Master's thesis

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Deciding What to Purchase

Factors Impacting Consumer Decision-Making Behavior in Social Commerce

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Abstract

This thesis examines consumer purchasing behavior in social commerce through utilizing non-intrusive eye tracking equipment on respondents in an eye tracking experiment. The evolving presence of social commerce brings forth significant changes to the world of online commerce, both to consumers and producers. Consequently, it is of utmost importance for companies engaging in social commerce to better understand consumer behavior and what influences purchasing decisions. Eye tracking is recognized as providing objective measurements of observational behavior and revealing human perceptual and cognitive behavior. Existing research on the subject is rather new and fragmented, and neglects the potential to combine such factors and their ability to cooperate in affecting the cognitive processing of consumers. This study synthesizes findings from a systematic literature review of antecedent research, and complement findings with a comprehensive eye tracking experiment to derive momentous insights on the interplay between multiple simultaneous influential factors on consumer decision-making in social commerce. Variations in price and complexity foster differing effects on the available informational criteria among consumers. There is no indication of a direct correlation between neither price nor complexity individually and consumer decision-making, however, introducing change in one variable produces altering effects on the selection and elimination of a product. Hence, variations in the combination of the two variables affect the cognitive processing and behavior of online consumers, possessing the capability to influence purchasing decisions.

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Chapter 1

Introduction

Social commerce is often referred to as the evolution of electronic commerce (e-commerce), which brings with it enhanced consumer participation and interaction, venturing from a product-oriented to a social, user-driven environment (Huang & Benyoucef, 2013). The change to social commerce adds functionality supporting sharing of experiences, granting consumers access to peer knowledge and perceptions in a networked community, supporting them in making informed purchasing decisions; not having to rely solely on information directly from the retailer (Marsden, 2009). Despite their fundamental similarities, the two forms of online commerce differ significantly. Whereas e-commerce has a primary focus on product lookup, search, and purchase-stage efficacy, social commerce diverges in terms of its business goals. Networking, information sharing, and collaboration are a primary concern, where shopping enters as a secondary focus (Wang & Zhang, 2012). The perspective of consumer interaction also differs, as it is individual and independent in e-commerce, as opposed to connected and collective in social commerce. This fosters and encourages customers to express themselves publicly on the platform, providing a greater reach surpassing that of merely the retailer. As such, social commerce shapes e-commerce into a community through conversation. Adopting a broader definition of the term, we thus accept social commerce as being a customer-centered, collaborative approach to online commerce.

A systematic literature review of antecedent research suggests that there has been an emphasis on consumer attention, and thus cognitive processing, accompanied by a trend to look at fixation duration and fixation count to discover attracters in websites displaying products. The collected literature exhibits a tendency of considering only a select few factors impacting consumer behavior and drawing inferences based on these factors alone. Moreover, it was found that these attracters can vary depending on the type of product displayed, due to different individual judgment criteria and responses to utilitarian as opposed to hedonic items (Sen & Lerman, 2007). Prior research has attempted to build upon the understanding of consumers' online shopping behavior, in relation to aspects such as price positioning and fixation, online reviews, social popularity, and time/product scarcity. These approaches have had varying execution and focus aspects, albeit with some com-

mon characteristics. Subjective factors impacting consumer perception and emotion have been investigated, as well as objective factors relating to attentional behaviors using a variety of products. Notably, existing studies on the subject matter have gathered knowledge and information on highly constrained aspects of consumer purchasing behavior. By itself, this creates limited knowledge on the decision-making process in its entirety, posing difficulties in obtaining conclusive insights and evidence on how social commerce sites can effectively influence their consumers.

These studies indicate that eye tracking offers the ability to more effectively study the behavioral-environmental processes behind transaction decisions. However, research lacks information on various combinations of these aspects and the importance this has on consumers' willingness to purchase products and services. This study intends to introduce additional environmental and product variables to unveil whether different combinations carry greater impact on consumer purchasing willingness and behavior, primarily through a quantitative data analysis. We postulate that the cooperation of multiple factors can alter the way consumers process information. As such, we aim to contribute to the knowledge base of how consumers process information in social commerce through new evidence resulting from a broader, more in-depth and complex data analysis. In turn, yielding a deepened understanding of approaches that effectively influence users' decisions to purchase products or services. It appears to be a consensus amongst antecedent researchers in the assumption that different industries may have different results, based on the products or services sought after and the intended end user. Consequently, our experiment design incorporates a variety of product categories pertaining to surmised combinations of the subjective constructs hedonic and utilitarian value; unveiling how they may affect consumer responses differently. The idea behind this is being able to make educated suggestions in selecting the information and visual cues to display for various product categories on social commerce platforms to best attract consumer attention, and positively impact purchasing decision-making. Contrasting prior research, we disregard the pre- and post-purchase stages of the decision-making process. Through our product category diversity and introduction of multiple simultaneous attracters, we hope to achieve a more comprehensive understanding of the online consumer decision-making process, and provide a solid foundation upon which future research can be based.

Henceforth, this thesis aims to analyze and disseminate how individuals process and consume information upon deciding what to purchase in a social commerce setting. It is driven by the experience and motivation that neurophysiological tools such as eye tracking can "inform the design of specific features capable of enhancing system adoption and use" (Dimoka et al., 2012). There is great potential for social platforms to yield direct economic value to retailers, functioning as additional outlets for sales and promotion in transaction-based social commerce. It is becoming increasingly important for online retailers to have a positive social media imprint, as the vast majority of online consumers are influenced by online reviews and social popularity. Hence, it is essential for social commerce sites to consider which aspects are important to present based on what information consumers utilize to make decisions. Gaining a comprehensive grip on the factors that stimulate consumer behavior can help companies better harness the power of social commerce (Zhang & Benyoucef, 2016, p. 102). Conclusively, this research can help *"provide invaluable insight into consumer preferences and behavior"* (Djamasbi, 2014, pp. 37-54),

shaping industry standards for user-centric web page design and development. In light of this, the following research question has been formulated as driving forces of this research:

RQ1: *What impacts consumers' purchasing intentions in social commerce?*

RQ2: *How do the price and complexity of products affect online consumer decision-making behavior?*

This thesis outlines significant findings with respect to eye tracking utilized in social commerce settings. The paper is structured as follows. Firstly, we establish an understanding of the term social commerce, and summarize theories leveraged and results produced from antecedent studies, reviewed in the associated project (Ormevik, 2019). Secondly, we elaborate on the methodology and setup used in conducting our study, alongside the data collection and measures of interest. Thirdly, we present the data analysis and associated results. Fourthly, we discuss our inferences and what practical and theoretical implications transpire from this, before indicating the limitations of this work. Lastly, we consider challenges encountered over the course of the thesis and correspondingly how to address and tackle them.

Chapter 2

Background

To foster comprehension of eye tracking in online consumer decision-making, we conducted a systematic literature review following the established guidelines of Kitchenham et al. (2009). Using **RQ1** in guiding the literature selection yielded an initial total of 15 articles after refinement based on relevant selection criteria. A subsequent synthesis of findings was facilitated through an analysis and comparison of studies composed of primarily empirical studies, whilst distinguishing between quantitative and qualitative research. Henceforth, the principal focus was on quantitative data extraction and the synthesis of the corresponding data, complementing this with qualitative research. The state of the art has been thoroughly reviewed, and the project preceding this thesis (Ormevik, 2019) identifies important background material from antecedent research. The most central segments presented in the project are summarized in the below sections.

2.1 Defining Social Commerce

Fundamentally, to comprehend an analysis of eye tracking in social commerce, a sufficient understanding of social commerce must be established. Succinctly put, social commerce is a subset of electronic commerce (e-commerce), applying and leveraging networking websites and social connections between users in order to promote and sell products and services for businesses (Todri & Adamopoulos, 2014). When introduced by Yahoo! In 2005, the term initially referred to allowing users to review products. However, over the years, social commerce has expanded and developed to include aspects such as product referrals, team-buying, peer recommendations, network-based marketing, and online merchandisers integrated into social network platforms (e.g. Twitter, Facebook, and Instagram), and firm-controlled online communities (Wang & Zhang, 2012). Two main types of social commerce have been identified by Zhang and Benyoucef (2016) as the following: (1) commercial features allowing transactions and advertisements incorporated into social networking sites; and (2) traditional e-commerce sites inclusive of social tools facilitating sharing and social interaction. Despite the term's rather ambiguous definition, an inclusive definition is as follows: "A subset of electronic commerce that involves using social

media, online media that supports social interaction and user contributions, to assist in the online buying and selling of products and services" (Socialcommercetoday.com, 2011).

Five elements have been attributed to explaining social commerce (Todri & Adamopoulos, 2014).
Reciprocity is the idea that customers can feel the need to return the favor to a company that has done a good deed, e.g. by recommending the company or rating it highly. *Community* states that showing commitment to a group or community sharing the same values or beliefs as oneself can establish group trends. Consequently, trust is established and acceptance of new products is more readily achieved. *Social proof* is a concept where evidence that people are purchasing the same products as oneself is vital in establishing trust between a company and its customers. This can be realized by allowing public feedback of products, similar to that of Amazon. *Authority*, in terms of proof of high product quality, e.g. through user recommendations and reviews, can grant a consumer sufficient trust in their own decision to purchase a product. *Liking* is a social construct in line with recommendations, where the amount of "likes" a product or company has can greatly impact consumer confidence and purchase justification.

The relevance of social commerce has grown vastly in the last decade, and Web 2.0 has greatly driven this development emerging from e-commerce. Amazon with its peer recommendations, Groupon with its group purchasing, eBay's peer-to-peer transactions, and Kickstarter's participatory commerce exemplify a fraction of existing sites which are arguably considered to be social commerce platforms (Indvik, 2013; Zhang & Benyoucef, 2016). Todri and Adamopoulos (2014) further exemplified social commerce tools as customer reviews, ratings, recommendations, referrals, and social advertising. Social commerce assists companies in their effort to engage customers with their brands according to their social behaviors. Furthermore, it establishes a platform for consumer-generated content about a company's brand and creates an incentive for customers to return to the company's website. A competitive edge can be gained, as all essential information necessary for product and brand research is present, allowing consumers to compare and ultimately choose one product or retailer over another.

Conclusively, The term *"social commerce"* is riddled with inconsistencies and appears to be constantly evolving since its rise in 2005. As such, our study accepts and adopts a broad definition of the term, and aspires to emphasize and investigate individuals' decision-making process and the various stages to reaching a purchase decision.

2.2 Theories

Applying the eye tracking methodology in studies of human behavior aids in capturing real-time information on individuals' fixations and visualization patterns as consumers; in turn granting researchers the ability to more effectively study the behavioral-environmental processes behind transaction decisions. To supplement this, researchers have utilized numerous theories in order to support their arguments in understanding and interpreting consumers' actions and psychological state of mind. Among these theories is *signaling theory*, which is central to understanding consumer behavior when varying information is accessible (Connelly et al., 2011). Signaling theory declares that when consumers lack sufficient knowledge for a product or service, or its quality, they typically draw inferences from

available signals to form cognitive perceptions. These aforementioned signals are *"manipulable attributes or activities that convey information about the signaler"* (Shin et al., 2017, pp. 292-302). A number of theories can further complement this when examining the information available to the consumers. *Social influence theory* suggests that an individual's behavior is influenced by the behavior of others in a social network setting (Mou & Shin, 2018; Kulviwat et al., 2009).

The efficacy of scarcity, both in terms of time and quantity, in guiding an individual's decision is supported by *commodity theory*. It succinctly says that a product or service with higher restrictions on availability and uniqueness will be given a greater perceived value (Anh, 2014). This, in combination with *reactance theory*, can be a powerful tool in investigating what triggers a decision within a consumer. Reactance theory suggests that if one's freedom is threatened or taken away entirely, one experiences a motivational state directed toward safeguarding one's own behavioral freedom (Gupta et al., 2013). Given the two latter definitions, an individual may grant more attention toward a limited or unavailable product due to the threat to personal freedom triggering a psychological reactance.

Moreover, congruity is a concept that has the ability to influence consumer response. Congruity theory explains that consumers are more likely to have favorable attitudes and behaviors toward something they hold congruent (i.e. similar) beliefs (Lee & Jeong, 2014). This, together with schema theory, formed *schema congruity theory* (SCT), which poses the idea that congruent items (e.g. products and their respective reviews) tend to produce favorable responses (Mandler, 1982; Stumpf & Baum, 2016; Luan et al., 2016). SCT aids the understanding of how cognitive schemas affect the processing of newly acquired information. This provides the basis for the postulation that consumers tend to seek experience-based reviews when searching for experience products, and correspondingly for attribute-based reviews and attribute products (Luan et al., 2016). Visual appeal and website perception are recurrent themes throughout antecedent studies, with seemingly high relevancy in regard to consumer decision-making. Sivaji et al. (2011) mention the importance of applying the Gestalt principles in website design for a heightened user experience. It was concluded that a positive shopping experience yielded a higher intensity in customer emotions, e.g. joy, pride, and liking. *Gestalt theory* and *affordance* are highlighted as crucial elements in increasing visual appeal and thus overall website perception for consumers. In its essence, Gestalt theory refers to a person's visual recognition capabilities, and is often explained using the phrase *"the whole is greater than the sum of its parts"* (Opie, 1999; Sivaji et al., 2011). Affordance, on the other hand, refers to relationship or *"actionable properties between the world and an actor"* (Norman, 1999, pp. 38-43), and is a concept that has been widely adopted in the design community. Hence, it is paramount that fundamental usability principles are applied and in place prior to establishing other principles such as trust and social presence.

2.3 Central Aspects and Findings

Menon et al. (2016) leveraged eye tracking in examining observational behavior regarding fixation time on price, with the intention of uncovering how direct and indirect intervention with product prices affects consumers' attention to price, as well as their total time

spent on the respective product pages. Direct intervention being price-related variables, and indirect being placement and display methods. The results depict a U-shape curve for both gender groups with consumers being significantly more attentive to price on the low and high price range and a lower fixation on price in the medium price range. Price was not the sole factor of the fixation; stimulus-driven variables also played a part. Hence, retailers have the ability to draw consumers' attention to price both indirectly through salient attributes and directly through price point and price visibility manipulation. This is in correspondence with Sen and Lerman (2007), who note that different judgment criteria are applied to luxury as opposed to non-luxury items. They propose that individuals respond differently to utilitarian/function-driven products than to hedonic/pleasure-driven products. Relaying static content (information relating to a product's characteristics, price, description, alongside visual cues such as images and thumbnails) plays a significant role in communicating judgment to consumers. In addition to this, Mikalef et al. (2017) assert that user-generated content such as product reviews also impacts consumer intentions as individuals *"tend to rely on the opinion of the masses"*. This is highly in line with the premise of social influence theory.

Luan et al. (2016) utilized both the empirical and eye tracking methodology to survey and interpret consumers' review searching behavior upon a product purchase in an attempt to mitigate subjective factors impacting consumers' perceptions and emotions. The part of this study that relates to eye tracking asserts that *"looking is perceiving"*, *"eye movement can reveal human perceptual, emotional, and cognitive behavior"*, and more specifically *"fixation can imply information extraction or acquisition process"*. This aspired the hypothesis that fixation duration is longer for attribute-based reviews than for experience-based reviews upon purchasing a search product, and vice versa for an experience product. This is supported in studies relating to fundamental usability, highlighting the importance of catering for product/service testimonials from other users as a trust element (Sivaji et al., 2011). It is also emphasized by word-of-mouth (WOM) being regarded as *"one of the most influential factors impacting consumer behavior"* by Daugherty and Hoffman (2014). They further assert the effect electronic word-of-mouth (eWOM) reviews can have on a consumer's purchase decision varies with the product category given hedonic versus utilitarian products. This corroborates Sen and Lerman's (2007) findings. Negative eWOM reaps more attention than positive eWOM for non-luxury brands, due to consumer perception that negative eWOM is a threat to the brand's potential utility. Castagnos and Pu (2010) also reiterated that consumers search for elements promoting trust, e.g. relevant reviews and ease of navigation. This is consistent with the assertion that visual appeal is also a pertinent contributing factor to trust (Djamasbi et al., 2010).

Aside from informational determinants, normative factors also contribute to the cognitive evaluation of consumers (Mikalef et al., 2017). Normative influence in the form of visually represented aggregated user-generated content is frequently seen in e-commerce sites. This comes in the form of average product ratings (e.g. a score rating system ranging from one to five stars), quantity of products bought, and more recently, "likes" and "reactions" on sites such as Facebook and Twitter. Mou and Shin's (2018) study on online consumer perceptions of social popularity and time scarcity asserts the importance of social popularity in establishing consumer trust and perceived product quality and value. Furthermore, the eye tracking experiment found that consumers' fixation attention is significantly

influenced by time scarcity, possibly corroborating the psychology behind reactance theory. Two research questions were formulated, one with respect to consumers' cognitive perceptions, and the other to consumers' visual attention in an online marketplace. The method applied in the study employed both eye tracking and an online questionnaire designed to investigate consumers' perceptions. Similarly to the study of Luan et al. (2016), the term social popularity is here closely related to experience-based reviews, i.e. information related to social features such as reviews and popularity ratings derived from peer consumers. Results determined that social popularity has an effect on trust, perceived value, and product quality. This includes factors such as the number of followers and page/post likes on Facebook (Mou & Shin, 2018; Sivaji et al., 2011). Additionally, time scarcity also impacted consumers' perception with regard to value and product quality, as well as their arousal toward impulsive purchases, however, it did not facilitate trust.

Yang (2015) found that positive and negative framing, or peripheral cues, can have an effect on purchase intentions by increasing attention on the cue message. Furthermore, on par with Yang's findings, Zhang and Benyoucef (2016) found that there is a positive relationship between peripheral cues and purchase intention. During the decision phase, a consumer's mind is more heavily impacted by negative product reviews than positive ones (Tzafilkou & Protogeros, 2017). Ergo product reviews may directly impact a consumer's decision on whether or not to purchase a product or service, depending on its framing. Moreover, Lohse and Wu (2001) conducted an experiment on what consumers notice when searching for e-commerce sites in Chinese yellow pages advertising. The respective results were consistent with prior findings from experiments in the United States, showing that consumers noticed a substantially higher percentage of advertisements taking up larger portions of the display, as well as those of more protruding color. This is also further supported by evidence presented by Xu and Zhang (2019), who utilized eye tracking experiments in combination with event related potential (ERP) in studying dominant factors of social tags. The experiments revealed color to be the predominant factor guiding consumers' decision behavior, relative to text, under high cognitive load. Conversely, in conditions involving low cognitive load, text is evidently a predominant factor over color. Color choice matters, and which colors are primarily associated with positive and negative feelings is a controversial topic with contradicting findings.

Consumers may also be guided in their decision-making by companies who deliberately select positively or negatively associated colors for product reviews. These results can aid and guide the development of both social commerce and e-commerce sites for product display, visualization, and recommender systems based on consumers' cognitive behavior (Chen & Pu, 2010; Xu & Zhang, 2019; Castagnos et al., 2010). This is also in line with the visibility design principle outlined in *The Design of Everyday Things* by Don Norman (2002), which indicates that the more visible an element is, the more likely a user (consumer) is to know about it and interact with it. Lohse and Wu also hypothesized that *"users are more likely to view advertisements near the beginning of the heading than those near the end"* (Lohse & Wu, 2001, p. 89). Following this hypothesis, consumers on social commerce platforms may be more likely to choose products listed near the start of the page, and pay less attention to, or even disregard those near the end and those listed in consecutive pages. Finally, the researchers also hypothesized that *"users are likely to spend more time viewing advertisements of businesses they end up choosing than those of*

businesses they do not choose" (Mikalef et al., 2017; Lohse & Wu, 2001, p. 89).

2.4 Eye Tracking Research

Central to understanding consumer decision-making is cognitive processing, which can represent the strategy of performing cognitive tasks (Yang, 2015). This is a trackable concept according to the eye-mind hypothesis (Underwood & Everatt, 1992), which assumes that a third party observer is capable of accessing the contents of conscious processing by recording eye movements. The correlation between fixation (also referred to as gaze) and what an individual is thinking about can also supposedly be explained using measures such as fixation duration and fixation count. Fixation duration is the period of time an individual spends gazing at a particular area (Mou & Shin, 2018). A longer fixation duration implies more time spent interpreting or processing a component. Similarly, fixation count represents the number of fixation points in a given area. This could reflect the degree to which the given information was understood and processed. Consequently, an observer can extract and interpret data resulting from tracking and recording these eye movements, thereby yielding information relating to consumer choice, attention, and preference based on purchase outcomes. Djamasbi (2014) presents two types of fixation data *"particularly effective in revealing viewing behavior for targeted areas of a web page"*: fixation timing and percentage of viewers. Fixation timing represents the order in which a perceptual element has been viewed, while the percentage of viewers indicates the proportion of users who viewed the respective perceptual element. Aside from this, a plethora of metrics to analyze eye tracking data exists, and it is up to the researcher to evaluate and decide on the specific measures most relevant to their study. Additional relevant eye tracking measures are explained further in the succeeding chapter.

Chapter 3

Method

Certain preconditions must be met in order for the experiment to be conducted successfully. This section discusses the optimal research setup and setting for the eye tracking study to take place, alongside the recruitment process, resting on the foundations of previous studies' protocols. Thereafter the experiment procedure is outlined and tracking measures are discussed. Given the limited prior research done on the topic of eye tracking with regard to social commerce, this study bases its study protocol on the methods present in prior, similar research experiments, also heeding experiments not related to social commerce. As a result, this study protocol follows similarly structured experiments. The project preceding this thesis (Ormevik, 2019) elaborates on essential knowledge surrounding the methodology and procedure that entails it. The below sections highlight valuable insights derived from the project.

3.1 Eye Tracking Methodology

As described by the world leader within the field of eye tracking, Tobii Technology, the eye tracking methodology uses near-infrared light invisible to the eye, in combination with high definition cameras to project light onto the eyes of an individual. This light is subsequently reflected off the cornea, from which the position of the eye is calculated using advanced algorithms, and the focus point of the eye is uncovered accordingly (*What is eye tracking?*, 2018). This grants us the capability to accurately and objectively record, collect, and analyze an individual's visual and subconscious behavior in an unbiased and quantifiable manner. Corroborating this, Djamasbi (2014) asserts that eye tracking is widely adopted as a methodology providing objective measurements of individuals' visual patterns, allowing us to see what draws consumers' attention. This can prove extremely valuable for online retailers, presenting the opportunity to drive consumers towards a call to action, e.g. purchasing a product or service. Visual attention is focused on visual stimulus, which is correspondingly processed by the brain, hence why eye movements are key in cognitive processing (Sharafi et al., 2015). Eye tracking grants us the ability to visualize what stimulates the mind of an individual, and represent this in plots such as heat maps

and gaze plots. Such maps of fixation information are created in various ways by grouping specific targeted areas of the web page into regions referred to as areas of interest (AOIs) (Ormevik, 2019). Eye tracking is extensively employed in both marketing research and user experience. Notably, the process consumers undertake during the viewing and selection phases of purchasing a product can be studied, revealing which elements naturally draw consumers' attention, and thereby also which elements are ignored. Finally, design flaws can be revealed by viewing the user experience through the consumer's eyes, and a platform's effectiveness in achieving desired goals can thus be studied.

A considerable amount of prior eye tracking experiments were complemented with surveys, questionnaires, interviews, and/or methodologies measuring brain response during the eye tracking process to procure further insight on an individual's cognitive behavior (Xu & Zhang, 2019; Djamasbi et al., 2010). The survey method is employed to acquire additional data capable of complementing the eye tracking data. Questions in surveys were often formulated and measured in a Likert scale manner, e.g. with seven points varying from "strongly disagree" to "strongly agree" (Mou & Shin, 2018; Daugherty & Hoffman, 2014; Castagnos et al., 2010; Sivaji et al., 2011; Yang, 2015; Luan et al., 2016). Moreover, interviews allow respondents to elaborate on their decisions and thought process, providing reasoning behind unclear results, confirming findings, or even revealing discrepancies between what their gaze tells us contrary to what they verbally or mindfully tell us. Hence, the survey method, both through questionnaires and interviews, is incorporated into the study in an attempt to produce an abundance of complementary data and insights capable of mitigating uncertainty in results.

3.2 Research Setup

Evident from antecedent research, six fundamental stages comprise the purchase decision-making process (Castagnos et al., 2010). Initially, the consumer becomes aware of a new need. Subsequently, a conscious choice of from where to purchase the desired product must be made, followed by a product alternative evaluation. Stage four and five involves closing the transaction, in the form of negotiation and actual purchase. Finally, if applicable, stage six consists of post-purchase service, which also affects user satisfaction with the overall transaction process. This poses as the basis for the experiment environment our study is conducted in; however, disregarding choosing where to purchase the product from, as well as the post-purchase stage. This study focuses more in-depth on the product alternative evaluation and decision-making process.

Reviewing prior eye tracking research and experiment methods, we have found a variety of approaches. Some researchers chose to collaborate with various retailers with differing product categories such as perfume, clothing, etc. (Menon et al., 2016; Castagnos & Pu, 2010) and leverage Facebook, Twitter, Instagram, Pinterest, or other social media sites as their shopping website (Daugherty & Hoffman, 2014; Vraga et al., 2016; Sivaji et al., 2011). Others have focused more on e-commerce sites such as Amazon, ZOL, and Taobao, recreating the visual and informational attributes of these sites, using existing product information readily available on the respective sites to more accurately reflect a real-world online shopping experience (Luan et al., 2016; Xu & Zhang, 2019). Experiments primarily took place in behavioral laboratories, with a duration ranging from eight

minutes to an hour. The vast majority of studies utilized a 20-inch monitor with a display resolution of 1024x768, and prompted respondents to browse the respective website and view numerous images of products, alongside corresponding product information and potential product reviews. Respondents subsequently had to choose between the available products, or alternatively not select any product whatsoever.

Pernice and Nielsen (2016) assert that more direct approaches to recruitment, e.g. over the phone or in person, are superior to indirect approaches, such as via email, which can be ignored or overlooked. This is mainly due to the questions that may arise from the respondents regarding the new and likely unfamiliar technology. Clarification is greatly simplified in direct conversation, as opposed to emailing back and forth, which may ultimately lower the threshold to agree to participate in the experiment. Therefore, the recruitment process undertaken for this experiment was largely direct, face-to-face conversations with students that allows for explaining the process in increased detail, with the added benefit of mitigating misunderstandings. In order to further facilitate the recruitment process, primarily students and employees at the Norwegian University of Science and Technology (NTNU), who indubitably know their way around a computer, were asked to participate. Hence, members of student organizations belonging to studies relating to computer science, information technology, and other similar studies became natural primary targets in our recruitment process. Numerous prior studies offered their respondents financial compensation, whether it be in the form of money or goods, in exchange for their time (Luan et al., 2016; Vraga et al., 2016; Castagnos et al., 2010; Mou & Shin, 2018; Xu & Zhang, 2019). Given the fact that time is limited, and donating one's own spare time free of charge is not acceptable to everyone, participants were offered a gift card with a value of 200 NOK as compensation to partake in our approximately 45-minute long experiment.

In order to generate credible quantitative data from the designed experiment and draw conclusions from the results, a sufficient amount of participants is needed. Research conducted by Pernice and Nielsen (2016) further suggests the desired number of participants for an eye tracking experiment where one is to draw conclusions from heat maps is substantially larger than for qualitative measurement studies. As such, they propose to include 30 participants per heat map (Pernice & Nielsen, 2016, p. 20), whilst taking into account the fact that current eye tracking technology may yield invalid results for certain participants due to its limitations. Henceforth, 39 people is the recommended amount of users to include in the actual study. Eye tracking studies are less susceptible to human error and bias given their physiological basis. This, combined with the amplitude of within-subject data points generated during an experiment, has resulted in samples ranging from 20 to 30 participants becoming more or less of the norm for eye tracking studies (Daugherty & Hoffman, 2014).

Antecedent studies largely recruited participants from student populations, through university email lists, flyers, and direct confrontation. Respondents ages span the age group currently pertaining to millennials, otherwise known as Generation Y (Djamasbi et al., 2010). Nevertheless, the year the respective studies were conducted in must also be taken into consideration when investigating consumer behavior. The quantity of participants recruited throughout the studies reviewed is depicted in **Figure 3.1**. Note that some participants were disregarded from the results due to factors such as sub-optimal eyesight, improper calibration, or other technical aspects that could jeopardize or invalidate the re-

sults (Menon et al., 2016; Yang, 2015; Xu & Zhang, 2019; Mikalef et al., 2017; Chen & Pu, 2010). The quantity of participants excluded from the results is displayed in red, whereas the actual sample size used is displayed in blue. Attempting to extract trends and norms, the median is deemed a better measure of central tendency than the mean. The mean quantity of participants included in the sample size, disregarding our study, is approximately 43 ($n = 42.667$), however this number is rather skewed due to a few select studies with substantially larger sample sizes. The median yields a total of 28 participants, which is also more in line with Daugherty's (2014) reasoning. Granted this information, through direct confrontation, we recruited a grand total of 31 participants to partake in our experiment, indicated by the leftmost column of the bar chart.

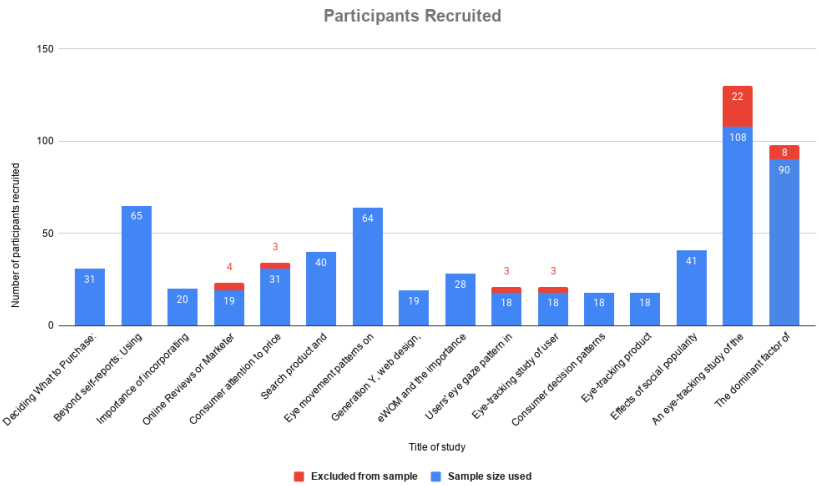


Figure 3.1: Participant sample size per study relative to this study

In order to prevent the end result of the research from being undermined by sub-optimal research scenarios, measures to improve the reliability of the eye tracking research must be emphasized. Bryn Farnsworth of iMotions outlined five aspects for an optimal eye tracking research setup (Farnsworth, 2017). Given that the majority of eye tracking devices utilize infrared light reflecting from the pupil, alongside complex algorithms to track eye movements, the *lighting* in the experiment's environment must be stable. In other words, mitigate the amount of fluctuating infrared light, and maintain consistent lighting levels to ensure high accuracy.

Modern eye tracking devices' capabilities allow for wider ranges of *movement* than their predecessors, which required attachment to a respondent's head (Djamasbi, 2014). Nevertheless, this still has limitations with respect to accuracy, and as such, the respondent's head should stay within the area the camera can reliably track the eyes in - known as the "headbox". An additional, seemingly obvious aspect is *obstruction* of view between the device and the respondent's eyes. However, even the briefest interruption can hinder crucial data from being collected, due to the recapture rate of the eye tracking

camera. This recapture rate determines how quickly the device re-detects the eyes post-interruption. This can be largely overcome by using an eye tracker with a higher recapture rate, and informing respondents that they are not to cover their eyes during the duration of the experiment.

Further, proper *calibration* of the device for each individual participant is vital for the validity of the experiment. Hence, this is an essential step in the process that can not be skipped and must be thoroughly executed. Failure to comply with the aforementioned steps may yield invalid results, as previously stated - see **Figure 3.1**. The final aspect concerns itself with the *quality of the data* gathered. One must not disregard the importance of checking not only the duration of the eye tracking, but also the accuracy of said tracking. Conclusively, attributed to eye tracking largely being related to attentional processes, it can reveal *"what"*, but not *"why"*.

Evident from the literature review outlined in the project (Ormevik, 2019), eye tracking systems leveraging a desktop mount, granting a larger freedom of movement for respondents, are the predominantly preferred system of use. **Figure 3.2** displays a bar chart illustrating the various systems utilized, where blue indicates systems attached to the desktop, red indicates systems mounted to the head of the respondent, and yellow indicates that the system used has not been disclosed. The leftmost column denotes the eye tracking system leveraged in this experiment.

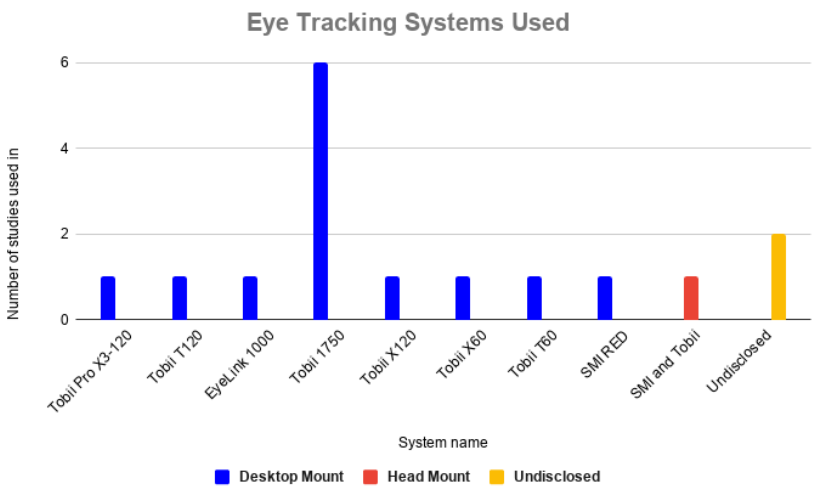


Figure 3.2: Eye tracking systems used in this experiment compared with antecedent experiments

Moreover, the aforestated measures to improve eye tracking reliability are accounted for. Complying with the restrictions presented by Farnsworth (Farnsworth, 2017), we utilize the Tobii Pro X3-120 eye tracking system, with a screen-based monitor mount instead of a head mount, as not to restrict head movement. This is a state of the art stand-alone, high-end system developed by world-leading eye tracking company Tobii, and captures gaze data at 120 Hz. In conjunction with this, contrasting antecedent studies, this study

employs a full HD 24-inch monitor with a display resolution of 1920 x 1080 to display and present products on; accurately imitating modern personal computer equipment. Finally, we ensure the laboratory is appropriately lit, mitigating effects from external elements of light and annoyances, and elements of obstruction and distraction are minimized before conducting the actual experiment.

3.3 Experiment Procedure

The study is designed as an in-depth experiment conducted in a laboratory setting, with an allocated time frame of approximately 45 minutes. Information on the experiment process is explained to the recruited participants, who are then informed that it is not them, but rather the system, that is being tested. When screening applicants for the study, it is essential to initially disclose what the study will focus on and communicating to participants that their eyes will be tracked. This is not only for ethical reasons, but also for preparing the user for the circumstances of the experiment. Notwithstanding, attracting too much attention to the eye tracking topic may have adverse effects such as impacting where and what the user chooses to focus on during the experiment due to potentially triggering subconscious actions. It is emphasized that, at any given time, they are able to withdraw from the experiment, and the study as a whole, without consequences and without the need to state a reason. Throughout the entirety of the experiment, respondents are free to ask questions to the researcher regarding the study, however, they are encouraged to complete the experiment with minimal disruption and assistance. Notwithstanding, the researcher is present in the room, in a non-intrusive manner, throughout the duration of the experiment for clarification and assistance purposes.

The respondents are initially required to sign a consent form, which states the purpose of the experiment and discloses all necessary information about the experiment to the users. **Appendix A** displays the respective consent form in its entirety. Certain demographic data is collected from the respondents beforehand, hence an application form disclosing information pertinent to the experiment's data collection was sent to, and approved by, the Norwegian Centre for Research Data (NSD). Subsequently, upon signing the consent form, non-sensitive demographic data, such as age and gender of the respondents, are collected through a quick demographic survey. After this, a brief introduction to the eye tracking system is given, in addition to a quick explanation of what will be tested during the ensuing experiment. A calibration exercise, syncing every individual participant's retinal movements to the recording equipment, commences to ensure the validity of measurements and results.

After the preparation for the experiment is complete, respondents are handed a physical sheet of paper with instructions on what to do during the experiment in the laboratory. These task instructions are formulated in such a way that they are general enough to provide the user with freedom of choice, as not to disrupt the natural flow of information processing and decision-making. The instructions should by no means pave the path of the user during the experiment, nor should they hint to what the study seeks to find. The complete instruction sheet can be seen in **Appendix B**. Respondents are then exposed to stimuli on a computer screen, in the form of being presented with two products from each respective product category per task, from which they are to decide upon which one to

purchase. The resulting decision then pertains to this specific product category. If after ten minutes the respondent is yet to reach a decision or states they are unable to make a decision, this is recorded as "decision not reached". The software used, Tobii Pro Lab, requires only one single web page to be in focus at any given time. As such, a landing page presents the two products belonging to the product category in question to the respondents. From this, they are redirected to the respective products by clicking on the corresponding product's button, displayed in **Figure 3.3**. The redirected page for product #1 will appear as indicated in **Figure 3.4**. The red rectangles, functioning as areas of interest, are not visible to the respondents and are further explained in later sections. The respondents are prompted to make a decision based on the information available on the page, encouraging them to view anything they find interesting and relevant to their decision. The procedure continues in an equivalent fashion for all succeeding product categories.

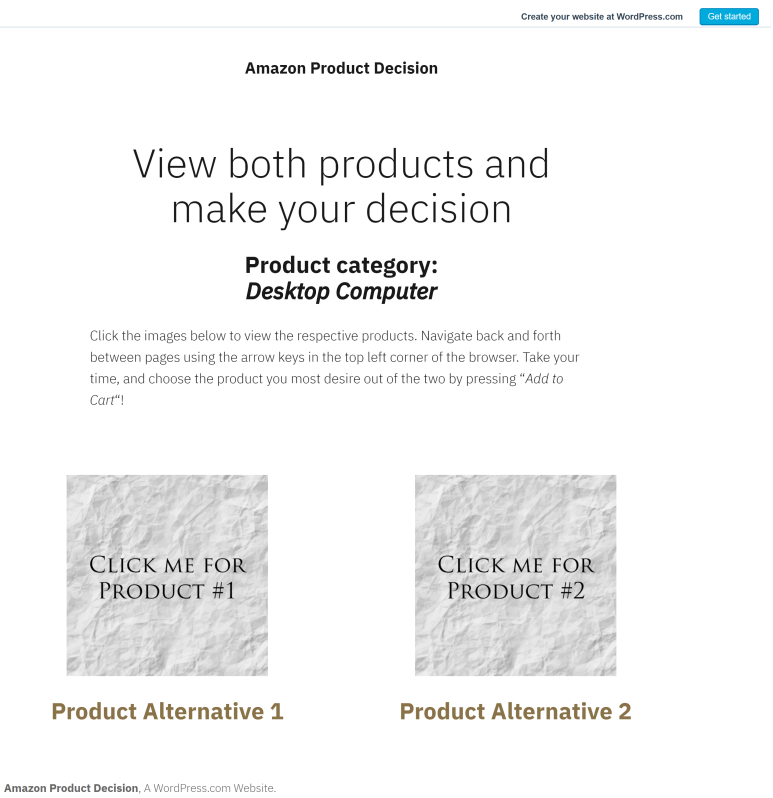


Figure 3.3: Landing page for one specific product category

After each stage in the experiment, i.e. after making a purchasing decision for one product category, respondents are prompted to fill out a short online survey with statements relating to the previous task and product category. These statements resemble the following: *"I found the product reviews helped me reach a purchasing decision"*. Their level of agreement is then measured on a seven-point Likert scale, with one (1) being "strongly

disagree" and seven (7) being "strongly agree". The post-stage assessment survey relating to the final product category concludes the study for the majority of respondents. Upon completion of the experiment, a proportion of respondents were requested to partake in a retrospective interview with the researcher, answering questions linked to the experiment as a whole. The questions are intended to expand on our insights into respondents' cognitive processing and decision-making behavior, and ultimately reinforce the resulting eye tracking data. The interview is, with the consent of the participating interviewees, audio recorded for easing the data extraction process for the researcher. This, in accordance with the rest of the study, is voluntary for all respondents asked. This concludes the individual experiments for the participants.

3.4 Samples and Data

Upon completing preparations for the experiment, setting up and testing the equipment through preliminary tests, and recruiting the initial participants, the experiment was initiated with the first participant on February 17th, 2020 and concluded with the last of the $n = 31$ participants on March 6th, 2020. The recruitment process resulted in 29% $(n = 9)$ female participants and 71% $n = 22$ male participants. Furthermore, the spread in age groups for respondents is the following: 9.7% $(n = 3)$ for ages 18 to 22, 83.8% $(n = 26)$ for ages 23 to 27, and 6.5% $(n = 2)$ for ages 28 to 32. All participants were familiar with Amazon as a company, however, their experience with shopping at Amazon ranged from low to medium. Aside from this, no further demographic data were collected as not to disclose any identifiable information on the subjects. The allocated and estimated time slot for the experiment involving the participants, pre-experiment briefing and post-experiment interview inclusively, was 60 minutes. Evident from the sample collection, the mean time spent completing the actual eye tracking experiment was 25 minutes and 34 seconds. Further, a threshold was defined and set for the calibration results, crucial in determining whether or not to re-calibrate and conduct the experiment. This threshold was set for the validation accuracy, and was selected to be allowed a maximum of 2.50°. The achieved validation accuracy was below 1.0°for all respondents, with a high of 0.98°and a low of 0.30°. Hence, no results were discarded due to an inability to produce a sufficient validation accuracy at this phase.

All respondents completed the experiment from beginning to end without any complications or substantial disruptions, successfully recording a decision for every single product category and their attached survey. The proportion of respondents prompted to attend a post-experiment interview was cut to 19.4% $(n = 6)$ by reason of time and cost constraints. These six interviews were conducted on randomly selected participants who agreed to answer questions related to the experiment and decisions made. It shall be noted that multiple additional participants shared thoughts and perceptions regarding their decisions and the experiment itself, whether unprompted or encouraged to do so; all of which is on record to be used in conjunction with the formal experiment results.

3.5 Eye Tracking Measures

Taking previously mentioned evidence into consideration, this study aims to foster a real-world online shopping experience to the best possible extent. With **RQ1** functioning as the major driving force for this research, a number of variables are introduced to the equation attempting to answer the research question. Two independent variables, i.e. controlled variables that can be changed in the experiment, will test the effect on numerous dependent variables, i.e. uncontrolled variables that are dependent on the independent variables. Given the variables we aim to investigate the power of, in conjunction with the most "known to the public" social commerce platforms available on the market, this study utilizes Amazon as its underlying social commerce platform. Thus, we follow the previous trends of leveraging existing social commerce platforms to display various product categories and conduct the experiment on.

Despite Amazon having formerly been categorized primarily as an e-commerce site, Amazon has developed and implemented social commerce tools that have become familiar concepts to most of its users. Such tools include customer reviews and the product rating system, which function as our primary components comprising the dependent variable *social popularity*, also known as peer influence. Customer reviews are peer reviews posted by other individuals who have purchased and used, or have experience with, the product or service in question. They are a form of customer feedback, and can be further separated into attribute and experience reviews, however, we make no distinction between the two for the purpose of this experiment. Wishing to establish an understanding of how reviews and other peer influence factors affect consumer behavior, we present the following two hypotheses:

H1: *Online consumers devote more attention to social influence factors pertaining to products with high price and high complexity than products with low price and low complexity*

H2: *Online consumers pay more attention to product reviews for products with high complexity than for products with low complexity*

Amazon also possesses the ability to display time left of sale and the remaining quantity currently available for products when applicable. The latter comprises our dependent variable *scarcity*, present for the product if it is sufficiently low in stock, demonstrated by Amazon with red text at the right-hand side of the product display. Complementing the study conducted by Mou and Shin (2018), we investigate quantity scarcity through the following hypotheses:

H3: *Online consumers are more fixated on price when scarcity is introduced than when scarcity is eliminated*

H4: *Online consumers reach a purchase decision quicker when scarcity is introduced than when scarcity is eliminated*

Our third dependent variable is *product information*, which is readily available for all

products on Amazon, based on what the vendor has provided as available description and information, e.g. product description, technical specifications, and product summary. The fourth dependent variable to be tested is whether or not the product was *chosen*, for each product category, when presented with the two alternatives. While this is the primary focus of the study in general, which is tested simultaneously with all other variables, we hypothesize the following:

H5: *Online consumers have a higher fixation duration proportion for products they end up purchasing than for products they do not purchase*

Our fifth and final dependent variable is the remainder of the available information on Amazon's web page for the product display, which we refer to as *distractions*. This comprises all visible elements that are not directly related to the product itself, but rather to Amazon's related product advertisements, based on their recommendation system. Examples of this includes related products, recommended products, frequently bought together, and any other recommendation system appearances. Notably, when utilizing an advert blocker extension in your web browser (e.g. AdBlock in Google Chrome), these distractions are not present. Our experiment was conducted in Google Chrome without an advert blocker extension, hence the distractions are consequently present as a dependent variable for all respondents.

The underlying assumption required to test the variables' impact on consumer decision-making is that the consumer's decision rests upon the visually available information surrounding each product and the cognitive processing that materializes from it. Supplementing prior research and answering **RQ2**, the independent, controlled variables used to investigate a possible cause and effect relationship are *price* and *complexity*. It is conjectured that the cost and information richness of a product influences our information consumption. The notion of price is a familiar concept to most, as it equates to the cost of purchasing an item. Complexity in this sense, or information richness, describes the amount of informational criteria present in an item. To exemplify, a pen has considerably fewer informational criteria than a computer, with e.g. weight, color, and dimensions, as opposed to an abundance of technical specifications. Succinctly put, the price and complexity of products may alter the social popularity, scarcity, product information, and/or distractions available for the respective products; and ultimately which product is chosen or eliminated. This leads to a two-by-two matrix in which price and complexity are variables varying from high to low, resulting in the four different product categories seen in **Figure 3.5**. Henceforth, we will use the following notation for denoting variations of high and low price and complexity: *(H/L)* indicates the combination comprising high price and low complexity, where *H* indicates high and *L* indicates low on the scale, and the order is price over complexity. This provides the basis for the following hypotheses:

H6: *Online consumers spend more time looking at reviews than price for products with high complexity*

H7: *Online consumers spend more time looking at price than reviews for products with low complexity*

By investigating the behavior and decision-making process of respondents for the various product categories, we may uncover how purchasing behavior is subject to change depending on the available information. Given the differing product categories, we hope to attain more information relevant to Sen and Lerman's (2007) discovery that individuals pass different judgment criteria and responses to utilitarian as opposed to hedonic items. We surmise that the chosen categories vary with respect to perceived hedonic versus utilitarian value for individual respondents. To gain further knowledge on this, surveying respondents post-decision on their perception of the respective items' value will complement the preceding eye tracking data and strengthen our results. Finally, this is tested with our hypothesis:

H8: *Online consumers are less fixated on price for products with high hedonic value than for those with high utilitarian value*

The areas of interest depicted in **Figure 3.4** define restricted areas from which our metrics are calculated. The AOIs are meticulously selected to obtain substantial data on the relevant variables while attempting to balance sensitivity and selectivity for the targeted areas. They are also chosen to represent and distinguish between the aforementioned variables as well as a number of additional unrelated informational sections presented by Amazon. From this, we can obtain valuable metrics such as proportion of time spent looking at an AOI, the ratio indicating how many participants looked at an AOI, dwell time, pupil dilation, and other fixation duration measurements. This is valuable in terms of insight into user engagement with various content available, unveiling how participants respond to different stimuli. Each AOI pertains to one of four of our stated dependent variables. The list of AOIs comprising our dependent variables is readily seen in **Table 3.1**. Correspondingly, these AOIs are used to measure the effect the independent variables have on the dependent variables. It must be noted that quantity solely represents scarcity, due to the absence of time scarcity.

