visual presentation while simultaneously addressing trust-

related barriers that may limit the effectiveness of other informational cues such as ratings and reviews compared to foreign offers.

6.4 The Interaction Between COO Information and Salient Stimulus-Driven Cues

The third research question set out to rigorously test whether intentionally making certain product cues—namely product image, ratings, price, and product details—more visually salient would increase consumer attention (measured as dwell time) to those information elements, and whether this would in turn reduce attention to COO information. This was examined in a context where local and foreign products were matched for competitiveness (equal price, ratings, image quality, and description detail), isolating the effect of cue salience and COO. The rationale for this approach draws from both the established power of visual salience in capturing attention (as supported by stimulus-driven attention theories) and the robust literature on COO as a natural, often default, heuristic in consumer decision-making.

6.4.1 Saliently Cued Product Image and COO information

The findings for Hypotheses 6-9 revealed a detailed perspective. When product images were saliently cued, there was a notable and statistically significant increase in the amount of time spent on those images for both local and foreign products. For local products, the average dwell time on the cued image increased from around 225 ms to more than 1,200 ms; for foreign products it increased from roughly 273 ms to over 1,700 ms. These increases were not only statistically significant but also considerable in scale, demonstrating that saliently cued product image on VA is exceptionally effective at attracting and maintaining consumer focus, irrespective of the product's origin. Significantly, this heightened attention to the product image coincided with a relative decline in focus on COO information. While the dwell times for COO remained within the anticipated range, they were noticeably lower than those for the saliently cued images, particularly for foreign products.

These findings strongly support the view that visual stimulus driven salience, when applied to images, can override the natural visual bias of COO information. This is consistent with bottom-up models of attention, which posit that the most visually prominent stimulus in a display will tend to attract dwell time, often irrespective of its semantic relevance. Product images are inherently

rich, concrete, and emotionally engaging, which likely explains their dominance in the competition for attention. This effect was even more pronounced for foreign products, suggesting that when consumers are faced with unfamiliar or potentially ambiguous product offerings, they rely even more heavily on visual information to form judgments or reduce uncertainty.

6.4.2 Saliently Cued Ratings, Price, Product Details and COO Information

Although saliently cued images increase VA, the pattern shifts when salience is applied to other cues-ratings, price, and product details. For these attributes, making them visually salient did not result in statistically significant or meaningful increases in dwell time. For example, for ratings, the increase in dwell time for local products was from about 144 ms to 451 ms, but this was not statistically significant at the conventional threshold, and the same pattern held for foreign products. The same was true for price and product details: despite being made more visually prominent, these cues did not command significantly more attention, nor did they meaningfully reduce attention to COO information.

While these results do not provide statistical support for the hypotheses regarding ratings, price, and product details, it is important to recognize that the descriptive data indicate a trend: saliently cued ratings, price, and product details did attract more attention than their when they were uncued. Although the increases in dwell time were not statistically significant, they were directionally consistent and suggest that salience manipulations can nudge consumer VA in meaningful ways, even if the effects are modest. This lack of significance may be attributed to several factors, individual variability in attention allocation, or the inherently lower visual prominence and cognitive accessibility of these cues compared to product images. Thus, while the statistical evidence is not robust, the observed trends warrant consideration and suggest that making these cues salient can still have practical value for marketers and e-commerce designers.

Importantly, even when these cues attracted more attention compared to their uncued versions, they did not surpass the dwell time allocated to COO information in a statistically significant way. COO information retained a relatively stable share of consumer VA, functioning as a persistent heuristic or reference point in the evaluation process. This finding is consistent with the literature by Liu et al. (2022) and Andéhn et al. (2016), which highlights the enduring power of COO as a shortcut for assessing quality, trustworthiness, or fit with personal values, particularly in contexts

where ethnocentrism or national pride is high, or where consumers have had negative experiences with foreign or local products in the past.

6.4.3 Salience of Product Information and COO Across Local and Foreign Products

The results also reveal interesting differences in how local and foreign products are processed. When images are made salient, foreign products receive even more attention than local ones, suggesting that consumers may scrutinize unfamiliar products more closely when given the opportunity. Yet, COO information for foreign products still attracts some residual attention, possibly reflecting a need for reassurance or confirmation of product origin—a finding that aligns with the literature on consumer ethnocentrism and risk reduction (Ortega-Egea & García-de-Frutos, 2021). Such heightened scrutiny of foreign products suggests that consumers may engage in a more deliberate evaluation process when faced with items that are not part of their local environment.

Furthermore, the results also suggest that the role of COO information is shifting but not disappearing. While its influence on overt attention can be diminished by strong visual cues, it remains an important part of the consumer's evaluative process. For local products the need to emphasize COO is heavily reduced if the product's local origin is already assumed or if the image conveys sufficient information. For foreign products, however, COO information presented transparently and positively, in combination with other trust signals such as salient reviews controls VA and potential bias.

6.4.4 Summary

These findings refine the understanding of cue utilization in consumer decision-making. They suggest that while salience can be a powerful tool for guiding attention, its effects are not uniform across all types of information. Visual cues like product images are uniquely positioned to benefit from salience manipulations, while more abstract or cognitive cues are less susceptible. This highlights the importance of considering both the nature of the cue and the context of the decision when designing interventions to influence consumer attention and purchase behavior. Additionally, the observed trends warrant consideration to suggest that salience manipulations can

nudge consumer attention in meaningful ways, even if the effects are modest and do not eclipse the enduring impact of COO information.

Finally, from a theoretical standpoint, this suggests a hierarchy of cue effectiveness when COO information is present: product images are highly salient and capable of strongly capturing attention, while ratings, price, and product details are more subtle cues that require more deliberate processing and are less likely to dominate attention even when visually emphasized. COO information appears to occupy a consistent middle ground, neither dominating nor being easily overshadowed by other salient cues perceived by a consumer despite physical property of these cues.

Chapter 7 Theoretical and Practical Contribution, Limitations and Further Research

7.1 Introduction

The chapter presents the contributions of the current research, addressing practical implications, study limitations, and recommendations for future research. A general conclusion of the entire research is also provided.

7.2 Originality and Theoretical Contribution

Introduction

Originality is a fundamental criterion for evaluating the quality of PhD research. Clarke and Lunt (2014) observe that while there is a broad consensus among academics that originality refers to a contribution to knowledge, its interpretation varies across disciplines. In the social sciences, originality can be demonstrated using new approaches, theories, methods, or data; the exploration of new topics; the investigation of understudied areas; or the production of novel findings (Guetzkow et al., 2004). Additionally, social scientists often associate originality with methodological innovation and researcher attributes such as integrity and authenticity (Clarke & Lunt, 2014). Originality may also reflect novel approaches involving posing new questions, adopting fresh perspectives, or establishing innovative connections between existing ideas (Johnston, 1997). A crucial dimension of originality within this research is its focus on understudied areas, particularly those concerning non-western regions (developing countries).

The originality of the current study is found in its take on an understudied population, innovative connections between existing concepts (COO and VA and Neuromarketing), providing a new perspective by considering competing local and foreign products, and contributing to theory. These are elaborated on in more detail below.

First, the present study contributes to the consumer decision making literature. Consumers tend to adopt different search strategies on their path to purchasing products (Y. Zhu & Dukes, 2017), thus affecting their VA in e-commerce. E-commerce shoppers typically first search for products to generate a consideration set, and then deliberately evaluate each product before making a final

choice (Noone & Robson, 2016). Then, consumers pay more attention to ads when they proceed to the deliberation process of decision making. Analogous to this process from consumer searches to decision making on purchases, this study specifically revealed a further understanding of VA to country-of-origin and bottom-up salient stimulus-driven cues on other information types in e-commerce. It demonstrates the dynamic visual relationship between country-of-origin information via the "made in" labels and other cued elements through the lens of neuromarketing technique - eye tracking.

Notably, to the current researcher's knowledge, this study is the first to reveal that among consumers in developing countries such as Ghana, country of origin information does not consistently constitute the primary visual focus in e-commerce contexts, as the presence of competing cues can divert attention. The findings indicate that VA can be incrementally shifted away from country-of-origin details for both competitive local and foreign products due to the salience of other visual cues in e-commerce environments, particularly on product pages. This finding provides an important theoretical insight by demonstrating that visual salience can override traditional country-of-origin heuristics, suggesting that the influence of COO information is contingent upon the broader visual environment in which consumers encounter product information rather than operating as a universally dominant cue.

Furthermore, the consumer information search relationship is moderated by extraneous factors, such as product familiarity, consumption frequency, and the relevance for specific information. This contribution is crucial as it posits that country-of-origin information should not be viewed as the sole determinant in e-commerce consumer decision making but rather as a flexible cognitive element that interacts with various factors based on situational contexts and immediate aspirations.