Table 3.1: AOIs allocated to their corresponding dependent variables

Product Information	**Social Popularity**	**Scarcity**	**Distractions**
Additional Details	4 Stars and Above	Quantity	Compare Similar Products
Other Technical Details	Customer Questions and Answers		Customers Also Viewed
Price	Detailed 3 Star Reviews		Frequently Bought Together
Product Description	Detailed All Reviews		Inspired By
Product Images Small	Detailed Negative Reviews		Recommended Products
Product Main Image	Review Summary		Related Products
Product Summary	Summary Reviews		Sponsored Products
Technical Details	Top Critical Review		
Title	Top Positive Review		
Zoomed Image	Top Reviews		

We choose to represent fixation duration as the ratio of time spent viewing an AOI relative to the total time spent fixating, as this is regarded as a more informative measure. Thus, our fixation duration proportion measure indicates how much time respondents spend looking at particular AOIs

as a proportion of the total time spent on all AOIs, rather than purely time spent viewing an AOI given in milliseconds. Mathematically speaking, this is represented as the sum of the durations of all fixations within an AOI, divided by the total duration of all fixations in the stimuli. Of equal importance is our second metric, dwell time, which equates to the amount of time spent fixating within an AOI from the time of first fixation until the eyes look away from that region. Dwell time is appraised as an outstanding measurement conveying a level of interest in a specific AOI. Intuitively, an increased level of interest in an AOI is expressed with an increased dwell time (Tullis & Albert, 2013). Given that fixation count, often referred to as number of fixations, is strongly correlated with dwell time, we choose to report dwell time only, disregarding fixation count. Moreover, pupillometry, the study of pupillary response, is another key component to understanding cognitive processing. Pupil dilation is measured as the widening of the pupil, and is an indicator of mood or attitude alterations, and complex cognitive tasks (Sharafi et al., 2015; Moresi et al., 2008). Variations in pupil dilation can provide valuable insight into cognitive load (Krejtz et al., 2018), demonstrated by Hess and Polt (1964), suggesting the relation that pupil diameter increases with task difficulty. Building on this, Tullis and Albert (2013) assert that larger pupil size implies heightened interest. Finally, heat maps are effective in visually representing eye movement for a multitude of respondents. Heat maps depict accumulated fixation for all respondents as fixation density, revealing areas within stimuli that attract more attention. Higher brightness (redness) in heat maps represents more densely viewed areas (Jabeen, 2010; Tullis & Albert, 2013). As the project preceding this thesis suggests (Ormevik, 2019), heat maps depict how respondents react to the stimulus in terms of how and where looking was distributed. The visualization of accumulated focus of attention for all respondents can potentially reveal trends in attention patterns (*Working with Heat Maps and Gaze Plots*, n.d.). As such, we capture not only individual behavior but also the cumulative average amongst respondents.

Adding to the knowledge base obtained by prior studies, this study introduces additional simultaneous product and environmental variables to the experiment. In addition, it incorporates both the survey and interview method to attain complementary data reinforcing the validity of the eye tracking data. We refer to environmental variables as being the attributes relating not directly to the product itself, but rather imposed restrictions (e.g. scarcity) and peer impact (e.g. social popularity). Thus we deem product variables to be attributes directly related to the product (e.g. price and product specification). This is to account for the intricacy of decision-making in real scenarios, not limiting purchasing behavior to one or a few impacting factors. Where previous studies have investigated behavior isolated on either price variability, visual cues, social popularity, or scarcity, we study a combination of these factors while simultaneously introducing the concept of product complexity. Adjusting the measurement of these variables on a scale of high to low, and analyzing the respective results can grant a more broadened understanding of online consumer behavior.

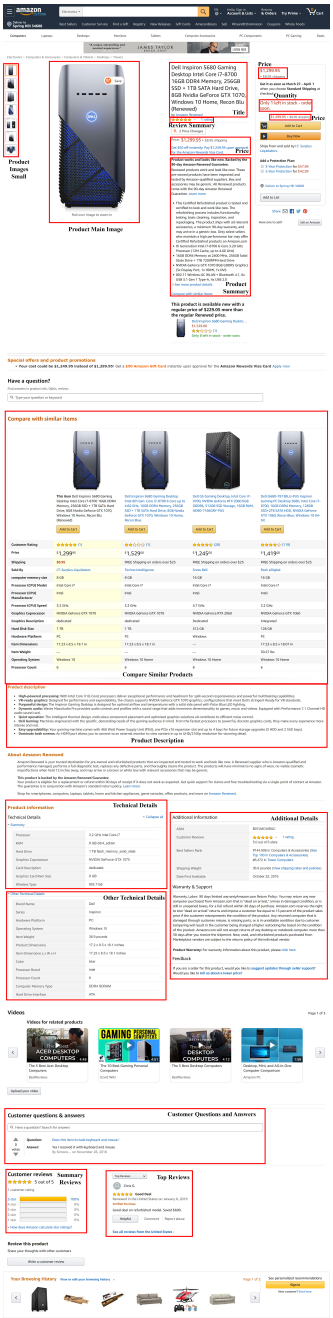


Figure 3.4: Amazon's product page for product #1 pertaining to its respective product category

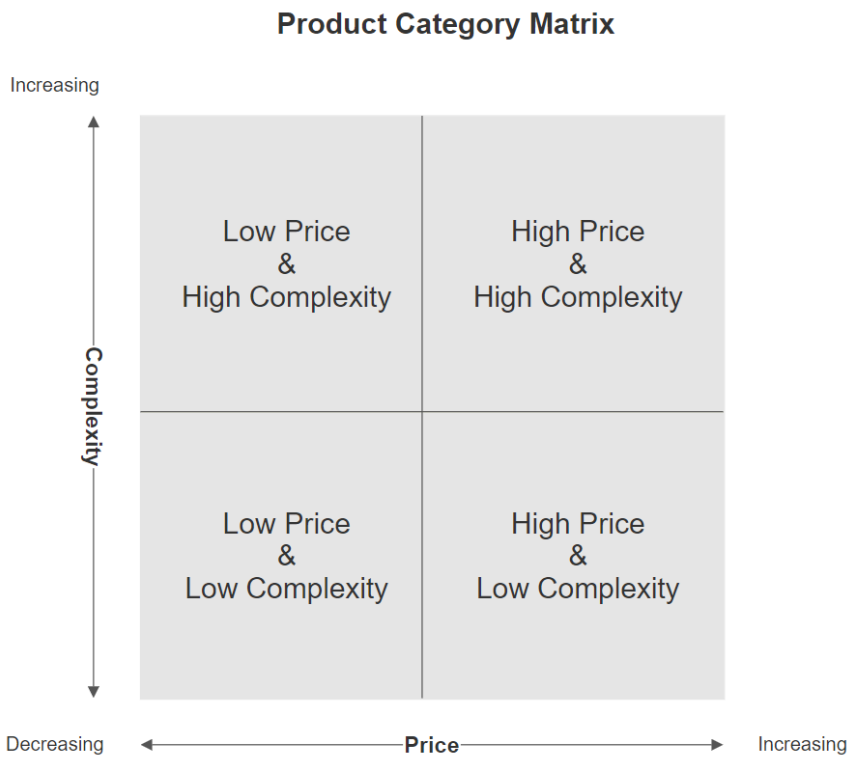


Figure 3.5: Two-by-two matrix indicating the four product categories included in the experiment; with the independent variables *price* and *complexity* along the x and y axes accordingly.

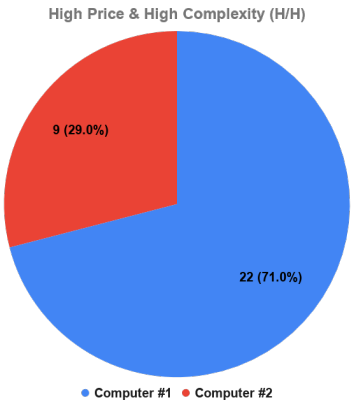
Chapter 4

Results

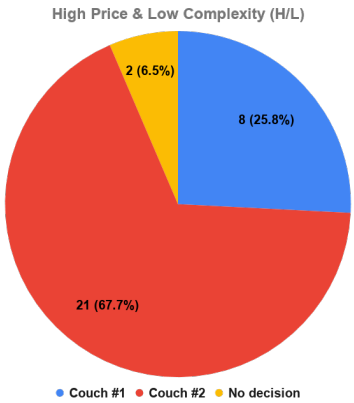
The eye tracking study did not exclude any participants from the results, as data collection was deemed to be valid beyond our threshold for all participants. Consequently, data from all 31 participants is presented below, composed of product decisions, eye tracking experiment data, and survey responses. **Figure 4.1** represents the purchasing decisions made by all respondents during the eye tracking experiment. The overall experiment revealed that respondents overwhelmingly decided upon Computer #1 for products pertaining to the *(H/H)* category, depicted in **4.1a**. Evident from the post-experiment interviews, respondents emphasized that Computer #1 had decidedly better specifications at a similar price, hence the increased selection of said product. The differences in product presentation between the products may have played a part in the decision-making process. Whereas Computer #1, the predominantly selected item, had a more verbal approach to the product description in an attempt to further sell the product, Computer #2 merely listed the specifications in a factual manner. Moreover, Computer #1 was listed as refurbished, included a display of shipping costs, information stating that there was only one item left in stock, and included one customer review and rating of 5.0 stars. Conversely, Computer #2 was listed as new, did not display shipping costs, had seven items left in stock, and an absence of reviews and ratings entirely.

In contradistinction to the *(H/H)* product alternatives, the *(H/L)* alternatives both have the same seller, Stone & Beam. Consequently, their respective available product description and information is highly comparable in terms of presentation. The only major dissimilarities being dimensions, aesthetics, and color, size, and fabric choices, as well as a distinct difference in the amount of customers reviews and ratings given. At the time when the initial experiment was conducted, February 17th, 2020, Couch #1 had received a total of 50 reviews and 52 ratings, yielding an average rating of 4.3 stars. Comparatively, Couch #2 received 324 reviews and 373 ratings, yielding 4.5 stars on average. Respondents displayed a preference toward Couch #2, producing this a purchasing decision 67.7% of the time, as depicted in 4.1b. Note that two $(n = 2)$ respondents obtained a "Decision not reached" result for the product category pertaining to *(H/L)*. The reasoning behind this being that they had no interest in purchasing a couch without physically testing it beforehand.

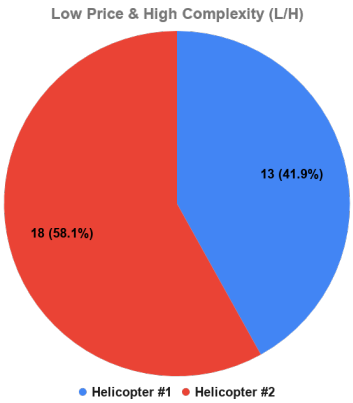
Despite having dissimilar sellers, the *(L/H)* product alternatives portray great similarities for product presentation as well as environmental variables, such as product information, quantity, and peer ratings. The only significant difference being a higher amount of total ratings for Helicopter #2, however, still yielding a near equivalent average rating of 4 stars. Correspondingly, both Mikado stick games in the *(L/L)* category display minimal product descriptions, brief product summaries, and near equivalent product information and peer ratings. The only immediate difference lies in the



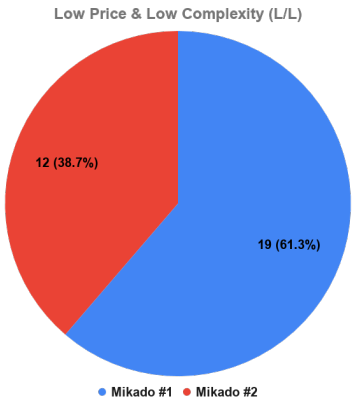
(a) Stationary computer



(b) Two seater couch



(c) Remote-controlled helicopter



(d) Mikado stick game

Figure 4.1: Proportion of selected product alternatives by respondents for all respective product categories

available quantity, with Mikado #1 being in stock and Mikado #2 showing a quantity scarcity of 12 in stock.

4.1 Fixation Duration Proportion

Descriptive statistics for fixation duration proportion are shown in **Table 4.1**, indicating the overall mean and standard deviations of fixation duration proportion accumulated for all respondents per AOI. Note that a total of 28 uniquely defined AOIs functioned as our primary target areas from which all succeeding measurements are calculated. This includes fixation duration proportion, dwell time, and pupil dilation. Areas outside of the predefined AOIs are disregarded in the analysis due to them being inconsequential in answering the research questions.

Table 4.1: Mean and standard deviations for fixation duration per AOI.

AOI	Mean	SD
4 Stars and Above	0.002	0.002
Additional Details	0.005	0.008
Compare Similar Products	0.008	0.014
Customer Questions and Answers	0.007	0.012
Customers Also Viewed	0.004	NA
Detailed 3 Star Reviews	0.026	0.014
Detailed All Reviews	0.017	NA
Detailed Negative Reviews	0.033	0.029
Frequently Bought Together	0.003	0.004
Inspired By	0.001	0.000
Other Technical Details	0.024	0.024
Price	0.005	0.008
Product Description	0.018	0.028
Product Images Small	0.010	0.016
Product Main Image	0.019	0.020
Product Summary	0.034	0.041
Quantity	0.007	0.025
Recommended Products	0.008	0.015
Related Products	0.004	0.006
Review Summary	0.003	0.006
Sponsored Products	0.015	0.016
Summary Reviews	0.003	0.002
Technical Details	0.007	0.015
Title	0.013	0.023
Top Critical Review	0.003	0.003
Top Positive Review	0.004	0.007
Top Reviews	0.042	0.040
Zoomed Image	0.038	NA

Note, for all succeeding sections, that the notations *Yes* and *No* indicate whether or not the product of interest was chosen. Further, note that the notation *Category* in the results refers to all product categories combined.

We also calculated a one-way analysis of variance on participants' total fixation duration for specific AOIs within specific product categories relative to the total sum of time spent viewing all AOIs. The results from the ANOVA analysis proved significantly different for the (H/L) category, shown in **Table 4.2**. This result indicates that there was a significant difference between proportion of time spent looking at the price of couches and whether or not the product was chosen $(F[1, 22] = 4.32, p = .049)$, $(M_{No} = 0.007, SD_{No} = 0.006 : M_{Yes} = 0.00264, SD_{Yes} = 0.00308)$. There was also a significant difference between proportion of time spent looking at the top reviews of couches and whether or not this product was chosen $(F[1, 29] = 6.86, p = .014)$, $(M_{No} = 0.062, SD_{No} = 0.040 : M_{Yes} = 0.0301, SD_{Yes} = 0.0271)$. The mean fixation duration proportion was also substantially higher for these two AOIs, pertaining to *Product Information* and *Social Popularity*, when the product was eliminated rather than chosen.

Table 4.2: Significantly different ANOVA results on fixation duration proportion for all AOIs in the *Couch* category (H/L)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Price Couch	1, 22	4.32	0.049	(0.007, 0.00264)	(0.006, 0.00308)
Top Reviews Couch	1, 29	6.86	0.014	(0.062, 0.0301)	(0.040, 0.0271)

Further, **Table 4.3** shows that there was a statistically significant difference between proportion of time spent viewing customer questions and answers for Mikado stick games and whether or not the product was chosen $(F[1, 28] = 5.170, p = .031)$, $(M_{No} = 0.003, SD_{No} = 0.004 : M_{Yes} = 0.00826, SD_{Yes} = 0.00861)$. Contrary to the AOI belonging to *Social Popularity* in the (H/L) category, the mean fixation duration proportion was higher for the selected product in the (L/L) category.

Table 4.3: Significantly different ANOVA results on fixation duration proportion for all AOIs in the *Mikado* category (L/L)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Customer Questions and Answers Mikado	1, 28	5.17	0.031	(0.003, 0.00826)	(0.004, 0.00861)

Table 4.4 displays the statistically significant results for AOIs and all product categories. Grouping the AOIs together according to dependent variables, the results are the following. For the dependent variable *Product Information*, there was a significant difference between whether the product was chosen or eliminated, and the proportion of time spent looking at additional details $(F[2, 69] = 5.07, p = 0.009)$, $(M_{No} = 0.003, SD_{No} = 0.005 : M_{Yes} = 0.00638, SD_{Yes} = 0.0102)$, product description $(F[3, 123] = 13.8, p = 0.000)$, $(M_{No} = 0.0170, SD_{No} = 0.031 : M_{Yes} = 0.0195, SD_{Yes} = 0.0247)$, product summary $(F[3, 216] = 28.3, p = 0.000)$, $(M_{No} = 0.0340, SD_{No} = 0.038 : M_{Yes} = 0.0344, SD_{Yes} = 0.0447)$, technical details $(F[3, 147] = 9.53, p = 0.000)$, $(M_{No} = 0.0060, SD_{No} = 0.016 : M_{Yes} = 0.0071, SD_{Yes} = 0.0137)$, and finally title $(F[3, 185] = 12.2, p = 0.000)$, $(M_{No} = 0.0120, SD_{No} = 0.020 : M_{Yes} = 0.0141, SD_{Yes} = 0.0249)$. The mean fixation duration on overall product information was moderately higher for selected products than for eliminated products. Moreover, for the dependent variable *Social Popularity*, a significant difference was found for whether or not the product was selected to be bought and proportion of time spent gazing at customer questions and answers $(F[3, 106] = 3.28, p = 0.024)$, $(M_{No} = 0.006, SD_{No} = 0.013 : M_{Yes} = 0.00742, SD_{Yes} = 0.0111)$, detailed negative reviews $(F[2, 11] = 10.6, p = 0.003)$, $(M_{No} = 0.0360, SD_{No} = 0.031 : M_{Yes} = 0.0309, SD_{Yes} = 0.03)$, top critical review $(F[2, 2] = 31, p = 0.031)$, $(M_{No} = 0.0050, SD_{No} = 0.004 : M_{Yes} = 0.00117, SD_{Yes} = 0.00037)$, and top reviews $(F[3, 94] = 5.87, p = 0.001)$, $(M_{No} = 0.0520, SD_{No} = 0.046 : M_{Yes} = 0.0337, SD_{Yes} = 0.0312)$. The majority of mean fixation duration proportion measurements for *Social Popularity* are higher for eliminated products, with the exception of customer questions and answers, which signifies the contrary. Lastly, the only significant difference for the dependent variable *Distractions*, lies within Amazon's generated compare similar products $(F[3, 138] = 3.66, p = 0.014)$, $(M_{No} = 0.010, SD_{No} = 0.019 : M_{Yes} = 0.00713, SD_{Yes} = 0.00917)$, where the mean is higher for eliminated products yet again.

Table 4.4: Significantly different ANOVA and associated pairwise ANOVA results on fixation duration proportion for all AOIs for all product categories

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Additional Details Category	2, 69	5.07	0.009	(0.003, 0.00638)	(0.005, 0.0102)
Compare Similar Products Category	3, 138	3.66	0.014	(0.010, 0.00713)	(0.019, 0.00917)
Customer Questions and Answers Category	3, 106	3.28	0.024	(0.006, 0.00742)	(0.013, 0.0111)
Detailed Negative Reviews Category	2, 11	10.6	0.003	(0.036, 0.0309)	(0.031, 0.03)
Product Description Category	3, 123	13.8	0	(0.017, 0.0195)	(0.031, 0.0247)
Product Summary Category	3, 216	28.3	0	(0.034, 0.0344)	(0.038, 0.0447)
Technical Details Category	3, 147	9.53	0	(0.006, 0.0071)	(0.016, 0.0137)
Title Category	3, 185	12.2	0	(0.012, 0.0141)	(0.020, 0.0249)
Top Critical Review Category	2, 2	31	0.031	(0.005, 0.00117)	(0.004, 0.00037)
Top Reviews Category	3, 94	5.87	0.001	(0.052, 0.0337)	(0.046, 0.0312)

Post hoc multiple comparisons tests were conducted to reveal the means that differ. Through pairwise ANOVA tests on all combinations of product categories, we obtained the results viewed in **Table 4.5**. This pairwise ANOVA analysis revealed significantly different results for additional details between *Computer* (H/H) and *Couch* (H/L) ($F[1, 49] = 10.2, p = 0.002$), and between *Couch* (H/L) and *Helicopter* (L/H) ($F[1, 37] = 6.6, p = 0.014$). Similarly, significantly different results were uncovered for product description between *Computer* (H/H) and *Helicopter* (L/H) ($F[1, 80] = 15, p = 0.000$), between *Couch* (H/L) and *Helicopter* (L/H) ($F[1, 75] = 18.2, p = 0.000$), between *Couch* (H/L) and *Mikado* (L/L) ($F[1, 43] = 8, p = 0.007$), and finally between *Helicopter* (L/H) and *Mikado* (L/L) ($F[1, 60] = 14.5, p = 0.000$). This was also the case for product summary between *Computer* (H/H) and *Couch* (H/L) ($F[1, 100] = 12.6, p = 0.001$), *Computer* (H/H) and *Helicopter* (L/H) ($F[1, 122] = 7.68, p = 0.006$), *Computer* (H/H) and *Mikado* (L/L) ($F[1, 118] = 39.7, p = 0.000$), *Couch* (H/L) and *Helicopter* (L/H) ($F[1, 98] = 31.5, p = 0.000$), *Couch* (H/L) and *Mikado* (L/L) ($F[1, 94] = 65.2, p = 0.000$), and between *Helicopter* (L/H) and *Mikado* (L/L) ($F[1, 116] = 13.8, p = 0.000$). Technical details also showed significantly different results for the combinations *Computer* (H/H) and *Couch* (H/L) ($F[1, 51] = 4.67, p = 0.035$), *Computer* (H/H) and *Helicopter* (L/H) ($F[1, 99] = 14.4, p = 0.000$), and *Computer* (H/H) and *Mikado* (L/L) ($F[1, 73] = 11, p = 0.001$). Lastly, the same can be said for the title, pertaining to the product categories *Computer* (H/H) and *Couch* (H/L) ($F[1, 90] = 10.7, p = 0.002$), *Computer* (H/H) and *Helicopter* (L/H) ($F[1, 115] = 10.9, p = 0.001$), *Computer* (H/H) and *Mikado* (L/L) ($F[1, 96] = 17.2, p = 0.000$), and *Helicopter* (L/H) and *Mikado* (L/L) ($F[1, 95] = 15.8, p = 0.000$).

Furthermore, compare similar products displayed significantly different results for the following two combinations. *Computer* (H/H) and *Helicopter* (L/H) ($F[1, 75] = 7.53, p = 0.008$), and *Computer* (H/H) and *Mikado* (L/L) ($F[1, 65] = 5.35, p = 0.024$). Equivalently so for customer questions and answers, with *Computer* (H/H) and *Helicopter* (L/H) ($F[1, 49] = 10.2, p = 0.002$),

and *Helicopter* (L/H) and *Mikado* (L/L) ($F[1, 53] = 5.08, p = 0.028$). Continuing with the social influence variable, detailed negative reviews provided significantly different results for *Couch* (H/L) and *Mikado* (L/L) ($F[1, 7] = 16, p = 0.005$), as well as for *Helicopter* (L/H) and *Mikado* (L/L) ($F[1, 9] = 14.8, p = 0.004$). The top critical review only showed significantly different results for the *Helicopter* (L/H) and *Mikado* (L/L) combination ($F[1, 1] = 244, p = 0.041$). Finally, top reviews yielded significantly different results for *Computer* (H/H) and *Couch* (H/L) ($F[1, 34] = 7.22, p = 0.011$), for *Computer* (H/H) and *Helicopter* (L/H) ($F[1, 42] = 7.42, p = 0.009$), for *Computer* (H/H) and *Mikado* (L/L) ($F[1, 26] = 6.9, p = 0.014$), and for *Helicopter* (L/H) and *Mikado* (L/L) ($F[1, 60] = 10.2, p = 0.002$)

Table 4.5: Significantly different ANOVA and associated pairwise ANOVA results on fixation duration proportion for all AOIs for product category combinations

AOI	**df**	**F value**	**p**
Additional Details Computer Couch	1, 49	10.2	0.002
Additional Details Couch Helicopter	1, 37	6.6	0.014
Compare Similar Products Computer Helicopter	1, 75	7.53	0.008
Compare Similar Products Computer Mikado	1, 65	5.35	0.024
Customer Questions and Answers Computer Helicopter	1, 49	10.2	0.002
Customer Questions and Answers Helicopter Mikado	1, 53	5.08	0.028
Detailed Negative Reviews Couch Mikado	1, 7	16	0.005
Detailed Negative Reviews Helicopter Mikado	1, 9	14.8	0.004
Product Description Computer Helicopter	1, 80	15	0
Product Description Couch Helicopter	1, 75	18.2	0
Product Description Couch Mikado	1, 43	8	0.007
Product Description Helicopter Mikado	1, 60	14.5	0
Product Summary Computer Couch	1, 100	12.6	0.001
Product Summary Computer Helicopter	1, 122	7.68	0.006
Product Summary Computer Mikado	1, 118	39.7	0
Product Summary Couch Helicopter	1, 98	31.5	0
Product Summary Couch Mikado	1, 94	65.2	0
Product Summary Helicopter Mikado	1, 116	13.8	0

Technical Details Computer Couch	1, 51	4.67	0.035
Technical Details Computer Helicopter	1, 99	14.4	0
Technical Details Computer Mikado	1, 73	11	0.001
Title Computer Couch	1, 90	10.7	0.002
Title Computer Helicopter	1, 115	10.9	0.001
Title Computer Mikado	1, 96	17.2	0
Title Helicopter Mikado	1, 95	15.8	0
Top Critical Review Helicopter Mikado	1, 1	244	0.041
Top Reviews Computer Couch	1, 34	7.22	0.011
Top Reviews Computer Helicopter	1, 42	7.42	0.009
Top Reviews Computer Mikado	1, 26	6.9	0.014
Top Reviews Helicopter Mikado	1, 60	10.2	0.002

Conclusively, **Table 4.6** shows the significantly different result between proportion of time spent looking at top reviews, irrespective of product category, and whether or not the product was chosen $(F[1, 96] = 5.400, p = .022)$, $(M_{No} = 0.052, SD_{No} = 0.046 : M_{Yes} = 0.0337, SD_{Yes} = 0.0312)$. Evident from this, the mean fixation duration proportion for top reviews is higher for eliminated products than chosen products.

Table 4.6: ANOVA results on fixation duration proportion for all AOIs of products chosen irrespective of product category

AOI	**df**	**F value**	**p**	**Mean(No, Yes)**	**SD(No, Yes)**
Top Reviews Chosen	1, 96	5.4	0.022	(0.052, 0.0337)	(0.046, 0.0312)

The associated plots for all significantly different fixation duration proportion metrics are shown in the five consecutive figures below, illustrating the means and confidence intervals for the respective groups in question. The plots further depict the differences in mean fixation duration proportion between the various product categories for the discussed AOIs.

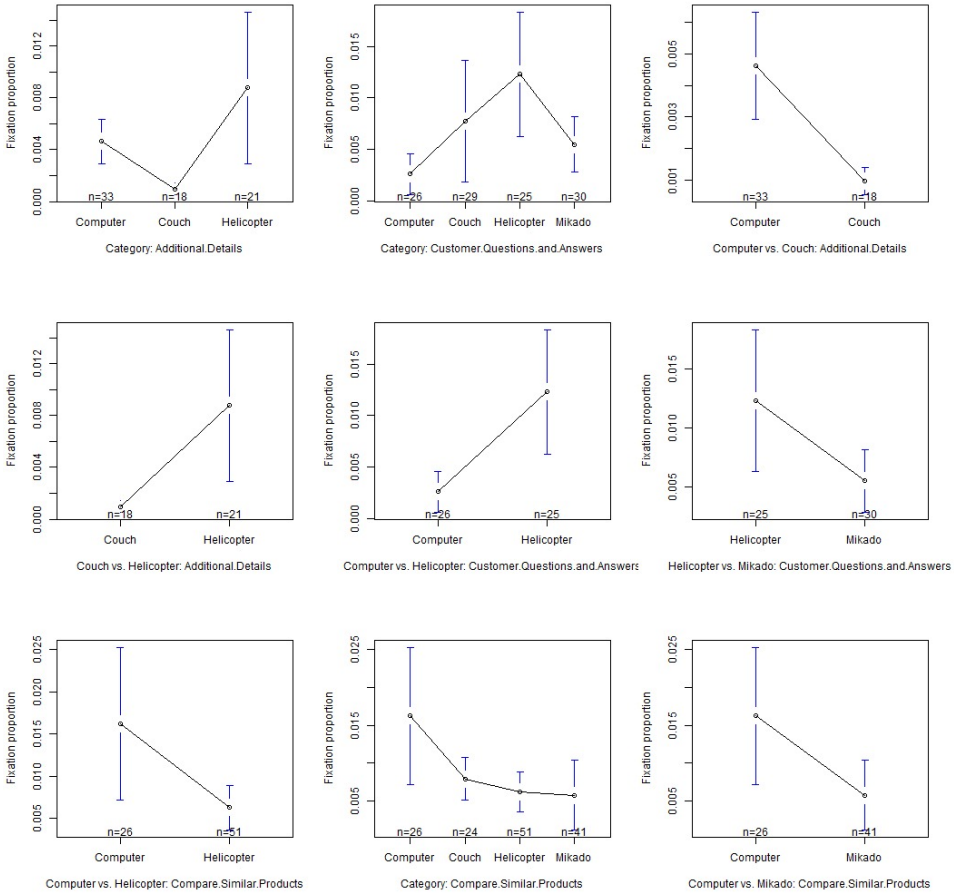


Figure 4.2: Mean and confidence interval plots of ANOVA results on fixation duration proportion for all AOIs with significantly different results (1-9)

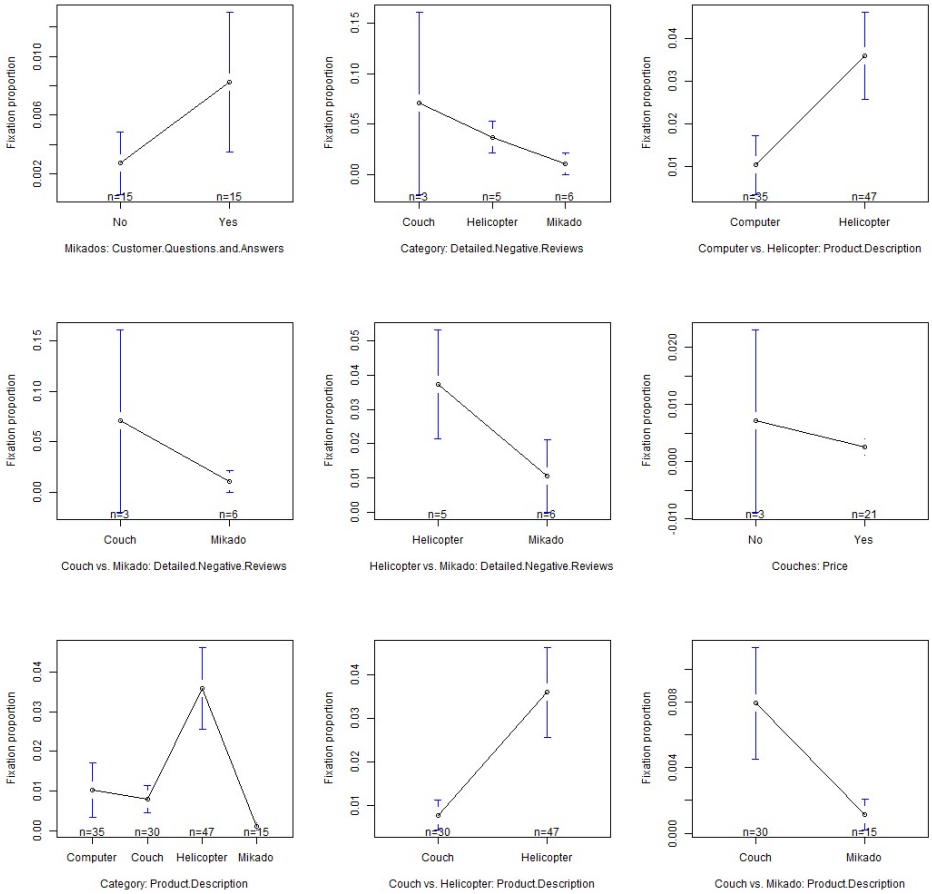


Figure 4.3: Mean and confidence interval plots of ANOVA results on fixation duration proportion for all AOIs with significantly different results (10-18)

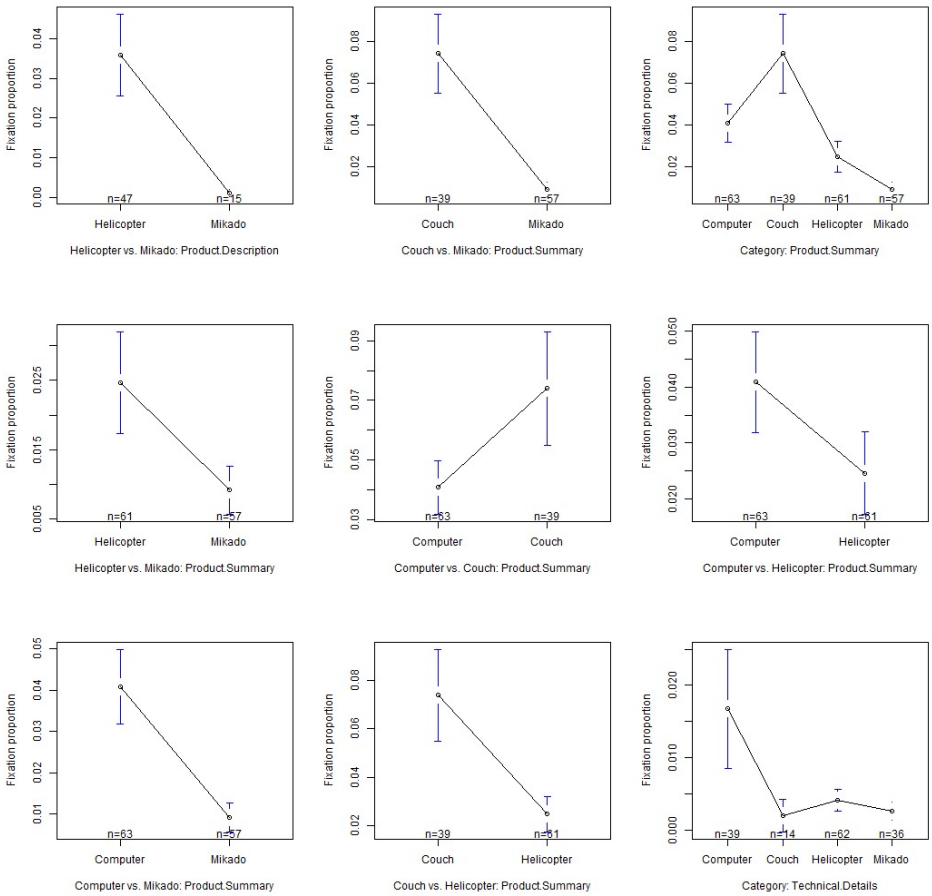


Figure 4.4: Mean and confidence interval plots of ANOVA results on fixation duration proportion for all AOIs with significantly different results (19-27)

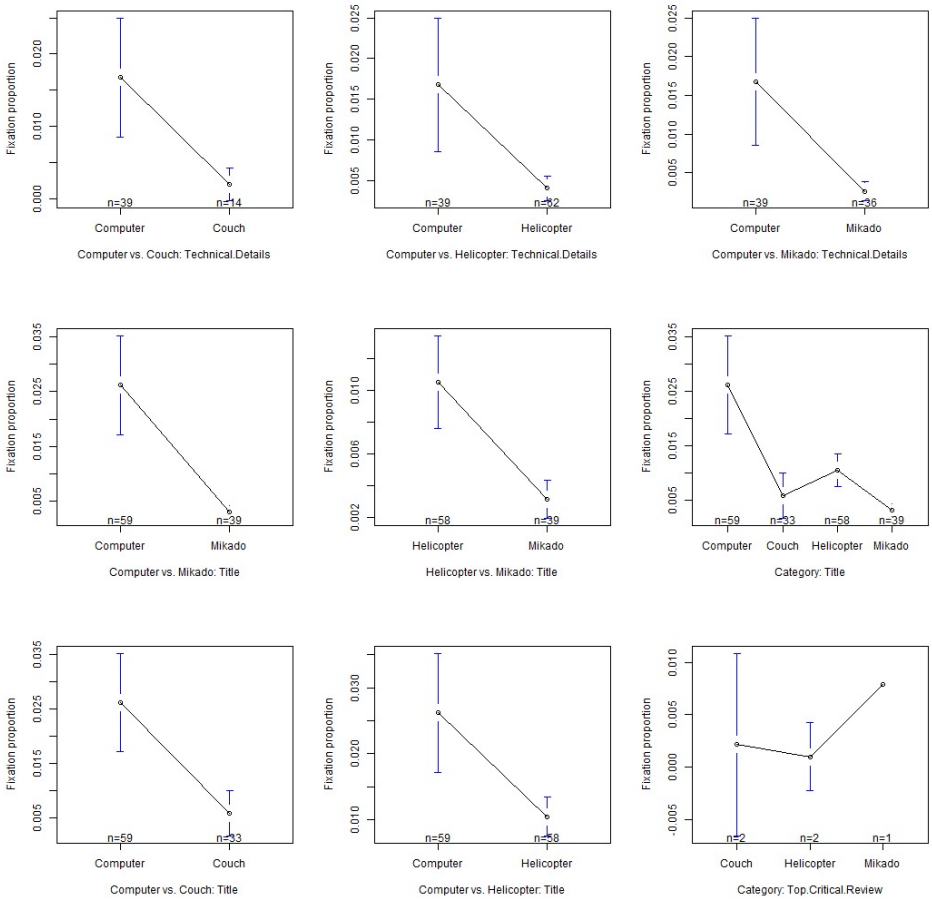


Figure 4.5: Mean and confidence interval plots of ANOVA results on fixation duration proportion for all AOIs with significantly different results (28-36)

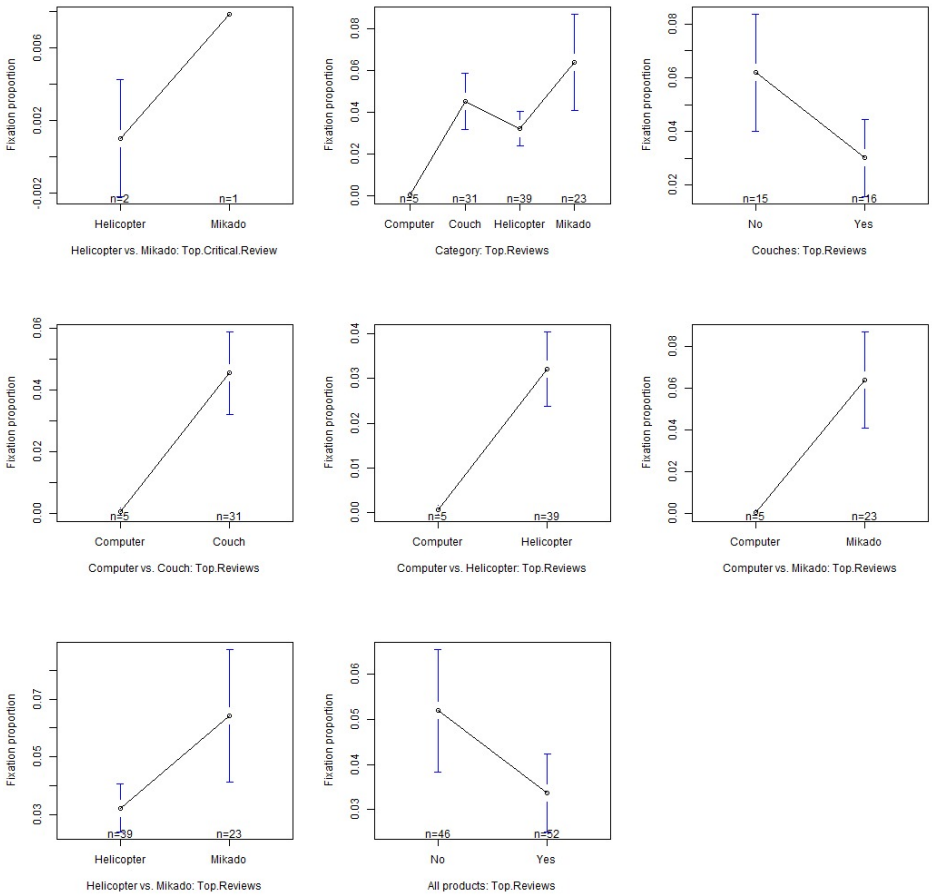


Figure 4.6: Mean and confidence interval plots of ANOVA results on fixation duration proportion for all AOIs with significantly different results (37-44)

Consequently, the remainder of AOIs not discussed were found to be insignificantly different. These AOIs include 4 stars and above, customers also viewed, detailed 3 star reviews, detailed all reviews, frequently bought together, product images small, product main image, quantity, recommended products, related products, review summary, sponsored products, summary reviews, top positive review, and zoomed image. The complete results of the fixation duration proportion ANOVA can be seen in **Appendix C.7**, organized according to product category.

4.2 Dwell Time

Descriptive statistics for dwell time are shown in **Table 4.7**, indicating the overall mean and standard deviations of dwell time accumulated for all respondents per AOI.

Table 4.7: Mean and standard deviations for dwell time per AOI.

AOI	Mean	SD
4 Stars and Above	7328.879	10463.205
Additional Details	19445.528	37873.858
Compare Similar Products	22022.148	30616.333
Customer Questions and Answers	20236.955	40976.865
Customers Also Viewed	26631.000	NA
Detailed 3 Star Reviews	67343.667	36830.460
Detailed All Reviews	20762.000	NA
Detailed Negative Reviews	179643.786	270325.845
Frequently Bought Together	8846.367	13407.574
Inspired By	3137.500	3031.367
Other Technical Details	67576.721	81769.657
Price	14231.902	31248.412
Product Description	67427.969	134689.367
Product Images Small	19247.719	24320.236
Product Main Image	57376.720	75196.310
Product Summary	111521.045	164035.975
Quantity	7931.327	18244.135
Recommended Products	14210.340	12816.416
Related Products	10740.168	19573.797
Review Summary	8048.759	14765.800
Sponsored Products	76226.471	131082.714
Summary Reviews	10270.385	9321.066
Technical Details	20495.232	52210.867
Title	30710.503	42641.358
Top Critical Review	12214.400	13005.144
Top Positive Review	13272.500	16413.507
Top Reviews	157491.214	206637.848
Zoomed Image	178599.000	NA

Equivalently to the fixation duration proportion, a one-way analysis of variance on was conducted on participants' dwell time for specific AOIs within a product category, i.e the total amount of time spent fixating within the respective AOI. Firstly, **Table 4.8** indicates that there is a statistically significant difference between total time spent looking at the title of couches and whether or not the product was chosen $(F[1, 31] = 6.18, p = .019)$, $(M_{No} = 4.14e + 03, SD_{No} = 3.42e + 03 : M_{Yes} = 2.54e + 04, SD_{Yes} = 3.05e + 04)$. It also discovered a significant difference between total time spent looking at the top reviews of couches and whether or not this product was chosen $(F[1, 29] = 5.42, p = .027)$, $(M_{No} = 2.41e + 05, SD_{No} = 2.03e + 05 : M_{Yes} = 1.1e + 05, SD_{Yes} = 9.48e + 04)$. The AOI title, under the dependent variable *Product Information* resulted in a remarkably higher mean dwell time for chosen products, whereas its top reviews counterpart, which pertains to *Social Popularity*, yielded a higher mean dwell time for eliminated products.

Table 4.8: Significantly different ANOVA results on dwell time for all AOIs in the *Couch* category (H/L)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Title Couch	1, 31	6.18	0.019	(4.14e+03, 2.54e+04)	(3.42e+03, 3.05e+04)

Top Reviews Couch	1, 29	5.42	0.027	(2.41e+05, 1.1e+05)	(2.03e+05, 9.48e+04)

Further, **Table 4.9** shows that there is a significant difference between the total time spent looking at customer questions and answers for Mikado stick games and whether or not the product was chosen ($F[1, 28] = 8.16, p = .008$), ($M_{No} = 5.72e + 03, SD_{No} = 5.73e + 03 : M_{Yes} = 2.37e + 04, SD_{Yes} = 2.37e + 04$). Following its previous trend, customer questions and answers, under *Social Popularity*, also resulted in a significantly higher mean dwell time for selected products than its eliminated counterpart.

Table 4.9: Significantly different ANOVA results on dwell time for all AOIs in the *Mikado* category (L/L)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Customer Questions and Answers Mikado	1, 28	8.16	0.008	(5.72e+03, 2.37e+04)	(5.73e+03, 2.37e+04)

Table 4.10 indicates statistically significant results for various AOIs with respect to all product categories. Proceeding with the grouping of AOIs according to dependent variables, the results are the following. For the dependent variable *Product Information*, there is a significant difference between whether the product was chosen or eliminated, and the proportion of time spent looking at additional details ($F[2, 69] = 3.18, p = 0.048$), ($M_{No} = 1.37e + 04, SD_{No} = 2.63e + 04 : M_{Yes} = 2.49e + 04, SD_{Yes} = 4.6e + 04$), price ($F[3, 272] = 3.08, p = 0.028$), ($M_{No} = (1.6e + 04, SD_{No} = 3.99e + 04 : M_{Yes} = 1.29e + 04, SD_{Yes} = 2.26e + 04$), product description ($F[3, 123] = 10.2, p = 0.000$), ($M_{No} = 5.8e + 04, SD_{No} = 1.36e + 05 : M_{Yes} = 7.64e + 04, SD_{Yes} = 1.34e + 05$), product summary ($F[3, 216] = 18.4, p = 0.000$), ($M_{No} = 1.09e + 05, SD_{No} = 1.42e + 05 : M_{Yes} = 1.14e + 05, SD_{Yes} = 1.82e + 05$), technical details ($F[3, 147] = 6.6, p = 0.000$), ($M_{No} = 2.12e + 04, SD_{No} = 6.52e + 04 : M_{Yes} = 1.98e + 04, SD_{Yes} = 3.54e + 04$), and title ($F[3, 185] = 9.31, p = 0.000$), ($M_{No} = 2.86e + 04, SD_{No} = 3.87e + 04 : M_{Yes} = 3.26e + 04, SD_{Yes} = 4.59e + 04$). Overall, the mean dwell time showed a higher mean dwell time for selected products in additional details, product description and title, and in contrast, a higher mean dwell time for eliminated products in price and technical details. For product summary, this mean was near equal, and thus disregarded. Additionally, for the dependent variable *Social Popularity*, significant differences were found for whether or not the product was selected to be bought and the total amount of time spent fixating on customer questions and answers ($F[3, 106] = 3.67, p = 0.015$), ($M_{No} = 1.56e + 04, SD_{No} = 2.75e + 04 : M_{Yes} = 2.44e + 04, SD_{Yes} = 4.99e + 04$), detailed negative reviews ($F[2, 11] = 6.24, p = 0.015$), ($M_{No} = 2.09e + 05, SD_{No} = 3.04e + 05 : M_{Yes} = 1.58e + 05, SD_{Yes} = 2.61e + 05$), and top reviews ($F[3, 94] = 3.54, p = 0.018$), ($M_{No} = 2.12e+05, SD_{No} = 2.7e+05 : M_{Yes} = 1.09e+05, SD_{Yes} = 1.07e+05$). Customer questions and answers persisted in its trend of displaying a higher mean for selected products, while the other AOIs pertaining to the dependent variable *Social Popularity* signaled the opposite. Finally, the only significant difference for the dependent variable *Distractions*, similarly to fixation duration proportion, belonged to Amazon's compare similar products ($F[3, 138] = 5.88, p = 0.001$), ($M_{No} = 2.18e + 04, SD_{No} = 2.85e + 04 : M_{Yes} = 2.22e + 04, SD_{Yes} = 3.21e + 04$), with a near equal mean dwell time.