A second key contribution of this study lies in uncovering the intricate relationship between country-of-origin (COO) information and bottom-up salient stimulus-driven cues within the e-commerce context. This relationship is particularly significant as it addresses a gap in the existing literature, where these elements have predominantly been studied in isolation rather than in conjunction. Prior research has frequently treated COO information and bottom-up cues as separate influences on VA, often suggesting that each independently dominates consumer focus in e-commerce settings. However, this study challenges the prevailing perspective by empirically demonstrating that COO information and bottom-up cued information can, in fact, be analyzed

concurrently. This integrative approach advances the theoretical understanding of VA in digital commerce, highlighting that rather than functioning in isolation, these elements may jointly shape consumer attention patterns. The findings reveal that while COO information serves as a predictor of how consumers direct their attention towards other product-related cues, bottom-up stimulus-driven cues also play a substantial role when presented alongside COO information. This dual influence underscores the complexity of consumer VA mechanisms, suggesting that visual focus is not solely guided by one type of cue but is the result of an interplay between multiple stimulus factors.

Moreover, the statistical analyses conducted within the study provide robust evidence of significant differences between these elements, indicating that neither COO nor bottom-up cues universally outweigh the other in capturing attention. Interestingly, despite the observed differences, several findings point to close correlations between these elements, thereby illustrating that their interaction is more nuanced than previously assumed. For instance, on product pages that showcase both local and foreign items, the coexistence of COO information with visually salient cued information types does not always result in the absolute dominance of either. Instead, there is an interdependent relationship, where the presence of both types of cues can enhance the overall visual engagement of the consumer. This nuanced understanding marks a significant advancement in the study of VA within e-commerce, emphasizing that the dynamic interaction between contextual (COO) and bottom-up cues should be a focal point in future research.

Third, this study also makes a significant contribution to the field of consumer decision-making research by examining how VA manifests when consumers are presented with competing local and foreign products in e-commerce settings. While previous studies have often explored consumer decision-making in the context of single-product evaluations or between distinctly different offerings, this research uniquely addresses scenarios where competing products present equal attributes such as comparable product images, prices, ratings, and detailed product details. Focusing on parity between product attributes allows for a clearer understanding of which elements truly capture consumer attention when traditional differentiators are minimized.

The study reveals that when local and foreign products are matched in terms of quality indicators (image quality, pricing, ratings, and product details), pictorial elements (product image) consistently receive greater VA, particularly when presented with salient cues. This finding

challenges the often-presumed dominance of textual cues (like price and product details) and highlights the power of visual salience in guiding consumer focus.

Importantly, the study found that this effect was more pronounced for foreign products when accompanied by country-of-origin (COO) information, suggesting that the visual appeal of foreign goods can be significantly heightened when COO cues are strategically integrated.

This finding is especially notable because it counters the traditional emphasis on textual data for 'better' information as primary decision-making drivers, suggesting that in visually driven digital platforms like e-commerce, the form and presentation of visual cues are often more influential than purely informational text. This finding challenges the often-presumed dominance of textual cues and highlights the power of visual salience in guiding consumer focus. Importantly, the findings demonstrate that VA functions as an intermediary mechanism linking stimuli to evaluative engagement, thereby empirically supporting the role of attention within stimulus–organism–response frameworks.

Fourth, a key theoretical contribution of the current study lies in its challenge to the linearity traditionally posited by the Cue Utilization Theory, Bottom Up Visual Attention Theory and SOR models. These theoretical frameworks often assume a predictable, direct relationship between the presence of a stimulus and the resultant consumer response, implying that increasing cue salience linearly enhances attention. However, the study's findings reveal a more complex interplay, wherein external and contextual variables can modulate or even attenuate the anticipated effects of salient cues. Specifically, the study identifies instances where expected cue dominance (e.g., the presumed superiority of salient price cues over country-of-origin information) is disrupted by contextual moderators such as product familiarity. This suggests that the theoretical premise of direct, unmediated cue-response pathways (stimulus-response structure) may be overly simplistic, failing to account for consumer-specific variables that condition attentional outcomes.

Fifth, this study thoroughly supports the theoretical claims, Cue Utilization Theory (CUT), and Stimulus Organism Response Theory (SOR), that visual cues have a significant influence on consumer VA in e-commerce. In accordance with the CUT which posits that consumers utilize readily available informational cues to infer product attributes or quality, the present study empirically demonstrates that visual cues especially with salient properties, such as country of

origin information (made in label), product image, price, product details and ratings are pivotal in attracting consumer attention. At the same time, this study also extends the SOR theory by empirically demonstrating that VA (measured through dwell time) can be interpreted as the organismic mechanism linking stimuli to evaluative engagement, thereby providing measurable evidence of the internal processing stage proposed within the SOR framework.

Sixth, this study provides a nuanced understanding of the stimulus driven cue paradigm (SDCP) with regards to how enhanced cue presentation amplifies consumer responses. Unlike theoretical models that assume a uniform stimulus response, the SDCP postulates that the salience of cues fundamentally dictates the intensity of the subsequent response. This theoretical position is supported by the study's findings, which demonstrate that cues presented with heightened salience (such as bold and dynamic visual elements) elicit significantly stronger attentional responses compared to less prominent stimuli. This insight advances the traditional understanding that cues inherently possess fixed effectiveness by suggesting that strategic visual enhancement is essential for maximizing the impact of information cues.

Lastly, the study highlights the influence of neuromarketing on the topics of Country of origin and VA. Neuromarketing provides deeper insights into consumer behavior beyond self-reported data, helps create more emotionally compelling and persuasive marketing strategies, and reduces marketing inefficiencies by identifying what truly captures attention and drives decision-making (Sagar et al., 2018). By employing eye tracking methodology, this study introduces a novel perspective within consumer buying decision literature, particularly by providing neuroscientific insights into how Ghanaian consumers engage with pertinent information (such as country of origin and various cues) in e-commerce settings. This offers a significant departure from self-reported studies and reinforces the validity of using neuroscientific approaches in marketing research.

7.4 Practical implications of the study

The findings of this research indicate that marketers must adopt a multifaceted approach to consumer behavior, particularly in emerging markets such as Ghana. While country-of-origin (COO) cues can significantly influence consumer decisions, they do not always dominate

consumer attention. Research by Behl et al. Behl et al. (2023) emphasizes the need for marketers to implement diverse visual cues such as engaging product images and compelling narratives alongside COO information to effectively capture consumer interest. This aligns with the work of Liu et al. (Liu et al., 2017), which highlights how product design and visual complexity can dramatically influence consumer responses.

The results also highlight the critical importance of high-quality product imagery in digital retail environments. Product images consistently attracted the highest levels of VA, suggesting that retailers should prioritise visually appealing product presentation. High-resolution images, aesthetically appealing packaging, and visually engaging product displays can significantly increase consumer engagement and improve evaluation outcomes. Additionally, e-commerce platforms may strategically utilise visual salience techniques to guide consumer attention toward important product information. This would especially be for local product for an increased chance of competitive advantage. High-quality, attention-grabbing images can not only increase engagement but also mitigate potential skepticism associated with offerings. However, efforts to boost attention to ratings, price, or product details through visual salience alone are unlikely to be effective. Instead, these cues may require different strategies, such as integrating them into the image itself, using interactive elements (e.g., hover-over pop-ups), or leveraging social proof and contextual relevance.

The findings of this study also extend considerable implications for product advertising design for Ghanaian local products and the affordances provided by bottom-up visual cues in developing markets. The relatively lower VA directed toward local products suggests that improving product presentation, branding, and packaging design may significantly enhance the competitiveness of local goods in digital marketplaces. By investing in stronger visual branding strategies, local manufacturers may narrow the attention gap between domestic and foreign product

Finally, the research highlights the potential value of neuromarketing techniques for marketing strategy development. Eye-tracking insights allow marketers to understand how consumers allocate VA in real time, enabling the optimisation of product page design and marketing

communication strategies (Behl et al., 2023). This alignment is essential for creating impactful brand experiences, leading to stronger consumer-brand relationships and enhanced loyalty.

7.5 Limitations

The present research, while providing valuable insights, encountered several significant limitations that warrant careful consideration. By highlighting these limitations, this discussion aims to foster an understanding of the methodological challenges inherent in the current study and their implications for research interpretation.