Table 4.10: Significantly different ANOVA and associated pairwise ANOVA results on dwell time for all AOIs for all product categories

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Additional Details Category	2, 69	3.18	0.048	(1.37e+04, 2.49e+04)	(2.63e+04, 4.6e+04)
Compare Similar Products Category	3, 138	5.88	0.001	(2.18e+04, 2.22e+04)	(2.85e+04, 3.21e+04)
Customer Questions and Answers Category	3, 106	3.67	0.015	(1.56e+04, 2.44e+04)	(2.75e+04, 4.99e+04)
Detailed Negative Reviews Category	2, 11	6.24	0.015	(2.09e+05, 1.58e+05)	(3.04e+05, 2.61e+05)
Price Category	3, 272	3.08	0.028	(1.6e+04, 1.29e+04)	(3.99e+04, 2.26e+04)
Product Description Category	3, 123	10.2	0	(5.8e+04, 7.64e+04)	(1.36e+05, 1.34e+05)
Product Summary Category	3, 216	18.4	0	(1.09e+05, 1.14e+05)	(1.42e+05, 1.82e+05)
Technical Details Category	3, 147	6.6	0	(2.12e+04, 1.98e+04)	(6.52e+04, 3.54e+04)
Title Category	3, 185	9.31	0	(2.86e+04, 3.26e+04)	(3.87e+04, 4.59e+04)
Top Reviews Category	3, 94	3.54	0.018	(2.12e+05, 1.09e+05)	(2.7e+05, 1.07e+05)

The associated post hoc pairwise ANOVA analysis for product category combinations are depicted in **Table 4.11**. This post hoc test revealed statistically significantly different results for additional details between *Computer* (H/H) and *Couch* (H/L) $(F[1, 49] = 4.81, p = 0.033)$, as well as for *Couch* (H/L) and *Helicopter* (L/H) $(F[1, 37] = 4.91, p = 0.033)$. Similarly, significantly different results were uncovered for product description between *Computer* (H/H) and *Helicopter* (L/H) $(F[1, 80] = 12.2, p = 0.001)$, *Couch* (H/L) and *Helicopter* (L/H) $(F[1, 75] = 12, p = 0.001)$, *Couch* (H/L) and *Mikado* (L/L) $(F[1, 43] = 6.66, p = 0.013)$, and for *Helicopter* (L/H) and *Mikado* (L/L) $(F[1, 60] = 8.35, p = 0.005)$. This is also the case for product summary between *Computer* (H/H) and *Couch* (H/L) $(F[1, 100] = 14.5, p = 0.000)$, *Computer* (H/H) and *Mikado* (L/L) $(F[1, 118] = 22.2, p = 0.000)$, *Couch* (H/L) and *Helicopter* (L/H) $(F[1, 98] = 16.9, p = 0.000)$, *Couch* (H/L) and *Mikado* (L/L) $(F[1, 94] = 41.6, p = 0.000)$, and for *Helicopter* (L/H) and *Mikado* (L/L) $(F[1, 116] = 10.5, p = 0.002)$. Technical details also showed significantly different results for the combinations *Computer* (H/H) and *Helicopter* (L/H) $(F[1, 99] = 9.99, p = 0.002)$, and *Computer* (H/H) and *Mikado* (L/L) $(F[1, 73] = 7.71, p = 0.007)$. The same can be said for the price, pertaining to the product categories *Helicopter* (L/H) and *Mikado* (L/L) $(F[1, 152] = 5.57, p = 0.020)$. Lastly, the following combinations unveiled significantly different results for

total amount of time spent looking at the title of the products. *Computer* (H/H) and *Couch* (H/L) ($F[1, 90] = 12.5, p = 0.001$), *Computer* (H/H) and *Mikado* (L/L) ($F[1, 96] = 25.6, p = 0.000$), and *Helicopter* (L/H) and *Mikado* (L/L) ($F[1, 95] = 10.3, p = 0.002$).

In addition to this, compare similar products displayed significantly different results for the following four product category combinations. *Computer* (H/H) and *Helicopter* (L/H) ($F[1, 75] = 7.16, p = 0.009$), *Computer* (H/H) and *Mikado* (L/L) ($F[1, 65] = 10.2, p = 0.002$), *Couch* (H/L) and *Helicopter* (L/H) ($F[1, 73] = 6.27, p = 0.014$), and *Couch* (H/L) and *Mikado* (L/L) ($F[1, 63] = 11.1, p = 0.001$). Equivalently so for customer questions and answers, with *Computer* (H/H) and *Couch* (H/L) ($F[1, 53] = 4.81, p = 0.033$), for *Computer* (H/H) and *Helicopter* (L/H) ($F[1, 49] = 7.49, p = 0.009$), and for *Computer* (H/H) and *Mikado* (L/L) ($F[1, 54] = 6.74, p = 0.012$). The detailed negative reviews only showed significantly different results for the *Couch* (H/L) and *Mikado* (L/L) combination ($F[1, 7] = 8.6, p = 0.022$). Finally, similarly to fixation duration proportion, top reviews yielded significantly different results for *Computer* (H/H) and *Couch* (H/L) ($F[1, 34] = 5.12, p = 0.030$), *Computer* (H/H) and *Helicopter* (L/H) ($F[1, 42] = 5.27, p = 0.027$), and *Helicopter* (L/H) and *Mikado* (L/L) ($F[1, 60] = 6.04, p = 0.017$).

Table 4.11: Significantly different ANOVA and associated pairwise ANOVA results on dwell time for all AOIs for product category combinations

AOI	df	F value	p
Additional Details Computer Couch	1, 49	4.81	0.033
Additional Details Couch Helicopter	1, 37	4.91	0.033
Compare Similar Products Computer Helicopter	1, 75	7.16	0.009
Compare Similar Products Computer Mikado	1, 65	10.2	0.002
Compare Similar Products Couch Helicopter	1, 73	6.27	0.014
Compare Similar Products Couch Mikado	1, 63	11.1	0.001
Customer Questions and Answers Computer Couch	1, 53	4.81	0.033
Customer Questions and Answers Computer Helicopter	1, 49	7.49	0.009
Customer Questions and Answers Computer Mikado	1, 54	6.74	0.012
Detailed Negative Reviews Couch Mikado	1, 7	8.6	0.022
Price Helicopter Mikado	1, 152	5.57	0.02
Product Description Computer Helicopter	1, 80	12.2	0.001
Product Description Couch Helicopter	1, 75	12	0.001
Product Description Couch Mikado	1, 43	6.66	0.013
Product Description Helicopter Mikado	1, 60	8.35	0.005

Product Summary Computer Couch	1, 100	14.5	0
Product Summary Computer Mikado	1, 118	22.2	0
Product Summary Couch Helicopter	1, 98	16.9	0
Product Summary Couch Mikado	1, 94	41.6	0
Product Summary Helicopter Mikado	1, 116	10.5	0.002
Technical Details Computer Helicopter	1, 99	9.99	0.002
Technical Details Computer Mikado	1, 73	7.71	0.007
Title Computer Couch	1, 90	12.5	0.001
Title Computer Mikado	1, 96	25.6	0
Title Helicopter Mikado	1, 95	10.3	0.002
Top Reviews Computer Couch	1, 34	5.12	0.03
Top Reviews Computer Helicopter	1, 42	5.27	0.027
Top Reviews Helicopter Mikado	1, 60	6.04	0.017

Finally, **Table 4.12** shows the significantly different result between total amount of time spent looking at the top critical review, irrespective of product category, and whether or not the product was chosen ($F[1,3] = 172, p = 0.001$), ($M_{No} = 2.63e+04, SD_{No} = 2.66e+03 : M_{Yes} = 2.8e{+}03, SD_{Yes} = 1.5e{+}03$). This is also the case for top reviews ($F[1,96] = 6.47, p = 0.013$), ($M_{No} = 2.12e{+}05, SD_{No} = 2.7e{+}05 : M_{Yes} = 1.09e{+}05, SD_{Yes} = 1.07e{+}05$). Both AOIs displayed a considerably higher mean dwell time for eliminated, as opposed to selected products.

Table 4.12: ANOVA results on dwell time for all AOIs of products chosen irrespective of product category

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Top Critical Review Chosen	1, 3	172	0.001	(2.63e+04, 2.8e+03)	(2.66e+03, 1.5e+03)
Top Reviews Chosen	1, 96	6.47	0.013	(2.12e+05, 1.09e+05)	(2.7e+05, 1.07e+05)

The associated plots for all significantly different dwell time metrics are shown in the five consecutive figures below, illustrating the means and confidence intervals for the respective groups in question. The plots further depict the differences in mean dwell time between the various product categories for the discussed AOIs.

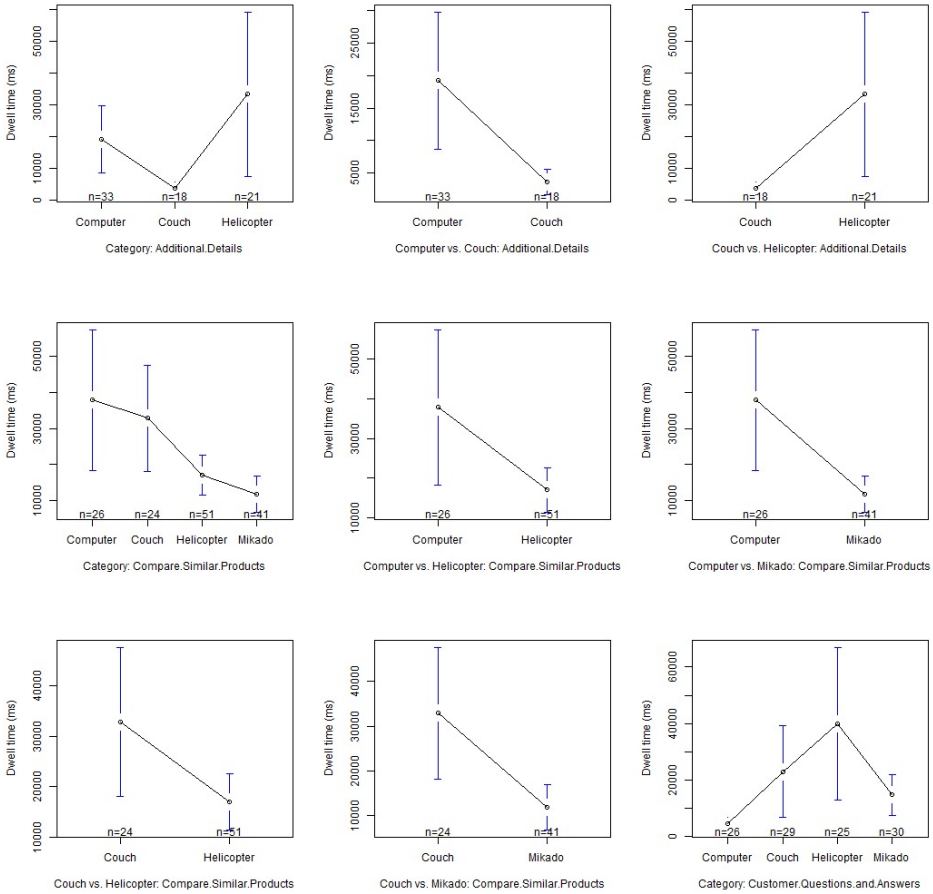


Figure 4.7: Mean and confidence interval plots of ANOVA results on dwell time for all AOIs with significantly different results (1-9)

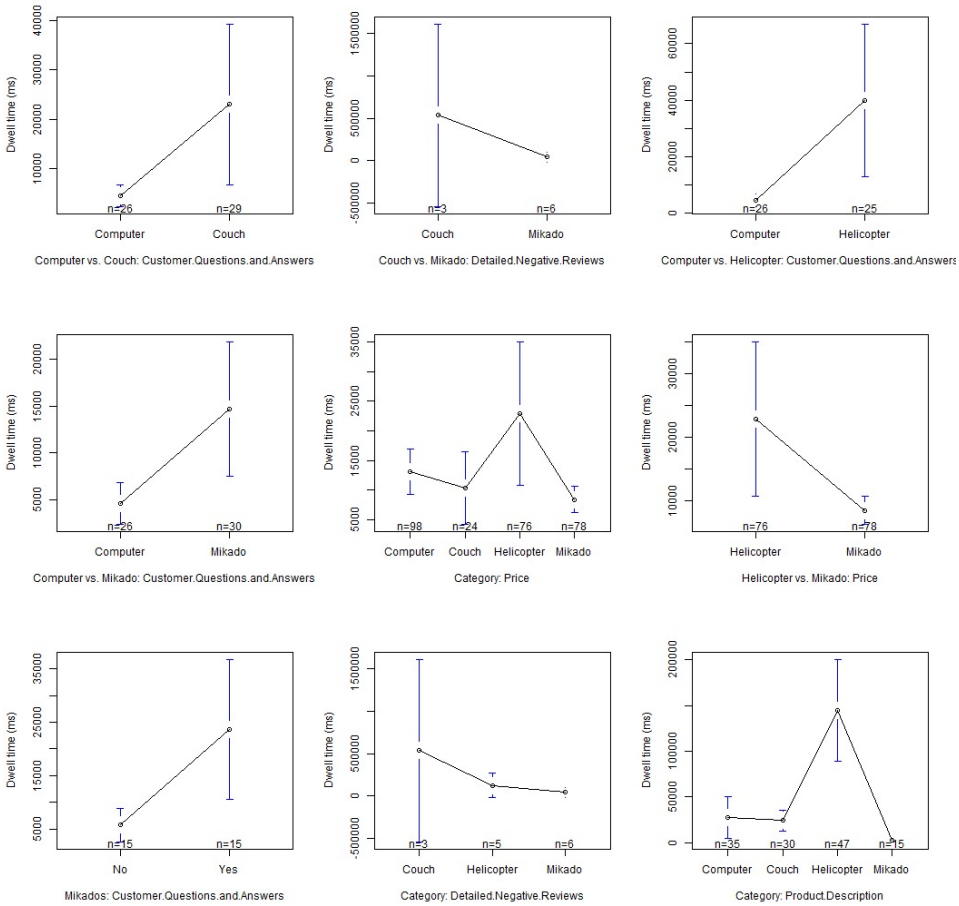


Figure 4.8: Mean and confidence interval plots of ANOVA results on dwell time for all AOIs with significantly different results (10-18)

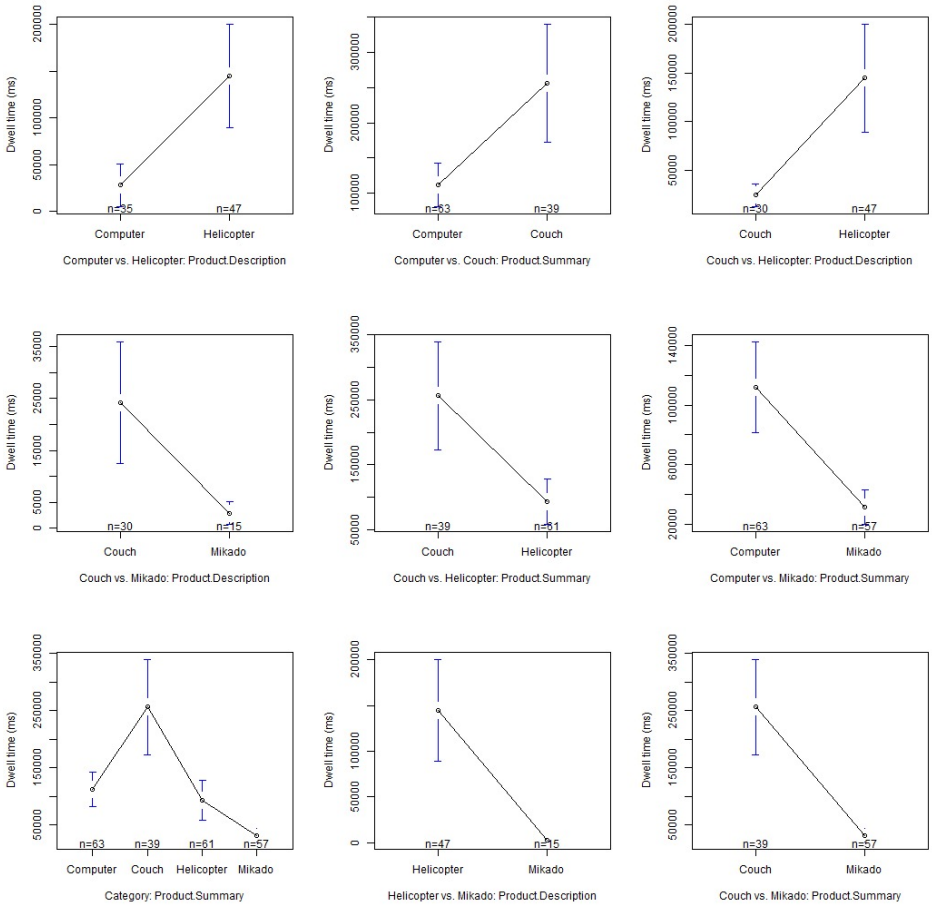


Figure 4.9: Mean and confidence interval plots of ANOVA results on dwell time for all AOIs with significantly different results (18-27)

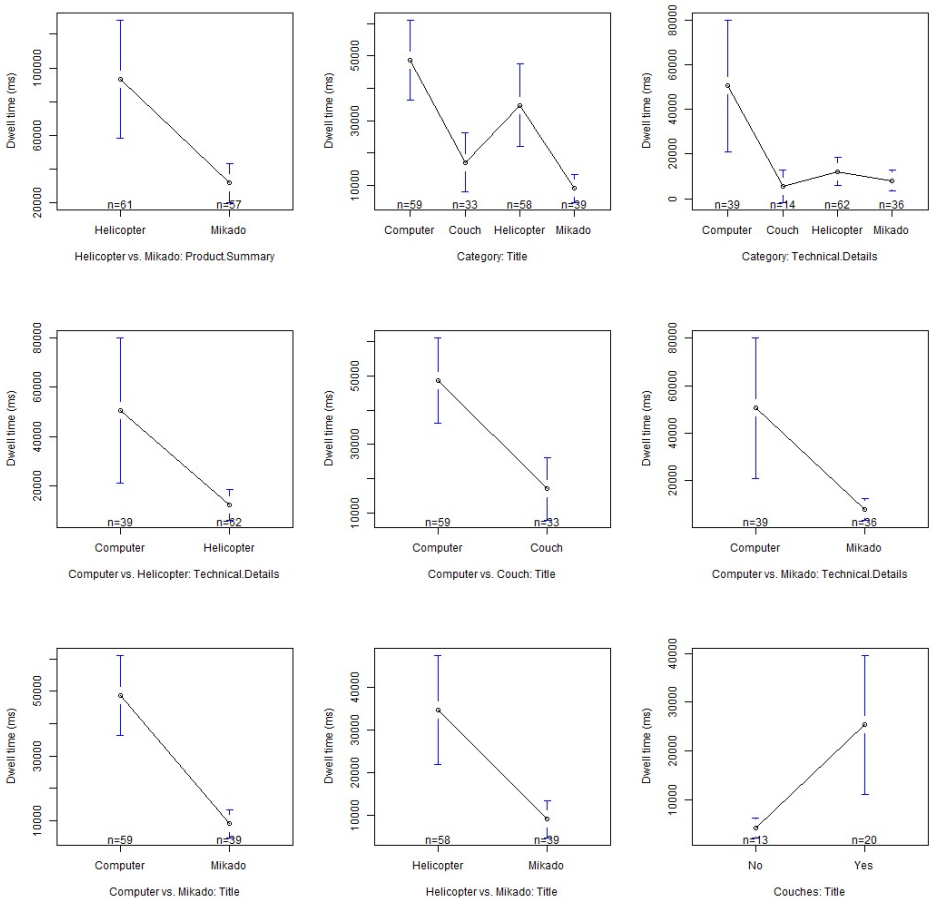


Figure 4.10: Mean and confidence interval plots of ANOVA results on dwell time for all AOIs with significantly different results (28-36)

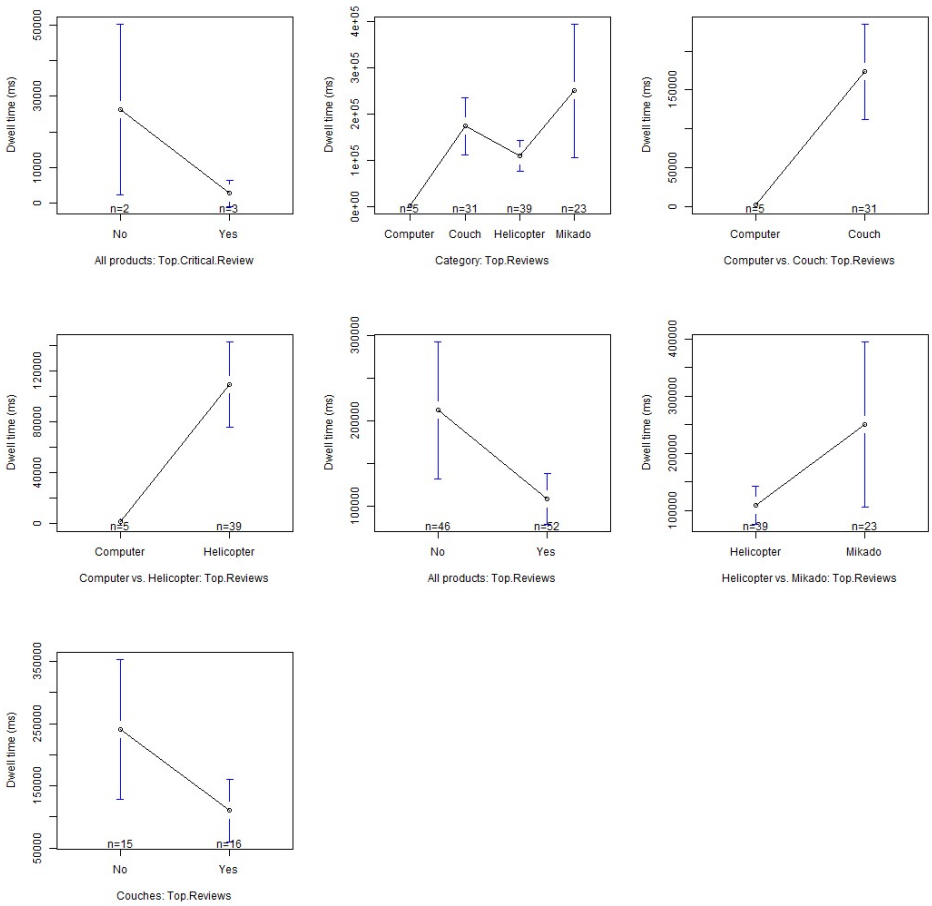


Figure 4.11: Mean and confidence interval plots of ANOVA results on dwell time for all AOIs with significantly different results (37-43)

Conclusively, for a proportion of the defined AOIs, we did not find a significant relationship. These are comprised of 4 stars and above, customers also viewed, detailed 3 star reviews, detailed all reviews, frequently bought together, product images small, product main image, quantity, recommended products, related products, review summary, sponsored products, summary reviews, top positive review, and zoomed image. The complete results of the dwell time ANOVA can be seen in **Appendix C.7**, following the fixation duration proportion calculations.

Notably, a comparison of total dwell time per AOI, accumulated for all respondents, is outlined for each product category in the stacked bar charts below. The bar charts show the time spent viewing each AOI relative to the product selection within the respective product category, both as a percentage and total dwell time in milliseconds. Hence, it visualizes the total time spent viewing an AOI, displayed in gray text at the right-hand side of each bar, and the proportion of which resulted in the respective products being either eliminated or selected accordingly. For instance, the uppermost AOI in **Figure 4.12**, 4 stars and above, indicates 0 milliseconds as the total accumulated dwell

time for that AOI. The successive AOI on the other hand, additional details, indicates a total of 633,263 milliseconds spent fixating within the AOI, of which 114,304 milliseconds is attributed to the elimination of computer #1, 420,537 milliseconds is attributed to selecting computer #1, 68,938 milliseconds resulted in computer #2 being eliminated, and the residual 29,484 milliseconds resulted in computer #2 being selected. Total dwell time equal to 0 for an AOI represents either that the AOI did not exist within the product category, or that all respondents neglected or overlooked the AOI. The integer enclosed in parentheses following the respective AOI names represents the number of respondents who fixated on the AOI a minimum of one time throughout the experiment. This also applies to the remainder of AOIs in the aforementioned product category, as well as for (H/L) in **Figure 4.13**, for (L/H) in **Figure 4.14**, and for (L/L) in **Figure 4.15**.

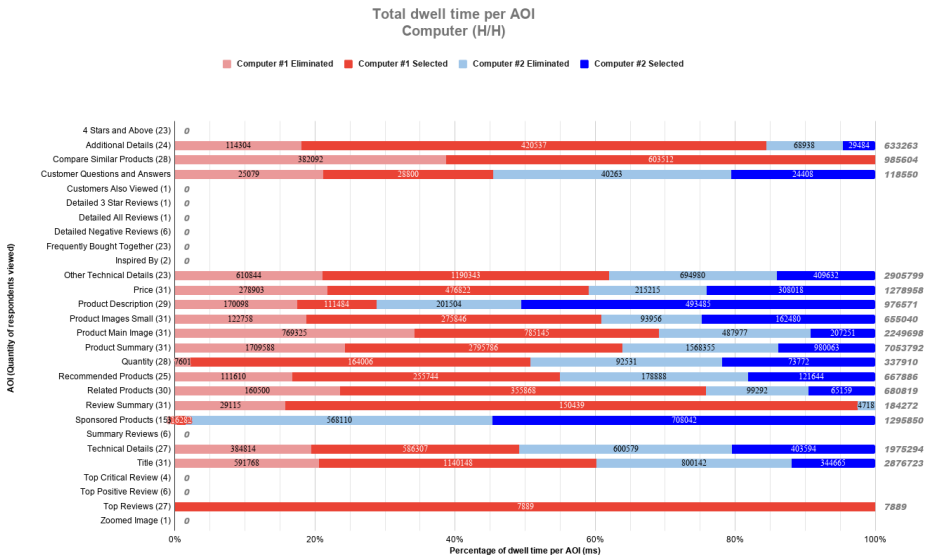


Figure 4.12: Total accumulated dwell time (in milliseconds) per AOI, as a proportion of each AOI, for all respondents, grouped by *Computer* (H/H) selections for all AOIs.

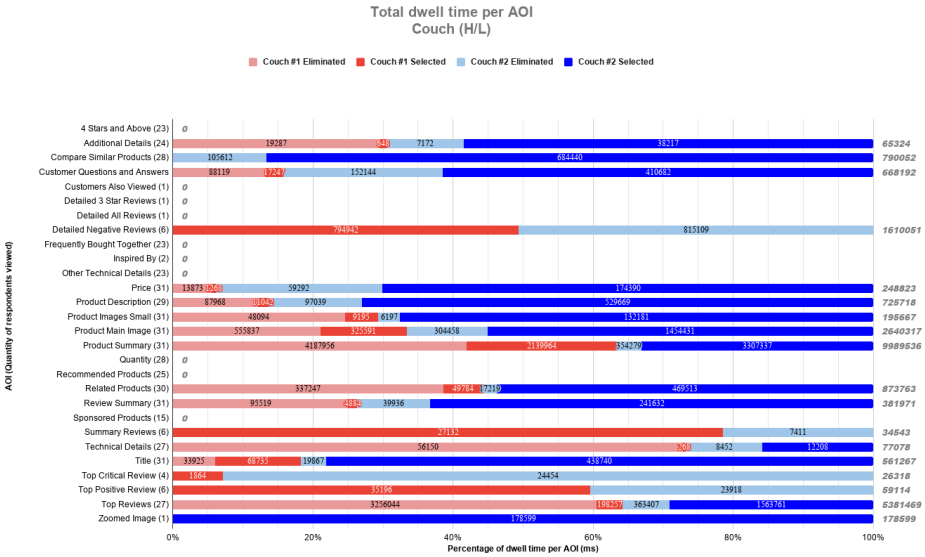


Figure 4.13: Total accumulated dwell time (in milliseconds) per AOI, as a proportion of each AOI, for all respondents, grouped by *Couch* (H/L) selections for all AOIs.

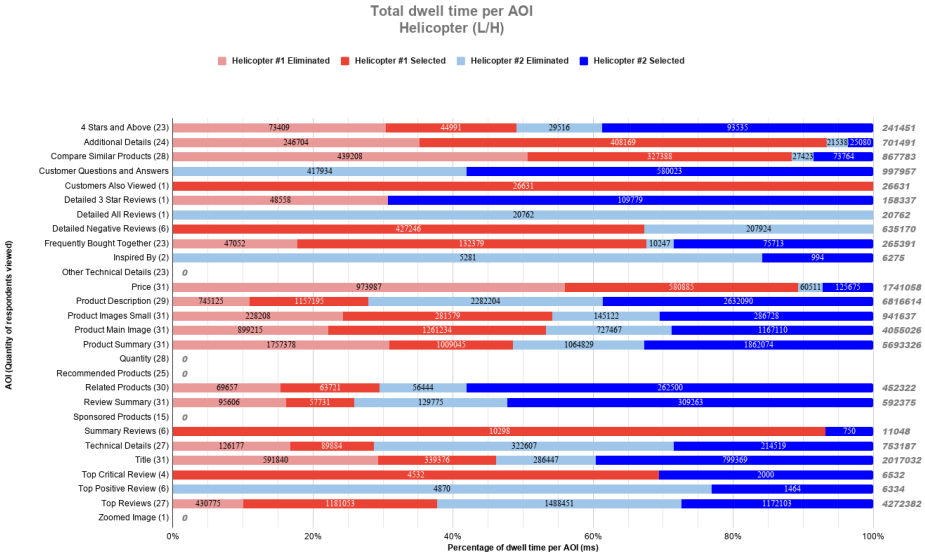


Figure 4.14: Total accumulated dwell time (in milliseconds) per AOI, as a proportion of each AOI, for all respondents, grouped by *Helicopter* (L/H) selections for all AOIs.

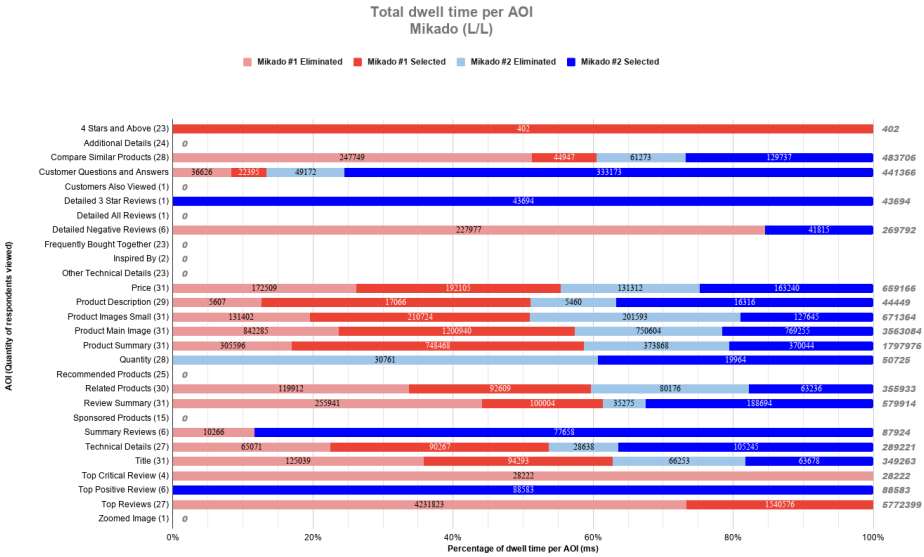


Figure 4.15: Total accumulated dwell time (in milliseconds) per AOI, as a proportion of each AOI, for all respondents, grouped by *Mikado* (L/L) selections for all AOIs.

Equivalently, **Figure 4.16** shows the total dwell time per AOI, accumulated for all respondents, grouped by the four overall product categories irrespective of whether or not the product was chosen to be bought. The bars in the chart visualize the time spent viewing each AOI for all product categories relative to one another; both as a percentage and total dwell time in milliseconds. With the purpose of illustrating the differences in what information consumers look at for the various categories of products, the bar chart depicts a side-by-side comparison of respondents' interest in the available AOIs, alongside the number of respondents who fixated on them.

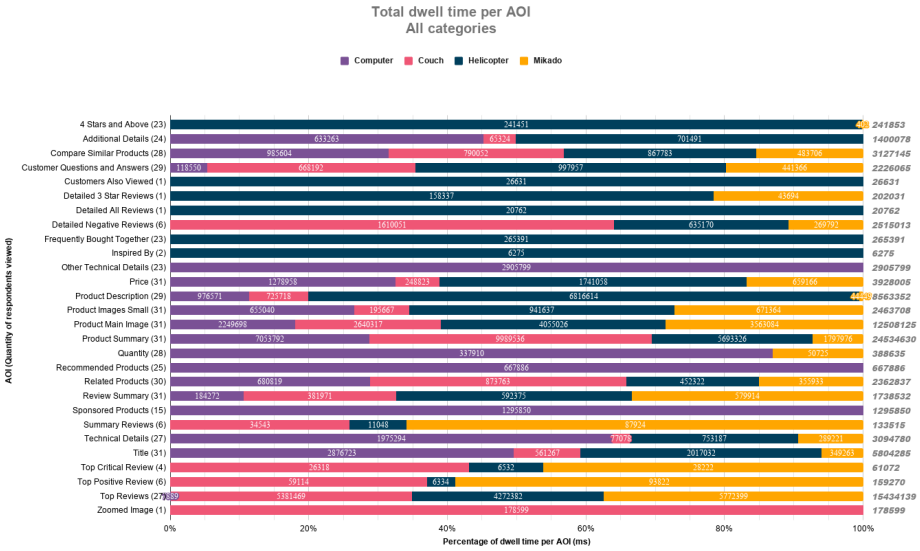


Figure 4.16: Total accumulated dwell time (in milliseconds) per AOI, as a proportion of each AOI, for all respondents, grouped by the overall product categories, irrespective of whether or not the product was selected or eliminated

Lastly, another interesting level of difference lies within the decision itself, irrespective of product category. The total dwell time per AOI, accumulated for all respondents, grouped by whether or not the product was chosen to be bought, is shown as a stacked bar graph in **Figure 4.17**. Total time spent gazing within each AOI is represented as the proportions comprising the products eliminated and the products selected, relative to each other. The values are depicted as dwell time in milliseconds and as a percentage of the dwell time within the respective AOI; while all AOIs are listed alongside the quantity of respondents who fixated on them.

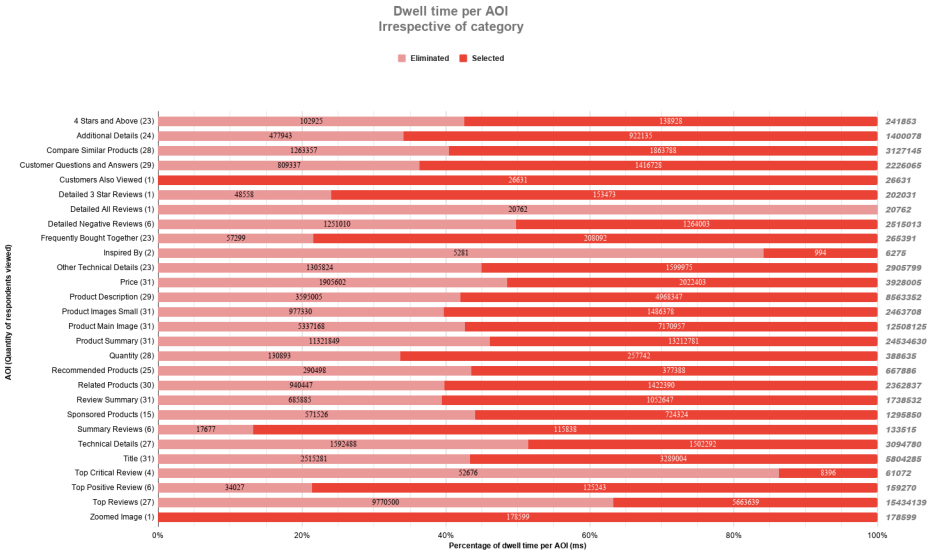


Figure 4.17: Total accumulated dwell time (in milliseconds) per AOI, as a proportion of each AOI, for all respondents, grouped by whether or not the product was selected or eliminated, irrespective of product category

4.3 Pupil Dilation

Descriptive statistics for pupil dilation are shown in **Table 4.13**, indicating the overall mean and standard deviations of pupil dilation accumulated for all respondents per AOI.

Table 4.13: Mean and standard deviations for pupil dilation per AOI.

AOI	Mean	SD
4 Stars and Above	3.255	0.426
Additional Details	3.322	0.481
Compare Similar Products	3.318	0.483
Customer Questions and Answers	3.255	0.524
Customers Also Viewed	3.526	NA
Detailed 3 Star Reviews	3.374	0.022
Detailed All Reviews	3.025	NA
Detailed Negative Reviews	2.980	0.387
Frequently Bought Together	3.246	0.355
Inspired By	3.510	0.130
Other Technical Details	3.246	0.461
Price	3.261	0.498
Product Description	3.318	0.479
Product Images Small	3.096	0.390
Product Main Image	3.274	0.464
Product Summary	3.276	0.483

Quantity	3.099	0.407
Recommended Products	3.331	0.416
Related Products	3.298	0.454
Review Summary	3.267	0.511
Sponsored Products	3.313	0.496
Summary Reviews	3.160	0.262
Technical Details	3.244	0.496
Title	3.269	0.508
Top Critical Review	3.507	0.302
Top Positive Review	3.177	0.394
Top Reviews	3.313	0.526
Zoomed Image	3.734	NA

Table 4.14 shows statistically significant results for the various AOIs and all product categories combined. The dependent variable *Product Information*, revealed a significant difference between whether the product was chosen or eliminated, and respondents' pupil dilation when looking at additional details $(F[2, 68] = 3.89, p = 0.025)$, $(M_{No} = (3.313 SD_{No} = (0.469 : M_{Yes} = 3.33), SD_{Yes} = 0.5)$, and when looking at product images small $(F[3, 124] = 5.7, p = 0.001)$, $(M_{No} = (3.080 SD_{No} = (0.362 : M_{Yes} = 3.11), SD_{Yes} = 0.415)$. The mean pupil dilation when gazing at these AOIs was higher for chosen products than for eliminated ones. Further, the dependent variable *Social Popularity* only contained one significantly different result for pupil dilation when viewing the top critical review $(F[2, 2] = 24.6, p = 0.039)$, $(M_{No} = (3.427 SD_{No} = (0.294 : M_{Yes} = 3.56), SD_{Yes} = 0.359)$. Granted, the mean pupil dilation proved higher for selected products, however, the sample size was minimal.

Table 4.14: Significantly different ANOVA and associated pairwise ANOVA results on pupil dilation for all AOIs for all product categories

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Additional Details Category	2, 68	3.89	0.025	(3.313, 3.330)	(0.469, 0.500)
Product Images Small Category	3, 124	5.7	0.001	(3.080, 3.110)	(0.362, 0.415)
Top Critical Review Category	2, 2	24.6	0.039	(3.427, 3.560)	(0.294, 0.359)

The analysis' associated post hoc test for product category combinations can be seen in **Table 4.15**. The post hoc pairwise ANOVA analysis revealed significantly different results for additional details between *Computer* (H/H) and *Couch* (H/L) $(F[1, 48] = 4.97, p = 0.030)$, and for *Couch* (H/L) and *Helicopter* (L/H) $(F[1, 37] = 5.91, p = 0.020)$. Similarly, significantly different results were uncovered for product images small between *Computer* (H/H) and *Mikado* (L/L) $(F[1, 69] = 7.06, p = 0.010)$, *Couch* (H/L) and *Helicopter* (L/H) $(F[1, 55] = 8.38, p = 0.005)$, and *Couch* (H/L) and *Mikado* (L/L) $(F[1, 52] = 16.4, p = 0.000)$. Finally, the top critical review also proved to be significantly different for respondents' pupil dilation in determining whether or not to purchase a product, for the combination of *Couch* (H/L) and *Helicopter* (L/H) $(F[1, 2] = 46.2, p = 0.021)$.

Table 4.15: Significantly different ANOVA and associated pairwise ANOVA results on pupil dilation for all AOIs for product category combinations

AOI	df	F value	p
Additional Details Computer Couch	1, 48	4.97	0.03
Additional Details Couch Helicopter	1, 37	5.91	0.02
Product Images Small Computer Mikado	1, 69	7.06	0.01
Product Images Small Couch Helicopter	1, 55	8.38	0.005
Product Images Small Couch Mikado	1, 52	16.4	0
Top Critical Review Couch Helicopter	1, 2	46.2	0.021

The associated plots for all significantly different pupil dilation metrics are shown in the figure below, illustrating the means and confidence intervals for the respective groups in question. The plots further depict the differences in mean pupil dilation between the various product categories for the discussed AOIs, .

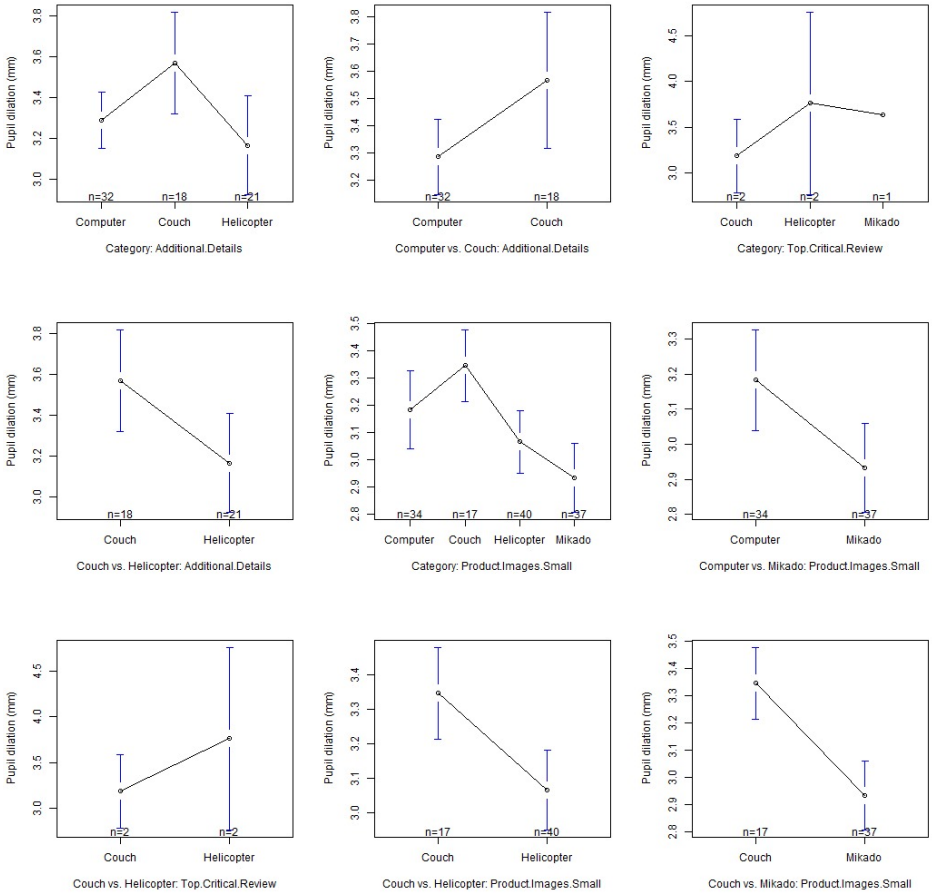


Figure 4.18: Mean and confidence interval plots of ANOVA results on pupil dilation for all AOIs with significantly different results (1-9)

Following this, the majority of defined AOIs were deemed insignificantly different. This comprises 4 stars and above, customers also viewed, compare similar products, customer questions and answers, detailed 3 star reviews, detailed all reviews, detailed negative reviews, frequently bought together, price, product description, product main image, product summary, quantity, recommended products, related products, review summary, sponsored products, summary reviews, technical details, title, top positive review, top reviews, and zoomed image. The complete results of the pupil dilation ANOVA can be seen in **Appendix C.7**, following the dwell time calculations.

4.4 Survey and Interview Data

Perceived hedonic and utilitarian value of all product categories were questioned, alongside the familiarity and preference toward products, and time spent reaching a decision. Further, the de-

pendent variables social popularity, scarcity, and product information were investigated, in terms of peer reviews, quantity of available items, and product information respectively. Measured on a Likert scale of one (strongly disagree) to seven (strongly agree), dependent and independent variables were tested on their influence of the respondent's final decision. A one-way analysis of variance (ANOVA) was computed on participants' post-stage assessment survey answers. Significantly different results obtained from the one-way ANOVA, and the associated pairwise ANOVA results are presented in the tables below. The resulting ANOVA, presented in **Table 4.16**, found a significant difference between the respondents' familiarity with the type of products and the product categories $(F[3, 120] = 22.009, p < .001)$, $(M = 4.565, SD = 2.184)$. The results were also significantly different for distinguishability between products $(F[3, 120] = 10.402, p < .001)$, $(M = 4.097, SD = 1.944)$. For more and less time spent reaching a decision, the results were significantly different for all categories, yielding $(F[3, 120] = 26.632, p < .001)$, $(M = 4.677, SD = 1.994)$ and $(F[3, 120] = 8.184, p < .001)$, $(M = 2.710, SD = 1.681)$ respectively. The perceived utilitarian value of the product was significantly different for all categories $(F[3, 120] = 37.821, p < .001)$, $(M = 3.839, SD = 2.116)$. Significantly different results were also found between basing the final decision on product complexity and all categories $(F[3, 120] = 11.953, p < .001)$, $(M = 3.048, SD = 1.701)$. Similarly significantly different results were found for personal preference $(F[3, 120] = 4.585, p = .004)$, $(M = 4.871, SD = 1.767)$, products' peer reviews $(F[3, 120] = 8.998, p < .001)$, $(M = 4.202, SD = 2.201)$, and the available product information $(F[3, 120] = 10.122, p < .001)$, $(M = 4.556, SD = 1.977)$. Finally, a significant difference between the product chosen and all categories was unveiled $(F[3, 118] = 4.950, p = .003)$, $(M = 1.492, SD = 0.502)$.

Table 4.16: Significantly different ANOVA results on participant post-stage assessment survey responses for all product categories

Statement	df	F value	p	Mean	SD
I am familiar with the type of product presented	3, 120	22.009	$< .001$	4.565	2.184
The products displayed were easy to distinguish between	3, 120	10.402	$< .001$	4.097	1.944
I would normally have spent more time making my decision	3, 120	26.632	$< .001$	4.677	1.994
I would normally have spent less time making my decision	3, 120	8.184	$< .001$	2.710	1.681
I found this product to be of utilitarian value to me (is useful/practical to me)	3, 120	37.821	$< .001$	3.839	2.116
My final decision was largely based on how complex the product is	3, 120	11.953	$< .001$	3.048	1.701
My final decision was largely based on personal preference	3, 120	4.585	0.004	4.871	1.767
My final decision was largely based on the products' peer reviews	3, 120	8.998	$< .001$	4.202	2.201
My final decision was largely based on the available product information	3, 120	10.122	$< .001$	4.556	1.977
Product Chosen	3, 118	4.950	0.003	1.492	0.502

The post hoc pairwise ANOVA analysis, shown in **Table 4.17**, between the *Computer* (H/H) and *Couch* (H/L) categories obtained significantly different results for their distinguishability $(F[1, 60] = 4.788, p = .033)$, $(M = 4.581, SD = 1.675)$. Equivalently so for the reasons of basing the

product decision on, with complexity ($F[1,60] = 11.760, p = .001$), ($M = 3.145, SD = 1.567$), personal preference ($F[1,60] = 6.686, p < .001$), ($M = 5.290, SD = 1.541$), peer reviews ($F[1,60] = 22.175, p < .001$), ($M = 3.887, SD = 2.348$), and product information ($F[1,60] = 15.751, p < .001$), ($M = 4.935, SD = 1.854$). Lastly, a significant difference for the product chosen between the two categories was unveiled ($F[1,58] = 13.427, p < .001$), ($M = 1.500, SD = 0.504$).