1. One of the primary limitations addressed in the study was the neuromarketing techniques, expertise and resources needed to conduct this study. As noted by Kansra et al. (Kansra et al., 2022), conducting neuromarketing experiments requires significant investment in technology, training, and time, which may limit the feasibility of such studies for many researchers. This constraint required more time and allowed only limited aspect of neuromarketing to be considered. For example, in addition to eye tracking, galvanic skin responses could have served as an additional measure for the current research.
2. Logistical and practical challenges were prominent in the longitudinal study. The extended duration of data collection demanded significant financial and human resources, straining the budget of the study. Additionally, access to participants was difficult, necessitating interventions such as regular reminders, visit to numerous Ghanaian communities or incentives, which could inadvertently influence participant responses and compromise the study's integrity. Ethical considerations in this study were significant.
3. In addition to the typical challenges of conducting a scientific study and the technical issues related to the study design, the researcher also encountered further difficulties in having access to an eye tracking laboratory within a commutable location for participants. The lab used for the study had very limited accessibility times as such the researcher had to book as many participants as possible and simplify the data collection process as much as possible to ensure time allocated was used efficiently.
4. The research was undertaken in the UK. The study considered Ghanaians are the sample. Ideally, collecting data in Ghana would have provide a more direct result even though

researcher only recruited participants who had not been in the UK for more than 6 months to control for a drastic change in consumer behaviour.

5. A further limitation of this study easy access to the participants. The Ghanaian community in Norwich is not a very big one as such it posed a challenge to easily have access to many more participants. Even though the threshold for the sample size for neuromarketing study was met, a larger sample would be provided more data, allowed for quicker statistical methods to be applied rather than non-parametric statistical analyses.
6. The products used in the current study included brand names which may have led to some brand bias. The current researcher controlled for this by using competing brands for both local and foreign products. Future research could consider omitting brand names leaving the focus of the study on the actual products and their offerings.
7. The study's context-products with equal offers and competitive features-may not reflect all real-world scenarios, where products often differ on multiple dimensions. The experimental nature of the task, with forced exposure to specific cues, may also differ from natural browsing behavior, where consumers have more control over what they attend to and for how long. Additionally, dwell time, while a useful proxy for attention, does not capture the full complexity of cognitive engagement or decision-making processes.

7.6 Future Research

Some suggestions for future research can be made from the results of this investigation:

1. This research is based on Ghanaian consumers in the UK. The output of this research is therefore based on Ghanaian consumers residing in the UK. If future research is conducted in other countries, it should look for different approaches when researching because every country has a different demographic, culture, and social background. The findings of this study may not be generalisable to other countries where e-commerce shopping behaviours may differ.
2. This research is based on Ghanaian consumer online buying local and foreign drink products online. Future studies can choose different product categories such as clothing or electronics. Additionally future studies could consider these categories between local SMEs and foreign SMEs, and local SMEs vs foreign large organisations.

3. This research solely considered VA. Future research could complement eye-tracking data with measures of recall, choice, and satisfaction to paint a more complete picture.
4. The current research considered e-commerce website product pages on a desktop. Consumers shop across various digital devices and as such, future research can explore the current study on other digital platforms.
5. Future research should include comparative studies. Direct comparison Ghanaian consumers and consumers in other emerging economies. This will show existing differences and provide perspective both within one's domestic market as well as between markets.
6. Further research could also explore the interaction between salience and individual differences. For example, are some consumers more susceptible to visual salience than others? Do cultural factors, shopping expertise, or personality traits moderate the effectiveness of salience manipulations? Understanding these nuances would help tailor interventions to specific segments and contexts.
7. Finally, another avenue for future research is to investigate the long-term effects of repeated exposure to salient cues. Does the impact of salience wear off over time as consumers become habituated, or does it persist? How does the interplay between salience and COO evolve as consumers gain more experience with foreign products or as market norms shift?

7.7 Conclusion

The present study examined the influence of country-of-origin (COO) information and bottom-up salient stimulus-driven cues on VA in e-commerce environments. Specifically, the research explored, among local and foreign products, which cues COO information and other informational cues such as saliently treated product images, price, product details, payment methods, and ratings received the highest dwell times during online product evaluation. The study was designed on the premise that within e-commerce contexts, COO information is typically presented as a standardized and widely recognised product identifier and therefore may naturally attract VA (Liefeld et al., 2004; Liu et al., 2022; Usunier, 2011; Zhang et al., 2021). However, although the impact of COO on consumer preferences has been extensively documented, other informational cues such as product images, price, ratings, and product details are also widely recognised as

influential factors in online shopping environments (Clemes et al., 2021; Alam and Elaasi, 2016; Wang, 2023; Zhang et al., 2021).