Table 4.17: Significantly different ANOVA results on participant post-stage assessment survey responses for *Computer* (H/H) and *Couch* (H/L).

Statement	df	F value	p	Mean	SD
The products displayed were easy to distinguish between	1, 60	4.788	0.033	4.581	1.675
My final decision was largely based on how complex the product is	1, 60	11.760	0.001	3.145	1.567
My final decision was largely based on personal preference	1, 60	6.686	$< .001$	5.290	1.541
My final decision was largely based on the products' peer reviews	1, 60	22.175	$< .001$	3.887	2.348
My final decision was largely based on the available product information	1, 60	15.751	$< .001$	4.935	1.854
Product Chosen	1, 58	13.427	$< .001$	1.500	0.504

The post hoc pairwise ANOVA analysis, presented in **Table 4.18**, between the *Computer* (H/H) and *Helicopter* (L/H) categories obtained significantly different results for respondents' familiarity with the products ($F[1,60] = 43.847, p < .001$), ($M = 3.903, SD = 2.252$). Further, respondents would normally have spent more time making a decision between the categories ($F[1,60] = 13.913, p < .001$), ($M = 5.097, SD = 1.799$). Significantly different results were obtained for their perceived utilitarian value ($F[1,60] = 43.354, p < .001$), ($M = 3.532, SD = 2.133$). Equivalently so for the reasons of basing the product decision on, with peer reviews ($F[1,60] = 18.028, p < .001$), ($M = 3.758, SD = 2.267$), personal preference ($F[1,60] = 6.686, p < .001$), ($M = 5.290, SD = 1.541$), peer reviews ($F[1,60] = 22.175, p < .001$), ($M = 3.887, SD = 2.348$), and product information ($F[1,60] = 4.056, p = .049$), ($M = 5.355, SD = 1.680$).

Table 4.18: Significantly different ANOVA results on participant post-stage assessment survey responses for *Computer* (H/H) and *Helicopter* (L/H).

Statement	df	F value	p	Mean	SD
I am familiar with the type of product presented	1, 60	43.847	$< .001$	3.903	2.252
I would normally have spent more time making my decision	1, 60	13.913	$< .001$	5.097	1.799
I found this product to be of utilitarian value to me (is useful/practical to me)	1, 60	43.354	$< .001$	3.532	2.133
My final decision was largely based on the products' peer reviews	1, 60	18.028	$< .001$	3.758	2.267
My final decision was largely based on the available product information	1, 60	4.056	0.049	5.355	1.680

The post hoc pairwise ANOVA analysis, shown in **Table 4.19**, between the *Computer* (H/H) and

Mikado (L/L) categories obtained significantly different results for their distinguishability ($F[1,60] = 30.744, p < .001$), ($M = 3.855, SD = 2.039$). Time spent making a decision had significant results for both more and less time, with ($F[1,60] = 67.107, p < .001$), ($M = 4.323, SD = 2.148$) and ($F[1,60] = 10.259, p = .002$), ($M = 3.065, SD = 1.958$) respectively. Significantly different results were obtained for their perceived utilitarian value ($F[1,60] = 24.983, p < .001$), ($M = 3.774, SD = 2.099$). Lastly, significantly different results were also found for the reasons of basing the product decision on, with complexity ($F[1,60] = 23.341, p < .001$), ($M = 2.887, SD = 1.690$), peer reviews ($F[1,60] = 7.813, p = .007$), ($M = 3.435, SD = 2.252$), and product information ($F[1,60] = 27.005, p < .001$), ($M = 4.597, SD = 2.131$).

Table 4.19: Significantly different ANOVA results on participant post-stage assessment survey responses for *Computer* (H/H) and *Mikado* (L/L).

Statement	df	F value	p	Mean	SD
The products displayed were easy to distinguish between	1, 60	30.744	$< .001$	3.855	2.039
I would normally have spent more time making my decision	1, 60	67.107	$< .001$	4.323	2.148
I would normally have spent less time making my decision	1, 60	10.259	0.002	3.065	1.958
I found this product to be of utilitarian value to me (is useful/practical to me)	1, 60	24.983	$< .001$	3.774	2.099
My final decision was largely based on how complex the product is	1, 60	23.341	$< .001$	2.887	1.690
My final decision was largely based on the products' peer reviews	1, 60	7.813	0.007	3.435	2.252
My final decision was largely based on the available product information	1, 60	27.005	$< .001$	4.597	2.131

The post hoc pairwise ANOVA analysis, displayed in **Table 4.20**, between the *Couch* (H/L) and *Helicopter* (L/H) categories obtained significantly different results for respondents' familiarity with the products ($F[1,60] = 79.699, p < .001$), ($M = 4.145, SD = 2.260$). Further, time spent making a decision had significant results for both more and less time, with ($F[1,60] = 11.658, p = .001$), ($M = 5.032, SD = 1.774$) and ($F[1,60] = 6.270, p = .015$), ($M = 2.355, SD = 1.269$) respectively. Significantly different results were obtained for their perceived utilitarian value ($F[1,60] = 120.996, p < .001$), ($M = 3.903, SD = 2.148$). Equivalently so for the reasons of basing the product decision on, with product complexity ($F[1,60] = 12.053p < .001$), ($M = 3.210, SD = 1.710$) and personal preference ($F[1,60] = 17.306, p < .001$), ($M = 5.000, SD = 1.650$).

Table 4.20: Significantly different ANOVA results on participant post-stage assessment survey responses for *Couch* (H/L) and *Helicopter* (L/H).

Statement	df	F value	p	Mean	SD
I am familiar with the type of product presented	1, 60	79.699	$< .001$	4.145	2.260
I would normally have spent more time making my decision	1, 60	11.658	0.001	5.032	1.774
I would normally have spent less time making my decision	1, 60	6.270	0.015	2.355	1.269

I found this product to be of utilitarian value to me (is useful/practical to me)	1, 60	120.996	$< .001$	3.903	2.148
My final decision was largely based on how complex the product is	1, 60	12.053	$< .001$	3.210	1.710
My final decision was largely based on personal preference	1, 60	17.306	$< .001$	5.000	1.650

The post hoc pairwise ANOVA analysis, depicted in **Table 4.21**, between the *Couch* (H/L) and *Mikado* (L/L) categories obtained significantly different results for respondents' familiarity with the products $(F[1, 60] = 7.003, p = .010)$, $(M = 5.226, SD = 1.911)$, as well as distinguishability $(F[1, 60] = 9.985, p = .002)$, $(M = 3.403, SD = 1.937)$. Further, time spent making a decision had significant results for both more and less time, with $(F[1, 60] = 61.422, p < .001)$, $(M = 4.258, SD = 2.103)$ and $(F[1, 60] = 20.443, p < .001)$, $(M = 2.887, SD = 1.839)$ respectively. Reasons of basing the product decision on also yielded significantly different results for product complexity $(F[1, 60] = 68.498p < .001)$, $(M = 4.145, SD = 2.071)$ and available product information $(F[1, 60] = 6.074, p = .017)$, $(M = 5.226, SD = 1.824)$. Lastly, it revealed a significant difference for the product chosen between the two categories $(F[1, 58] = 7.508, p = .008)$, $(M = 1.550, SD = 0.502)$.

Table 4.21: Significantly different ANOVA results on participant post-stage assessment survey responses for *Couch* (H/L) and *Mikado* (L/L).

Statement	df	F value	p	Mean	SD
I am familiar with the type of product presented	1, 60	7.003	0.010	5.226	1.911
The products displayed were easy to distinguish between	1, 60	9.985	0.002	3.403	1.937
I would normally have spent more time making my decision	1, 60	61.422	$< .001$	4.258	2.103
I would normally have spent less time making my decision	1, 60	20.443	$< .001$	2.887	1.839
My final decision was largely based on how complex the product is	1, 60	68.498	$< .001$	4.145	2.071
My final decision was largely based on the available product information	1, 60	6.074	0.017	5.226	1.824
Product Chosen	1, 58	7.508	0.008	1.550	0.502

Finally, the post hoc pairwise ANOVA analysis, displayed in **Table 4.22**, between the *Helicopter* (L/H) and *Mikado* (L/L) categories obtained significantly different results for respondents' familiarity with the products $(F[1, 60] = 19.654, pz.001)$, $(M = 3.532, SD = 2.193)$, as well as distinguishability $(F[1, 60] = 15.469, p < .001)$, $(M = 3.613, SD = 2.083)$. Further, time spent making a decision had significant results for both more and less time, with $(F[1, 60] = 12.238, p < .001)$, $(M = 3.548, SD = 1.896)$ and $(F[1, 60] = 6.396, p = .014)$, $(M = 3.274, SD = 1.729)$ respectively. Conclusively, reasons of basing the product decision on also yielded significantly different results for product complexity $(F[1, 60] = 22.653p < .001)$, $(M = 2.952, SD = 1.833)$ and available product information $(F[1, 60] = 9.832, p = .003)$, $(M = 4.177, SD = 2.037)$.

Table 4.22: Significantly different ANOVA results on participant post-stage assessment survey responses for *Helicopter* (L/H) and *Mikado* (L/L).

Statement	df	F value	p	Mean	SD
I am familiar with the type of product presented	1, 60	19.654	$< .001$	3.532	2.193
The products displayed were easy to distinguish between	1, 60	15.469	$< .001$	3.613	2.083
I would normally have spent more time making my decision	1, 60	12.238	$< .001$	3.548	1.896
I would normally have spent less time making my decision	1, 60	6.396	0.014	3.274	1.729
My final decision was largely based on how complex the product is	1, 60	22.653	$< .001$	2.952	1.833
My final decision was largely based on the available product information	1, 60	9.832	0.003	4.177	2.037

We did not find a significant difference between the following statements and the various product categories. *I found it easy to decide which product to purchase* $(F[3, 120] = 0.548, p = .651)$, $(M = 4.056, SD = 1.832)$. *I found this product to be of hedonic value to me (brings me happiness and/or pleasure)* $(F[3, 120] = 1.225, p = 0.304)$, $(M = 4.677, SD = 1.606)$. *My final decision was largely based on the price of the product* $(F[3, 120] = 0.749, p = 0.525)$, $(M = 3.556, SD = 1.944)$. *My final decision was largely based on how many items were left available* $(F[3, 120] = 0.863, p = 0.463)$, $(M = 1.355, SD = 0.788)$. The complete post-stage assessment survey results, including insignificantly different results, are attached in **C**.

Chapter 5

Discussion

This research studies the attention and behavior of online consumers with respect to purchasing decisions in social commerce. We incorporate numerous simultaneous variables to construct an enhanced image of insight into consumer behavior in the decision process, and measure respondents' respective responses to them. Varying the independent interventions price and complexity in a two-by-two matrix with high and low combinations, we investigate and reveal consumer responses to the different informational criteria present for the product categories in said matrix. We differentiate this informational criteria based on vendor-created information (*Product Information*), peer-created content (*Social Popularity*), product availability limitations (*Scarcity*), Amazon's advertisement intervention (*Distractions*), and whether the respondents selected or eliminated the presented products (*Chosen*). We first discuss the results based on our dependent variables, after which we venture into how this research compares to similar studies, based on corroborations for antecedent results and new findings from our data samples. We subsequently proceed to consider implications this research has on businesses involved in social commerce, with a primary focus on the design and marketing aspects of business processes. Lastly, we present limitations and constraints manifested in the execution of this study. Please note that for the remainder of this discussion, the notation *Computer* replaces and denotes the product category *Computer (H/H)*. Equivalently, *Couch*, *Helicopter*, and *Mikado* replace and denote *Couch (H/L)*, *Helicopter (L/H)*, and *Mikado (L/L)*, respectively.

First and foremost, an analysis of and comparison between the stacked bar charts in **Figure 4.12** through **Figure 4.17** considered consumer fixation on all AOIs on numerous accounts. First, irrespective of product category, investigating fixation duration proportion, dwell time, and pupil dilation for eliminated as opposed to selected products, while taking into account the proportion of respondents who looked at the various AOIs for every stage of the comparison process. Second, the equivalent is considered respective of product category, for all six combinations, i.e. *Computer* versus *Couch*, *Computer* versus *Helicopter*, *Computer* versus *Mikado*, *Couch* versus *Helicopter*, *Couch* versus *Mikado*, and *Helicopter* versus *Mikado*. Finally, within the product category itself, investigating dwell time for the selected versus eliminated products for all four categories individually, disregarding dissimilar categories. Further, it must be noted that a proportion of the viewed AOIs were only present for certain product categories or products, due to the circumstances of Amazon's product presentation, a lack of peer reviews, non-existent quantity scarcity, or other conditions. The effect of this is seen in **Figure 4.16**, where the lowermost AOI, *Zoomed Image*, was only viewed for the product category *Couch*, and the AOI, *Other Technical Details*, was only available for the category *Computer*. We have made the conscious decision to disregard the AOIs whose interaction

and fixations stem from a substantially low quantity of respondents, and did not yield statistically significantly different results. This includes the following AOIs: *Customers Also Viewed*, *Detailed 3 Star Reviews*, *Detailed All Reviews*, *Inspired By*, and *Zoomed Image*.

Product Information

Irrespective of product category, it is evident that a number of AOIs were favored in the decision process, whether in the direction of elimination or selection. Weighing in the factor of difference in dwell time between selected and eliminated products per AOI, and disregarding those with a factor of less than 1.5, i.e. a 50% difference in dwell time, we find that the following AOIs have a significant effect on general product selection and elimination. *Additional Details* showed a 92.94% higher total dwell time for the selected as opposed to eliminated products. In other words, when individuals select a product, they tend to look more at additional details than when they end up not choosing the product. Correspondingly, respondents also showed further interest in *Product Images Small* for selected products, with a 52.09% higher total dwell time. When comparing shapes for attractiveness and subsequently have to select an alternative, individuals tend to gradually increase dwell time for the alternative they ultimately end up choosing (Shimojo et al., 2004). This is often referred to as *"the gaze cascade effect"*, suggesting that thumbnail images of a product can impact purchasing decisions based on attractiveness. The aforementioned two AOIs belong to the dependent variable *Product Information*, showing that there could be a correlation between product information provided by the vendor and consumer purchasing decision.

Contrary to the above, respective of product category, a different set of AOIs proved favorable among respondents during the decision process. Our computed ANOVA tests and associated mean and confidence interval plots clearly indicate the differences in fixation duration proportion, dwell time, and pupil dilation for numerous AOIs. Combining the data and synthesizing the results gives us deeper insights into consumer interest and the cognitive processing occurring throughout the decision-making process. Evident from the mean plots shown in **Figure 4.2**, **Additional Details** showed a significant difference in mean fixation duration proportion between *Computer* and *Couch*, as well as *Couch* and *Helicopter*, with a much higher value for *Computer* and *Helicopter* than *Couch*. This is corroborated by the mean dwell time for the same categories, with an equivalent trend (see **Figure 4.7**). As there were no additional details available for *Mikado*, this can signify increased attention to additional details for products with higher complexity among consumers; looking at it for longer before averting their eyes, and longer in total due to multiple revisits. Lastly, the mean pupil dilation also proved to be significantly higher for *Couch* than both *Computer* and *Helicopter*. An increase in pupil diameter often implies heightened interest, or even increased cognitive load due to a rise in task difficulty(Moresi et al., 2008), as the mental workload attached to making a decision can have a visible effect on human pupil diameter. Given the increased attention to the aforementioned product categories, we may only conclude that the respondents perceived it to be a more difficult task to extract information from the additional details for couches than the stationary computers and remote-controlled helicopters. Highly noteworthy is the significant difference in attention to *Price* (see **Figure 4.8**), where the mean dwell time was higher for *Helicopter* than *Mikado*, despite the products pertaining to the same price category (low). This may indicate that when the price is low, consumers stay fixated on price for longer for more complex products. However, the slight increase in price from *Mikado* to *Helicopter* may also affect the magnitude of this behavior.

The mean fixation duration proportion for *Product Description* (see continuation in **Figure 4.4**) was interestingly significantly higher for *Helicopter* than all other categories, i.e. *Computer*, *Couch*, and *Mikado*; and for *Couch* than *Mikado*. The same applies to mean dwell time, being higher for *Helicopter* than all three other categories, and higher for *Couch* than *Mikado*. With *Couch* and *Helicopter* being opposing product categories in terms of price and complexity, it limits our ability to make inferences to solely price or solely complexity as factors affecting consumer purchasing

decisions. We can, however, infer that consumers pay more overall attention to, and have a higher continuous fixation for product descriptions for products where price is low and complexity is high. The mean pupil dilation for *Product Images Small*, i.e. the thumbnail photos for a product, was significantly higher for *Computer* than *Mikado*, and for *Couch* than both *Helicopter* and *Mikado*. This likely implies a higher consumer interest in thumbnail photos for couches than stationary computers and Mikado stick games. However, it may also indicate that the respondents were put under an increased cognitive load due to task difficulty upon looking at these thumbnails. *Product Summary* was remarkably the only AOI with significant results for fixation duration proportion for all combinations of product categories, as depicted in **Figure 4.9**. The mean was significantly higher for *Couch* than all other categories, and for *Computer* than both *Helicopter* and *Mikado*, and lastly for *Helicopter* than *Mikado*. Correspondingly, the mean dwell time was also significantly higher for *Couch* than all other categories, and for both *Computer* and *Helicopter* than *Mikado*. The exception lies within dwell time, as the mean was higher for *Computer* than *Helicopter*, but insignificantly so. This may still signify that price can impact consumer behavior, in the sense that higher price leads to higher attention to product summaries.

Notably from **Figure 4.5**, *Technical Details* only yielded a significantly higher mean fixation duration proportion for *Computer*, being higher than all other categories. Although not significantly higher, *Helicopter* yielded a slight increase compared with the remaining two categories, which is a good indication that consumers become more attentive to the technical details of items when product complexity increases. Equivalently, mean dwell time was significantly higher for *Computer* than *Helicopter* and *Mikado*, but not quite significantly different from *Couch*. Nevertheless, the results are conclusive enough to deduce that consumers devote additional attention, both consecutive and overall, to the technical details of products when price and complexity are both high. Comparatively, *Computer* also showed a considerable increase in total attention paid to *Title*, with a higher mean fixation duration proportion than all other categories. With *Helicopter* being significantly higher than *Mikado*, this shows a similar trend to *Technical Details* with respect to complexity, however more conclusive. **Figure 4.10** shows that mean dwell time proved significantly higher for *Computer* than *Couch* and *Mikado*, and for *Helicopter* than *Mikado*. We attribute this fixation and dwell time to the length of, and information present in, the title of the various product categories. For *Computer* and *Helicopter*, relevant product information, e.g. technical specifications, are outlined in the title, whereas for *Couch* and *Mikado* this includes far less information.

Lastly, within each product category, i.e. within the selected versus eliminated product in each of the four product categories, only a select few significant differences were established with respect to our metrics. No significant differences were found within the product categories *Computer* or *Helicopter*. Notwithstanding, *Price* was found to have a significantly higher mean fixation duration proportion for the eliminated product for *Couch* than the selected product, evident from **Table 4.2** and the corresponding means plot in **Figure 4.3**. Hence, respondents spent more time in total deciding to eliminate the product based on the price of the couch. Ergo, price may have a direct correlation with online consumer decisions for the product category *Couch*. Following this, *Title* showed a drastic increase in mean dwell time for the selected product, over the eliminated one, for *Couch*, as seen in **Table 4.12** and the final means plot in **Figure 4.10**. This signifies that consumers stay fixated longer, before moving their eyes away from the title of the product they ultimately decide on purchasing. *Price* and *Title* are both elements of the dependent variable *Product Information*, and from this, we can extract that information provided by the seller is highly relevant, as can affect consumer decision-making for products of high price and low complexity. For couches, respondents had a distinctly higher total fixation duration on the product's title than its price (125.57%), which may be due to the length and duration it takes to cognitively process the information. That being said, the key distinction between the two AOIs is the consensus among consumers to purchase the product whose title they looked longer at uninterruptedly, while the price gazed at for the longest duration in total ends up being eliminated. Put simply, more frequent revisits to price seemingly has an inverse

relationship with consumer willingness to purchase.

Synthesizing the above information, all of which pertains to the dependent variable *Product Information*, we find that product complexity affects online consumer behavior and interaction with vendor-created information to a greater extent than price. Higher complexity leads to an increase in the dwell time and the total proportion of time spent looking at the additional details and product description of a product. Interestingly, when paired with a low price, complexity also affects how long consumers spend uninterruptedly looking at the price of a product, where higher complexity yields longer consecutive fixations. In contrast, when paired with a high price, high complexity leads to an increased attention, both consecutively and overall, to technical details. Irrespective of complexity, price evidently impacts consumer attention to product summaries, where a higher price implies an increase in time spent fixating on it the product summary. This information alone is neither capable of supporting nor contradicting any of our initial hypotheses. Regarding cognitive processing, the high price and low complexity category, i.e. *Couch*, proved to be of significantly higher interest, or have an increased attached cognitive load, than both *Computer* and *Helicopter*. These attached longer fixations generally imply a *"deeper and more effortful cognitive processing"* (Holmqvist et al., 2011, p. 381). Hence it may have been a more difficult task for consumers to extract information necessary in reaching a decision for these AOIs.

Social Popularity

Continuing, four of the AOIs comprising our dependent variable *Social Popularity* displayed an increased total fixation duration when respondents ended up selecting the product rather than eliminating it. *Customer Questions and Answers* was viewed for 75.05% longer for selected products, and *Review Summary* was viewed for 53.47% longer. Interestingly, a mere six $(n = 6)$ respondents viewed *Summary Reviews* and *Top Positive Review*, but for 555.30% and 268.07% longer respectively, for selected products than for their eliminated counterpart. Granted the majority of respondents did not view these regions, whether by choice or unknowingly, the proportion who did, showed a noteworthy preference toward selecting the product following their fixation. Therefore we consider it a significant finding, suggesting that both reviews in general as well as positive reviews can have a correlation with consumer purchasing decision in the direction of selection. Contrasting this, *Top Critical Review* showed a 84.06% higher total dwell time for the eliminated as opposed to selected products, irrespective of product category. Simultaneously, mean dwell time was also significantly higher for eliminated products, by a staggering 839.29%. Hence, during the elimination process of a product, individuals display a tendency of looking more at the top critical review for a product than when they end up actually selecting the product. The fact that consumers devoted more attention to this the top critical review for products they ended up eliminating could thus be correlated with their purchasing decision. Similarly, *Top Reviews* was given a 42.03% higher amount of time spent viewing for eliminated products than for selected products. This is further supported by its significantly different ANOVA result (see **Table 4.6** and **Table 4.12**), stating that the mean dwell time is higher for eliminated products by a factor of approximately 2 (94.50%), and for mean fixation duration proportion by approximately 1.5 (54.30%). Both these AOIs also pertain to the dependent variable *Social Popularity*, which is a good indicator that peer influence has the ability to impact purchasing decisions in the direction of elimination.

Progressing, respective of product category, respondents had a significantly higher mean fixation duration proportion for *Helicopter* than for both *Computer* and *Mikado* when looking at *Customer Questions and Answers*. Furthermore, *Computer* has a vastly lower mean dwell time than all other product categories. The reason behind this is the fact that computer #1 only had one $(n = 1)$ customer question and answer, while computer #2 had none. Hence we discard these results and remain solely with the difference between *Helicopter* and *Mikado*, which portrays increased total attentiveness to peer answers for products of low price when complexity increases. **Figure 4.3** tells us that for

Detailed Negative reviews, both *Couch* and *Helicopter* proved significantly higher in mean fixation duration proportion than *Mikado*. Comparably, mean dwell time was also significantly higher for *Couch* than *Mikado*. Due to *Couch* and *Helicopter* being opposing in terms of price and complexity combinations, and the fact that this AOI was not existent for *Computer*, we cannot infer any concrete differences for the AOI with respect to the product categories. *Top Critical Review* only proved significantly different between *Helicopter* and *Mikado*, with a higher mean for *Mikado* (see **Figure 4.6**). However, with only one $(n = 1)$ respondent having viewed the top critical review for this category, we deem the results inconclusive. *Top Reviews* on the other hand showed a significantly lower mean fixation duration proportion for *Computer* than all other categories, and higher for *Mikado* than *Helicopter*. With *Mikado* and *Couch* as the highest mean proportions, this could be an assertion that complexity plays a part in total attention devoted to top reviews, irrespective of price; where lower product complexity produces higher consumer gaze attention to top reviews. Nonetheless, it must be noted that the lack of reviews for the products in the *Computer* category likely impacts this massively, as the mean dwell time is also significantly lower for *Computer* than *Couch* and *Helicopter*; while it is higher for *Mikado* than *Helicopter*. The latter supports the initial assertion, broadening the assertion to complexity potentially impacting consecutively devoted attention, where lower complexity yields higher consecutive attention to top reviews. Finally, pupil dilation also proved to have a significantly higher mean value for *Helicopter* than *Couch*. This signifies a higher interest or increased difficulty in evaluating top reviews for helicopters than for couches. Combining common traits, we find that a higher complexity, when the product price is already low, increases consumers' total time spent viewing customer questions and answers. Conversely, a lower complexity implies a higher amount of total and consecutive time spent looking at the top reviews for the products. In other words, consumers seek out previously answered questions by peer customers for low-priced products when complexity becomes higher, while they become more attentive to the top reviews as complexity again decreases.

Within the product category *Couch*, respondents had a remarkably higher mean fixation duration proportion for *Top Reviews* when looking at the product they ended up not choosing. The equivalent applies to the mean dwell time for the same AOI. Combined, this is a strong indication that consumers spend more time, both overall and consecutively, looking at the top reviews for couches they ultimately end up eliminating. This could imply that it takes longer for online consumers to reach the decision of not purchasing a couch, based on top reviews; simultaneously making up their mind quicker for couches they end up purchasing. Within *Mikado*, *Customer Questions and Answers* had a larger mean proportion of fixation duration for the product respondents selected than the one they eliminated. This is also the case for the corresponding mean dwell time, from which we may conclude that customer questions and answers can impact consumer decision-making. For the case of *Mikado* in thus study, this is in the direction of selecting the product. The only similarity for these final two AOIs, aside from pertaining to the dependent variable *Social Popularity*, is product complexity. The two different social influence factors had contrasting results in terms of impacting the selection and elimination of products. Where the high price and low complexity product was eliminated following a longer fixation, the low price and low complexity product was selected. This may suggest that for low complexity products, a higher price can deter consumers from purchasing a product after reading its associated peer reviews, while a lower price can encourage consumers to purchase the product after reading its associated customer questions and answers. Conclusively, peer reviews in general had varying effects on online consumer decision-making behavior, in terms of the measurements fixation duration proportion and dwell time. Due to the inconsistencies found in selection versus elimination following attention to reviews, we conclude that peer reviews impact consumer decisions in social commerce settings, albeit with no clear correlation to either selection or elimination alone. It is also apparent that the price and complexity combination present for a product affects the magnitude of the impact resulting from individual social informational criteria. To illustrate, answers to peer questions had an opposing effect on consumer attention for products

of high complexity and products of low complexity when price was a fixed low. Ergo, price and complexity variations greatly affect attention behavior and decision-making correspondingly.

Scarcity

The third dependent variable is *Scarcity*, whose only associated AOI is *Quantity*, which in turn provided a 96.91% higher total dwell time for selected products. We find that the effect of limiting the available quantity of a product impacted our consumers to, more often than not, select the product whose quantity scarcity they looked at the longest. Conjoining survey responses outlined in **Table 4.19** with eye tracking results shows no confirmation from participants' conscious answers that scarcity in fact impacts the final decision. It must also be noted that quantity scarcity was only available for both products within the *Computer* category and for product #2 within the *Mikado* category, as these were the only products with a limited supply. As the results are inconclusive, we can not generalize scarcity to have an effect on consumer purchasing decisions for all product categories. Rather, we must limit it to the product categories where scarcity was applicable in this study, namely *Computer* and *Mikado*. Henceforth, we may only conclude that quantity scarcity subconsciously affects consumer decision-making for our product category extremities, i.e. *(H/H)* and *(L/L)*. Nevertheless, in accordance with commodity theory, products with a higher restriction in availability, e.g. fewer available items in this scenario, may have been perceived to have a higher value (Anh, 2014). The increase in fixation is further corroborated by reactance theory, suggesting that more attention is devoted to limited products (Gupta et al., 2013). A psychological reactance can be triggered to safeguard one's own behavioral freedom, implying that consumers may feel a need to select the product whose availability is lowest.

Distractions

Irrespective of product category, *Frequently Bought Together* was only present for *Helicopter*, but resulted in a remarkable 263.17% higher total dwell time for the chosen helicopter than for the eliminated one. This, alongside *Related Products* with its 51.25% higher total dwell time, may be an indication that the dependent variable *Distractions* also has the capability of impacting consumer purchasing behavior in the decision phase. Respective of product category on the other hand, *Compare Similar Products* displayed a significantly higher mean fixation duration proportion for *Computer* than for both *Helicopter* and *Mikado*. Rather similarly, *Computer*, alongside *Couch*, had a decidedly higher mean dwell time than *Helicopter* and *Mikado* as well. One takeaway from this is that product price may have a direct correlation with online consumers' interest in a comparison of products, where a higher price is linked to paying more attention consecutively to comparative information. Remarkably, combining high price with a higher product complexity had a tendency of resulting in an higher total time spent viewing comparative information, than with a lower complexity; which, in turn, only yielded higher consecutive fixations. Effectively, this means that consumers spent a similar amount of time, on average, looking at the information before looking at something else when the price was high, but revisited the information more frequently when complexity also became high. When accounting for product category, vendor-created comparative information is the only information proven to be of significant relevance. Therefore it becomes clear that the results are not sufficiently conclusive to generalize this to *Distractions* as a whole, but rather enforce a limitation to these findings to *Compare Similar Products* alone. However, with the noteworthy increase in total dwell time for selected as opposed to eliminated products in similar AOIs, we can assuredly state that *Distractions* affects consumer viewing behavior and interest.

Due to the lack of available peer reviews and ratings for both products within the *Computer* product category, we are rendered unable to make conclusions regarding its total fixation duration

relative to other categories. For this reason, we possess an insufficient amount of data neither supporting nor contradicting hypothesis **H1**, and may not conclude on anything related to the matter. Notwithstanding the fact that *Computer* lacked customer reviews for the most part, we found that for products of low price, more attention, both overall and consecutively, was devoted to reviews of products with a lower complexity. This refutes hypothesis **H2**, and we reject it accordingly. Further, *Scarcity* was only present in the form of quantity for *Computer* and *Mikado*, which greatly limits the explorability of **H3** with respect to all product categories. Additionally, while price fixation was decisively higher for *Computer* than all other categories, *Helicopter* surpassed *Mikado*, which contradicts hypotheses **H3** and **H4**, and accordingly forces us to discard both. Taking the sum of total fixation duration for all respondents and all products, we found that respondents looked at the products they ended up selecting for 13.51% longer than the products they ended up eliminating. This is not a significant increase in total fixation duration, and we hence reject hypothesis **H5**. While **Figure 4.14** illustrates the vast difference in time spent looking at reviews as opposed to price for *Helicopter*, the aforementioned issue persists, with only one singular review present for the *Computer* category. Hence we can neither accept or reject **H6**. We can clearly reject **H7** on the other hand, as **Figure 4.13** and **Figure 4.15** show that online consumers spent noteworthy more time fixating on product reviews than price for both product categories with a low complexity. Lastly, **H8** relates to the hedonic value of products, which, with our assumption relied on consumer perception of hedonic versus utilitarian value. As our post-stage assessment survey did not find any significant results for hedonic value, we may not assert anything with respect to this hypothesis.

Further, it must be emphasized that individuals may behave differently when they are knowingly being observed. Evident from the post-experiment interviews, respondents revealed a curiosity regarding whether or not they would have subconsciously acted in a different manner in the comfort of their own home, outside of an experimental and observatory setting. Combined with the varying survey responses relating to time spent reaching a decision, we may only speculate on whether respondents felt individual pressure to reach a purchasing decision quicker or slower than usual. This surveillance may have induced stress to participants, in turn causing shorter fixations, which is characteristic of a high mental workload (Holmqvist et al., 2011). In addition, being consciously aware that their eyes were being monitored and tracked may have led to fixations on informational criteria that would otherwise have been overlooked and ignored. Interviews also uncovered individual differences in the particular criteria decisive to determining the product alternatives, with no clear consensus for product categories being linked to specific informational criteria. The primary reason for this being a dissimilarities in knowledge within particular product categories, corroborated by the survey responses regarding familiarity. For example, individuals with prior knowledge of computer specifications will read technical specifications carefully, whereas those without this knowledge may instead turn to reviews, and vice versa. This also became evident from our post-experiment interviews, where respondents familiar with computer specifications deemed that their decision relating to this product category, *(H/H)*, relied heavily on available product information. In contrast, respondents unfamiliar with computer specifications deemed their that decision, relating to the same respective product category, was based largely on reviews. Familiarity, or expertise in a field, often results in longer fixations than for novices, yet fewer fixations overall. For the case of familiarity, longer fixations do not imply deeper processing, but rather relates to an increased visual span (Nodine et al., 1993; Pomplun et al., 2001; Reingold & Charness, 2005). Accordingly, uncovering respondents' knowledge regarding not only product details, but also web page familiarity is vital.

Moreover, the fixations measured in the experiment do not necessarily entail cognitive processing of the information fixated on. Multiple respondents stated that during their evaluation process of the respective products, they had a tendency to stare at the screen while contemplating their decision. This may imply that some fixations can be neglected due to the fixation not relating specifically to an AOI or anything essential on the screen, but rather to a different informational aspect or the decision

process in its entirety. The difference in these fixations is virtually indistinguishable, and can hence not be filtered out of the results. Consequently, this may have led to significant increases in fixation duration for particular AOIs, despite potentially cognitively processing an entirely different AOI or informational aspect. As reported by one of the test subjects, the initial product viewed for each product category, product #1, may also have had the tendency to be used as a reference product for the respondents. This could result in longer gazes and fixations for that product, and subsequently compare the second product with the description and variables introduced in the first one. Thus a proportion of fixations for one product could be dependent on the projected information for the reference product, and hence differ according to the order the items were viewed in.

Overall, our findings indicate a spread in attention and interest for the various available informational criteria among consumers. Regarding to purchasing intentions, a multitude of factors seemingly influence consumers. With respect to **RQ1**, we observe significant results and implications for all dependent variables. it It is evident that variations in the independent variables, price and complexity, have differing effects on the dependent variables. There is no clear direct link between neither price nor complexity individually and consumer decision to purchase, from which we are unable to deduce a concrete and precise answer to **RQ2**. Rather, the combination of the two affects consumer interaction and responses to the defined AOIs, which in turn impacts decision-making behavior. Interestingly, introducing change in a variable is also seen to have altering effects when comparing selected and eliminated products irrespective of category, as opposed to comparing product categories to one another, and comparing products within the same category. Granted, product scarcity and platform-induced advertisements are impacted, the most protruding differences lie in the consumer's reception to vendor-created content as opposed to peer influence with price and complexity alterations. Conclusively, we must limit our inferences to the specific products leveraged in this experiment, i.e. stationary computers, two-seater couches, remote-controlled helicopters, and Mikado stick games, rather than their corresponding general price and complexity combinations. For a complete and generalized conclusion to be valid, numerous products from each product category must be tested against one another, to establish whether it is the product itself or its associated product category that influences consumer behavior.

5.1 Research Implications

This study poses significant theoretical and practical implications for social commerce platforms, especially relating to usability and design within human-computer interaction (HCI). Where previous studies have largely limited their research to include either one type of product or compare hedonic and utilitarian products (Castagnos et al., 2010; Menon et al., 2016; Luan et al., 2016; Djamasbi, 2014), this thesis incorporates a multitude of products while comparing the impact different simultaneous influential factors have on the various product categories. The introduction of a varied product range encourages consumers to pass different judgment criteria to the evaluation process when selecting and eliminating products. The results clearly show that online consumers' interest, fixation, and cognitive processing differ substantially from one product category to another, proving that there is no fixed recipe that applies to all products on how to display product information. Rather, sellers and online marketplace platforms must develop an understanding of how consumers perceive the available information, along with what they look for and require in order to reach a purchasing decision, and accordingly how this changes when price and complexity change.

Contrasting Mikalef et al. (Mikalef et al., 2017), we found a significant difference in the time spent looking at positive reviews for eliminated and selected products. There was an overwhelming increase in fixation on selected as opposed to eliminated products, albeit with a mere six participants having viewed positive and negative reviews. Besides, where antecedent studies found that participants spent more time gazing at negative reviews of eliminated products than selected ones

(Mikalef et al., 2017; Tzafilkou & Protogeros, 2017), our findings indicate no such difference, with a near equal fixation duration proportion for the two outcomes. Overall, product information was looked at longer for selected products than for eliminated products, but insignificantly so for product summary. Compared to these prior findings, for which product summary (equivalent to *"details"* in that study) showed a significantly higher total fixation for selected products, our findings portray a similar spread in total dwell time for selected and eliminated products, implying an incapability in corroborating said results. With respect to price as a product informational aspect, we found that the total dwell time on price was significantly higher for products of high complexity than products of low complexity, albeit with no inclination toward selecting or eliminating the product. Comparing this to the U-shape function fixations on price found by Menon et al. (2016), our results do not corroborate significant fixation alterations with a price increase or decrease, but rather with complexity variations. Nevertheless, combining our results with antecedent findings, we infer that retailers can draw consumers' attention to price directly, through the positioning of the element (visibility), and indirectly, through the properties of the product.

This study is highly comparative in nature to Mou and Shin's (2018) study, which leveraged signaling theory to uncover the effects of time scarcity and social popularity on consumers' perceptions, yet to a more limited extent. However, shifting the focus from trust, perceived value, and perceived quality, to purchase decision, visual attention, and what this entails, we found that social popularity and producer-created content function as signals influencing these latter aspects. Complementing the findings with a fixation attention data analysis, we corroborate that social popularity and available product information affect cognitive processing in the decision phase and prompts changes in interest and attention among consumers. To a lesser extent, this also applies to quantity scarcity and elements of visual distraction. This corroboration is supported by our employed eye tracking methodology, suggesting the importance of signals from a neurophysiological perspective. We suggest future research to inquire respondents about their conscious perceptions of the informational factors being studied, thus comparing and exploring the similarities and differences in conscious versus subconscious perceptions. Contrasting Mou and Shin, we extract the influence of peer influence without distinguishing between positive and negative reviews and the attached perceived trust it establishes. Measuring how reviews in general can alter the attentional behavior of consumers with fluctuations in price and complexity proved that reviews have varying impacts on consumers depending on the product being evaluated. In practical terms, disregarding trust establishment, online marketplace platforms should consider adapting the visibility of available consumer-generated content for product categories whose attention to reviews fostered an enhanced selection of the product. For instance, higher attentiveness to customer questions and answers for *Mikado* yielded a higher amount of selected products, whereas higher attentiveness to top reviews for *Couch* resulted in a higher amount of eliminated products. Put simply, ensuring the best possible fit between product category and displayed social influential factors is in the social commerce platform's best interest to increase sales.

Equivalently, product information proved to have consequential differences in terms of viewing behavior with respect to the four product category combinations. A large proportion of the AOIs attached to product information had noteworthy effects for consumers, not only in determining the selected product when faced with two product alternatives within the same price and complexity category, but also in which information was emphasized in the decision-making process across all categories. Whereas technical details heavily influenced consumers' cognitively processing their decision for stationary computers, the title of the product was of higher interest and facilitated the decision greatly when comparing couches. This separation in how corresponding information is of heterogeneous value is further supported by the evidence that the product summary is of grave importance to the evaluation process, but is considered with varying significance for all four price and complexity combinations. Henceforth, how much thought and detail sellers should put into each respective product information section must be meticulously planned according to the product's price

and complexity, while weighing in the results showing what is emphasized by online consumers for each category.

With respect to the layout and positioning of visually available information, social commerce platforms ought to carefully consider the placement of every individual informational criteria. This will improve visibility and allow for a heightened understanding of how to interact with the system, ensuring all information is readily available and thus enhance the overall user experience. Specifically for Amazon, the informational sections denoted *"Product Description"*, *"Technical Details"*, and *"Customer Reviews"* are not located in a close proximity to the rest of the product information, such as images, price, and aggregated average rating. Instead, the consumer is often required to scroll past distractions, i.e. indirectly related information, such as *"Related Products"* or *"Sponsored Products"*. Amazon's display layout is not consistent or standardized throughout the site, but rather seemingly randomized after the initial product display (product summary). This caused a significant proportion of respondents to overlook relevant product information and reviews entirely for certain products, before eventually realizing where this information was located on the page. One caveat from this is to distribute all relevant static product information and user generated content within a close vicinity to one another. This will affect the way designers and developers construct interfaces for social commerce sites, with the intention to increase the probability of interaction with all available elements and potentially alter or ease the decision-making process. Accommodating Don Norman's design principle on visibility (Norman, 2002), allocating and positioning relevant information such that it is clearly visible facilitates knowledge on how to use and interact with it, while the opposite implies difficulties in knowing about its existence and use. This is further supported by Gestalt theory, stating that *"the whole is greater than the sum of its parts"* (Opie, 1999); more specifically by the principle *proximity*, as objects close to one another appear to form groups. Amazon's information inconsistency impairs the ability to establish a familiar environment for the user. As previously discussed, familiarity affects fixation duration, where experienced users tend to have longer fixations than those with less experience. This, in turn, impacts researchers ability to accurately investigate consumers decisions related to products, as it forces the incorporation of environmental familiarity. Consequently, implementing consistency to the user interface and ensuring information is where the consumer expects to find it can profit the retailers greatly as it mitigates the impediment of unfamiliarity.

5.2 Limitations

First and foremost, the generalizability of this research is highly limited. The samples, consisting primarily of students in the age bracket of 23-27 years of age at the Norwegian University of Science and Technology, are not representative of the general public. Adding to this, the sample size is also not substantial, reaching only 31 participants due to time and resource constraints. Expanding the sample to include a larger quantity of test subjects, and diversifying the audience to include various ages, occupations, and geographical locations can greatly increase validity of results to be generalizable. Additionally, the product categories pertain to their perceived high/low combinations of price and complexity, yet this is not generalizable to *all* products within these categories. Research should look into a multitude of products belonging to these product categories to ensure the validity of the results extend beyond that of solely the distinct products used in this experiment. We have also leveraged Amazon as the sole representative for social commerce platforms. Adding other platforms of the like to the experiment, and sampling these, can potentially alter the results of the influence our dependent and independent variables have on consumer purchasing behavior. Our independent variables, price and complexity, are subject of perception, meaning they can be interpreted differently to different individuals. Our definition of high price is merely in contradistinction to its opposing low price category, whereas the *high* and *low* can have different interpretations for different peo-

ple; equivalently so for complexity. Furthermore, pre-existing bias and inclination may guide the actions of respondents, either subconsciously or consciously affecting the cognitive processing of information.

Due to the software used, Tobii Pro Lab, the web pages presented are required to be contained in one singular tab. Ergo, for all products viewed, respondents were unable to open multiple simultaneous tabs to obtain a side-by-side view during the comparison of the respective products. Instead, they were forced to navigate back and forth between web pages to view the different products, thus causing two participants to verbally mention having forgotten what information pertained to which product. This may also have been the case for additional participants. Post-experiment interviews revealed that being able to use a side-by-side comparison would aid in and ease the decision-making process for a number of respondents. It must also be noted that not all respondents were acquainted with Amazon and its layout, thus resulting in part of the relevant information being overlooked by a proportion of respondents given the unfamiliar environment. Further, this unfamiliarity may have led to a higher dwell time, as Ottati et al. (1999) assert that uncertainty and poor situation awareness can be the cause of higher dwell time, separating experienced and novice users. Finally, pupil dilation changes can be triggered by numerous factors, one of which is lighting changes. Hence, the requirement for a tight experimental design, with a minute to no room for errors and elements of distractions, must be established for complete certainty that the pupil dilation effect is caused by one specific factor (Holmqvist et al., 2011).

Empirically, the understanding of the consumption of information from various sources is rather limited. As noted by Vraga et al. (2016), eye tracking does not facilitate pinpointing the underlying processes for attention to diverse content. Cognition, perception, and emotion are difficult to measure, owed to automatic subconscious processing of information. Furthermore, our usage of the survey methodology brings forth another limitation, as the validity of a Likert scale attitude measurement can be inaccurate. Individuals' responses can be subject to social desirability, i.e. participants can lie to produce a favorable response, thus compromising the results. The Likert scale is also inadequate in measuring true attitudes due to its uni-dimensional and discrete nature with limited response alternatives. Another frequently seen occurrence is the habit of avoiding the selection of extremities, even in situations where the extreme is the most accurate. This is possibly by reason of the negative connotations and implications associated with choosing the extreme. Lastly, succeeding choices can be influenced by previous statements, consequently resulting in a concentration toward one end of the response spectrum (agree/disagree). Moreover, despite the attempt to mimic a real-world online shopping scenario and environment, the experiment was conducted in a laboratory setting. Utilizing an unobtrusive eye tracker and minimizing external elements of threat to validity is still not an equivalent replacement for a completely natural setting to the participants. Different settings may foster different behavior, accordingly, our findings are limited to the setting and task at hand.

Chapter 6

Challenges

This chapter discusses circumstances having contributed to delaying and preventing results from being produced. Various challenges were imposed on this study, including, but not limited to, availability of eye tracking equipment and laboratory, COVID-19 restrictions, data export issues, and computer processing limitations.

The master thesis start date was initially set to be early January 2020. Preparations for starting the thesis were made during this time, yet all subsequent work depended on the eye tracking experiments to take place beforehand. This event was heavily postponed due to the unavailability of both the necessary equipment and the laboratory in which the experiments would take place. The room and equipment were occupied by other students at the university, resulting in major delay for our experiments to commence. Initial preparations took place starting the 8th of January, with a thesis starting date of the 15th of January. Upon concluding preparations, the eye tracking experiments were intended to initiate on the 27th of January. Room and equipment unavailability caused this to be delayed until the 17th of February, from which the availability was merely increased to three days per week (Monday, Tuesday, and Friday). Only one single eye tracking system and computer was accessible to use, due to the other system having recently been shipped to the Netherlands for research purposes. As such, the time to conduct the experiments was effectively doubled, as only one participant could conduct the experiment at any given time, instead of the initially planned two. Another challenge that presented itself was the challenge of room booking, as the laboratory was erroneously booked by multiple students, causing our experiments to be further delayed by several days. Finally, the laboratory's physical location caused the Internet connection to be highly unstable and slow, causing further delay due to the requirement of a stable connection for the experiments to proceed. Consequently, the experiments were concluded on the 6th of March.

Following this, the eye tracking data required to be exported to an appropriate format and analyzed according to the measures intended to investigate. The aforementioned unstable Internet connection also resulted in a vastly high amount of stimuli having been created, due to the way Tobii Pro Lab and the eye tracking system works, meaning the size of the data per participant became far larger than expected. The data then had to be exported to a file format which allows for an ensuing analysis to take place. The laboratory computer did not succeed in exporting the data for reasons unknown, thus implying further delay in obtaining and processing the results. After successfully transferring the large files to a secondary computer, the export finished successfully, however, another challenge entailed. The software used, Tobii Pro Lab, exports the data in a highly inefficient way, forcing large amounts of manual work to be done to extract proper AOI measurements, in terms

of marking the selection and naming of hundreds, or more specifically $(n = 885)$, areas of interest individually. This is also, presumably, partly due to the unstable Internet connection, causing stimuli to render differently, and thus multiply, for each web stimulus. The number of stimuli ought to have been equal to the number of products presented $(n = 8)$, two per product category, instead of the substantially higher number $(n = 55)$. This also posed difficulties in the later analysis, due to the naming convention enforced for areas of interest and web page stimuli by Tobii Pro Lab. We circumvented this issue by applying a number of regular expressions to replace any and all invalid characters, and make the AOIs interpretable.

Due to the sequential nature of the thesis, virtually all work that could be done up until this point had been done. The thesis required the data to be successfully exported and extracted in order for the analysis to ensue and results to be produced. New restrictions were imposed by the Norwegian University of Science and Technology following COVID-19 governmental regulations, heavily affecting the research capabilities. The university campus closed on the 12th of March, preventing physical attendance, usage of equipment, and face-to-face consultation. Unable to leverage the higher performance university computer to export the data, a personal laptop was utilized, causing the export to take a total of 118 uninterrupted hours to complete. Following this, the succeeding analysis in the statistical computing programming language R commenced with said laptop. Given the aforementioned vast amount of AOIs, yielding an abundance of data entries, (ca. 140 million per participant) the speed of the results procurement was drastically decreased due to limited processing power. Furthermore, lacking supervision and follow-up from key collaborators during the study, possibly due to COVID-19 circumstances, enhanced the problematic situation, resulting in an initial inability to produce results. Throughout this time, communication was largely one-sided, responses were frequently non-existent, and agreements were not kept. Determination and repeated attempts to acquire feedback and assistance eventually succeeded, and the issue resolved itself shortly thereafter. Proper assistance was provided, thus allowing the procurement of results to resume. However, the process still involved reducing redundant and irrelevant data acquired in the data collection, and subsequently combining the relevant data. This process requires a high allocation of RAM (random-access memory) from a computer, thus implying that the personal laptop used was insufficient in achieving this without great modifications. Increasing memory allocation was not an option, as the memory of the machine used was exhausted before finishing reducing a number of the data export files due to the size of the data. Memory allocation was reported at approximately 100% usage, on a 64-bit laptop with 8.00 GB of RAM, throughout the duration of the data reduction process. Despite allocating the maximum available amount of RAM to the statistical analysis software R, the only outcome for files larger than a certain threshold was the error *"Error: memory exhausted (limit reached)"*. One solution for data sets with a large portion of disposable data was to nullify and discard the unnecessary rows of data entirely, before processing the remaining data. For larger data sets with a smaller fraction of disposable data, however, the only successfully encountered workaround was to transfer said data sets to a computer with more RAM (16.00 GB in our case), and continue processing the data accordingly. The initial separation of data, separating per participant recording, forced a considerable amount of additional manual work to be done before the analysis could ensue. Separating and reducing the original data sets, and merging them again post-processing overcame this obstacle, finally allowing the procurement of results.

Lastly, the software used required a license to use it. Due to limited funds, a trial period was initiated for the software, lasting a total of 30 consecutive days. This implies that all parts of analysis dependent on Tobii Pro Lab must be concluded prior to the expiration of the trial license. In combination with the delayed results procurement and closed university facilities, a limitation in measurements analyzed emanated from this. Heat maps and gaze plots are readily extracted within the software, however, the license expiration date had foregone the time of which this became applicable. The effect of this is seen in **chapter 4**, as our final results lack the aforementioned qualities.

6.1 Suggested Changes

For future work, the equipment and area of work should be properly managed. The booking system must be in order to avoid double-booking and causing confusion and wasted time. For efficiency purposes, multiple eye tracking systems can be utilized simultaneously, as the experiment does not require the researcher to be available solely to one participant for the duration of the experiment; and the processes can be completed separately. Moreover, ensuring a stable, and preferably fast Internet connection is a fundamental requirement for a successful eye tracking experiment of this nature, as it is centered around online commerce. Regarding the issues of data export creating multiple instances of a singular web stimulus in Tobii Pro Lab, we do not know how to circumvent these impediments, and urge future researchers to investigate alternative approaches and software solutions. COVID-19 could not have been prevented, however, communication and collaboration could still have proceeded, as usual, coordinating online using telecommunications applications such as Skype, Whereby, or even email and telephone. If all involving parts maintain communications and continue work as usual despite encountering unforeseen and unusual events, projects such as this one can survive and complete successfully. Alternatively, if troublesome, revision of original plans can take place and continue accordingly. One suggestion for overcoming the obstacle of processing power limitation or similar challenges, is to distribute and allocate time slots to students in need of university equipment. Allowing the usage of significantly more powerful equipment can shorten the amount of time spent processing data considerably, and allow manual work, such as data analyses, to be commenced quickly.

Exploring the methods used in the later stages of the study beforehand can vastly impact the amount of required work later and resolve potential conflicts. For this instance, getting acquainted with the allowed and disallowed characters in R prior to conducting the experiments would have vastly reduced the amount of work; both manual and automatic yet time-consuming. This would allow one to prevent the issue of having to refactor all AOIs, web page stimuli, and any other desired variable names defined in the experiment, by avoiding such characters completely. Adding to this, conducting a trial run of the experiments and successive results analysis, in order to establish the format for the data to be processed, is highly beneficial. This will, undoubtedly, lead to a significant decrease in time spent manually processing and altering data to fit the desired output. Finally, issuing proper equipment capable of handling the succeeding data analyses and processes, as well as providing the researcher with the necessary software licensing would nurture and facilitate the research, rather than decelerating and hindering it.

Appendices

Appendix A

Consent Form

Would you like to participate in the research project

,

"Deciding What to Purchase: Factors Impacting Consumer Decision-Making Behavior in Social Commerce"?

Researchers: Erik Ormevik (erikorm@stud.ntnu.no)
Patrick Mikalef (patrick.mikalef@ntnu.no)

Institution: Norwegian University of Science and Technology (NTNU)

Introduction

You have been offered the opportunity to participate in an experiment on eye tracking in social commerce. It is your choice whether to participate in this study or not. This form explains what participating entails so that you can make an informed decision.

Purpose

The context of our study is consumer decision making in social commerce settings, using eye tracking technology. During the experiment, participants' eye movements are monitored and recorded using a remote eye tracker attached to a computer monitor. Thereafter participants will be given a number of tasks to complete on the computer in front of them, which they are to solve alone. The aim of this study is to see how an online consumer decides what to purchase when given alternatives.

Who can participate?

Certain eye glasses or contact lenses might make it problematic for the eye tracker to accurately track your gaze. If this is the case, the participant's data results will be disregarded in the subsequent analysis, as such data may invalidate the results. Hence, the only prerequisite for participation is normal or corrected-to-normal vision.

Procedure

After arriving at the laboratory, participants will be asked to sign this form. Each individual is seated in front of his or her computer, where we will start calibrating the eye tracker to your eyes. As soon as you are ready to start, the test begins. The instructions on how to proceed are given in a separate sheet of paper, but are also shown on the screen. Between each stage in the experiment, the participants are asked to fill out an online survey with statements relating to the previous task, answering the statements with a level of agreement on a scale from one to seven. E.g. *"I found it easy to decide between the products displayed"* - ranging from 1 (strongly disagree) to 7 (strongly agree).

After the experiment, a handful of participants will be asked to participate in an interview with the main researcher, Erik Ormevik. The interview will be audio-recorded for simplifying the research process afterwards, and will not be used for anything other than remembering the statements given in the interview. The interview questions will relate to the experiment that was completed, such as *"Was there anything in particular that made it difficult to choose between products?"*.

Data handling

Only the experimenters will know the identity of the participants. All data will be stored separately from the participant names, as identity is irrelevant to our study and results. The research will be reported in a master thesis presented by the main researcher, Erik Ormevik, in collaboration with NTNU without identifying the participants. If other researchers request

to see the data to verify the results, only anonymous data will be delivered. The only demographic information we will ask of you is age and gender, which is to be used in our post-experiment analysis, completely anonymized.

Risks and benefits for a participant

The experiment will be as safe as any other instance of using a desktop computer. No unusual risks are involved. The eye tracker uses infrared light that is almost invisible to the human eye to illuminate the eyes while tracking. In comparison to the infrared radiation from the sun on a sunny day, for example, the intensity of the light is very low and poses no risk for safety. All participants are free to stop participating in the experiment at any time. There will be no consequences whatsoever if you decide to withdraw from the experiment. You are not required to provide a reason for withdrawing.

Your rights

As long as you can be identified in the data, it is your right to:

- Get insight into what personal information is registered on you
- Have information about you corrected
- Have information about you deleted
- Be provided a copy of your personal information (data portability)
- Send a complaint to *"personvernombudet"* or *"Datatilsynet"* regarding the processing and managing of your personal information

What gives us the right to manage personal information about you?

Vi manage information about you based on your consent.

Further information

The experimenters will be happy to answer any and all questions regarding the experiment.

Consent to participate

I have read and understood this document and decided to participate in the experiment.

Date: _____

Name (print): _____

Signature: _____

NSD NORSK SENTER FOR FORSKNINGSDATA

NSD sin vurdering

Prosjekttittel

Deciding What to Purchase: How do we Consume Information on Social Commerce Platforms Like Amazon?

Referansenummer

429185

Registrert

28.10.2019 av Erik Ormevik - erikorm@stud.ntnu.no

Behandlingsansvarlig institusjon

Norges teknisk-naturvitenskapelige universitet NTNU / Fakultet for informasjonsteknologi og elektroteknikk (IE) / Institutt for datateknologi og informatikk

Prosjektansvarlig (vitenskapelig ansatt/veileder eller stipendiat)

Patrick Mikalef, patrick.mikalef@ntnu.no, tlf: 73558995

Type prosjekt

Studentprosjekt, masterstudium

Kontaktinformasjon, student

Erik Ormevik, erikkvo@gmail.com, tlf: 46697736

Prosjektperiode

01.01.2020 - 11.06.2020

Status

18.11.2019 - Vurdert

Vurdering (1)

18.11.2019 - Vurdert

Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet med vedlegg den 18.11.2019. Behandlingen kan starte.

MELD VESENTLIGE ENDRINGER
Dersom det skjer vesentlige endringer i behandlingen av personopplysninger, kan det være nødvendig å melde

dette til NSD ved å oppdatere meldeskjemaet. Før du melder inn en endring, oppfordrer vi deg til å lese om hvilke type endringer det er nødvendig å melde:

https://nsd.no/personvernombud/meld_prosjekt/meld_endringer.html

Du må vente på svar fra NSD før endringen gjennomføres.

TYPE OPPLYSNINGER OG VARIGHET
Prosjektet vil behandle alminnelige kategorier av personopplysninger frem til 11.06.2020.

LOVLIG GRUNNLAG
Prosjektet vil innhente samtykke fra de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse som kan dokumenteres, og som den registrerte kan trekke tilbake. Lovlig grunnlag for behandlingen vil dermed være den registrertes samtykke, jf. personvernforordningen art. 6 nr. 1 bokstav a.

PERSONVERNPRINSIPPER
NSD vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen om:

- lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen
- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke behandles til nye, uforenlige formål
- dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet
- lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet

DE REGISTRERTES RETTIGHETER
Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: åpenhet (art. 12), informasjon (art. 13), innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18), underretning (art. 19), dataportabilitet (art. 20).

NSD vurderer at informasjonen om behandlingen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13.

Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER
NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32).

For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og/eller rådføre dere med behandlingsansvarlig institusjon.

OPPFØLGING AV PROSJEKTET
NSD vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til med prosjektet!

Kontaktperson hos NSD: Karin Lillevold
Tlf. Personverntjenester: 55 58 21 17 (tast 1)

Appendix B

Instruction Sheet

For all following tasks, you have approximately ten (10) minutes to either select one of the two available products for purchase, or neither of them. For all tasks, you may go back and forth between the two products by pressing the *"back"* and *"forward"* arrows in the upper-left corner of the screen/browser window.

Both of the following outcomes are equally acceptable:

- If you have reached a decision, please place the product you wish to purchase into your cart by pressing *"Add to Cart"* for that item, and proceed with the next task by pressing **F10** on the keyboard.
- If you can not reach a decision, please do not add any of the items to the cart, and proceed with the next task by pressing **F10** on the keyboard.

Task 1 - Computer

You are a person who wants a new computer. View both products presented to you and try to reach a decision on which one to buy.

Task 2 - Couch

You are a person who wants a new couch. View both products presented to you and try to reach a decision on which one to buy.

Task 3 - Remote Controlled Helicopter

You are a person who wants a new remote controlled helicopter. View both products presented to you and try to reach a decision on which one to buy.

Task 4 - Mikado Stick Game

You are a person who wants the Mikado stick game. View both products presented to you and try to reach a decision on which one to buy.

Appendix C

Survey Data

C.1 All Four Conditions

Table C.1: ANOVA - I am familiar with the type of product presented

Cases	Sum of Squares	df	Mean Square	F	p
Task	208.161	3.000	69.387	22.009	$< .001$
Residual	378.323	120.000	3.153		

Table C.2: ANOVA - The products displayed were easy to distinguish between

Cases	Sum of Squares	df	Mean Square	F	p
Task	95.935	3.000	31.978	10.402	$< .001$
Residual	368.903	120.000	3.074		

Table C.3: ANOVA - I found it easy to decide which product to purchase

Cases	Sum of Squares	df	Mean Square	F	p
Task	5.573	3.000	1.858	0.548	0.651
Residual	407.032	120.000	3.392		

Table C.4: ANOVA - I would normally have spent more time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	195.484	3.000	65.161	26.632	$< .001$
Residual	293.613	120.000	2.447		

Table C.5: ANOVA - I would normally have spent less time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	59.032	3.000	19.677	8.184	$< .001$
Residual	288.516	120.000	2.404		

Table C.6: ANOVA - I found this product to be of hedonic value to me (brings me happiness and/or pleasure)

Cases	Sum of Squares	df	Mean Square	F	p
Task	9.419	3.000	3.140	1.225	0.304
Residual	307.677	120.000	2.564		

Table C.7: ANOVA - I found this product to be of utilitarian value to me (is useful/practical to me)

Cases	Sum of Squares	df	Mean Square	F	p
Task	267.677	3.000	89.226	37.821	$< .001$
Residual	283.097	120.000	2.359		

Table C.8: ANOVA - My final decision was largely based on the price of the product

Cases	Sum of Squares	df	Mean Square	F	p
Task	8.540	3.000	2.847	0.749	0.525
Residual	456.065	120.000	3.801		

Table C.9: ANOVA - My final decision was largely based on how complex the product is

Cases	Sum of Squares	df	Mean Square	F	p
Task	81.839	3.000	27.280	11.953	$< .001$
Residual	273.871	120.000	2.282		

Table C.10: ANOVA - My final decision was largely based on how many items were left available

Cases	Sum of Squares	df	Mean Square	F	p
Task	1.613	3.000	0.538	0.863	0.463
Residual	74.774	120.000	0.623		

Table C.11: ANOVA - My final decision was largely based on personal preference

Cases	Sum of Squares	df	Mean Square	F	p
Task	39.484	3.000	13.161	4.585	0.004
Residual	344.452	120.000	2.870		

Table C.12: ANOVA - My final decision was largely based on the products' peer reviews

Cases	Sum of Squares	df	Mean Square	F	p
Task	109.444	3.000	36.481	8.998	$< .001$
Residual	486.516	120.000	4.054		

Table C.13: ANOVA - My final decision was largely based on the available product information

Cases	Sum of Squares	df	Mean Square	F	p
Task	97.056	3.000	32.352	10.122	$< .001$
Residual	383.548	120.000	3.196		

Table C.14: ANOVA - Product Chosen

Cases	Sum of Squares	df	Mean Square	F	p
Task	3.408	3.000	1.136	4.950	0.003
Residual	27.083	118.000	0.230		

C.2 Computer and Couch

Table C.15: ANOVA - I am familiar with the type of product presented

Cases	Sum of Squares	df	Mean Square	F	p
Task	3.629	1.000	3.629	1.384	0.244
Residual	157.290	60.000	2.622		

Table C.16: ANOVA - The products displayed were easy to distinguish between

Cases	Sum of Squares	df	Mean Square	F	p
Task	12.645	1.000	12.645	4.788	0.033
Residual	158.452	60.000	2.641		

Table C.17: ANOVA - I would normally have spent more time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	0.258	1.000	0.258	0.139	0.711
Residual	111.419	60.000	1.857		

Table C.18: ANOVA - I would normally have spent less time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	1.952	1.000	1.952	0.946	0.335
Residual	123.742	60.000	2.062		

Table C.19: ANOVA - I found this product to be of utilitarian value to me (is useful/practical to me)

Cases	Sum of Squares	df	Mean Square	F	p
Task	8.532	1.000	8.532	3.511	0.066
Residual	145.806	60.000	2.430		

Table C.20: ANOVA - My final decision was largely based on how complex the product is

Cases	Sum of Squares	df	Mean Square	F	p
Task	24.532	1.000	24.532	11.760	0.001
Residual	125.161	60.000	2.086		

Table C.21: ANOVA - My final decision was largely based on personal preference

Cases	Sum of Squares	df	Mean Square	F	p
Task	14.516	1.000	14.516	6.686	0.012
Residual	130.258	60.000	2.171		

Table C.22: ANOVA - My final decision was largely based on the products' peer reviews

Cases	Sum of Squares	df	Mean Square	F	p
Task	90.726	1.000	90.726	22.175	$< .001$
Residual	245.484	60.000	4.091		

Table C.23: ANOVA - My final decision was largely based on the available product information

Cases	Sum of Squares	df	Mean Square	F	p
Task	43.613	1.000	43.613	15.751	$< .001$
Residual	166.129	60.000	2.769		

Table C.24: ANOVA - Product Chosen

Cases	Sum of Squares	df	Mean Square	F	p
Task	2.820	1.000	2.820	13.427	$< .001$
Residual	12.180	58.000	0.210		

C.3 Computer and Helicopter

Table C.25: ANOVA - I am familiar with the type of product presented

Cases	Sum of Squares	df	Mean Square	F	p
Task	130.645	1.000	130.645	43.847	$< .001$
Residual	178.774	60.000	2.980		

Table C.26: ANOVA - The products displayed were easy to distinguish between

Cases	Sum of Squares	df	Mean Square	F	p
Task	3.629	1.000	3.629	1.261	0.266
Residual	172.645	60.000	2.877		

Table C.27: ANOVA - I would normally have spent more time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	37.161	1.000	37.161	13.913	$< .001$
Residual	160.258	60.000	2.671		

Table C.28: ANOVA - I would normally have spent less time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	2.726	1.000	2.726	1.214	0.275
Residual	134.710	60.000	2.245		

Table C.29: ANOVA - I found this product to be of utilitarian value to me (is useful/practical to me)

Cases	Sum of Squares	df	Mean Square	F	p
Task	116.532	1.000	116.532	43.454	$< .001$
Residual	160.903	60.000	2.682		

Table C.30: ANOVA - My final decision was largely based on how complex the product is

Cases	Sum of Squares	df	Mean Square	F	p
Task	0.258	1.000	0.258	0.089	0.767
Residual	174.129	60.000	2.902		

Table C.31: ANOVA - My final decision was largely based on personal preference

Cases	Sum of Squares	df	Mean Square	F	p
Task	5.226	1.000	5.226	1.957	0.167
Residual	160.258	60.000	2.671		

Table C.32: ANOVA - My final decision was largely based on the products' peer reviews

Cases	Sum of Squares	df	Mean Square	F	p
Task	72.403	1.000	72.403	18.028	$< .001$
Residual	240.968	60.000	4.016		

Table C.33: ANOVA - My final decision was largely based on the available product information

Cases	Sum of Squares	df	Mean Square	F	p
Task	10.903	1.000	10.903	4.056	0.049
Residual	161.290	60.000	2.688		

Table C.34: ANOVA - Product Chosen

Cases	Sum of Squares	df	Mean Square	F	p
Task	1.306	1.000	1.306	5.625	0.021
Residual	13.935	60.000	0.232		

C.4 Computer and Mikado

Table C.35: ANOVA - I am familiar with the type of product presented

Cases	Sum of Squares	df	Mean Square	F	p
Task	8.532	1.000	8.532	2.094	0.153
Residual	244.452	60.000	4.074		

Table C.36: ANOVA - The products displayed were easy to distinguish between

Cases	Sum of Squares	df	Mean Square	F	p
Task	85.952	1.000	85.952	30.744	$< .001$
Residual	167.742	60.000	2.796		

Table C.37: ANOVA - I would normally have spent more time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	148.645	1.000	148.645	67.107	$< .001$
Residual	132.903	60.000	2.215		

Table C.38: ANOVA - I would normally have spent less time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	34.129	1.000	34.129	10.259	0.002
Residual	199.613	60.000	3.327		

Table C.39: ANOVA - I found this product to be of utilitarian value to me (is useful/practical to me)

Cases	Sum of Squares	df	Mean Square	F	p
Task	79.032	1.000	79.032	24.983	$< .001$
Residual	189.806	60.000	3.163		

Table C.40: ANOVA - My final decision was largely based on how complex the product is

Cases	Sum of Squares	df	Mean Square	F	p
Task	48.790	1.000	48.790	23.341	$< .001$
Residual	125.419	60.000	2.090		

Table C.41: ANOVA - My final decision was largely based on personal preference

Cases	Sum of Squares	df	Mean Square	F	p
Task	0.258	1.000	0.258	0.072	0.790
Residual	215.613	60.000	3.594		

Table C.42: ANOVA - My final decision was largely based on the products' peer reviews

Cases	Sum of Squares	df	Mean Square	F	p
Task	35.629	1.000	35.629	7.813	0.007
Residual	273.613	60.000	4.560		

Table C.43: ANOVA - My final decision was largely based on the available product information

Cases	Sum of Squares	df	Mean Square	F	p
Task	85.952	1.000	85.952	27.005	$< .001$
Residual	190.968	60.000	3.183		

Table C.44: ANOVA - Product Chosen

Cases	Sum of Squares	df	Mean Square	F	p
Task	0.145	1.000	0.145	0.634	0.429
Residual	13.742	60.000	0.229		

C.5 Couch and Helicopter

Table C.45: ANOVA - I am familiar with the type of product presented

Cases	Sum of Squares	df	Mean Square	F	p
Task	177.823	1.000	177.823	79.699	$< .001$
Residual	133.871	60.000	2.231		

Table C.46: ANOVA - The products displayed were easy to distinguish between

Cases	Sum of Squares	df	Mean Square	F	p
Task	2.726	1.000	2.726	0.813	0.371
Residual	201.161	60.000	3.353		

Table C.47: ANOVA - I would normally have spent more time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	31.226	1.000	31.226	11.658	0.001
Residual	160.710	60.000	2.678		

Table C.48: ANOVA - I would normally have spent less time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	9.290	1.000	9.290	6.270	0.015
Residual	88.903	60.000	1.482		

Table C.49: ANOVA - I found this product to be of utilitarian value to me (is useful/practical to me)

Cases	Sum of Squares	df	Mean Square	F	p
Task	188.129	1.000	188.129	120.996	$< .001$
Residual	93.290	60.000	1.555		

Table C.50: ANOVA - My final decision was largely based on how complex the product is

Cases	Sum of Squares	df	Mean Square	F	p
Task	29.823	1.000	29.823	12.053	$< .001$
Residual	148.452	60.000	2.474		

Table C.51: ANOVA - My final decision was largely based on personal preference

Cases	Sum of Squares	df	Mean Square	F	p
Task	37.161	1.000	37.161	17.306	$< .001$
Residual	128.839	60.000	2.147		

Table C.52: ANOVA - My final decision was largely based on the products' peer reviews

Cases	Sum of Squares	df	Mean Square	F	p
Task	1.032	1.000	1.032	0.291	0.592
Residual	212.903	60.000	3.548		

Table C.53: ANOVA - My final decision was largely based on the available product information

Cases	Sum of Squares	df	Mean Square	F	p
Task	10.903	1.000	10.903	3.397	0.070
Residual	192.581	60.000	3.210		

Table C.54: ANOVA - Product Chosen

Cases	Sum of Squares	df	Mean Square	F	p
Task	0.309	1.000	0.309	1.341	0.252
Residual	13.341	58.000	0.230		

C.6 Couch and Mikado

Table C.55: ANOVA - I am familiar with the type of product presented

Cases	Sum of Squares	df	Mean Square	F	p
Task	23.290	1.000	23.290	7.003	0.010
Residual	199.548	60.000	3.326		

Table C.56: ANOVA - The products displayed were easy to distinguish between

Cases	Sum of Squares	df	Mean Square	F	p
Task	32.661	1.000	32.661	9.985	0.002
Residual	196.258	60.000	3.271		

Table C.57: ANOVA - I would normally have spent more time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	136.516	1.000	136.516	61.422	$< .001$
Residual	133.355	60.000	2.223		

Table C.58: ANOVA - I would normally have spent less time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	52.403	1.000	52.403	20.443	$< .001$
Residual	153.806	60.000	2.563		

Table C.59: ANOVA - I found this product to be of utilitarian value to me (is useful/practical to me)

Cases	Sum of Squares	df	Mean Square	F	p
Task	139.500	1.000	139.500	68.498	$< .001$
Residual	122.194	60.000	2.037		

Table C.60: ANOVA - My final decision was largely based on how complex the product is

Cases	Sum of Squares	df	Mean Square	F	p
Task	4.129	1.000	4.129	2.484	0.120
Residual	99.742	60.000	1.662		

Table C.61: ANOVA - My final decision was largely based on personal preference

Cases	Sum of Squares	df	Mean Square	F	p
Task	18.645	1.000	18.645	6.074	0.017
Residual	184.194	60.000	3.070		

Table C.62: ANOVA - My final decision was largely based on the products' peer reviews

Cases	Sum of Squares	df	Mean Square	F	p
Task	12.645	1.000	12.645	3.090	0.084
Residual	245.548	60.000	4.092		

Table C.63: ANOVA - My final decision was largely based on the available product information

Cases	Sum of Squares	df	Mean Square	F	p
Task	7.113	1.000	7.113	1.920	0.171
Residual	222.258	60.000	3.704		

Table C.64: ANOVA - Product Chosen

Cases	Sum of Squares	df	Mean Square	F	p
Task	1.702	1.000	1.702	7.508	0.008
Residual	13.148	58.000	0.227		

C.7 Helicopter and Mikado

Table C.65: ANOVA - I am familiar with the type of product presented

Cases	Sum of Squares	df	Mean Square	F	p
Task	72.403	1.000	72.403	19.654	$< .001$
Residual	221.032	60.000	3.684		

Table C.66: ANOVA - The products displayed were easy to distinguish between

Cases	Sum of Squares	df	Mean Square	F	p
Task	54.258	1.000	54.258	15.469	$< .001$
Residual	210.452	60.000	3.508		

Table C.67: ANOVA - I would normally have spent more time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	37.161	1.000	37.161	12.238	$< .001$
Residual	182.194	60.000	3.037		

Table C.68: ANOVA - I would normally have spent less time making my decision

Cases	Sum of Squares	df	Mean Square	F	p
Task	17.565	1.000	17.565	6.396	0.014
Residual	164.774	60.000	2.746		

Table C.69: ANOVA - I found this product to be of utilitarian value to me (is useful/practical to me)

Cases	Sum of Squares	df	Mean Square	F	p
Task	3.629	1.000	3.629	1.586	0.213
Residual	137.290	60.000	2.288		

Table C.70: ANOVA - My final decision was largely based on how complex the product is

Cases	Sum of Squares	df	Mean Square	F	p
Task	56.145	1.000	56.145	22.653	$< .001$
Residual	148.710	60.000	2.478		

Table C.71: ANOVA - My final decision was largely based on personal preference

Cases	Sum of Squares	df	Mean Square	F	p
Task	3.161	1.000	3.161	0.886	0.350
Residual	214.194	60.000	3.570		

Table C.72: ANOVA - My final decision was largely based on the products' peer reviews

Cases	Sum of Squares	df	Mean Square	F	p
Task	6.452	1.000	6.452	1.606	0.210
Residual	241.032	60.000	4.017		

Table C.73: ANOVA - My final decision was largely based on the available product information

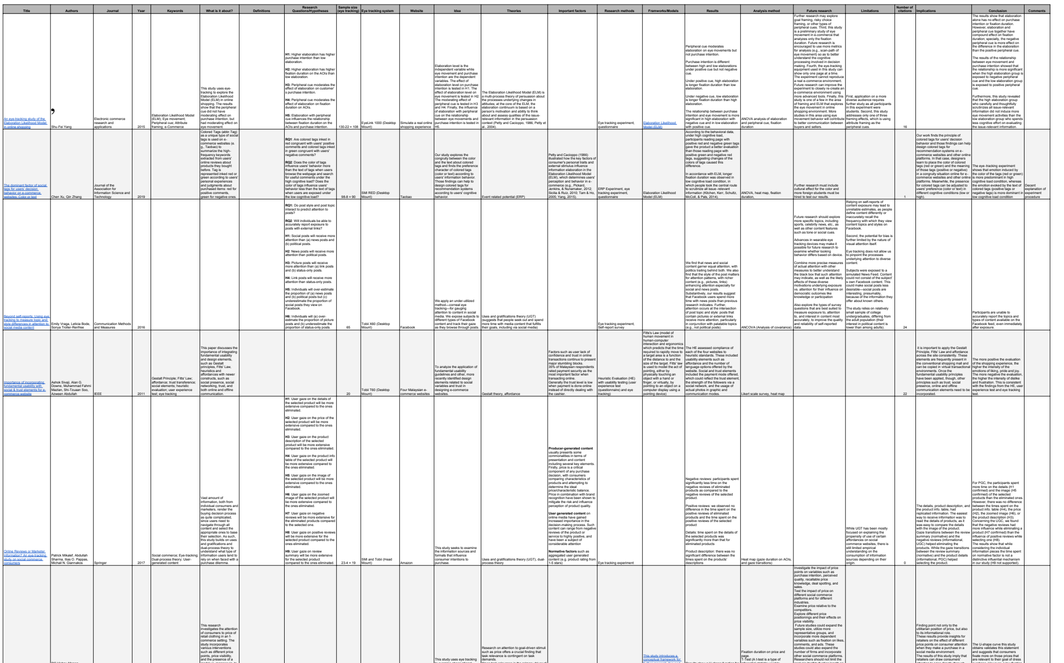
Cases	Sum of Squares	df	Mean Square	F	p
Task	35.629	1.000	35.629	9.832	0.003
Residual	217.419	60.000	3.624		

Table C.74: ANOVA - Product Chosen

Cases	Sum of Squares	df	Mean Square	F	p
Task	0.581	1.000	0.581	2.338	0.132
Residual	14.903	60.000	0.248		

Appendix D

Antecedent Research Summary Spreadsheet



Title	Authors	Journal	Year	Keywords	What is it about?	Definitions	Research Questions/Hypotheses	Sample size (eye tracking)	Eye tracking system	Website	Idea	Theories	Important factors	Research methods	Framworks/Models	Results	Analysis method	Future research	Limitations	Number of citations	Implications	Conclusion	Comments
An eye-tracking study of the Elaboration Likelihood Model in online shopping	Shu-Fei Yang	Electronic commerce research and applications	2015	Elaboration Likelihood Model (ELM); Eye movement; Peripheral cue; Attribute framing; e-Commerce	This study uses eye-tracking to explore the Elaboration Likelihood Model (ELM) in online shopping. The results show that the peripheral cue did not have moderating effect on purchase intention, but had moderating effect on eye movement.		**H1:** Higher elaboration has higher purchase intention than low elaboration. **H2:** Higher elaboration has higher fixation duration on the AOIs than low elaboration. **H3:** Peripheral cue moderates the effect of elaboration on customer' s purchase intention. **H4:** Peripheral cue moderates the effect of elaboration on fixation duration on AOIs. **H5:** Elaboration with peripheral cue influences the relationship between fixation duration on the AOIs and purchase intention.	130-22 = 108	EyeLink 1000 (Desktop Mount)	Simulate a real online shopping experience	Elaboration level is the independent variable while eye movement and purchase intention are the dependent variables. The effect of elaboration level on purchase intention is tested in H1. The effect of elaboration level on eye movement is tested in H2. The moderating effect of peripheral cue is tested in H3 and H4. Finally, the influence of elaboration with peripheral cue on the relationship between eye movements and purchase intention is tested in H5.	The Elaboration Likelihood Model (ELM) is a multi-process theory of persuasion about the processes underlying changes in attitudes; at the core of the ELM, the elaboration continuum is based on a person's motivation and ability to think about and assess qualities of the issue-relevant information in the persuasion context (Petty and Cacioppo, 1986, Petty et al., 2004).		Eye tracking experiment, questionnaire	Elaboration Likelihood Model (ELM)	Peripheral cue moderates elaboration on eye movements but not purchase intention. Purchase intention is different between high and low elaborations under positive cue but not negative cue. Under positive cue, high elaboration is longer fixation duration than low elaboration. Under negative cue, low elaboration is longer fixation duration than high elaboration. The relationship between purchase intention and eye movement is more significant in high elaboration with negative cue and in low elaboration with positive cue.	ANOVA analysis of elaboration and peripheral cue, fixation duration	Further research may explore goal framing, risky choice framing, or other types of peripheral cues. Third, this study is a preliminary study of eye movement in e-commerce that analyzes only the fixation duration. Future research is encouraged to use more metrics for analysis (e.g., scan-path of eye movement) so as to better understand the cognitive processing involved in decision making. Fourth, the eye-tracking equipment used in this study can show only one page at a time. The experiment cannot reproduce a real e-commerce environment. Future research can improve the experiment to closely re-create an e-commerce environment using more advanced tools. Finally, this study is one of a few in the area of framing and ELM that explores the eye movement in online shopping environment. More studies in this area using eye movement behavior will contribute to better communication between buyers and sellers.	First, application on a more diverse audience requires further study as all participants in this experiment were students. Second, this study addresses only one of three framing effects, which is using attribute framing as the peripheral cues.	16		The results show that elaboration alone has no effect on purchase intention or fixation duration. However, elaboration and peripheral cue together have compound effect on fixation duration; specially, the negative peripheral cue is more effect on the difference in the elaboration than the positive peripheral cue. The results of the relationship between eye movement and purchase intention showed that the relationship is more significant when the high elaboration group is exposed to negative peripheral cue and the low elaboration group is exposed to positive peripheral cue. Furthermore, this study revealed that the high elaboration group who carefully and thoughtfully scrutinizes all issue-relevant information did not induce more eye movement activities than the low elaboration group who spends less cognitive effort on evaluating the issue-relevant information.	
The dominant factor of social tags for users' decision behavior on e-commerce websites: Color or text	Chen Xu, Qin Zhang	Journal of the Association for Information Science and Technology	2019		Colored Tags (abbr.Tag) as a unique type of social tags is used on e-commerce websites (e. g., Taobao) to summarize the high-frequency keywords extracted from users' online reviews about products they bought before. Tag is represented inked red or green according to users' personal experiences and judgments about purchased items: red for positive comments, green for negative ones.		**RQ1**: Are colored tags inked in red congruent with users' positive comments and colored tags inked in green congruent with users' negative comments? **RQ2**: Does the color of tags influence users' behavior more than the text of tags when users browse the webpage and search for useful comments under the high cognitive load? Does the color of tags influence users' behavior less than the text of tags when users are exposed under the low cognitive load?	98-8 = 90	SMI RED (Desktop Mount)	Taobao	Our study explores the congruity between the color and the text about colored tags and finds the preference character of colored tags (color or text) according to users' information behavior. Those findings can help to design colored tags for recommendation systems according to users' cognitive behavior.	Event related potential (ERP)	Petty and Cacioppo (1986) illustrated how the key factors of consumer's personal traits and external stimulus influence information elaboration in the Elaboration Likelihood Model (ELM), which determines users' perception and behavior in e-commerce (e.g., Pickard, Jenkins, & Nunamaker, 2012; Sicilia & Ruiz, 2010; Tam & Ho, 2005; Yang, 2015).	ERP Experiment, eye tracking experiment, questionnaire	Elaboration Likelihood Model (ELM)	According to the behavioral data, under high cognitive load, participants reading page with positive red and negative green tags gave the product a better evaluation than those reading page with positive green and negative red tags, suggesting changes of the colors of tags caused this difference. In accordance with ELM, longer fixation duration was observed in low cognitive load condition, in which people took the central route to scrutinize all issue-relevant information (Kitchen, Kerr, Schultz, McColl, & Pals, 2014).	ANOVA, heat map, fixation duration,	Further research must include cultural effect for the color and more foreign students must be hired to test our results.		1	Our work finds the principle of colored tags for users' decision behavior and those findings can help design colored tags for recommendation systems on e-commerce websites and other online platforms. In that case, designers learn to place the color of colored tags (red or green) and the meaning of those tags (positive or negative) in a congruity situation online for e-commerce websites and other online platforms. Meanwhile, the presence for colored tags can be adjusted to users' preference (color or text) in different cognitive conditions (low or high).	The eye-tracking experiment shows that emotion induced by the color of the tags (red or green) is more predominant in high cognitive load condition, whereas the emotion evoked by the text of colored tags (positive tags or negative tags) is more dominant in low cognitive load condition	Decent explanation of experiment procedure
Beyond self-reports: Using eye tracking to measure topic and style differences in attention to social media content	Emily Vraga, Leticia Bode, Sonya Troller-Renfree	Communication Methods and Measures	2016				**RQ1:** Do post style and post topic interact to predict attention to posts? **RQ2**: Will individuals be able to accurately report exposure to posts with external links? **H1:** Social posts will receive more attention than (a) news posts and (b) political posts. **H2**: News posts will receive more attention than political posts. **H3:** Picture posts will receive more attention than (a) link posts and (b) status-only posts. **H4:** Link posts will receive more attention than status-only posts. **H5:** Individuals will over-estimate the proportion of (a) news posts and (b) political posts but (c) underestimate the proportion of social posts they view on Facebook. **H6:** Individuals will (a) over-estimate the proportion of picture posts and (b) underestimate the proportion of status-only posts.	65	Tobii X60 (Desktop Mount)	Facebook	We apply an under-utilized method—corneal eye tracking—for gauging attention to content in social media. We expose subjects to different types of Facebook content and track their gaze as they browse through posts.	Uses and gratifications theory (UGT) (suggests that people seek out and spend more time with media content that fulfills their goals, including via social media)		Eye tracking experiment, Self-report survey		We find that news and social content garner equal attention, with politics trailing behind both. We also find that the style of the post matters for attention patterns, with richer content (e.g., pictures, links) enhancing attention especially for social and news posts. Substantively, our results suggest that Facebook users spend more time with news posts than previous research indicates. Further, attention occurs at the intersection of post topic and style: posts that contain pictures or external links receive more attention, particularly in conjunction with palatable topics (e.g., not political posts).	ANCOVA (Analysis of covariance)	Future research should explore more specific topics, including sports, celebrity news, etc., as well as other content features such as tone or social cues. Advances in wearable eye tracking devices may make it possible for future research to examine whether looking behavior differs based on device. Combine more precise measures of actual attention with other measures to better understand the black box that such attention may indicate, as well as the likely effects of these diverse motivations underlying exposure vs. attention for their influence on democratic outcomes like knowledge or participation Also explore the types of survey questions that are best suited to measure exposure to, attention to, and interest in content most accurately, to improve the quality and reliability of self-reported data.	Relying on self-reports of content exposure may lead to unreliable estimates, as people define content differently or inaccurately recall the frequency with which they view content topics and styles on Facebook. Second, the potential for bias is further limited by the nature of visual attention itself. Eye tracking does not allow us to pinpoint the processes underlying attention to diverse content. Subjects were exposed to a simulated News Feed. Content could not consist of the subject' s own Facebook content. This could make social posts less desirable—social posts are interesting, presumably, because of the information they offer about known others. The study relies on relatively small sample of college undergraduates, differing from the adult population (their interest in political content is lower than among adults).	24		Participants are unable to accurately report the topics and types of content available on the Facebook feed, even immediately after exposure.	
Importance of incorporating fundamental usability with social & trust elements for e-commerce website	Ashok Sivaji, Alan G. Downe, Muhammad Fahmi Mazlan, Shi-Tzuaan Soo, Azween Abdullah	IEEE	2011	Gestalt Principle; Fitts' Law; affordance; trust transference; social elements; heuristic evaluation; user experience test; eye tracking	This paper discusses the importance of integrating fundamental usability and design elements, such as Gestalt principles, Fitts' Law, heuristics and affordances with newer constructs, such as social presence, social networking, trust, and both online and offline communication.			20	Tobii T60 (Desktop Mount)	Four Malaysian e-commerce websites	To analyze the application of fundamental usability guidelines and other, more recently identified design elements related to social variables and trust in designing e-commerce websites.	Gestalt theory, affordance	Factors such as user lack of confidence and trust in online transactions continue to present major stumbling blocks. 35% of Malaysian respondents rated payment security as the most important factor when transacting online. Generally the trust level is low when payment is done online instead of directly dealing with the cashier.	Heuristic Evaluation (HE) with usability testing (user experience test (questionnaire) and eye tracking)	Fitts's Law (model of human movement in human-computer interaction and ergonomics which predicts that the time required to rapidly move to a target area is a function of the distance to and the size of the target. Fitts' law is used to model the act of pointing, either by physically touching an object with a hand or finger, or virtually, by pointing to an object on a computer display using a pointing device)	The HE assessed compliance of each of the four websites to heuristic standards. These included usability elements such as affordance and the number of language options offered by the website. Social and trust elements included the payment mode offered, which could reflect the trust element, the strength of the followers via a social network, and the usage of actual photos in graphic and communication modes.	Likert scale survey, heat map			22	it is important to apply the Gestalt Principle, Fitts' Law and affordance across the site consistently. These elements are frequently present in the conventional shopping mall and can be copied in virtual transactional environments. Once the fundamental usability principles have been applied, though, other principles such as trust, social presence, online and offline communication elements need to be incorporated.	The more positive the evaluation of the shopping experience, the higher the intensity of the emotions of liking, pride and joy. The more negative the evaluation, the higher the intensity of dislike and frustration. This is consistent with the findings from the HE, user experience test and eye tracking test.	
Online Reviews or Marketer Information? An eye-tracking study on social commerce consumers	Patrick Mikalef, Abdullah Sharma, Ilias O. Pappas, Michail N. Giannakos	Springer	2017	Social commerce; Eye-tracking; Dual-process theory; User-generated content	Vast amount of information, both from individual consumers and marketers, render the buying decision process as quite complicated, since users need to navigate through all content and select the appropriate ones to base their selection. As such, this study builds on uses and gratifications and dual-process theory to understand what type of information users tend to rely on when faced with a purchase dilemma.		**H1**: User gaze on the details of the selected product will be more extensive compared to the ones eliminated. **H2**: User gaze on the price of the selected product will be more extensive compared to the ones eliminated. **H3**: User gaze on the product description of the selected product will be more extensive compared to the ones eliminated. **H4**: User gaze on the product info table of the selected product will be more extensive compared to the ones eliminated. **H5**: User gaze on the image of the selected product will be more extensive compared to the ones eliminated. **H6**: User gaze on the zoomed image of the selected product will be more extensive compared to the ones eliminated. **H7**: User gaze on negative reviews will be more extensive for the eliminated products compared to the selected one. **H8**: User gaze on positive reviews will be more extensive for the selected product compared to the ones eliminated. **H9:** User gaze on review summary will be more extensive for the selected product compared to the ones eliminated.	23-4 = 19	SMI and Tobii (Head Mount)	Amazon	This study seeks to examine the information sources and formats that influence consumer intentions to purchase.	Uses and gratifications theory (UGT), dual-process theory	**Producer-generated content** usually presents some commonalities in terms of presentation and content including several key elements. Firstly, price is a critical component of any purchase decision, with consumers comparing characteristics of products and attempting to determine the ideal price/characteristic balance. Price in combination with brand recognition have been shown to mitigate the risk and influence perception of product quality. **User generated content** on online media have gained increased importance in the decision-making process. Such content can range from negative reviews of the product or service to highly positive, and have been a subject of considerable attention **Normative factors** such as aggregated user generated content (e.g. product rating from 1-5 stars)	Eye tracking experiment		Negative reviews: participants spent significantly less time on the negative reviews of eliminated products as compared to the negative reviews of the selected product. Positive reviews: we observed no difference in the time spent on the positive reviews of eliminated products and the time spent on the positive reviews of the selected product Details: time spent on the details of the selected products was significantly more than that for eliminated products Product description: there was no significant difference between the times spent on the products' descriptions	Heat map (gaze duration on AOIs, and gaze transitions)		While UGT has been mostly focused on explaining the propensity of use of certain affordances on social commerce websites, there is still limited empirical understanding on the consumption of information sources depending on their origin.	0	The details, product description, and the product info. table, had replicated information. The easiest way to receive information was to read the details of products, as it was easy to compare the details with the image of the product. Gaze transitions between the review summary (normative) and the negative reviews (informational, UGC) helped eliminating the products. While the gaze transitions between the review summary (normative) and the product details (informational, PGC) helped selecting the product.	For PGC, the participants spent more time on the details (H1 confirmed) and the image (H5 confirmed) of the selected products than the eliminated ones. However, there was no difference between the times spent on the product info. table (H4), the price (H2), the zoomed image (H6), or the product description (H3). Concerning the UGC, we found that the negative reviews had more influence while eliminating a product (H7 confirmed) than the influence of positive reviews while selecting one (H8). The results show that while considering the individual information pieces the time spent on normative factor is not a distinctive influential mechanism in our study (H9 not supported).	
Consumer attention to price in social commerce: Eye tracking patterns in retail clothing	RG Vishnu Menon, Valdimar Sigurdsson, Nils Magne Larsen, Asle Fagerstrøm, Gordon R. Foxall	Journal of Business Research	2016	Social commerce; F-commerce; Price; Attention; Eye tracking; Retail clothing	This research investigates the attention of consumers to price of retail clothing in an f-commerce setting. The study incorporates various interventions such as different price points, price visibility, and the presence of a model vs. mannequin, to assess their impact on the attention to price through the use of an eye tracking device.			34-3 = 31	Tobii 1750 (Desktop Mount)	Clothing retailer page on Facebook	This study uses eye tracking to examine observational behavior as fixation time on price and the total fixation time on a Facebook page that displays clothing products.	Research on attention to goal-driven stimuli such as price offers a crucial finding that task relevance is contingent on task demands. Since task relevance is the primary driver of goal-driven attention, several studies investigate task-specific effects on attention and their results show that people pay increased attention to goal-relevant stimuli.		Eye tracking experiment	This study introduces a conceptual framework for further research, focused on the mechanisms through which social commerce can lead to increased sales and profits.	Results show a U-shape function for fixations on price and total fixations on a page with respect to price for females who buy for themselves and males who buy for their partners.	Fixation duration on price and page. T-Test (A t-test is a type of inferential statistic used to determine if there is a significant difference between the means of two groups, which may be related in certain features.)	Investigate the impact of price points on variables such as purchase intention, perceived quality, recallable price knowledge, deal spotting, and sales. Test the impact of price on different social commerce platforms and for different industries. Examine price relative to the competitors. Explore different price positionings and their effects on price visibility. Future studies could expand the sample size, utilize more representative groups, and incorporate more dependent variables such as fixation on likes, comments, and ads. These studies could also expand the number of firms and incorporate other social commerce platforms. Researchers should not limit the analysis itself to fixation length on price, but should explore other measurements such as time to first fixation, fixation count, and observation length.	Small sample size, not the most representative group used (as they were all European students)	26	Finding point not only to the utilitarian position of price, but also to its informational role. These results provide insights for retailers on the effect of different price points on consumer attention when they make a purchase in a social media environment. The results of this study imply that retailers can draw consumers' attention to price directly through manipulation of the price points and price position (visibility) or indirectly through the use of a salient attribute such as a model/mannequin.	The U-shape curve this study obtains validates this statement and suggests that consumers fixate more on those prices that are relevant to their goal of dress purchase. However, a low fixation on price for the mid-range prices does not necessarily mean that the consumers did not consider them in their choice decisions	