In practice, these cues coexist and interact during consumer information search in digital retail environments. During this interaction, COO information can shape the interpretation and weighting of other product cues and may therefore influence how consumers evaluate competing products (Hertz, 2015). For example, research on wine packaging has shown that the presence or absence of COO information can influence VA directed towards other cues (Liu et al., 2022). This phenomenon has been described as the “superiority effect,” where COO information dominates VA and evaluation processes (Zhang et al., 2021; Liu et al., 2022). Nevertheless, a key gap remains within this interaction, particularly when considering the role of bottom-up stimulus-driven attention mechanisms.

Bottom-up attention theory suggests that certain visual features, when enhanced through salient design elements, can automatically capture attention and influence subsequent cognitive processing (Geng and Mangun, 2011). Accordingly, this study explored whether the assumed superiority of COO information could be diminished or overridden by other cues that were deliberately enhanced through bottom-up visual salience. In other words, the study examined whether COO information would continue to dominate VA when competing with cues that had been visually enhanced according to the stimulus-driven cue paradigm. This investigation was particularly relevant given research suggesting that attention is often allocated according to perceptual salience, with visually striking elements being prioritised over less prominent cues (Bucker and Theeuwes, 2017; Fenders et al., 2017).

The findings provide robust evidence that when product images were presented with salient visual cues, they attracted significantly higher dwell times than country-of-origin information, thereby diminishing the previously suggested superiority effect of COO cues. Although other informational cues such as price, ratings, and product details did not consistently surpass COO information in terms of dwell time, they still received comparable or slightly higher levels of VA in several instances. These outcomes suggest that the dominance of COO information in guiding VA is not absolute but rather contingent upon the visual environment in which product information

is presented. Factors such as product familiarity, perceived relevance of the cue, and the specific task context may also shape how consumers allocate VA across competing information cues.

Overall, the study demonstrates that VA in e-commerce environments is shaped by a complex interaction between contextual cues such as country-of-origin information and perceptually salient stimulus-driven cues. Importantly, the findings show that visually salient product imagery can override the attentional advantage traditionally associated with COO information, highlighting the critical role of perceptual salience in consumer information processing. In doing so, the study contributes to existing literature by demonstrating that cue effectiveness in digital commerce is not determined solely by informational importance but also by visual prominence and attentional capture mechanisms.

The findings also suggest that marketers for local products especially should adopt a comprehensive approach when designing e-commerce product pages, ensuring that multiple cues are strategically presented to attract and sustain consumer attention. This includes optimising visual presentation, enhancing the salience of key information cues, and considering how consumers' familiarity with products and their origins may influence information processing. By integrating these strategies, marketers may improve consumer engagement and increase the likelihood of achieving competitive advantage in increasingly complex digital marketplaces, particularly within emerging markets..

Chapter 8 References

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Chapter 9 Appendices

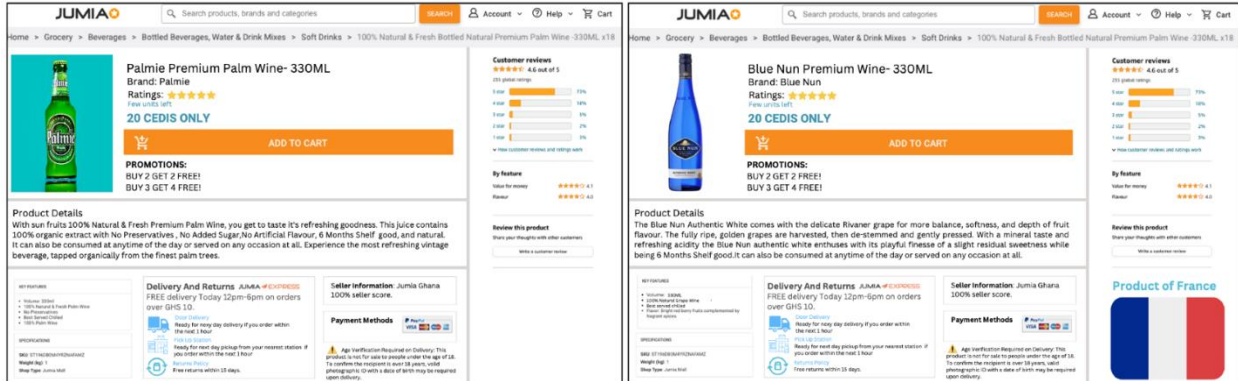


Figure 70 showing the product pages for local wine (on the left) and foreign wine (on the right) where participants in this group will have a made in label present for the foreign wine.