Title	Authors	Journal	Year	Keywords	What is about?	Definitions	Research Questions/Hypotheses	Sample size (key findings)	Eye-tracking system	Website	Site	Theories	Important factors	Research method	Frameworks/Models	Results	Analytic method	Future research	Limitations	Number of citations	Implications	Conclusion	Comments
Where consumer eye movements fixate in online product listing pages: Eye-tracking study of search product ranking effects	Ming Liu, Zhang Tao, Jin Ma, Peng Yuan Liu	Computers in Human Behavior	2018	Online review; Search product; Ranking; Eye movements; Visual attention	This study uses eye-tracking method to investigate how online review search ranking and review quantity influence how consumers fixate on search product listings.	**Eye tracking** is a method to study how people look at something and identify what aspects of a product influence eye movements and attention. (p. 1, 2) AOIs, which can be used to compare visual strategies and to infer the underlying cognitive processing. **Fixation duration** is a period of time in which the eye gaze does not change significantly and is long enough for the brain to start interpreting or encoding information. Normalized representation of fixation duration is the duration of one of limited number of fixations, expressed as the AOI's screen attention, or in percent. Fixation duration, in contrast to fixation count, is a measure of how much information from the object is processed. (p. 3) **Fixation count** refers to the number of fixations in a specific area, which can be used to measure understanding and processing the given information. (p. 3)	RR: When consumers purchase search products, they will spend more time and more fixations than to experience based products. RS: When consumers purchase experience products, they will spend more time and more fixations than to experience based products. RN: When consumers purchase experience products, they will spend more time and more fixations than to experience based products. H1: When consumers purchase search products, they will spend more time on sponsored search results than organic search results. H2: When consumers purchase search products, they will spend more time on sponsored search results than organic search results. H3: When consumers purchase search products, they will spend more time on sponsored search results than organic search results. H4: When consumers purchase search products, they will spend more time on sponsored search results than organic search results.	40	Tobii T120 (Desktop Mount)												Traditional sentimental analysis (positive and negative) and review quantity are difficult to affordable some variables such as review quantity and review valence because they are operationalized in different ways. Cognitive processing, attention, and decision-making are complex and cannot be measured by traditional methods. Eye-tracking is not because some subconscious processing may cover consumers.	22	Online shopping practitioners such as retailers should pay more attention to strategies should stereotypes the presentation of search results and review quantity and review valence as well as the attribute information of search product listings. Consumers increasingly rely on online information to evaluate products and make purchase decisions. Practitioners are stepping the search products, they need to seek ways to influence the consumer decision, when they purchase experience products, they need to focus on providing accurate experience based reviews, as proposed by Kuan et al. (2014).	Consumers increasingly rely on online information to evaluate products and make purchase decisions.	Doesn't mention eye-tracking.
Consumer behavior in online shopping environments	Gerald L. Lohse, S. J. Bellman	Electronic Markets	2000		They examined eye movements of online shoppers conducting a search for the yellow pages of a particular product, jewelry, on a computer screen.			41		Yellow pages	Seeing what captures the attention of consumers is important for an e-commerce business in the online space.	Attention is an important component of subsequent social behavior.	Eye-tracking experiment; questionnaire	Models of eye-movements and attention. Models of eye-movements and attention provide insight about the underlying cognitive and decision-making mechanisms. Models of attention primitives such as salient stimuli, attention capture, and organized search. Models of attention allocation, visual processing, and memory. Models of attention as a function of features and trans-saccadic memory. Models of information processing capacities in the human brain. Not sure had the largest influence on the study, but influenced by Lapidus and Pinker.	Participants noticed 50% of the search page display ads but only 3% of	As information environments and commerce grow and develop in China, deep understanding of this information processing capacities in the human brain and its implications for e-commerce practitioners and researchers will be increasingly focused research.	1	Our research has implications for studying information processing capacities in the human brain and its implications for e-commerce in China.		
Consumers' online decision making: The moderating roles of screen size and decision complexity	Xiaoyan Qiyomaki, Stefan Gregl, Tom Calvo	International Journal of Human-computer studies	2019	Generation Y; Millennials; HCI; Eye-tracking; Decision-making; Eye motion; Fixation; Gaze; Usability; Web design	This study addresses generation Y (age 18-34) consumers who are economically influential, technically savvy, and have online purchase experience. Generation Y is getting the advantage of this group, and they are the future. Generation Y, who, they argue, are more sensitive to demographic has been more.		RQ: Consumers will display more attention to important and less attention to unimportant information. H1: Consumers will spend more time on product information when the screen size is smaller than when the screen size is larger. H2: Consumers will spend more time on product information when the decision is difficult than when the decision is easy. H3: Consumers will spend more time on product information when the screen size is smaller than when the screen size is larger and the decision is difficult than when the decision is easy.	15	Tobii T60 (Desktop Mount)															
Eye-tracking research in consumer psychology	Tony Dwyer(Hons), Emma Hutton	Journal of Marketing Communications	2016	Electronic word of mouth; Visual stimulus; Consumer attention; Eye tracking	Reviews social consumer research in the past, and aims to provide a "roadmap" for the path of users.	We define **BOSM** as "perceived quality of information from different sources for consumer purchase decisions. One is the information quality are accepted by a group of current consumers. The other two are information from other consumers and from the seller." (p. 1) **Eye-tracking** is a method to study how people look at something and identify what aspects of a product influence eye movements. (p. 2) AOIs, which can be used to compare visual strategies and to infer the underlying cognitive processing. **Fixation duration** is a period of time in which the eye gaze does not change significantly and is long enough for the brain to start interpreting or encoding information. Normalized representation of fixation duration is the duration of one of limited number of fixations, expressed as the AOI's screen attention, or in percent. Fixation duration, in contrast to fixation count, is a measure of how much information from the object is processed. (p. 3) **Fixation count** refers to the number of fixations in a specific area, which can be used to measure understanding and processing the given information. (p. 3)	RQ: Consumers will display more attention to important and less attention to unimportant information. H1: Consumers will decrease their attention to BOSM participating in the purchase decision when the BOSM is more consuming social media. H2: Consumers will decrease their attention to BOSM participating in the purchase decision when the BOSM is more consuming social media. H3: BOSM campaign options will have more attention to influence consumer attention with the BOSM than the BOSM campaign options.	29																
Eye-tracking research on product ranking effects in online shopping	Ming Liu, Zhang Tao, Jin Ma, Peng Yuan Liu	CHI	2017	Recommender systems; Eye-tracking; Ranking; Visual attention; Eye movements	This study uses eye-tracking method to investigate how online review search ranking and review quantity influence how consumers fixate on search product listings.			213 (+ 13)	Tobii T60 (Desktop Mount)		In our experiment, we mimic a typical e-commerce organization system and use the system to collect the system.			Survey; eye-tracking experiment			Interpret plot (Heat map); gaze path; process sequence; attention						
Eye-tracking study of gaze patterns in consumer choice	Li Chen, Pearl Pu	Springer	2016	Recommender systems; Interface; organization design; Eye-tracking; Decision-making; Adaptive interaction	In this paper, we particularly investigate how decision-making strategies influence users' decision making behaviors and the preservation of their eye movements in various interfaces.			21.3 + 18	Tobii T60 (Desktop Mount)	Three recommender systems were designed for this eye-tracking study: 1. Organization by similarity; 2. organization by quality; 3. organization with two categories, but not in similar (Kuan et al. 2014)	2004 Amazon.com, we have submitted to understand: 1) How is users' actual visual behavior in the Amazon.com? 2) Can Eye-tracking technology provide evidence that can prompt users to accept the recommendations so as to improve the system's performance? Gamma factorial scientific		Eye-tracking experiment		The eye-tracking data revealed that the organization by similarity layout, can significantly prolong users' fixation on items, with the leading benefits of better organize decision quality. We eye-tracking results interestingly show that the organization by similarity layout is different from the other two layouts, in the sense that it lowered the number of attentions users need to make in the organization based interfaces, even when the number of recommended items increased.	Fixation duration, SACRA		One objective will be to revisiting more cases from diverse origins and domains, and to further validate the results. Another will be to revisit the design of users' perceptual processes and determining the reason that causes the observed difference between the perceived strategies and the actual behavior. We will also begin to build predictive models of users' decision behaviors through combining eye-tracking data with other data sources.	Small sample size	17		Category structure can more likely lead to a rigorous consideration of the decision quality and detailed decisions of the product attributes, while the flat category layout was demonstrated to lead to more intuitive and heuristic fixations and engineering decision quality.	Decision quality
Eye-tracking studies of users' preferences for recommender systems	Li Chen, Pearl Pu	Springer	2018	Recommender systems; Eye-tracking; Preference elicitation; Decision-making; Visual attention; Interface design	In this paper, we accumulate evidence from our previous studies and other related studies to provide a comprehensive review of the current state of the art in using eye-tracking technique to study users' decision making behaviors, and the preservation of their eye movements in various interfaces.				Tobii T60 (Desktop Mount)					Eye-tracking experiment											
Eye-tracking analysis of consumer choice behaviors in online shopping environments	Ai-Hsin Cassagnes, Pearl Pu	CHI	2018	Eye-tracking systems; Recommender systems; Accommodate systems; Usage patterns	In this paper, we examine how eye-tracking can help us understand consumers' behaviors, and how we can use the gaze patterns to infer decision-making strategies.				Tobii T60 (Desktop Mount)		The performed website has some significant flaws for this scenario, which we have to be aware of. In fact, it contains several	The understanding of this soft-constraint problem and of the underlying decision making process will help us to provide better recommendation of because and reasons.		Eye-tracking experiment; questionnaire		Users only much more on the recommender when they are looking for particular for themselves. Users are more likely to use the recommender when they are searching a particular product.	Heat map, gaze plot; Sadness, Surprise, Neutral, Happiness and a values between duration series					
Eye-tracking analysis of consumer choice behaviors in online shopping environments	Ai-Hsin Cassagnes, Nicolas Lemay, Pearl Pu	CHI	2019		In this paper, we seek to understand how users behave differently in different interfaces by analyzing their sessions as they browsed with a website. We also investigate how the different recommendation strategies in an item-to-item recommender system affect Bing Nan (2011) and Bing Nan (2012) and Bing Nan (2013) and Bing Nan (2014)	We define the **organization** as the way in which recommended related people where the system uses to show different recommendations based on item-to-item recommendation. We define the **attention** as the amount of recommended related people where the system uses to show different recommendations based on item-to-item recommendation. We define the **preference** as the "level" of one or more categories.																	

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Effects of social popularity and social influence cues on perceived product quality and purchase intention in online shopping	Sun Mou, Zongbao Shen	Computers in Human Behavior	2018	Social popularity; Time scarcity; Smartphoneuse; Eye tracking	The effects of social popularity and time scarcity on online perceptions of and purchase intentions.	Chang and Yi (2013-E) suggested that social popularity refers to the volume of previous purchases of a product, whereas time scarcity refers to the perceived sufficiency and accessibility of a product.	**RQ1:** On social popularity and time scarcity: Affective consumers' cognitive perceptions of product quality? **RQ2:** On social popularity and time scarcity: Affective consumers' cognitive perceptions of social influence?	41	Tobii X120 (Desktop Mount)	The experiment created a high-tech environment in a laboratory setting. Participants were tested in a controlled environment to minimize extraneous variables.	Employed signaling theory and a secondary dataset was used to test the proposed conceptual model. Questionnaires were used to measure the variables.	**Signaling theory:** Signaling plays an important role in guiding individuals' decision-making, information seeking, and behavioral intentions. When consumers do not have direct access to the quality of an any unrelated of its quality, they typically rely on indirect signals to infer it from cognitive perceptions. For example, consumers may infer product quality from product quality. Previous research always claim that the greater the perceived availability and uniqueness of a product, the greater the value it will be perceived. **Resource theory** suggests that if an individual's resources are limited or diminished, s/he experiences psychological stress and cognitive overload. Limited resources undermine a person's ability to process information. **Attention Influence theory** suggests that an individual's attention is a limited resource and is influenced by the features of others.		Eye tracking experiment, questionnaire / panel data analysis		First, smart breaks were found to have a higher impact score than social popularity, suggesting that consumers are more likely to form a perception of product quality from smart breakthrough products, compared to social popularity, an important with regard to trust, perceived value, and perceived product quality. Third, time scarcity is a biased with regard to trust, perceived value, perceived product quality, and purchase intention. The consumers paid more attention to time scarcity, which underscores the importance of highly-quality products in the time-scarce situation. Additionally, consumers also directed much visual attention to the time scarcity information. Fourth, the study found that consumers paid more visual attention to the social popularity information. Moreover, the study found that consumers paid more attention to the signal of time scarcity. Moreover, the study found that social popularity has a positive effect on Brand's value. Original brand's value is based on the cognitive effort by consumers.	Fixation duration, fixation count, heat map analysis, ANOVA test for fixation data. Fixation duration, fixation count, heat map analysis, ANOVA test for fixation data. Fixation duration, fixation count, performs a panel analysis, which is a statistical analysis, effect size as well as statistical significance. The effects of social popularities and scarcity, and the Gizes of consumers' cognitive, affective and perceived product quality were tested with a three way ANOVA test. Fixation duration, fixation count, heat map analysis, ANOVA test for fixation data. Fixation duration, fixation count, normal distribution was examined by Kolmogorov-Smirnov test and Pearson, KRL-CEOSD test. Fixation duration, fixation count, Brutt that the sample size was 41 and the 95% CI was approx.-0.05.	First, because the heat map analysis revealed that the details a strong degree of freedom in the eye tracking system, a tension analysis an eye-tracking experimenter design is needed. Second, the eye tracking focus research much consider the cognitive and affective perceptions. For example, visual attention to the product may be accepted had to greater trust or perceived product quality. Third, the study focuses on the effects of social popularities and time scarcity, and the Gizes of consumers' cognitive, affective and cognitive perceptions. Fourth, the relationship between the social influence and personal intentions, consumer's cognitive, affective and general movements (not just visual attention) and product quality. Some studies may request the participants to perform the task in a laboratory scenario and a mobile eye tracking experiment in a traditional protocols as about	Are limitation of this study. In that it used a single item to measure the variables, which may have a bias in the results regarding movement measurement. The study used students for its sample, which may limit the generalizability of the results to a broader consumer base.	16	Implications As an extension of the signals that are used in signaling theory, the study found that social popularity and time scarcity are important signals in the online shopping context. Moreover, consumers' cognitive perceptions, affective perceptions, and behavioral intentions are influenced by social popularity and time scarcity. Perceived value and perceived product quality, online marketplace practitioners should pay attention to the signaling theory.[1] Accompanied and not only the product, but also the online shops. The approach can be used to measure consumers' perceptions from consumers and online shops. Trust, an important factor in online shopping and reviews, can be enhanced by selling products with high social popularity and time scarcity. Trust can be increased also long-term loyalty. Consumers' trust in the online shop time scarcity significantly influences the perceived value of the product. Online marketplace practitioners should pay attention to the signals of their websites. We can increase the perceived value and product quality perceptions.	Conclusion Social popularity is important to the online marketplace, product quality, and perceived value. Time scarcity is very important for the online marketplace, perceived value. Social popularity and time scarcity are significant influences on the online marketplace. Fashion accessories.	Comments Lower Comments in discussion
Consumer eye-tracking research	Kirsten Cornelsen	AIS Transactions on Replication Research	2019					16	Not an eye-tracking experiment											37			

Appendix E

ANOVA Results

E.1 Computer

Table E.1: ANOVA results on fixation duration proportion for all AOIs in the *Computer* category (H/H)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Additional Details Computer	1, 31	2.02	0.165	(0.003, 0.0057)	(0.004, 0.00527)
Compare Similar Products Computer	1, 24	0.239	0.629	(0.019, 0.0145)	(0.031, 0.016)
Customer Questions and Answers Computer	1, 24	2.02	0.168	(0.004, 0.00127)	(0.007, 0.0017)
Other Technical Details Computer	1, 41	1.43	0.238	(0.020, 0.0283)	(0.019, 0.0279)
Price Computer	1, 96	0.482	0.489	(0.005, 0.00577)	(0.006, 0.00752)
Product Description Computer	1, 33	0.276	0.603	(0.009, 0.0124)	(0.013, 0.0273)
Product Images Small Computer	1, 32	0.761	0.389	(0.010, 0.0142)	(0.013, 0.0158)
Product Main Image Computer	1, 57	1.15	0.288	(0.019, 0.0143)	(0.020, 0.0165)
Product Summary Computer	1, 61	0.0489	0.826	(0.040, 0.0419)	(0.036, 0.0365)
Quantity Computer	1, 35	0.465	0.5	(0.005, 0.0118)	(0.010, 0.0385)

Recommended Products Computer	1, 45	0.268	0.607	(0.006, 0.00864)	(0.006, 0.0203)
Related Products Computer	1, 66	1.48	0.228	(0.004, 0.00609)	(0.006, 0.00909)
Review Summary Computer	1, 32	1.34	0.255	(0.001, 0.00282)	(0.001, 0.00442)
Sponsored Products Computer	1, 15	3.25	0.091	(0.011, 0.0257)	(0.011, 0.023)
Technical Details Computer	1, 37	0.211	0.649	(0.015, 0.0187)	(0.028, 0.0231)
Title Computer	1, 57	0.192	0.663	(0.024, 0.0281)	(0.030, 0.0384)

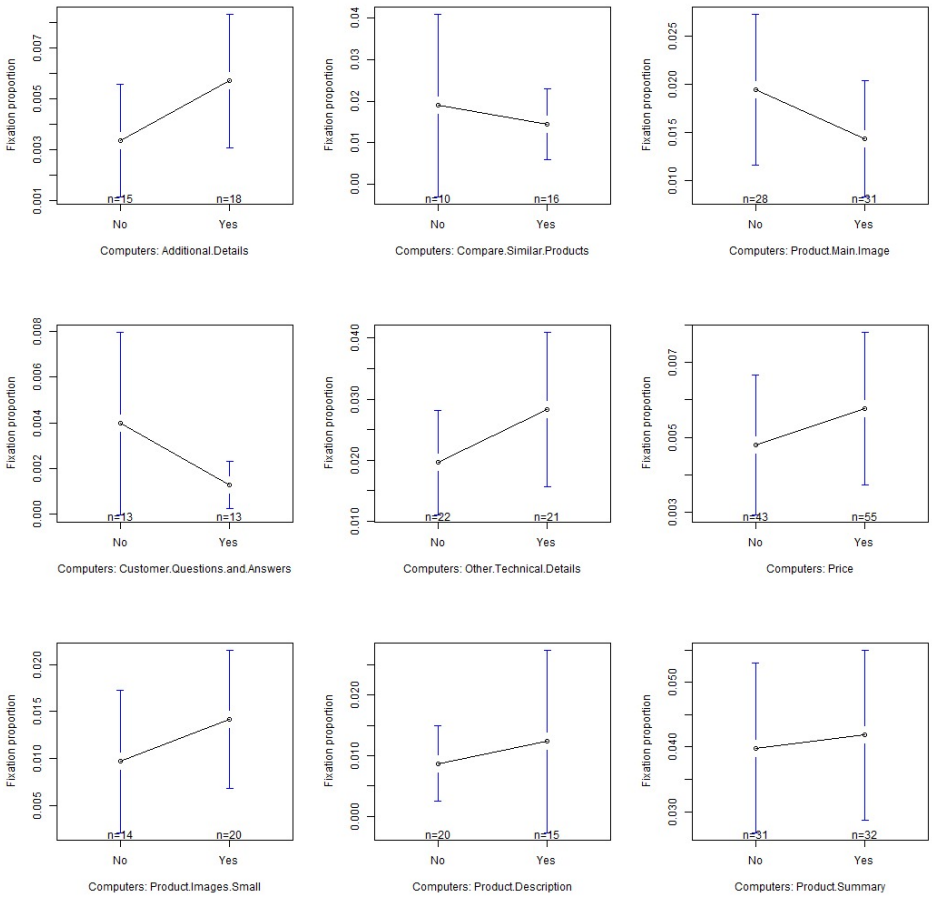

Figure E.1: Associated plots of ANOVA results on fixation duration proportion for all AOIs (1-9) in the *Computer* category (H/H)

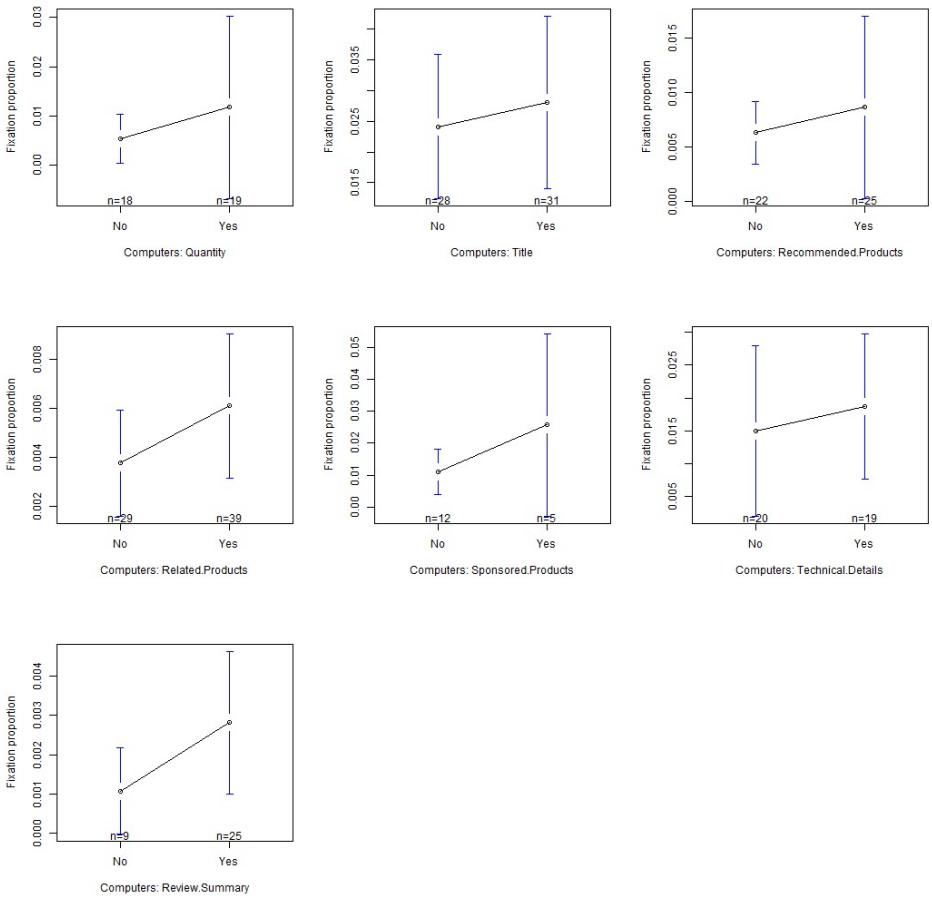

Figure E.2: Associated plots of ANOVA results on fixation duration proportion for all AOIs (10-16) in the *Computer* category (H/H)

Table E.2: ANOVA results on dwell time for all AOIs in the *Computer* category (H/H)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Additional Details Computer	1, 31	1.53	0.226	(1.22e+04, 2.5e+04)	(1.97e+04, 3.57e+04)
Compare Similar Products Computer	1, 24	0.000602	0.981	(3.82e+04, 3.77e+04)	(4.8e+04, 5.04e+04)
Customer Questions and Answers Computer	1, 24	0.182	0.673	(5.03e+03, 4.09e+03)	(5.61e+03, 5.55e+03)

Other Technical Details Computer	1, 41	0.449	0.506	(5.94e+04, 7.62e+04)	(8.23e+04, 8.23e+04)
Price Computer	1, 96	0.508	0.478	(1.15e+04, 1.43e+04)	(1.69e+04, 2.07e+04)
Product Description Computer	1, 33	0.903	0.349	(1.86e+04, 4.03e+04)	(2.82e+04, 9.75e+04)
Product Images Small Computer	1, 32	0.898	0.35	(1.55e+04, 2.19e+04)	(1.47e+04, 2.22e+04)
Product Main Image Computer	1, 57	1.03	0.314	(4.49e+04, 3.2e+04)	(5.16e+04, 4.6e+04)
Product Summary Computer	1, 61	0.157	0.693	(1.06e+05, 1.18e+05)	(1.34e+05, 1.1e+05)
Quantity Computer	1, 35	1.03	0.317	(5.56e+03, 1.25e+04)	(6.11e+03, 2.84e+04)
Recommended Products Computer	1, 45	0.251	0.619	(1.32e+04, 1.51e+04)	(1.14e+04, 1.41e+04)
Related Products Computer	1, 66	0.433	0.513	(8.96e+03, 1.08e+04)	(1.09e+04, 1.17e+04)
Review Summary Computer	1, 32	0.319	0.576	(3.76e+03, 6.02e+03)	(5.63e+03, 1.14e+04)
Sponsored Products Computer	1, 15	2.07	0.171	(4.76e+04, 1.45e+05)	(7.68e+04, 2.1e+05)
Technical Details Computer	1, 37	0.00917	0.924	(4.93e+04, 5.21e+04)	(1.17e+05, 5.6e+04)
Title Computer	1, 57	0.0209	0.886	(4.97e+04, 4.79e+04)	(5.15e+04, 4.5e+04)

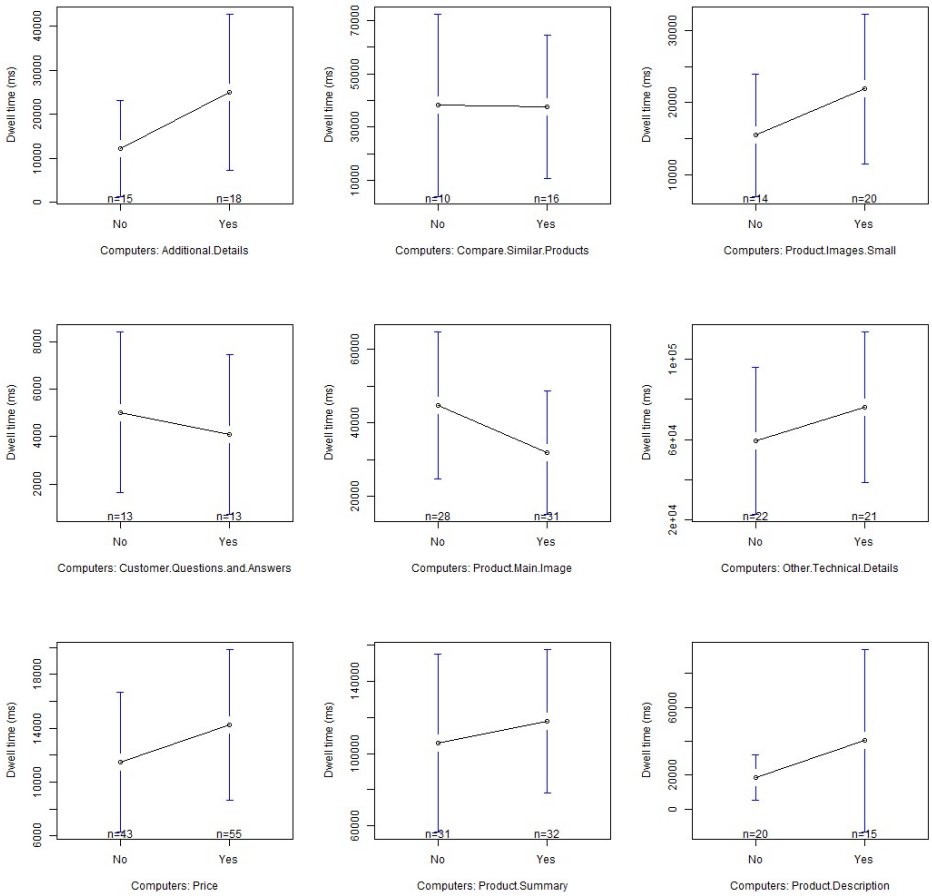

Figure E.3: Associated plots of ANOVA results on dwell time for all AOIs (1-9) in the *Computer* category (H/H)

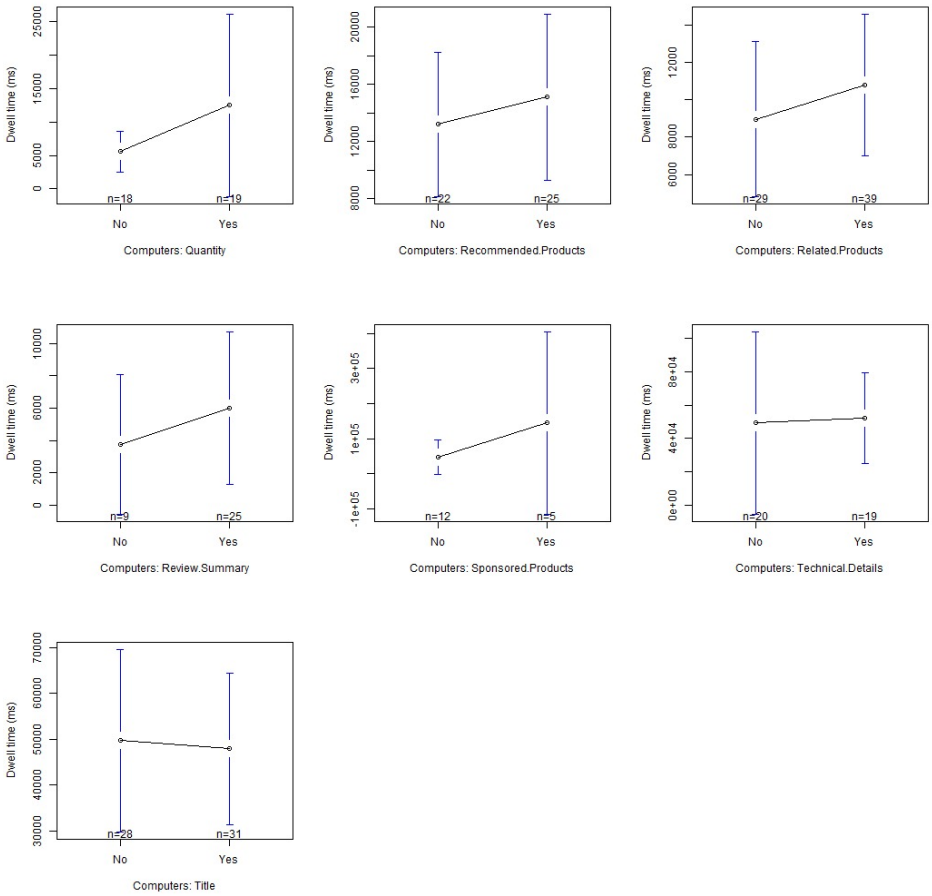

Figure E.4: Associated plots of ANOVA results on dwell time for all AOIs (10-16) in the *Computer* category (H/H)

Table E.3: ANOVA results on pupil dilation for all AOIs in the *Computer* category (H/H)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Additional Details Computer	1, 30	0.675	0.418	(3.226, 3.339)	(0.406, 0.370)
Compare Similar Products Computer	1, 18	3.41	0.081	(3.128, 3.503)	(0.464, 0.416)
Customer Questions and Answers Computer	1, 18	0.241	0.63	(3.381, 3.267)	(0.558, 0.457)
Other Technical Details Computer	1, 41	0.00386	0.951	(3.250, 3.241)	(0.471, 0.463)

Price Computer	1, 57	0.567	0.455	(3.257, 3.343)	(0.427, 0.454)
Product Description Computer	1, 31	0.0122	0.913	(3.286, 3.303)	(0.486, 0.315)
Product Images Small Computer	1, 32	0.164	0.688	(3.148, 3.207)	(0.367, 0.448)
Product Main Image Computer	1, 55	0.288	0.594	(3.292, 3.354)	(0.420, 0.449)
Product Summary Computer	1, 59	0.305	0.583	(3.252, 3.317)	(0.458, 0.468)
Quantity Computer	1, 34	1	0.324	(3.069, 3.209)	(0.430, 0.409)
Recommended Products Computer	1, 42	0.277	0.602	(3.366, 3.300)	(0.478, 0.359)
Related Products Computer	1, 44	0.119	0.732	(3.294, 3.337)	(0.388, 0.455)
Review Summary Computer	1, 24	0.0537	0.819	(3.408, 3.453)	(0.310, 0.502)
Sponsored Products Computer	1, 15	0.0989	0.757	(3.338, 3.253)	(0.331, 0.823)
Technical Details Computer	1, 37	0.156	0.695	(3.298, 3.240)	(0.485, 0.427)
Title Computer	1, 55	0.00336	0.954	(3.280, 3.288)	(0.501, 0.534)

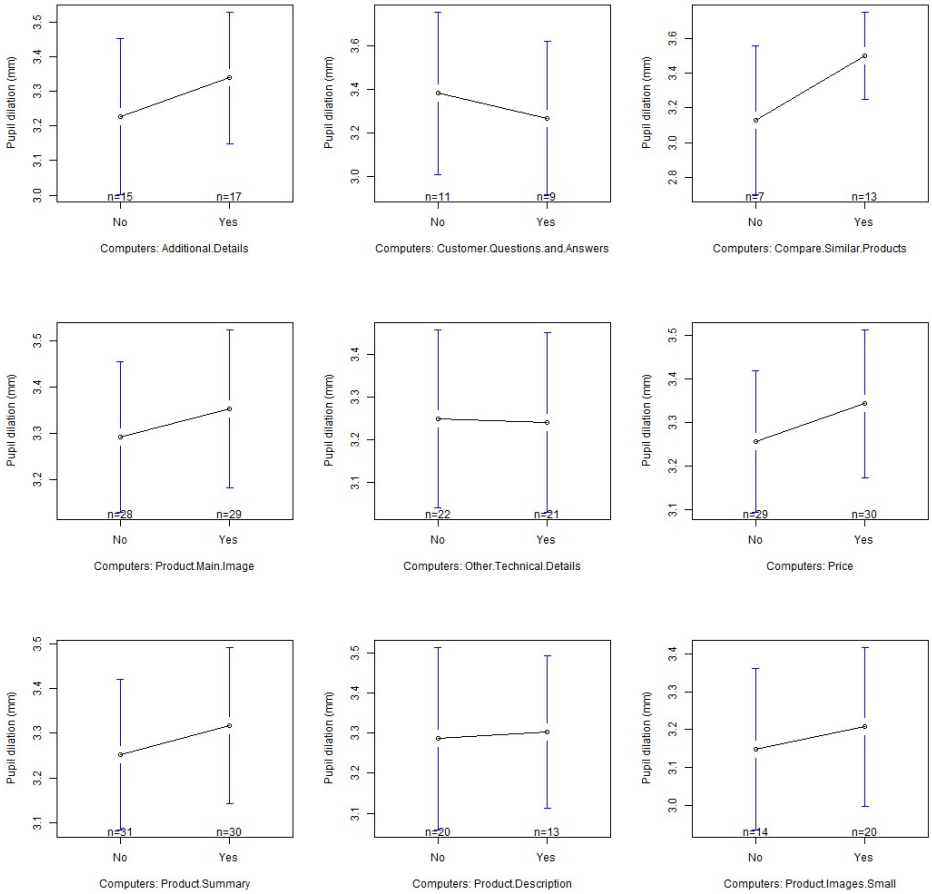

Figure E.5: Associated plots of ANOVA results on pupil dilation for all AOIs (1-9) in the *Computer* category (H/H)

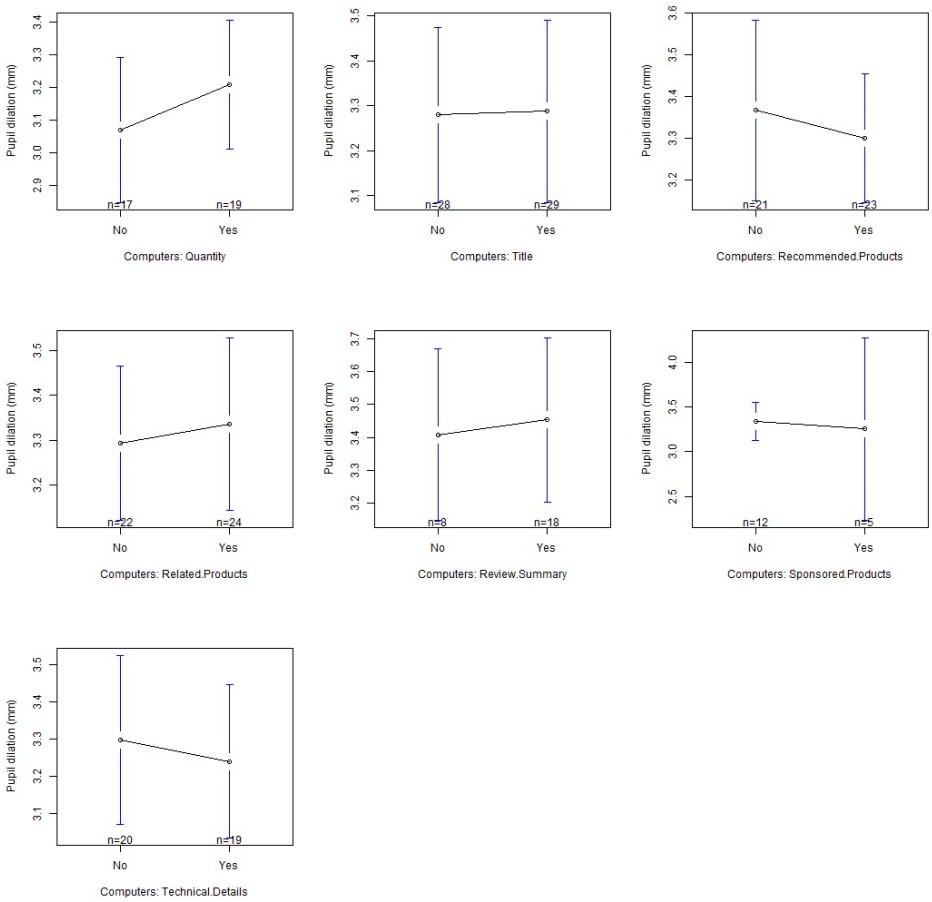

Figure E.6: Associated plots of ANOVA results on pupil dilation for all AOIs (10-16) in the *Computer* category (H/H)

E.2 Couch

Table E.4: ANOVA results on fixation duration proportion for all AOIs in the *Couch* category (H/L)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Additional Details Couch	1, 16	0.000113	0.992	(0.001, 0.000968)	(0.001, 0.000715)
Compare Similar Products Couch	1, 22	0.513	0.481	(0.006, 0.00848)	(0.009, 0.00593)
Customer Questions and Answers Couch	1, 27	0.0244	0.877	(0.008, 0.00735)	(0.020, 0.011)

Detailed Negative Reviews Couch	1, 1	0.497	0.609	(0.095, 0.0585)	(NA, 0.042)
Price Couch	1, 22	4.32	0.049	(0.007, 0.00264)	(0.006, 0.00308)
Product Description Couch	1, 28	2.7	0.111	(0.005, 0.0104)	(0.005, 0.0111)
Product Images Small Couch	1, 15	0.42	0.527	(0.003, 0.0054)	(0.007, 0.00677)
Product Main Image Couch	1, 36	2.33	0.136	(0.015, 0.0282)	(0.014, 0.0348)
Product Summary Couch	1, 37	0.186	0.669	(0.070, 0.078)	(0.044, 0.0707)
Related Products Couch	1, 53	1.59	0.212	(0.003, 0.00537)	(0.005, 0.00699)
Review Summary Couch	1, 45	2.62	0.112	(0.002, 0.00459)	(0.002, 0.00858)
Summary Reviews Couch	1, 1	2.36	0.367	(0.001, 0.00348)	(NA, 0.00139)
Technical Details Couch	1, 12	0.357	0.561	(0.002, 0.00111)	(0.005, 0.00111)
Title Couch	1, 31	2.73	0.109	(0.002, 0.00851)	(0.002, 0.0146)
Top Positive Review Couch	1, 2	0.106	0.776	(0.003, 0.00678)	(NA, 0.0106)
Top Reviews Couch	1, 29	6.86	0.014	(0.062, 0.0301)	(0.040, 0.0271)

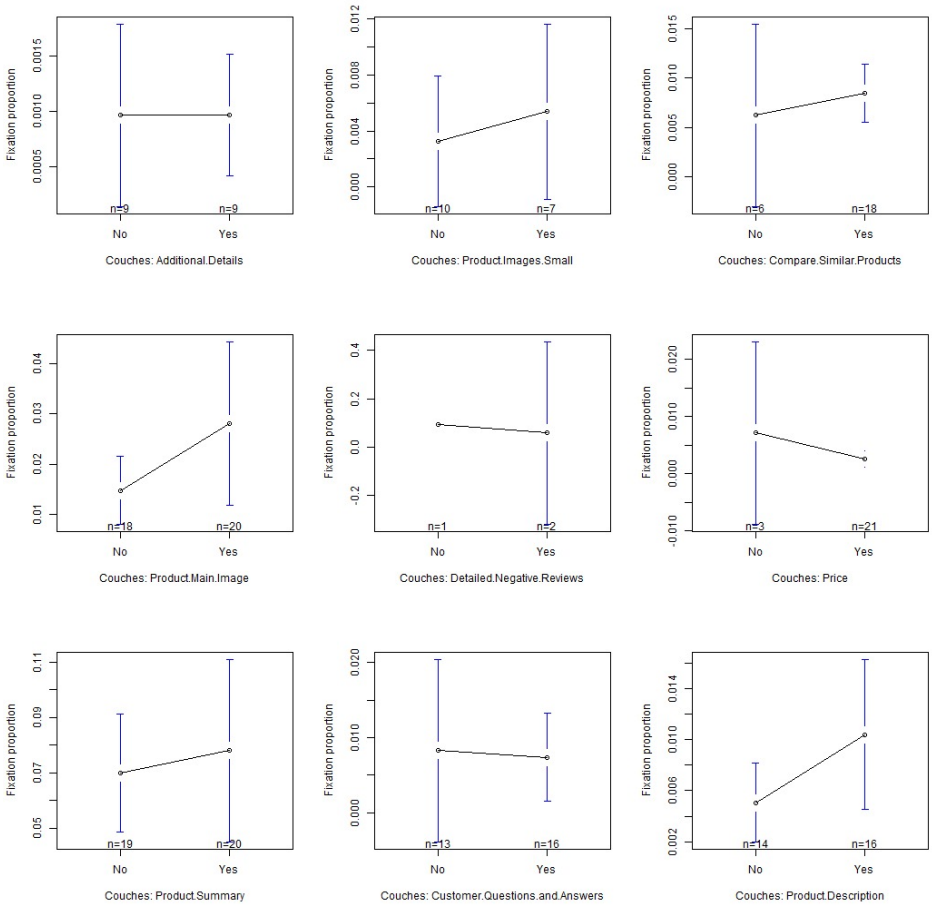

Figure E.7: Associated plots of ANOVA results on fixation duration proportion for all AOIs (1-9) in the *Couch* category (H/L)

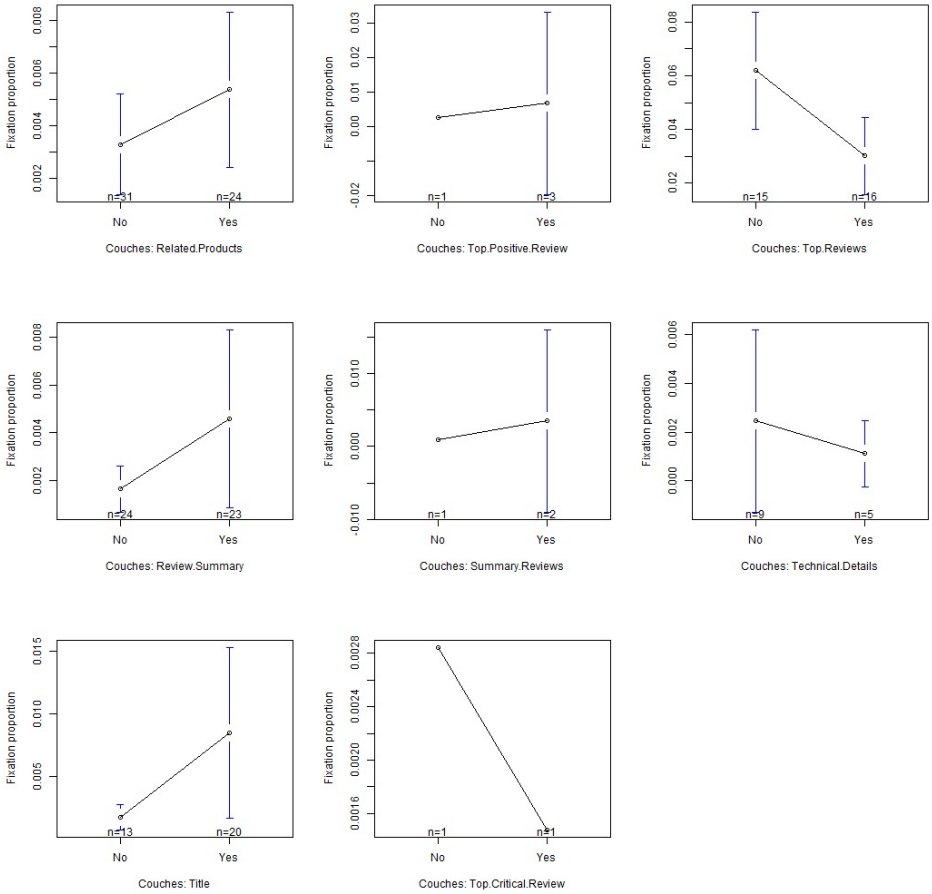

Figure E.8: Associated plots of ANOVA results on fixation duration proportion for all AOIs (10-17) in the *Couch* category (H/L)

Table E.5: ANOVA results on dwell time for all AOIs in the *Couch* category (H/L)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Additional Details Couch	1, 16	0.548	0.47	(2.94e+03, 4.32e+03)	(2.65e+03, 4.91e+03)
Compare Similar Products Couch	1, 22	1.57	0.223	(1.76e+04, 3.8e+04)	(1.82e+04, 3.8e+04)
Customer Questions and Answers Couch	1, 27	0.263	0.613	(1.85e+04, 2.67e+04)	(3.62e+04, 4.81e+04)

Detailed Negative Reviews Couch	1, 1	0.446	0.625	(8.15e+05, 3.97e+05)	(NA, 5.11e+05)
Price Couch	1, 22	3.57	0.072	(2.44e+04, 8.36e+03)	(2.93e+04, 1.1e+04)
Product Description Couch	1, 28	3.44	0.074	(1.32e+04, 3.38e+04)	(1.38e+04, 3.94e+04)
Product Images Small Couch	1, 15	2.18	0.161	(5.43e+03, 2.02e+04)	(6.67e+03, 3.1e+04)
Product Main Image Couch	1, 36	1.98	0.168	(4.78e+04, 8.9e+04)	(5.37e+04, 1.13e+05)
Product Summary Couch	1, 37	0.159	0.693	(2.39e+05, 2.72e+05)	(1.86e+05, 3.16e+05)
Related Products Couch	1, 53	1.73	0.194	(1.14e+04, 2.16e+04)	(1.77e+04, 3.83e+04)
Review Summary Couch	1, 45	1.39	0.245	(5.64e+03, 1.07e+04)	(8.28e+03, 1.93e+04)
Summary Reviews Couch	1, 1	0.201	0.732	(7.41e+03, 1.36e+04)	(NA, 1.12e+04)
Technical Details Couch	1, 12	0.419	0.53	(7.18e+03, 2.5e+03)	(1.59e+04, 1.49e+03)
Title Couch	1, 31	6.18	0.019	(4.14e+03, 2.54e+04)	(3.42e+03, 3.05e+04)
Top Positive Review Couch	1, 2	0.784	0.469	(2.39e+04, 1.17e+04)	(NA, 1.19e+04)
Top Reviews Couch	1, 29	5.42	0.027	(2.41e+05, 1.1e+05)	(2.03e+05, 9.48e+04)