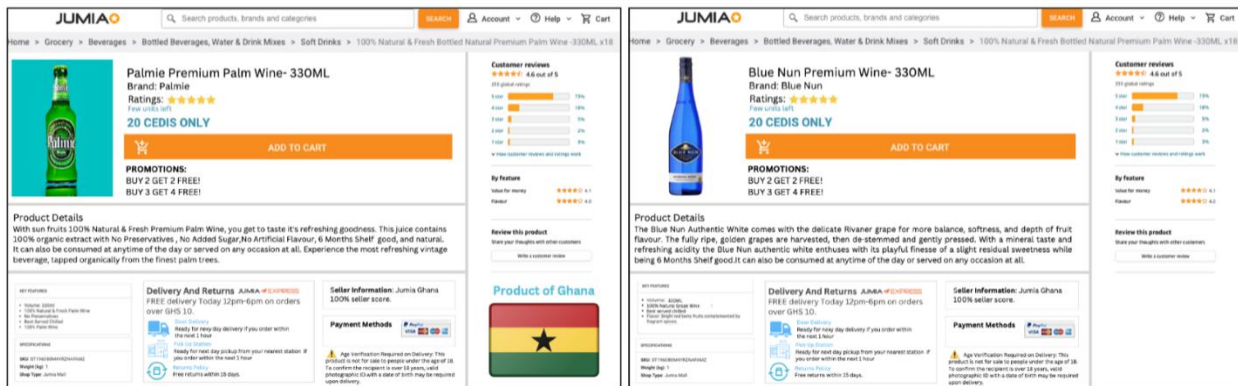


Figure 71 Figure showing the product pages for local wine (on the left) and foreign wine (on the right) where participants in a group will have a made in label present for the local wine.

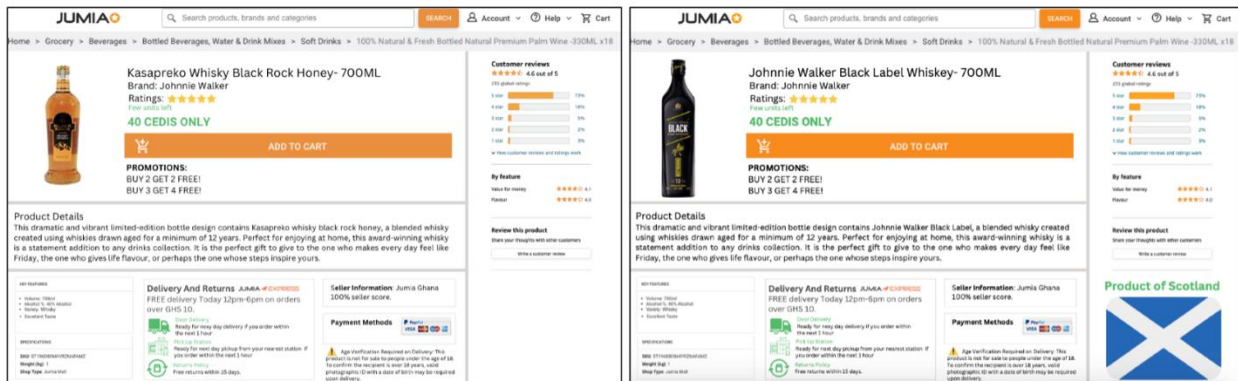


Figure 72 showing the product pages for local whisky (on the left) and foreign whiskey (on the right) where participants in a group will have a made in label present for the foreign whiskey.