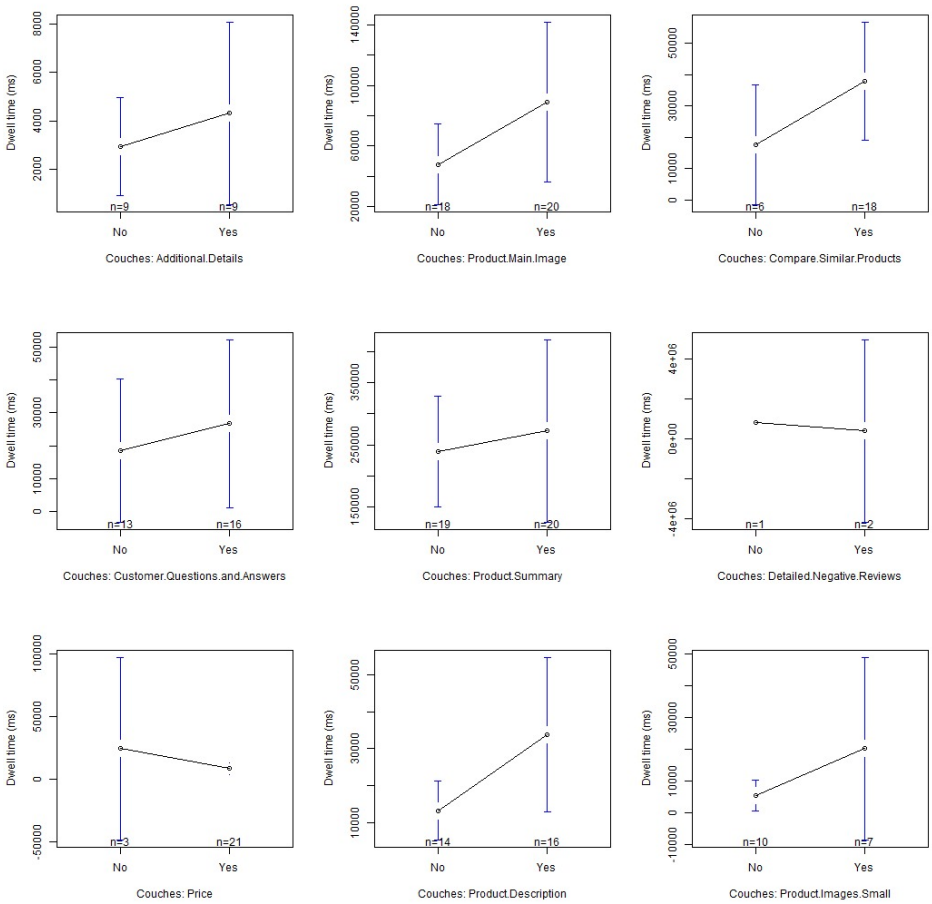

Figure E.9: Associated plots of ANOVA results on dwell time for all AOIs (1-9) in the *Couch* category (H/L)

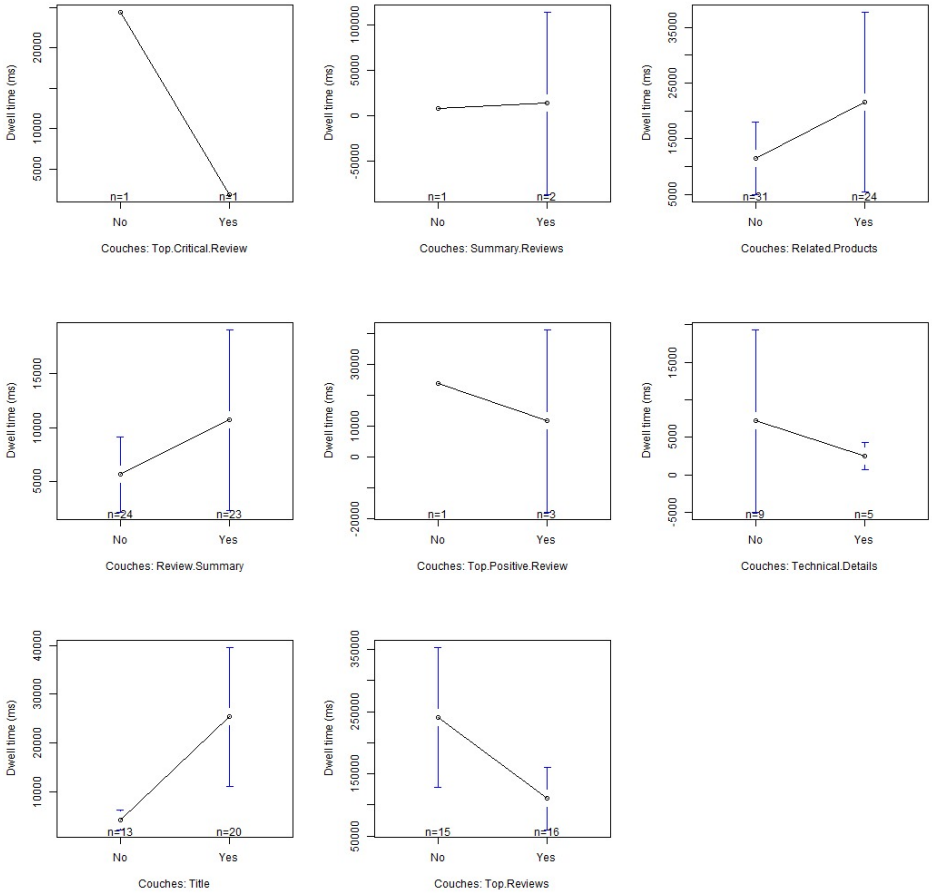

Figure E.10: Associated plots of ANOVA results on dwell time for all AOIs (10-17) in the *Couch* category (H/L)

Table E.6: ANOVA results on pupil dilation for all AOIs in the *Couch* category (H/L)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Additional Details Couch	1, 16	0.677	0.423	(3.668, 3.470)	(0.435, 0.572)
Compare Similar Products Couch	1, 11	0.306	0.591	(3.282, 3.453)	(0.103, 0.517)
Customer Questions and Answers Couch	1, 22	0.0162	0.9	(3.410, 3.378)	(0.660, 0.545)
Detailed Negative Reviews Couch	1, 1	0.68	0.561	(3.127, 3.001)	(NA, 0.125)

Price Couch	1, 16	0.298	0.592	(3.167, 3.343)	(0.361, 0.530)
Product Description Couch	1, 28	0.0711	0.792	(3.445, 3.493)	(0.524, 0.469)
Product Images Small Couch	1, 15	0.0687	0.797	(3.332, 3.366)	(0.300, 0.204)
Product Main Image Couch	1, 35	0.0031	0.956	(3.345, 3.353)	(0.494, 0.466)
Product Summary Couch	1, 36	0.0124	0.912	(3.385, 3.402)	(0.475, 0.469)
Related Products Couch	1, 25	0.105	0.749	(3.286, 3.336)	(0.302, 0.486)
Review Summary Couch	1, 33	0.399	0.532	(3.405, 3.301)	(0.459, 0.517)
Summary Reviews Couch	1, 1	0.0719	0.833	(2.979, 3.079)	(NA, 0.305)
Technical Details Couch	1, 12	4.46	0.056	(3.224, 3.773)	(0.463, 0.473)
Title Couch	1, 29	1.63E-06	0.999	(3.362, 3.362)	(0.419, 0.549)
Top Positive Review Couch	1, 1	0.138	0.774	(3.267, 3.096)	(NA, 0.376)
Top Reviews Couch	1, 28	0.0549	0.816	(3.259, 3.296)	(0.422, 0.453)

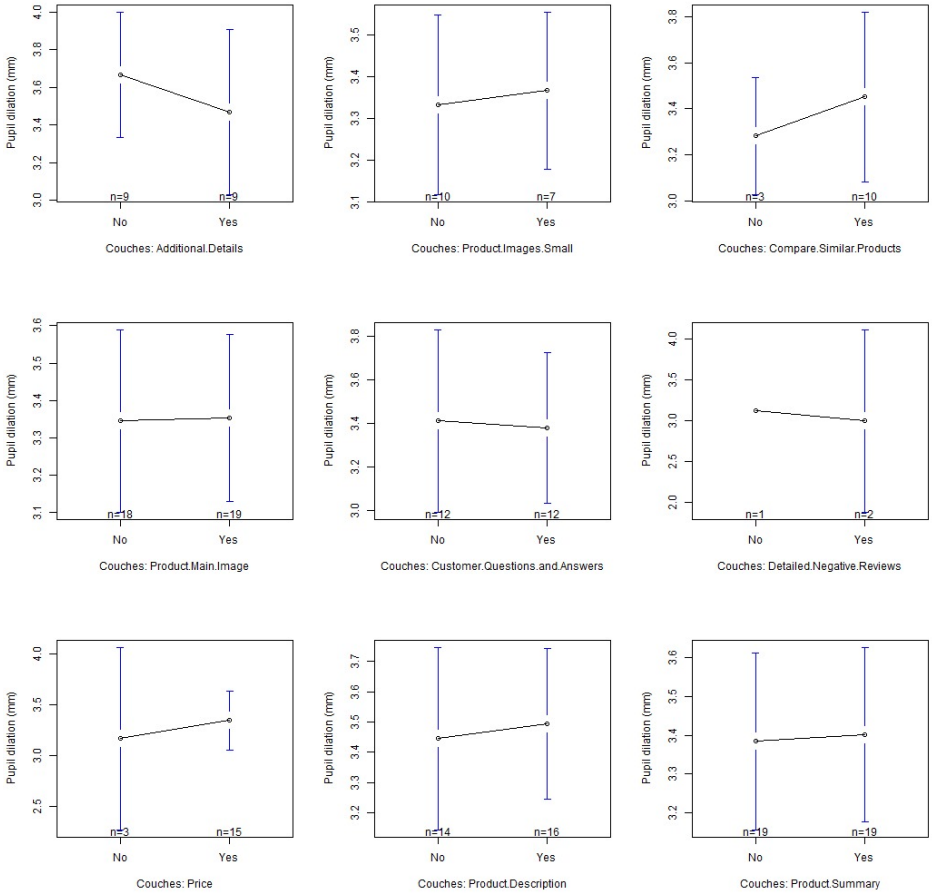

Figure E.11: Associated plots of ANOVA results on pupil dilation for all AOIs (1-9) in the *Couch* category (H/L)

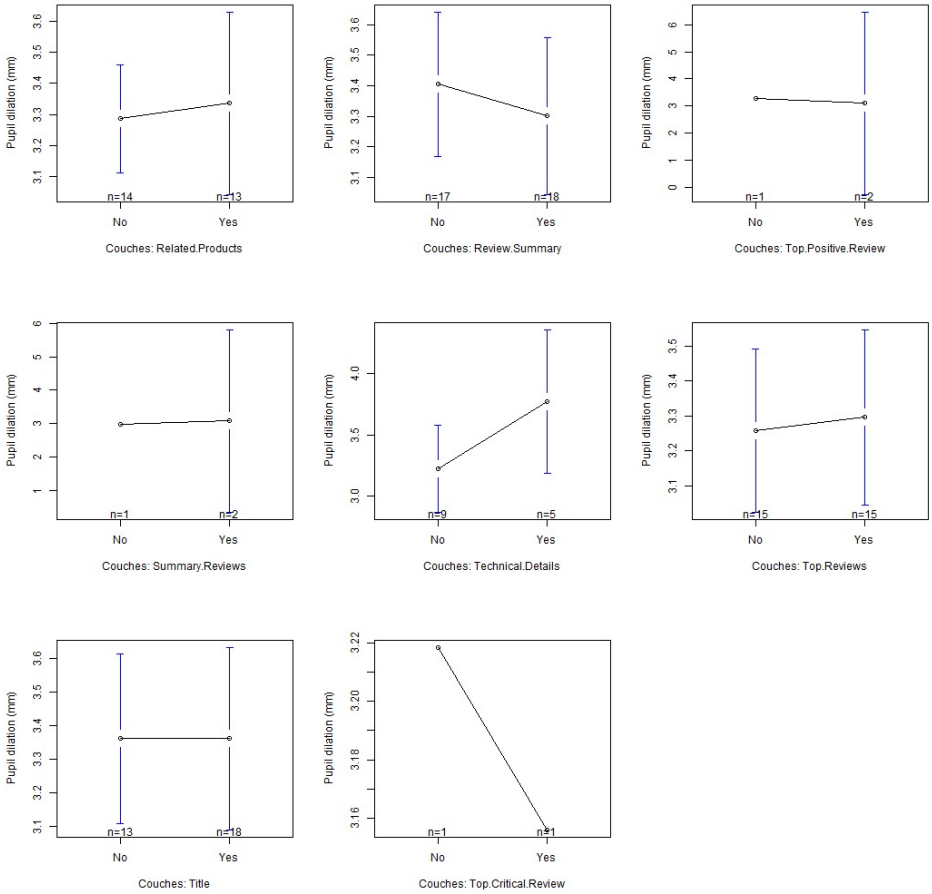

Figure E.12: Associated plots of ANOVA results on pupil dilation for all AOIs (10-17) in the *Couch* category (H/L)

E.3 Helicopter

Table E.7: ANOVA results on fixation duration proportion for all AOIs in the *Helicopter* category (L/H)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
4 Stars and Above Helicopter	1, 30	1.22	0.277	(0.002, 0.00282)	(0.002, 0.00289)
Additional Details Helicopter	1, 19	1.61	0.219	(0.005, 0.0125)	(0.006, 0.0172)

Compare Similar Products Helicopter	1, 49	0.998	0.323	(0.008, 0.00504)	(0.012, 0.00544)
Customer Questions and Answers Helicopter	1, 23	1.42E-06	0.999	(0.012, 0.0123)	(0.013, 0.016)
Detailed Negative Reviews Helicopter	1, 3	0.293	0.626	(0.033, 0.0401)	(0.011, 0.0155)
Frequently Bought Together Helicopter	1, 28	2.28	0.142	(0.001, 0.00367)	(0.001, 0.00546)
Price Helicopter	1, 74	0.0716	0.79	(0.007, 0.00642)	(0.010, 0.0075)
Product Description Helicopter	1, 45	0.000439	0.983	(0.036, 0.0361)	(0.045, 0.025)
Product Images Small Helicopter	1, 38	0.597	0.444	(0.010, 0.0149)	(0.016, 0.0265)
Product Main Image Helicopter	1, 58	3.48	0.067	(0.017, 0.0255)	(0.012, 0.0227)
Product Summary Helicopter	1, 59	0.452	0.504	(0.027, 0.0224)	(0.030, 0.0281)
Related Products Helicopter	1, 38	1.09	0.303	(0.002, 0.00356)	(0.002, 0.00606)
Review Summary Helicopter	1, 67	0.311	0.579	(0.003, 0.00432)	(0.004, 0.00998)
Technical Details Helicopter	1, 60	0.55	0.461	(0.005, 0.00352)	(0.007, 0.00451)
Title Helicopter	1, 56	0.0369	0.848	(0.010, 0.0108)	(0.010, 0.012)
Top Positive Review Helicopter	1, 1	0.0353	0.882	(0.001, 0.000554)	(0.000, NA)
Top Reviews Helicopter	1, 37	0.265	0.61	(0.030, 0.0343)	(0.029, 0.0222)

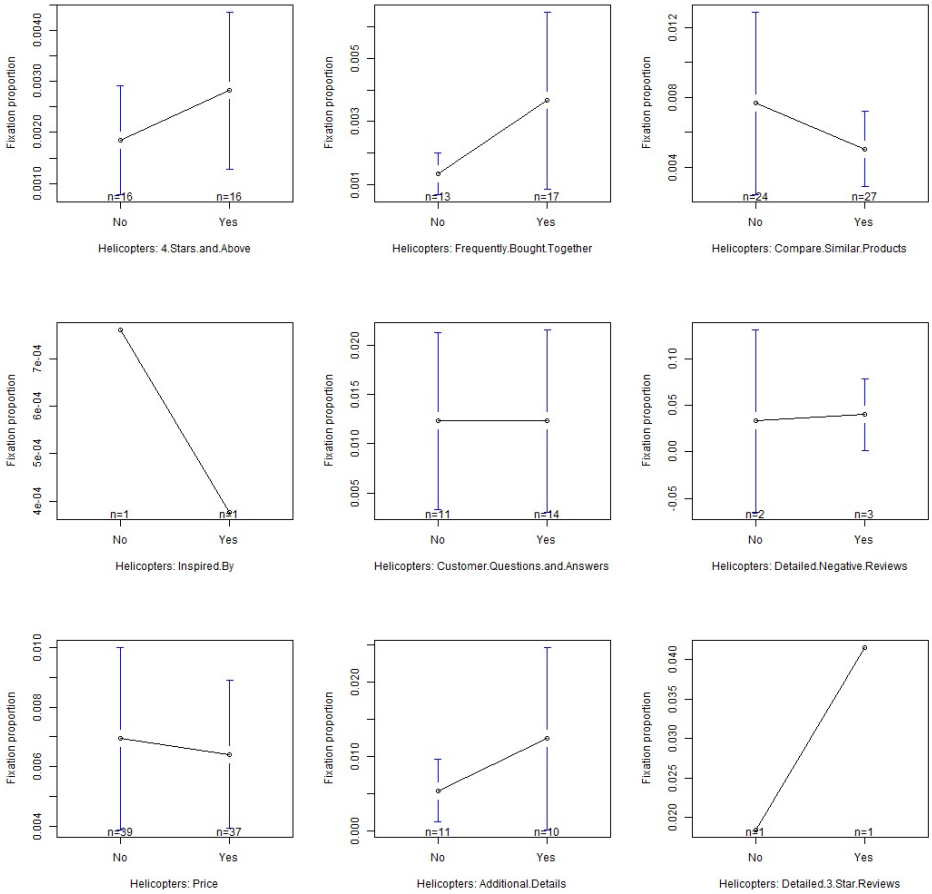

Figure E.13: Associated plots of ANOVA results on fixation duration proportion for all AOIs (1-9) in the *Helicopter* category (L/H)

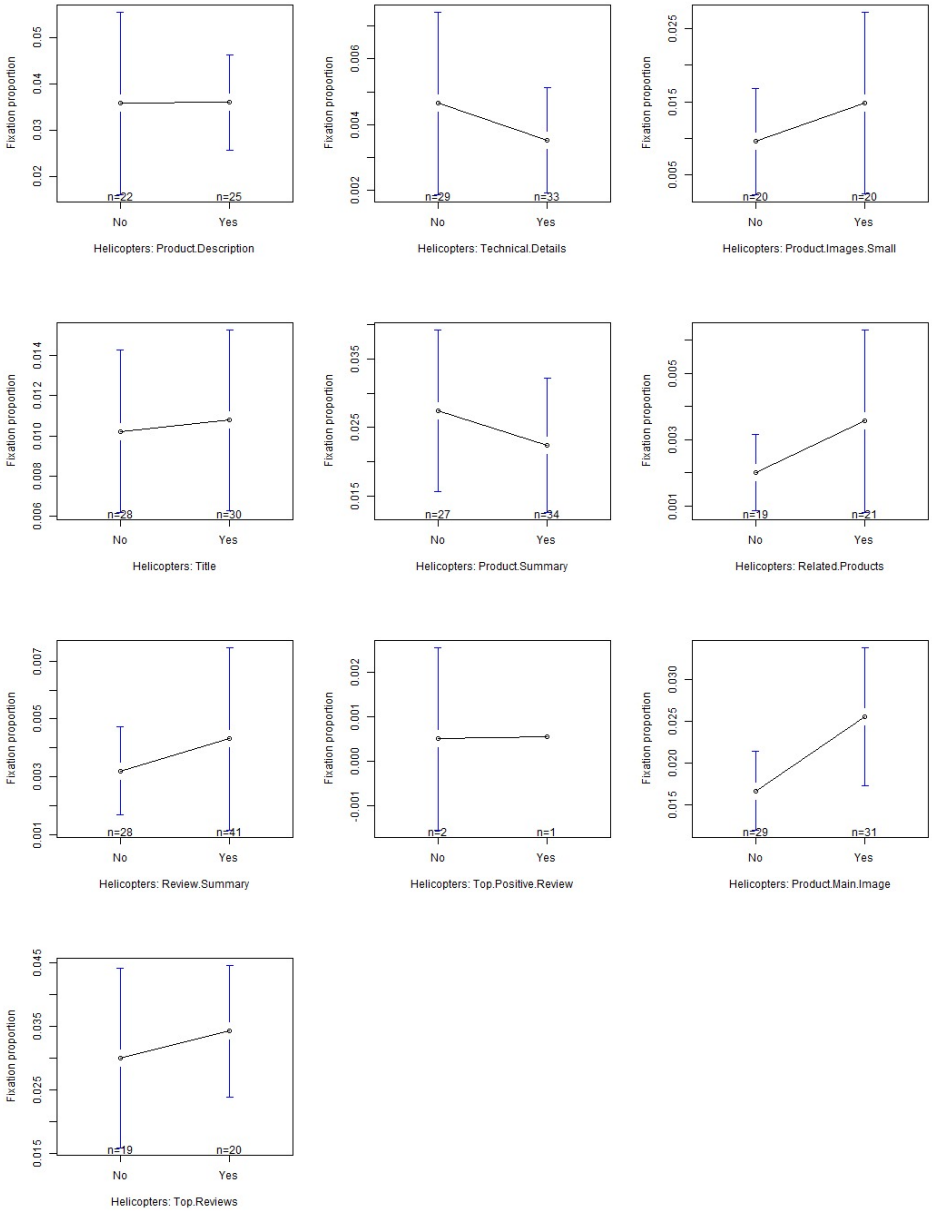

Figure E.14: Associated plots of ANOVA results on fixation duration proportion for all AOIs (10-19) in the *Helicopter* category (L/H)

Table E.8: ANOVA results on dwell time for all AOIs in the *Helicopter* category (L/H)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
4 Stars and Above Helicopter	1, 30	0.348	0.56	(6.43e+03, 8.66e+03)	(5.34e+03, 1.41e+04)
Additional Details Helicopter	1, 19	0.57	0.46	(2.44e+04, 4.33e+04)	(3.96e+04, 7.22e+04)
Compare Similar Products Helicopter	1, 49	0.667	0.418	(1.94e+04, 1.49e+04)	(2.34e+04, 1.64e+04)
Customer Questions and Answers Helicopter	1, 23	0.0162	0.9	(3.8e+04, 4.14e+04)	(3.69e+04, 8.31e+04)
Detailed Negative Reviews Helicopter	1, 3	0.107	0.765	(1.04e+05, 1.42e+05)	(1.02e+05, 1.4e+05)
Frequently Bought Together Helicopter	1, 28	2.66	0.114	(4.41e+03, 1.22e+04)	(2.5e+03, 1.71e+04)
Price Helicopter	1, 74	0.367	0.546	(2.65e+04, 1.91e+04)	(6.58e+04, 3.61e+04)
Product Description Helicopter	1, 45	0.0624	0.804	(1.38e+05, 1.52e+05)	(2.07e+05, 1.77e+05)
Product Images Small Helicopter	1, 38	0.993	0.325	(1.87e+04, 2.84e+04)	(2.37e+04, 3.68e+04)
Product Main Image Helicopter	1, 58	1.45	0.234	(5.61e+04, 7.83e+04)	(6.67e+04, 7.57e+04)
Product Summary Helicopter	1, 59	0.317	0.576	(1.05e+05, 8.44e+04)	(1.21e+05, 1.51e+05)
Related Products Helicopter	1, 38	1.2	0.28	(6.64e+03, 1.55e+04)	(8.08e+03, 3.45e+04)
Review Summary Helicopter	1, 67	0.0593	0.808	(8.05e+03, 8.95e+03)	(1.06e+04, 1.75e+04)
Technical Details Helicopter	1, 60	1.01	0.32	(1.55e+04, 9.22e+03)	(3.33e+04, 1.24e+04)
Title Helicopter	1, 56	0.26	0.612	(3.14e+04, 3.8e+04)	(3.12e+04, 6.14e+04)
Top Positive Review Helicopter	1, 1	0.0669	0.839	(2.44e+03, 1.46e+03)	(3.06e+03, NA)
Top Reviews Helicopter	1, 37	0.244	0.624	(1.01e+05, 1.18e+05)	(1.17e+05, 9.23e+04)

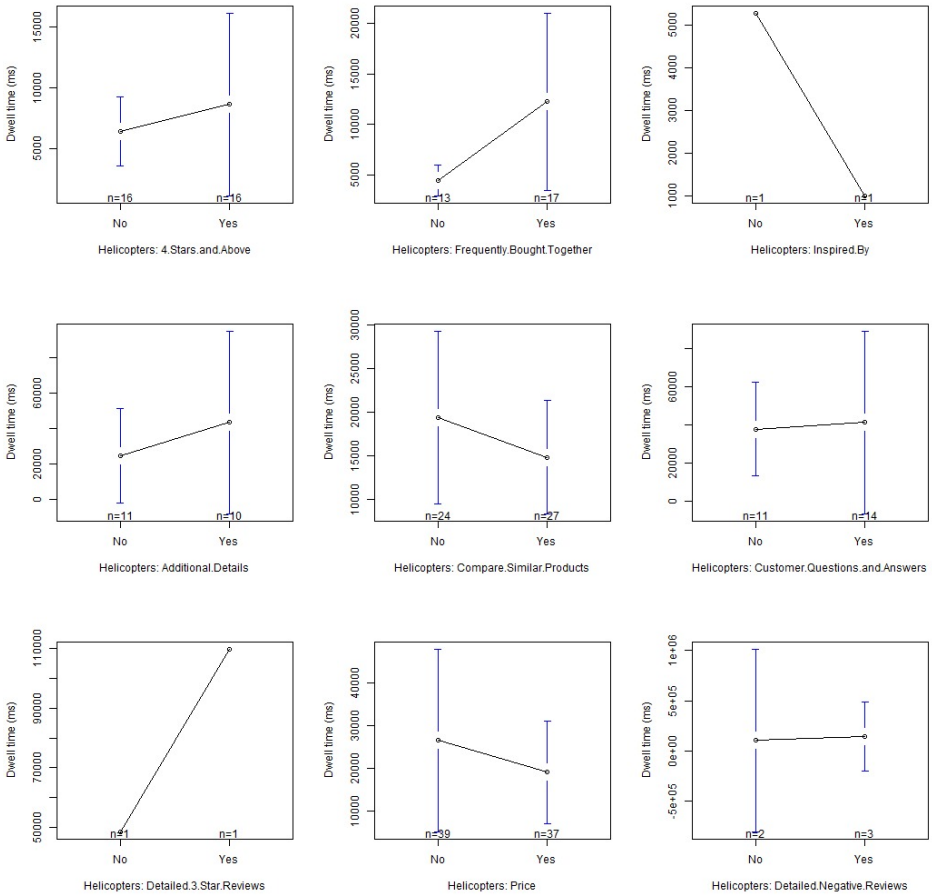

Figure E.15: Associated plots of ANOVA results on dwell time for all AOIs (1-9) in the *Helicopter* category (L/H)

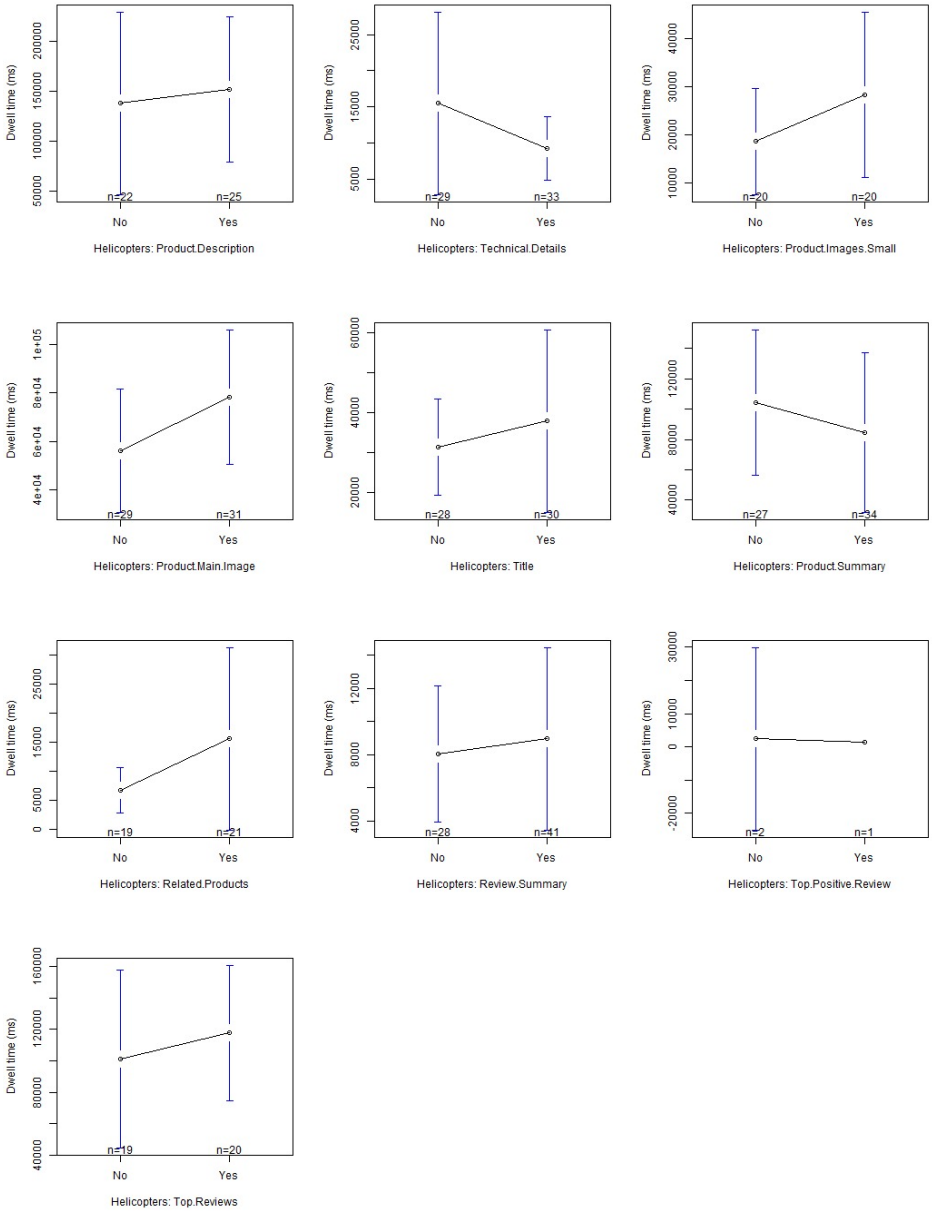

Figure E.16: Associated plots of ANOVA results on dwell time for all AOIs (10-19) in the *Helicopter* category (L/H)

Table E.9: ANOVA results on pupil dilation for all AOIs in the *Helicopter* category (L/H)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
4 Stars and Above Helicopter	1, 30	0.797	0.379	(3.327, 3.190)	(0.456, 0.411)
Additional Details Helicopter	1, 19	0.0376	0.848	(3.142, 3.188)	(0.456, 0.628)
Compare Similar Products Helicopter	1, 33	0.0155	0.902	(3.346, 3.364)	(0.344, 0.502)
Customer Questions and Answers Helicopter	1, 20	1.45	0.242	(3.400, 3.130)	(0.558, 0.489)
Detailed Negative Reviews Helicopter	1, 3	0.0336	0.866	(2.872, 2.975)	(0.682, 0.587)
Frequently Bought Together Helicopter	1, 27	0.197	0.66	(3.279, 3.220)	(0.317, 0.392)
Price Helicopter	1, 52	0.115	0.736	(3.279, 3.329)	(0.526, 0.547)
Product Description Helicopter	1, 45	0.0974	0.756	(3.333, 3.285)	(0.540, 0.515)
Product Images Small Helicopter	1, 38	0.0946	0.76	(3.048, 3.084)	(0.321, 0.404)
Product Main Image Helicopter	1, 58	0.198	0.658	(3.230, 3.284)	(0.454, 0.480)
Product Summary Helicopter	1, 56	0.05	0.824	(3.253, 3.283)	(0.506, 0.511)
Related Products Helicopter	1, 31	0.109	0.743	(3.374, 3.317)	(0.485, 0.497)
Review Summary Helicopter	1, 51	0.0464	0.83	(3.230, 3.263)	(0.568, 0.561)
Technical Details Helicopter	1, 38	0.501	0.483	(3.308, 3.200)	(0.438, 0.512)
Title Helicopter	1, 55	0.0539	0.817	(3.241, 3.275)	(0.551, 0.528)
Top Positive Review Helicopter	1, 1	0.124	0.784	(2.863, 3.241)	(0.876, NA)
Top Reviews Helicopter	1, 37	0.0538	0.818	(3.335, 3.378)	(0.532, 0.635)

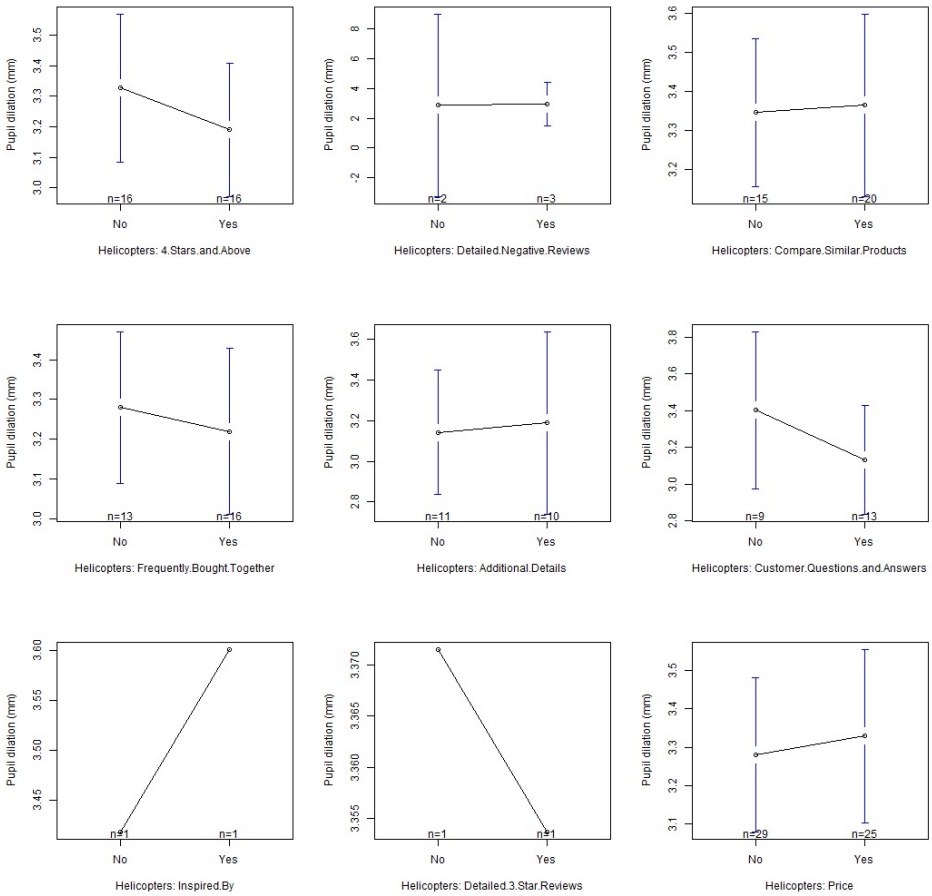

Figure E.17: Associated plots of ANOVA results on pupil dilation for all AOIs (1-9) in the *Helicopter* category (L/H)

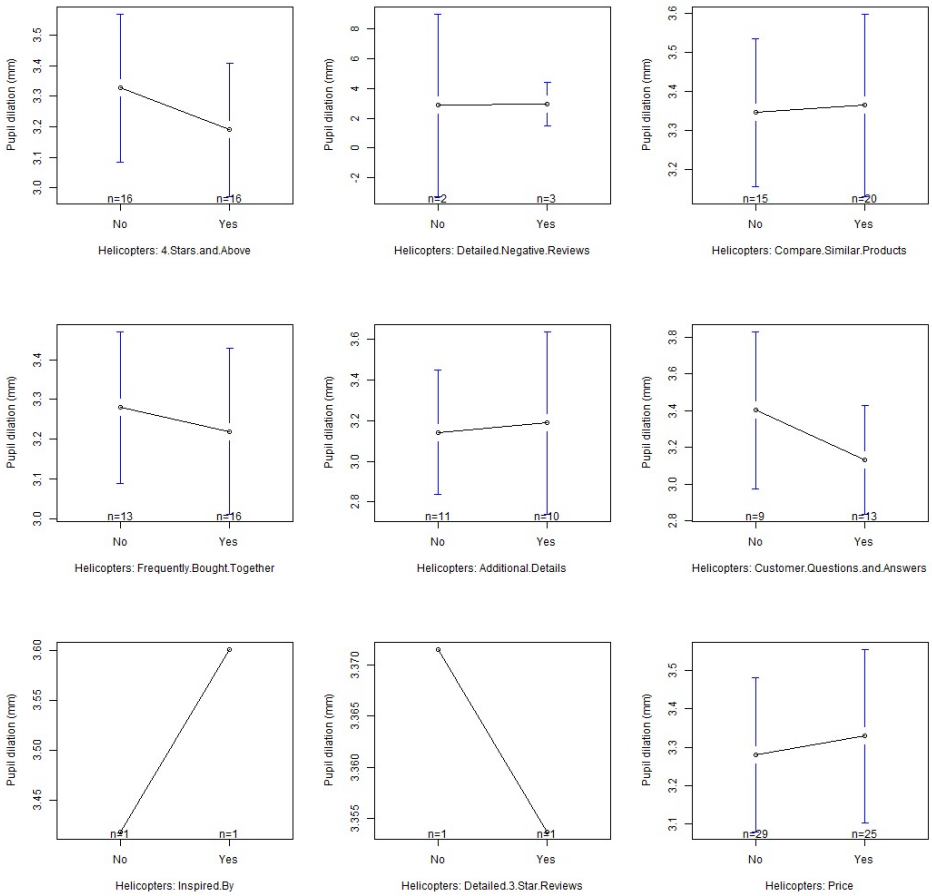

Figure E.18: Associated plots of ANOVA results on pupil dilation for all AOIs (10-20) in the *Helicopter* category (L/H)

E.4 Mikado

Table E.10: ANOVA results on fixation duration proportion for all AOIs in the *Mikado* category (L/L)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Compare Similar Products Mikado	1, 39	1.43	0.239	(0.009, 0.00342)	(0.021, 0.00437)
Customer Questions and Answers Mikado	1, 28	5.17	0.031	(0.003, 0.00826)	(0.004, 0.00861)

Detailed Negative Reviews Mikado	1, 4	6.54	0.063	(0.018, 0.00342)	(0.009, 0.00301)
Price Mikado	1, 76	0.497	0.483	(0.006, 0.00415)	(0.012, 0.00837)
Product Description Mikado	1, 13	0.915	0.356	(0.001, 0.00148)	(0.001, 0.0021)
Product Images Small Mikado	1, 35	0.00576	0.94	(0.009, 0.00853)	(0.011, 0.0112)
Product Main Image Mikado	1, 59	0.0733	0.788	(0.017, 0.0182)	(0.014, 0.0224)
Product Summary Mikado	1, 55	1.39	0.243	(0.007, 0.0111)	(0.010, 0.0155)
Quantity Mikado	1, 10	1.24	0.291	(0.005, 0.000963)	(0.010, 0.000864)
Related Products Mikado	1, 55	0.278	0.6	(0.003, 0.0022)	(0.005, 0.0025)
Review Summary Mikado	1, 64	0.971	0.328	(0.002, 0.00268)	(0.003, 0.00304)
Summary Reviews Mikado	1, 6	1.8	0.229	(0.001, 0.0035)	(0.000, 0.00246)
Technical Details Mikado	1, 34	1.5	0.229	(0.002, 0.0033)	(0.002, 0.00459)
Title Mikado	1, 37	0.0554	0.815	(0.003, 0.00299)	(0.005, 0.00246)
Top Positive Review Mikado	1, 3	1.36	0.328	(0.001, 0.00804)	(0.000, 0.00863)
Top Reviews Mikado	1, 21	0.911	0.351	(0.074, 0.0531)	(0.061, 0.0441)

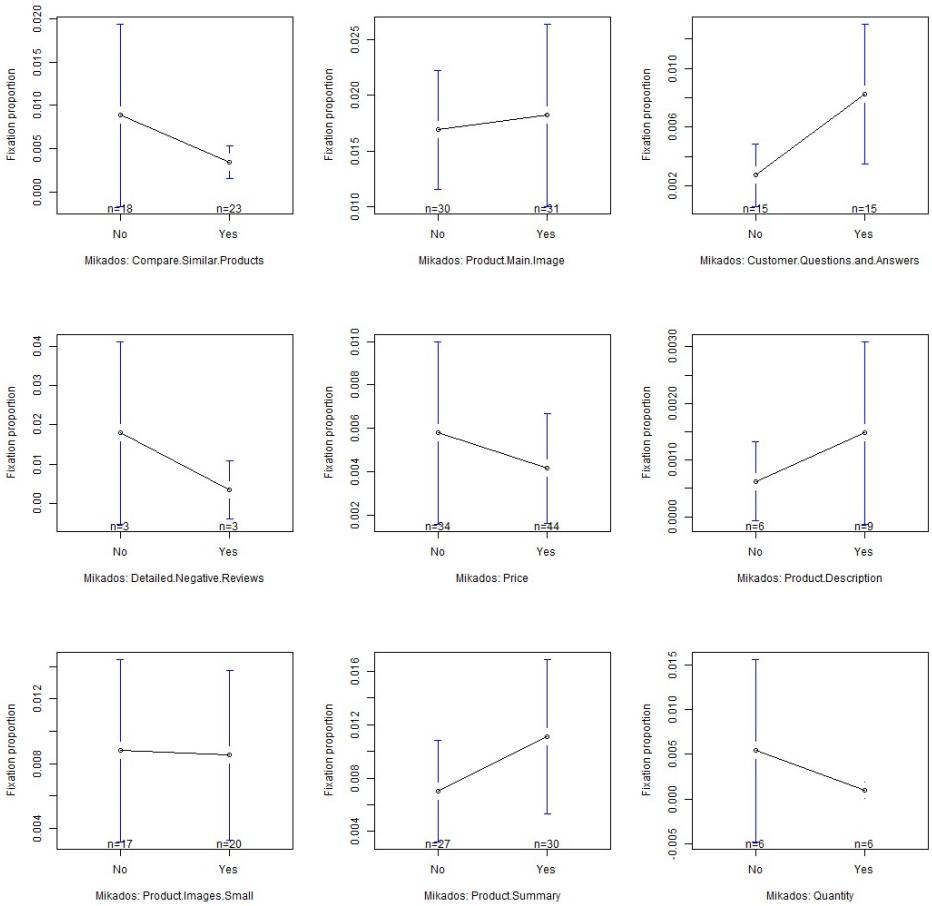

Figure E.19: Associated plots of ANOVA results on fixation duration proportion for all AOIs (1-9) in the *Mikado* category (L/L)

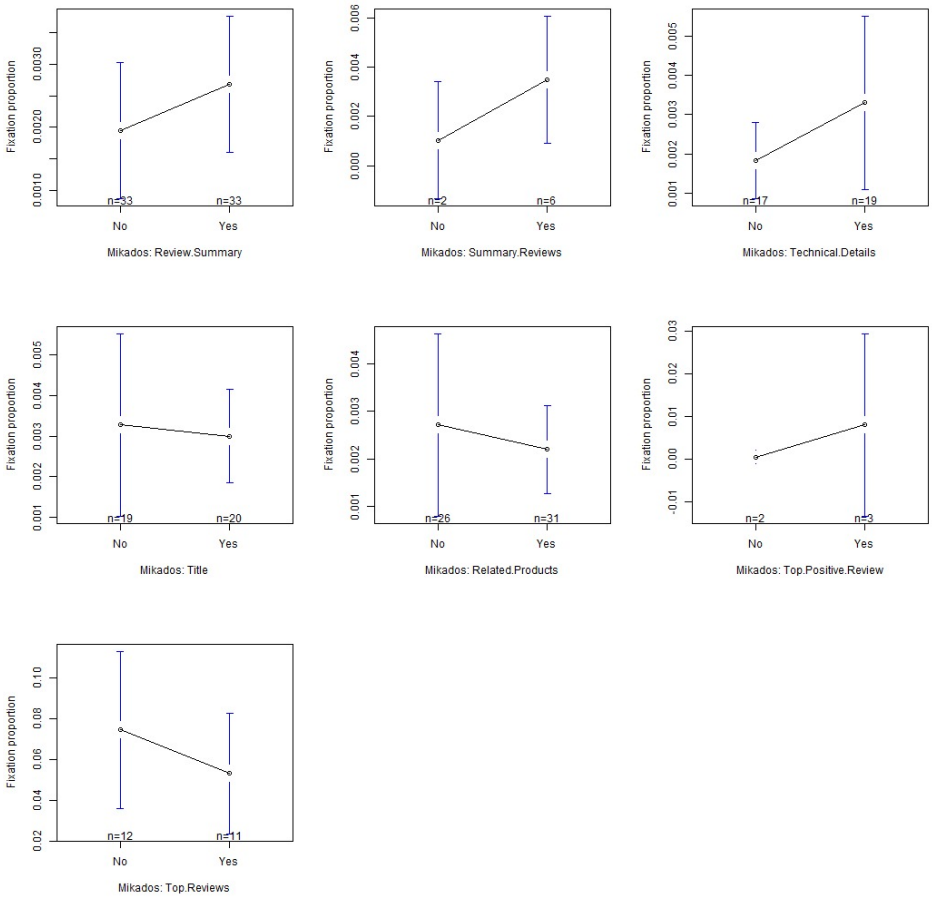

Figure E.20: Associated plots of ANOVA results on fixation duration proportion for all AOIs (10-16) in the *Mikado* category (L/L)

Table E.11: ANOVA results on dwell time for all AOIs in the *Mikado* category (L/L)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Compare Similar Products Mikado	1, 39	3.84	0.057	(1.72e+04, 7.59e+03)	(2.19e+04, 7.6e+03)
Customer Questions and Answers Mikado	1, 28	8.16	0.008	(5.72e+03, 2.37e+04)	(5.73e+03, 2.37e+04)
Detailed Negative Reviews Mikado	1, 4	2.14	0.217	(7.6e+04, 1.39e+04)	(7.26e+04, 1.12e+04)

Price Mikado	1, 76	0.148	0.702	(8.94e+03, 8.08e+03)	(9.32e+03, 1.02e+04)
Product Description Mikado	1, 13	0.794	0.389	(1.84e+03, 3.71e+03)	(986, 5e+03)
Product Images Small Mikado	1, 35	0.14	0.71	(1.96e+04, 1.69e+04)	(2.63e+04, 1.66e+04)
Product Main Image Mikado	1, 59	0.223	0.638	(5.31e+04, 6.36e+04)	(5.71e+04, 1.08e+05)
Product Summary Mikado	1, 55	1.08	0.303	(2.52e+04, 3.73e+04)	(3.32e+04, 5.17e+04)
Quantity Mikado	1, 10	0.598	0.457	(5.13e+03, 3.33e+03)	(4.92e+03, 2.88e+03)
Related Products Mikado	1, 55	2.46	0.122	(7.7e+03, 5.03e+03)	(7.67e+03, 5.09e+03)
Review Summary Mikado	1, 64	0.000346	0.985	(8.82e+03, 8.75e+03)	(1.97e+04, 1.29e+04)
Summary Reviews Mikado	1, 6	0.783	0.41	(5.13e+03, 1.29e+04)	(1.06e+03, 1.18e+04)
Technical Details Mikado	1, 34	1.1	0.302	(5.51e+03, 1.03e+04)	(4.83e+03, 1.82e+04)
Title Mikado	1, 37	0.243	0.625	(1.01e+04, 7.9e+03)	(1.74e+04, 8.93e+03)
Top Positive Review Mikado	1, 3	2.26	0.23	(2.62e+03, 2.95e+04)	(353, 2.4e+04)
Top Reviews Mikado	1, 21	2.47	0.131	(3.53e+05, 1.4e+05)	(4.25e+05, 1.49e+05)