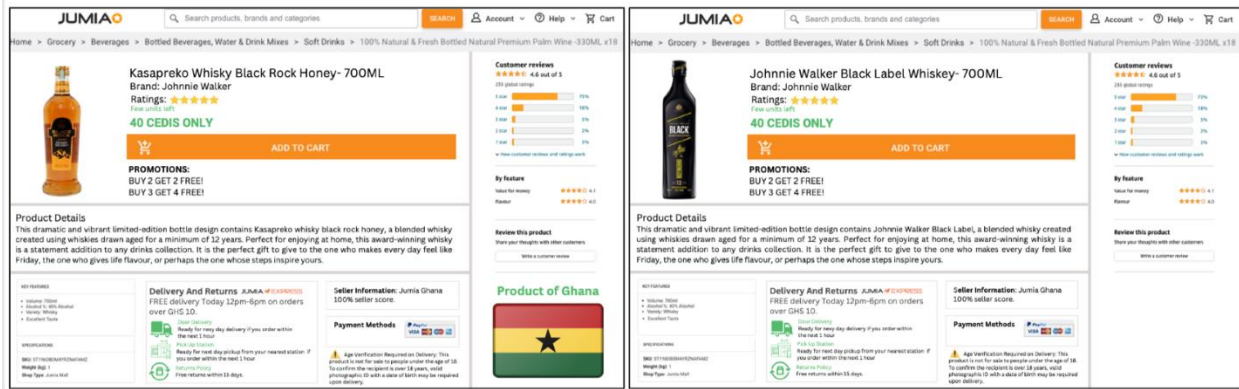


Figure 73 showing the product pages for local whisky (on the left) and foreign whisky (on the right) where participants in a group will have a made in label present for the local whiskey.

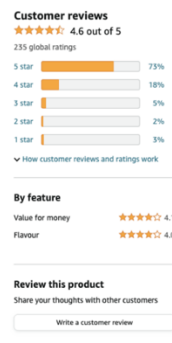
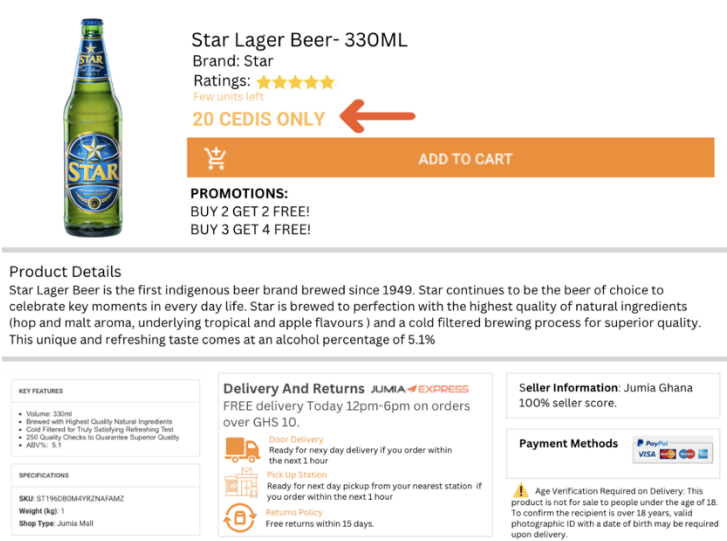



Figure 74 shows the product page for the local product (whiskey) when the made in label is absent. It also shows an Example of how salient cues were used on the product pages. Cues were represented by arrows pointing towards the area of interest.

Johnnie Walker Black Label Whiskey- 700ML
 Brand: Johnnie Walker
 Ratings: ★★★★★ 
 Few units left
40 CEDIS ONLY
 **ADD TO CART**

PROMOTIONS:
 BUY 2 GET 2 FREE!
 BUY 3 GET 4 FREE!

Customer reviews
 ★★★★★ 4.6 out of 5
 233 global ratings

Star Rating	Percentage
5 star	73%
4 star	18%
3 star	5%
2 star	2%
1 star	3%

▼ How customer reviews and ratings work

By feature

Feature	Rating
Value for money	★★★★☆ 4.1
Flavour	★★★★☆ 4.0

Review this product
 Share your thoughts with other customers
 Write a customer review

KEY FEATURES

- Volume: 700ml
- Alcohol %: 40% Alcohol
- Variety: Whisky
- Excellent Taste

SPECIFICATIONS

SKU: ST1962B0M4YR2NFA6MZ
 Weight (kg): 1
 Shop Type: Jumia Mall

Delivery And Returns JUMIA EXPRESS
 FREE delivery Today 12pm-6pm on orders over GHS 10.

Door Delivery
 Ready for next day delivery if you order within the next 1 hour

Pick Up Station
 Ready for next day pickup from your nearest station if you order within the next 1 hour

Returns Policy
 Free returns within 15 days.

Seller Information: Jumia Ghana
 100% seller score.

Payment Methods
 PayPal, VISA, MasterCard

Age Verification Required on Delivery: This product is not for sale to people under the age of 18. To confirm the recipient is over 18 years, valid photographic ID with a date of birth may be required upon delivery.

Figure 75 shows the product page for the foreign product (whiskey) when the made in label is absent. It also shows an example of how salient cues were used on the product pages. Cues were represented by arrows pointing towards the area of interest.