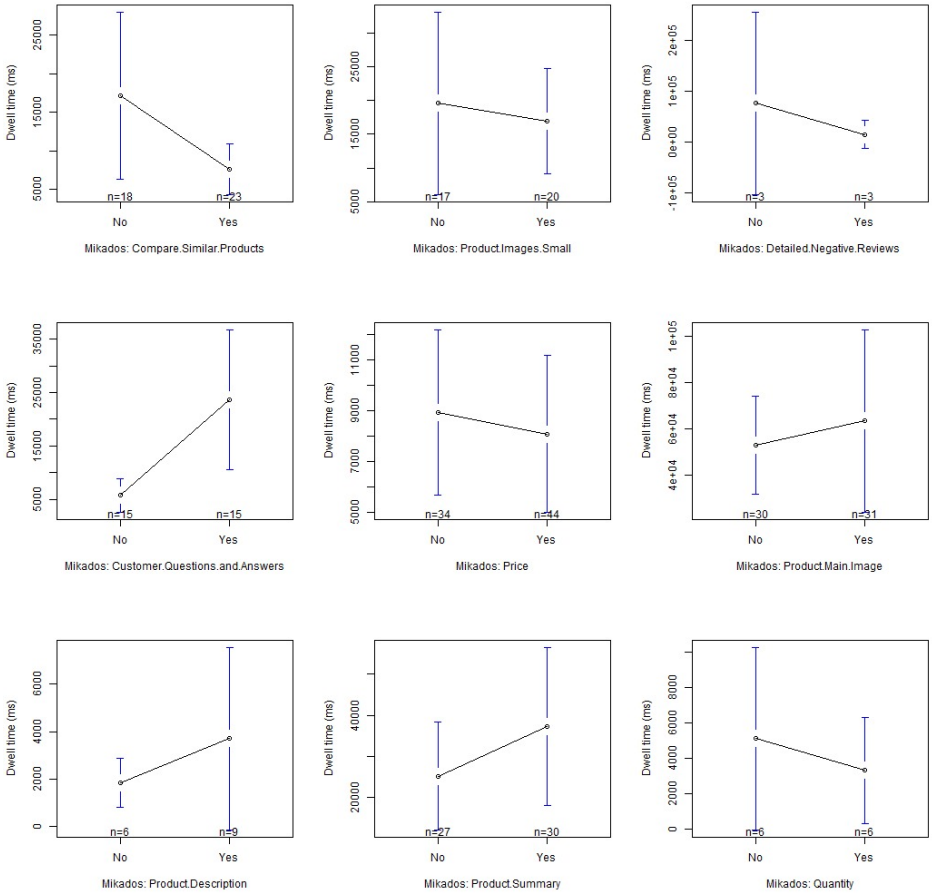

Figure E.21: Associated plots of ANOVA results on dwell time for all AOIs (1-9) in the *Mikado* category (L/L)

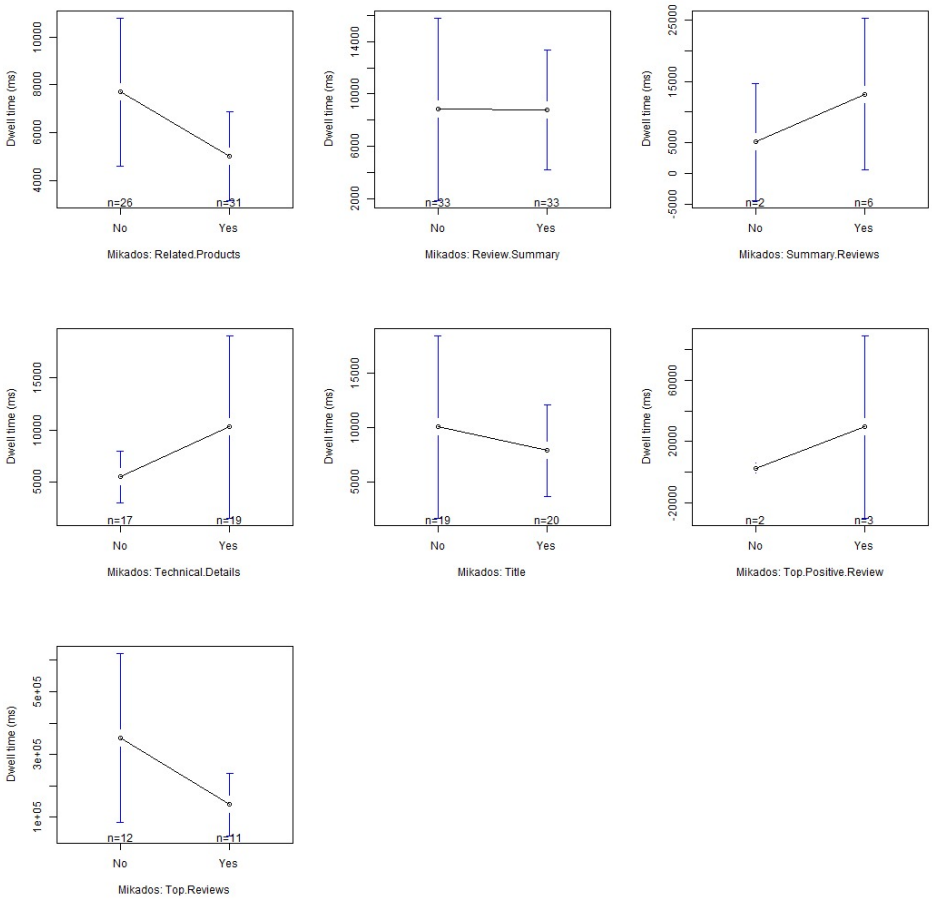

Figure E.22: Associated plots of ANOVA results on dwell time for all AOIs (10-16) in the *Mikado* category (L/L)

Table E.12: ANOVA results on pupil dilation for all AOIs in the *Mikado* category (L/L)

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
Compare Similar Products Mikado	1, 37	0.0744	0.787	(3.254, 3.205)	(0.621, 0.496)
Customer Questions and Answers Mikado	1, 27	2.78	0.107	(3.243, 2.967)	(0.515, 0.372)
Detailed Negative Reviews Mikado	1, 4	0.00677	0.938	(2.973, 3.002)	(0.455, 0.397)
Price Mikado	1, 54	0.0483	0.827	(3.178, 3.147)	(0.533, 0.517)

Product Description Mikado	1, 13	0.876	0.366	(3.207, 3.021)	(0.414, 0.350)
Product Images Small Mikado	1, 35	0.0945	0.76	(2.912, 2.951)	(0.367, 0.401)
Product Main Image Mikado	1, 58	0.0116	0.915	(3.203, 3.189)	(0.484, 0.493)
Product Summary Mikado	1, 54	0.161	0.69	(3.166, 3.219)	(0.485, 0.506)
Quantity Mikado	1, 10	0.2	0.665	(3.015, 2.920)	(0.419, 0.305)
Related Products Mikado	1, 29	0.121	0.73	(3.246, 3.179)	(0.453, 0.577)
Review Summary Mikado	1, 47	0.0645	0.801	(3.153, 3.118)	(0.503, 0.475)
Summary Reviews Mikado	1, 4	0.589	0.485	(3.303, 3.090)	(0.215, 0.348)
Technical Details Mikado	1, 33	0.271	0.606	(3.190, 3.092)	(0.631, 0.481)
Title Mikado	1, 36	0.0403	0.842	(3.169, 3.201)	(0.500, 0.470)
Top Positive Review Mikado	1, 2	0.031	0.876	(3.361, 3.311)	(0.397, 0.042)
Top Reviews Mikado	1, 21	0.688	0.416	(3.135, 3.323)	(0.492, 0.594)

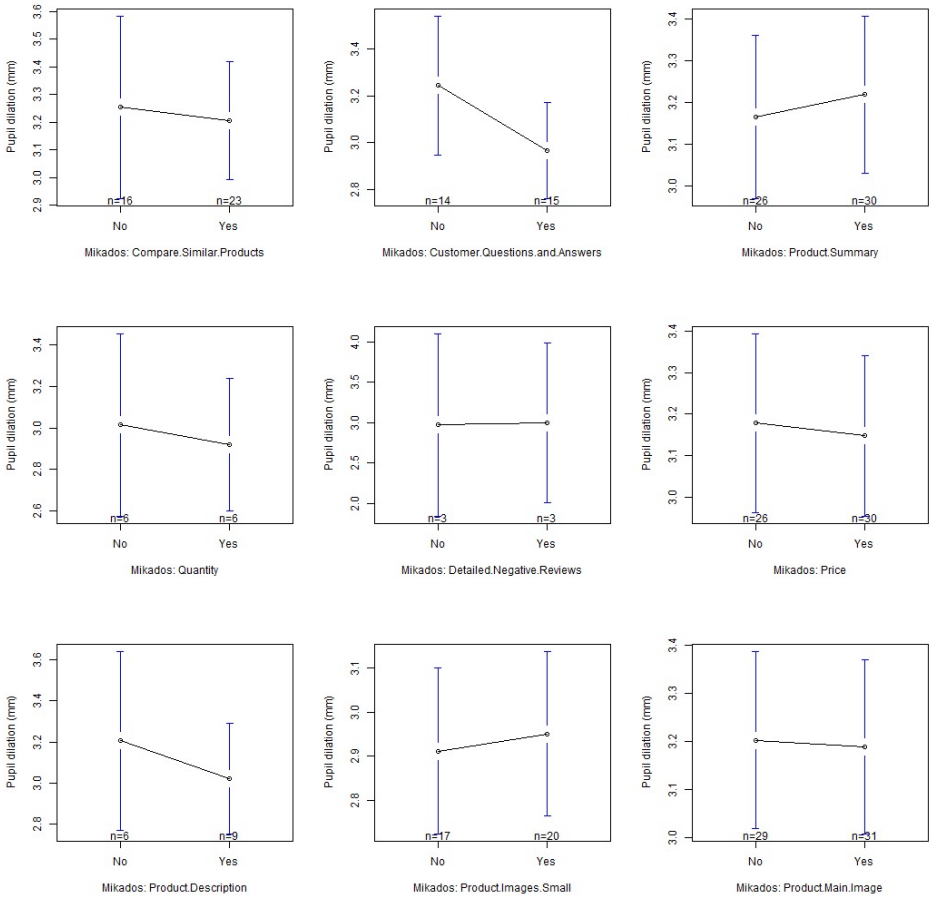

Figure E.23: Associated plots of ANOVA results on pupil dilation for all AOIs (1-9) in the *Mikado* category (L/L)

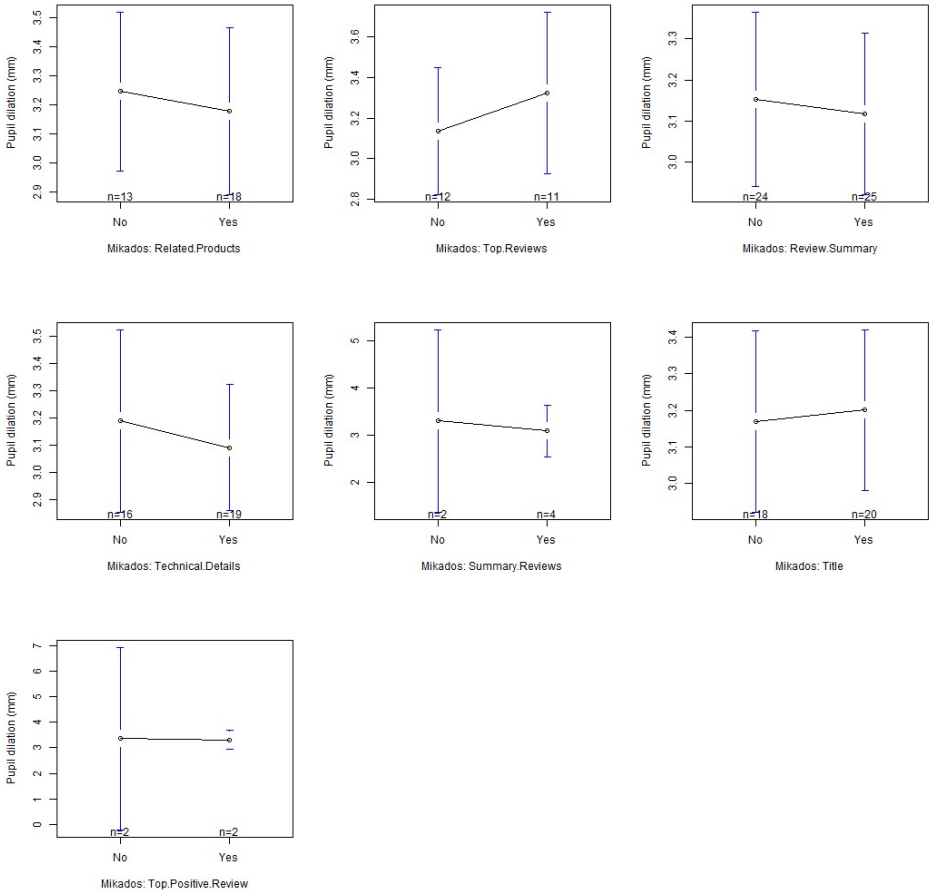

Figure E.24: Associated plots of ANOVA results on pupil dilation for all AOIs (10-16) in the *Mikado* category (L/L)

E.5 Product Chosen

Table E.13: ANOVA results on fixation duration proportion for all AOIs of products chosen irrespective of product category

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
4 Stars and Above Chosen	1, 31	0.875	0.357	(0.002, 0.00266)	(0.002, 0.00288)
Additional Details Chosen	1, 70	2.5	0.119	(0.003, 0.00638)	(0.005, 0.0102)
Compare Similar Products Chosen	1, 140	1.24	0.268	(0.010, 0.00713)	(0.019, 0.00917)

Customer Questions and Answers Chosen	1, 108	0.184	0.669	(0.006, 0.00742)	(0.013, 0.0111)
Detailed 3 Star Reviews Chosen	1, 1	0.242	0.709	(0.018, 0.0291)	(NA, 0.0177)
Detailed Negative Reviews Chosen	1, 12	0.0881	0.772	(0.036, 0.0309)	(0.031, 0.03)
Frequently Bought Together Chosen	1, 28	2.28	0.142	(0.001, 0.00367)	(0.001, 0.00546)
Other Technical Details Chosen	1, 41	1.43	0.238	(0.020, 0.0283)	(0.019, 0.0279)
Price Chosen	1, 274	0.627	0.429	(0.006, 0.00505)	(0.009, 0.00739)
Product Description Chosen	1, 125	0.31	0.578	(0.017, 0.0195)	(0.031, 0.0247)
Product Images Small Chosen	1, 126	1.53	0.219	(0.008, 0.0118)	(0.013, 0.0181)
Product Main Image Chosen	1, 216	1.85	0.175	(0.017, 0.0209)	(0.015, 0.0241)
Product Summary Chosen	1, 218	0.0241	0.877	(0.034, 0.0344)	(0.038, 0.0447)
Quantity Chosen	1, 47	0.28	0.599	(0.005, 0.00918)	(0.010, 0.0336)
Recommended Products Chosen	1, 45	0.268	0.607	(0.006, 0.00864)	(0.006, 0.0203)
Related Products Chosen	1, 218	2.89	0.091	(0.003, 0.00443)	(0.005, 0.00693)
Review Summary Chosen	1, 214	3.28	0.071	(0.002, 0.00362)	(0.003, 0.0073)
Sponsored Products Chosen	1, 15	3.25	0.091	(0.011, 0.0257)	(0.011, 0.023)
Summary Reviews Chosen	1, 11	2.78	0.124	(0.001, 0.00311)	(0.000, 0.00215)
Technical Details Chosen	1, 149	0.0648	0.799	(0.006, 0.0071)	(0.016, 0.0137)
Title Chosen	1, 187	0.443	0.507	(0.012, 0.0141)	(0.020, 0.0249)
Top Critical Review Chosen	1, 3	4.9	0.114	(0.005, 0.00117)	(0.004, 0.00037)
Top Positive Review Chosen	1, 10	2.06	0.182	(0.001, 0.00643)	(0.001, 0.00835)
Top Reviews Chosen	1, 96	5.4	0.022	(0.052, 0.0337)	(0.046, 0.0312)

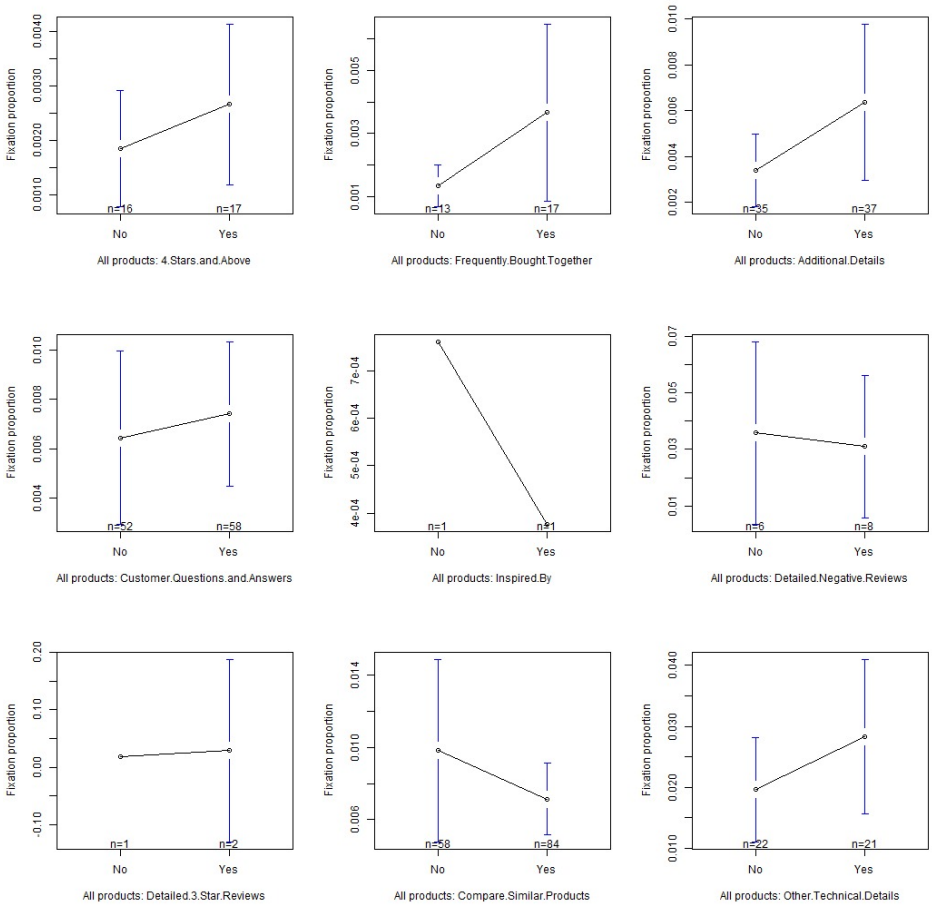

Figure E.25: Associated plots of ANOVA results on fixation duration proportion for all AOIs (1-9) of products chosen irrespective of product category

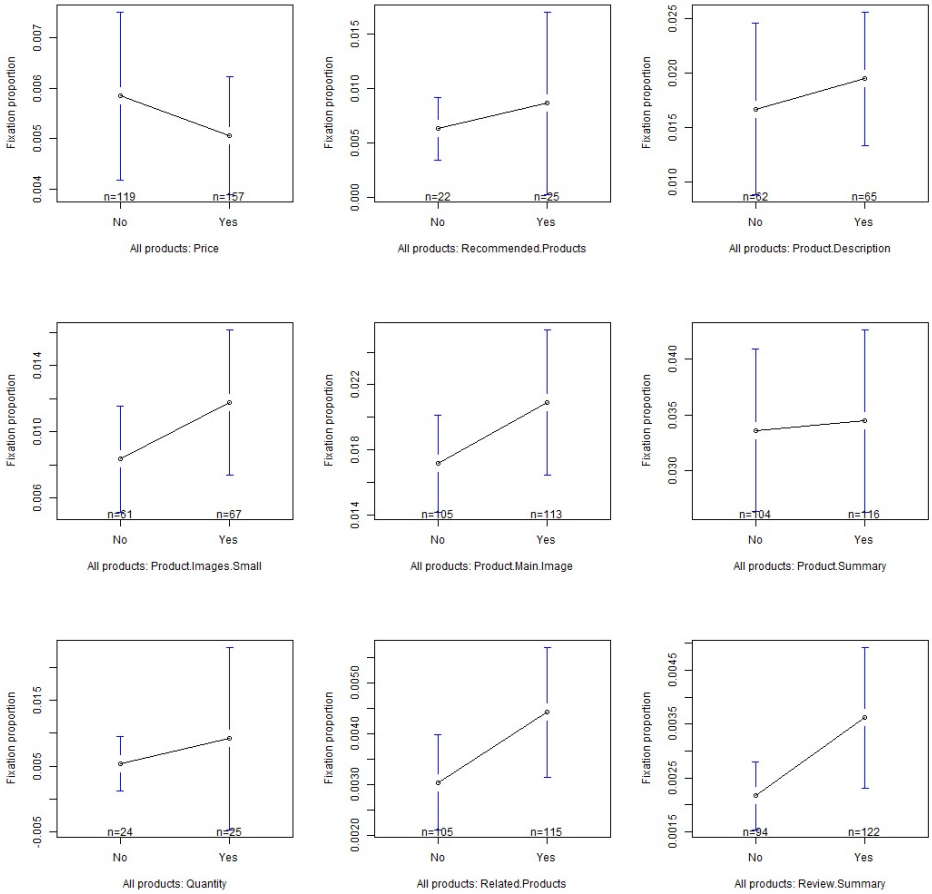

Figure E.26: Associated plots of ANOVA results on fixation duration proportion for all AOIs (10-18) of products chosen irrespective of product category

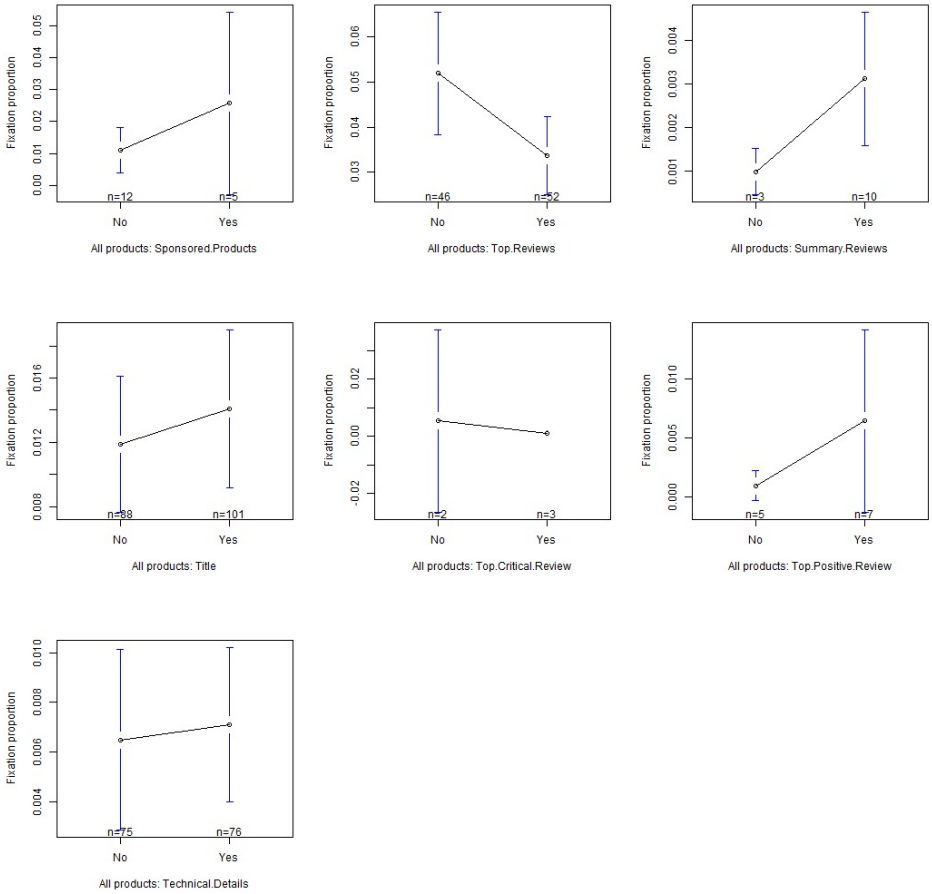

Figure E.27: Associated plots of ANOVA results on fixation duration proportion for all AOIs (19-25) of products chosen irrespective of product category

Table E.14: ANOVA results on dwell time for all AOIs of products chosen irrespective of product category

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
4 Stars and Above Chosen	1, 31	0.222	0.641	(6.43e+03, 8.17e+03)	(5.34e+03, 1.38e+04)
Additional Details Chosen	1, 70	1.61	0.209	(1.37e+04, 2.49e+04)	(2.63e+04, 4.6e+04)
Compare Similar Products Chosen	1, 140	0.00599	0.938	(2.18e+04, 2.22e+04)	(2.85e+04, 3.21e+04)

Customer Questions and Answers Chosen	1, 108	1.29	0.259	(1.56e+04, 2.44e+04)	(2.75e+04, 4.99e+04)
Detailed 3 Star Reviews Chosen	1, 1	0.242	0.709	(4.86e+04, 7.67e+04)	(NA, 4.67e+04)
Detailed Negative Reviews Chosen	1, 12	0.111	0.744	(2.09e+05, 1.58e+05)	(3.04e+05, 2.61e+05)
Frequently Bought Together Chosen	1, 28	2.66	0.114	(4.41e+03, 1.22e+04)	(2.5e+03, 1.71e+04)
Other Technical Details Chosen	1, 41	0.449	0.506	(5.94e+04, 7.62e+04)	(8.23e+04, 8.23e+04)
Price Chosen	1, 274	0.679	0.411	(1.6e+04, 1.29e+04)	(3.99e+04, 2.26e+04)
Product Description Chosen	1, 125	0.594	0.442	(5.8e+04, 7.64e+04)	(1.36e+05, 1.34e+05)
Product Images Small Chosen	1, 126	2.07	0.153	(1.6e+04, 2.22e+04)	(2.1e+04, 2.68e+04)
Product Main Image Chosen	1, 216	1.54	0.216	(5.08e+04, 6.35e+04)	(5.73e+04, 8.85e+04)
Product Summary Chosen	1, 218	0.0515	0.821	(1.09e+05, 1.14e+05)	(1.42e+05, 1.82e+05)
Quantity Chosen	1, 47	0.865	0.357	(5.45e+03, 1.03e+04)	(5.74e+03, 2.49e+04)
Recommended Products Chosen	1, 45	0.251	0.619	(1.32e+04, 1.51e+04)	(1.14e+04, 1.41e+04)
Related Products Chosen	1, 218	1.67	0.197	(8.96e+03, 1.24e+04)	(1.23e+04, 2.43e+04)
Review Summary Chosen	1, 214	0.431	0.512	(7.3e+03, 8.63e+03)	(1.37e+04, 1.55e+04)
Sponsored Products Chosen	1, 15	2.07	0.171	(4.76e+04, 1.45e+05)	(7.68e+04, 2.1e+05)
Summary Reviews Chosen	1, 11	0.85	0.376	(5.89e+03, 1.16e+04)	(1.52e+03, 1.03e+04)
Technical Details Chosen	1, 149	0.0296	0.864	(2.12e+04, 1.98e+04)	(6.52e+04, 3.54e+04)

Title Chosen	1, 187	0.409	0.523	(2.86e+04, 3.26e+04)	(3.87e+04, 4.59e+04)
Top Critical Review Chosen	1, 3	172	0.001	(2.63e+04, 2.8e+03)	(2.66e+03, 1.5e+03)
Top Positive Review Chosen	1, 10	1.38	0.268	(6.81e+03, 1.79e+04)	(9.69e+03, 1.93e+04)
Top Reviews Chosen	1, 96	6.47	0.013	(2.12e+05, 1.09e+05)	(2.7e+05, 1.07e+05)

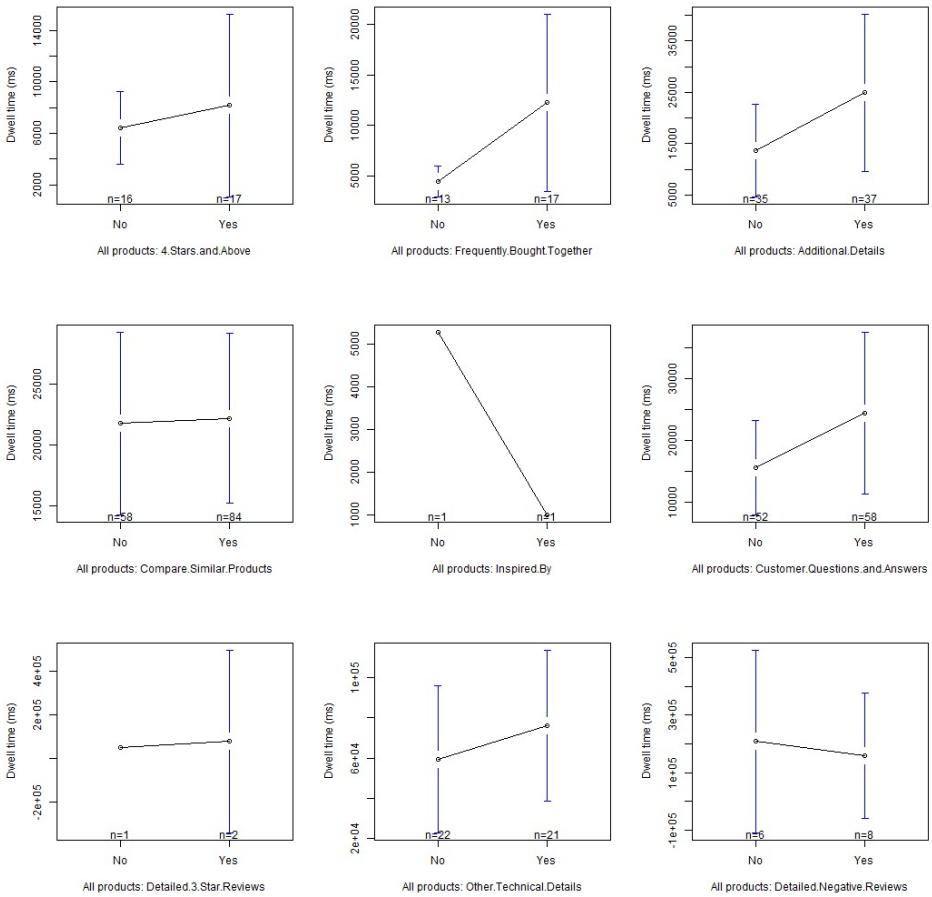

Figure E.28: Associated plots of ANOVA results on dwell time for all AOIs (1-9) of products chosen irrespective of product category

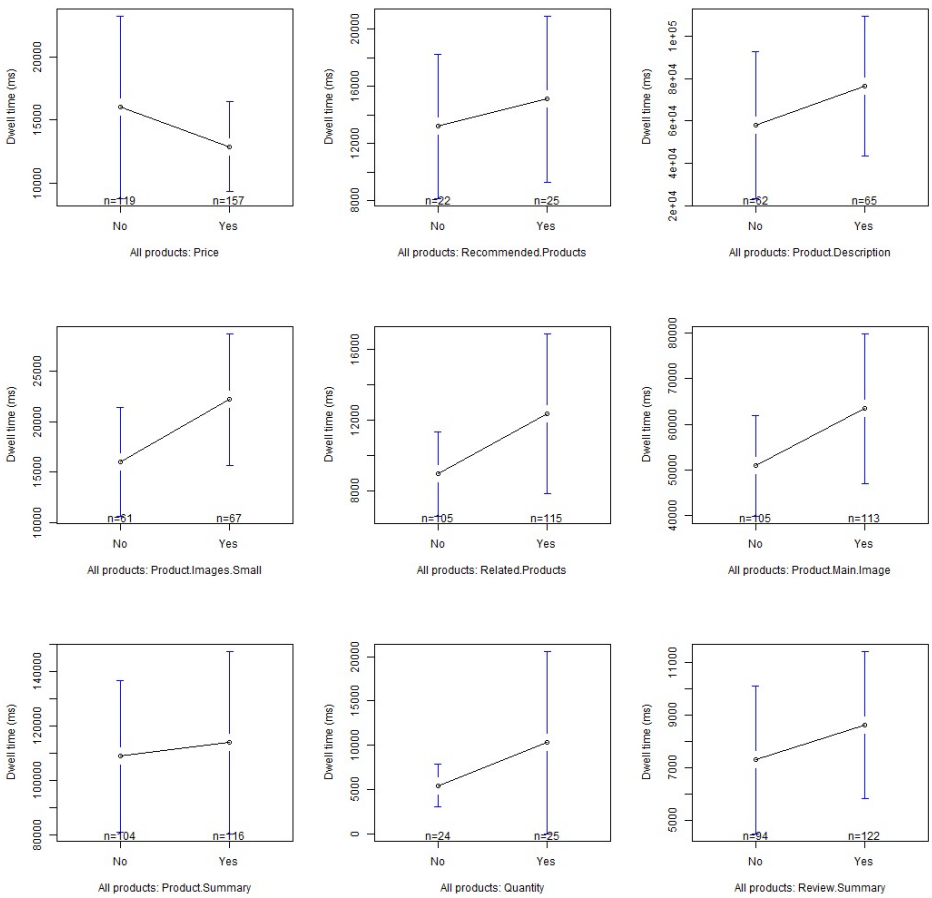

Figure E.29: Associated plots of ANOVA results on dwell time for all AOIs (10-18) of products chosen irrespective of product category

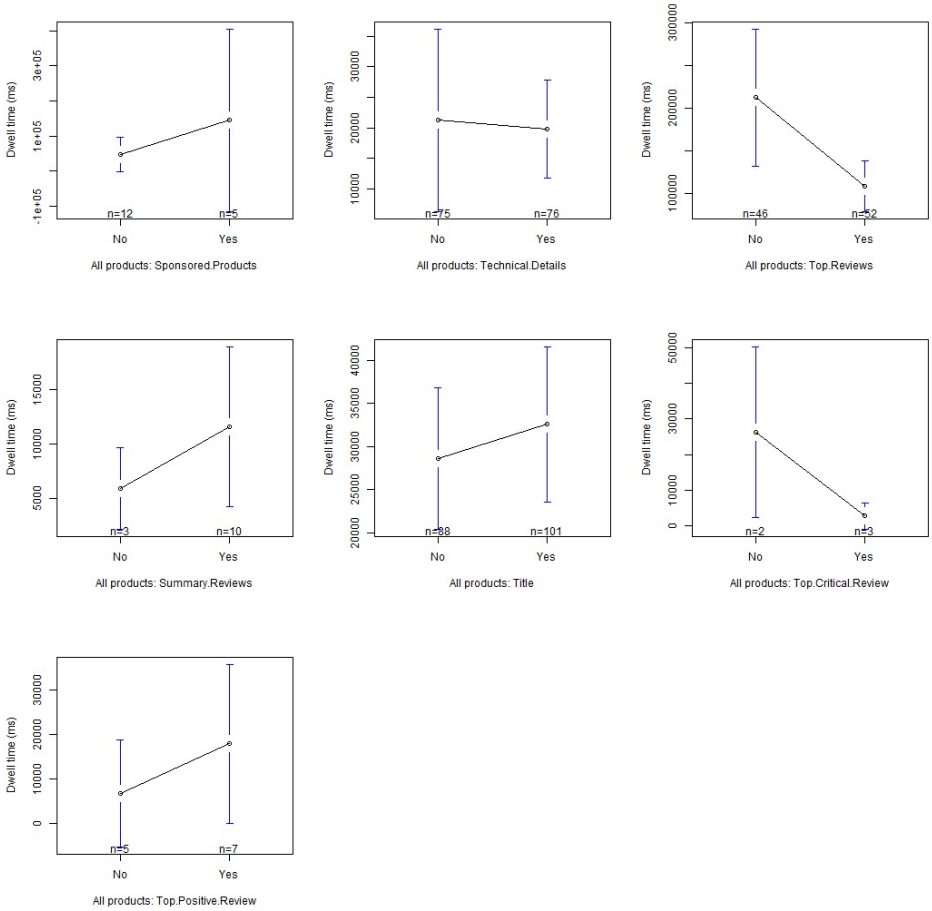

Figure E.30: Associated plots of ANOVA results on dwell time for all AOIs (19-25) of products chosen irrespective of product category

Table E.15: ANOVA results on pupil dilation for all AOIs of products chosen irrespective of product category

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
4 Stars and Above Chosen	1, 31	0.876	0.357	(3.327, 3.188)	(0.456, 0.398)
Additional Details Chosen	1, 69	0.0209	0.885	(3.313, 3.330)	(0.469, 0.500)
Compare Similar Products Chosen	1, 105	0.719	0.398	(3.268, 3.349)	(0.474, 0.489)
Customer Questions and Answers Chosen	1, 93	2.99	0.087	(3.350, 3.166)	(0.559, 0.478)

Detailed 3 Star Reviews Chosen	1, 1	0.00988	0.937	(3.372, 3.375)	(NA, 0.030)
Detailed Negative Reviews Chosen	1, 12	0.0151	0.904	(2.965, 2.992)	(0.430, 0.382)
Frequently Bought Together Chosen	1, 27	0.197	0.66	(3.279, 3.220)	(0.317, 0.392)
Other Technical Details Chosen	1, 41	0.00386	0.951	(3.250, 3.241)	(0.471, 0.463)
Price Chosen	1, 185	0.349	0.556	(3.238, 3.281)	(0.487, 0.508)
Product Description Chosen	1, 123	0.0986	0.754	(3.331, 3.304)	(0.502, 0.460)
Product Images Small Chosen	1, 126	0.198	0.657	(3.080, 3.110)	(0.362, 0.415)
Product Main Image Chosen	1, 212	0.204	0.652	(3.259, 3.288)	(0.457, 0.472)
Product Summary Chosen	1, 211	0.373	0.542	(3.255, 3.295)	(0.479, 0.488)
Quantity Chosen	1, 46	0.515	0.477	(3.055, 3.140)	(0.418, 0.401)
Recommended Products Chosen	1, 42	0.277	0.602	(3.366, 3.300)	(0.478, 0.359)
Related Products Chosen	1, 135	0.0202	0.887	(3.303, 3.292)	(0.406, 0.497)
Review Summary Chosen	1, 161	0.00117	0.973	(3.265, 3.268)	(0.501, 0.523)
Sponsored Products Chosen	1, 15	0.0989	0.757	(3.338, 3.253)	(0.331, 0.823)
Summary Reviews Chosen	1, 9	0.0683	0.8	(3.195, 3.146)	(0.241, 0.284)
Technical Details Chosen	1, 126	0.193	0.661	(3.263, 3.225)	(0.500, 0.495)
Title Chosen	1, 181	0.0887	0.766	(3.257, 3.279)	(0.501, 0.517)
Top Critical Review Chosen	1, 3	0.187	0.695	(3.427, 3.560)	(0.294, 0.359)
Top Positive Review Chosen	1, 8	0.0671	0.802	(3.143, 3.211)	(0.546, 0.218)
Top Reviews Chosen	1, 95	0.96	0.33	(3.258, 3.363)	(0.484, 0.562)

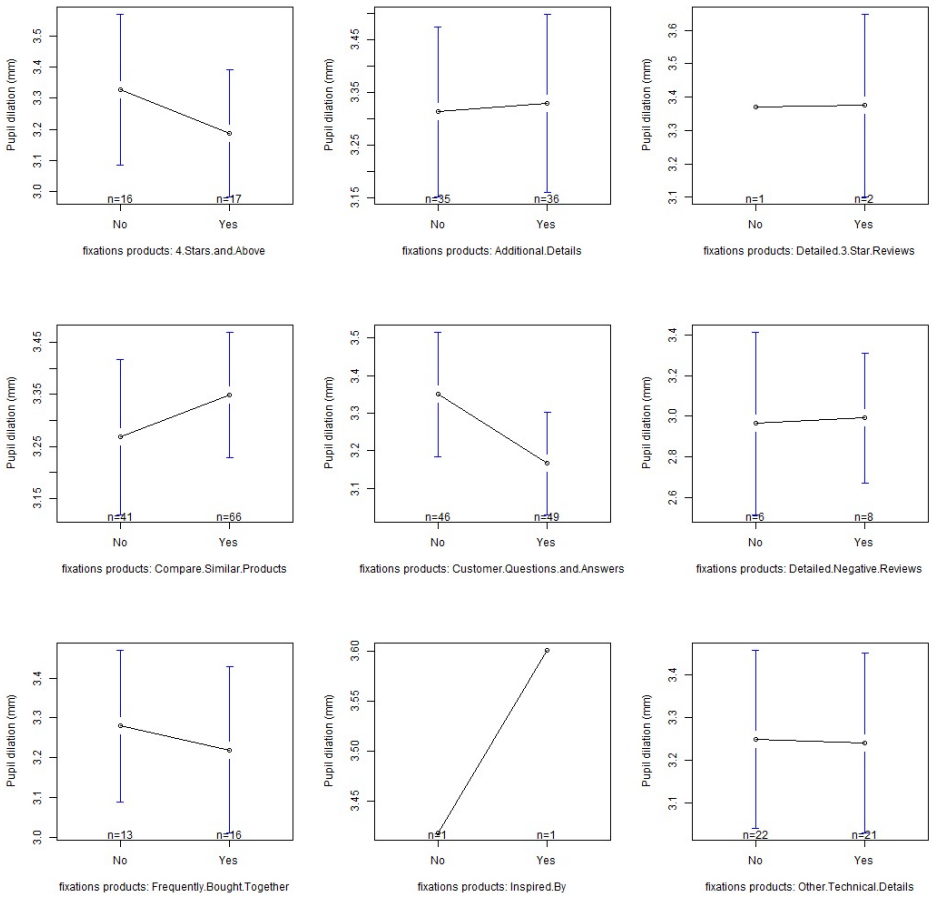

Figure E.31: Associated plots of ANOVA results on pupil dilation for all AOIs (1-9) of products chosen irrespective of product category

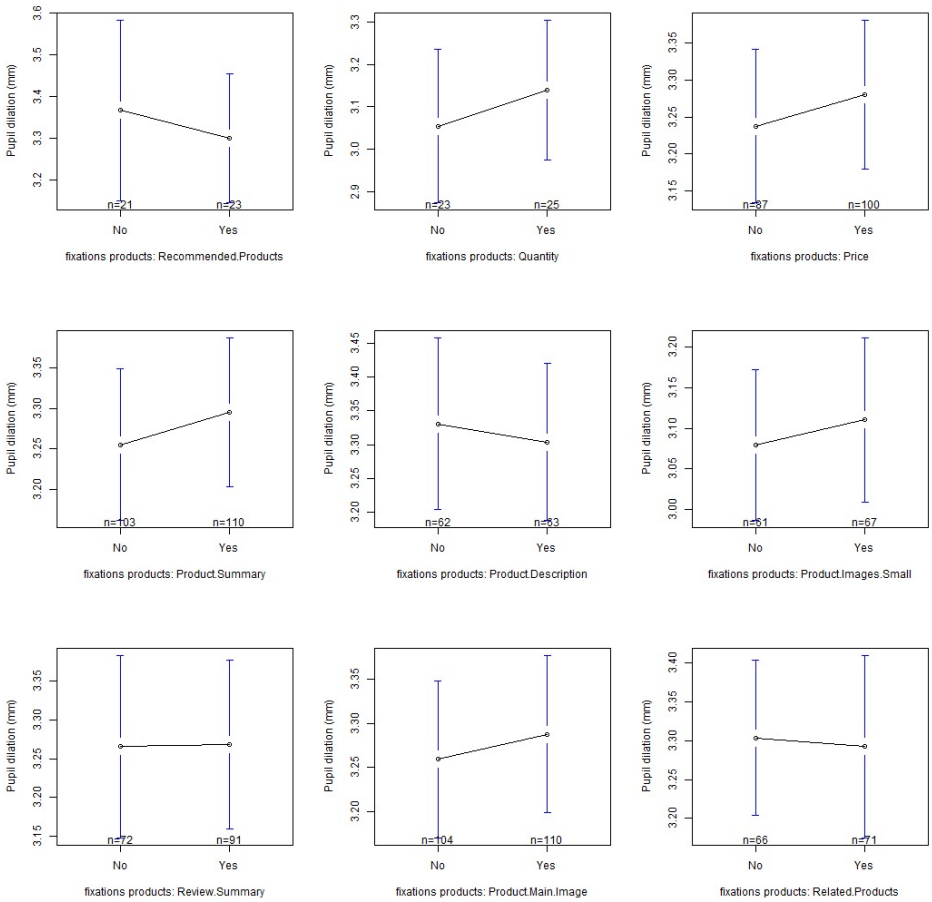

Figure E.32: Associated plots of ANOVA results on pupil dilation for all AOIs (10-18) of products chosen irrespective of product category

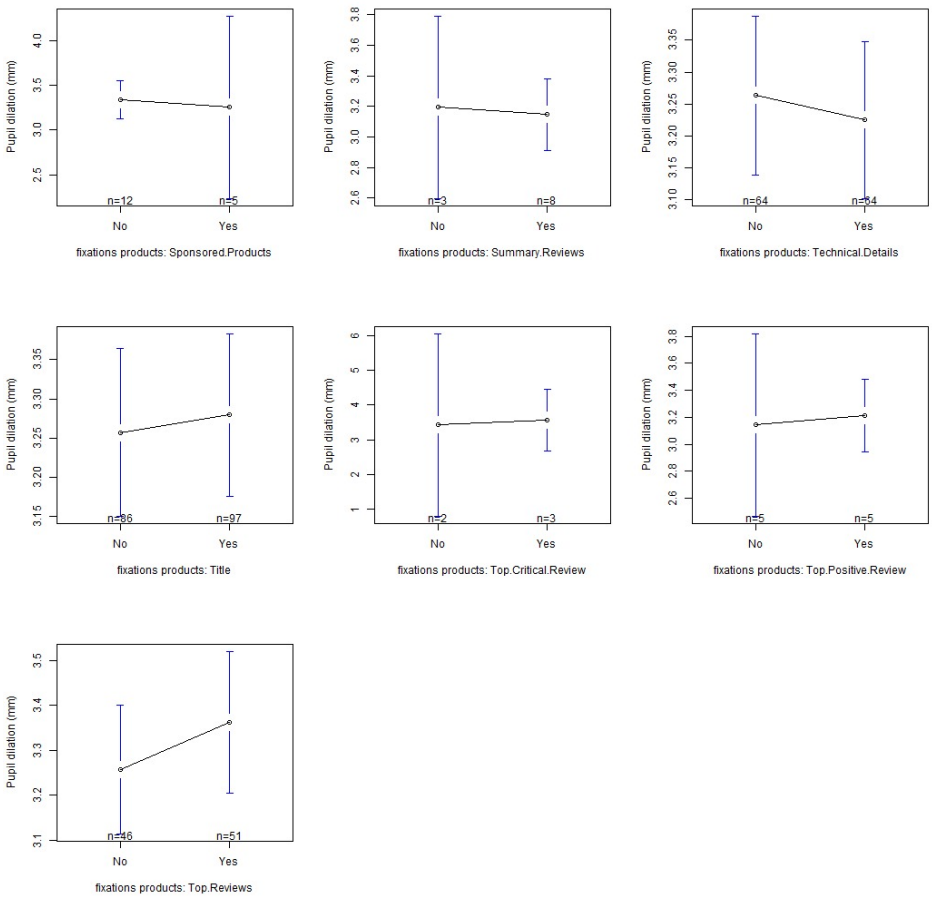

Figure E.33: Associated plots of ANOVA results on pupil dilation for all AOIs (19-25) of products chosen irrespective of product category

E.6 Product Category

Table E.16: ANOVA and associated pairwise ANOVA results on fixation duration proportion for all AOIs for all product categories

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
4 Stars and Above Category	1, 31	0.788	0.382	(0.002, 0.00266)	(0.002, 0.00288)
Additional Details Category	2, 69	5.07	0.009	(0.003, 0.00638)	(0.005, 0.0102)

Compare Similar Products Category	3, 138	3.66	0.014	(0.010, 0.00713)	(0.019, 0.00917)
Customer Questions and Answers Category	3, 106	3.28	0.024	(0.006, 0.00742)	(0.013, 0.0111)
Detailed 3 Star Reviews Category	1, 1	0.448	0.625	(0.018, 0.0291)	(NA, 0.0177)
Detailed Negative Reviews Category	2, 11	10.6	0.003	(0.036, 0.0309)	(0.031, 0.03)
Price Category	3, 272	1.31	0.272	(0.006, 0.00505)	(0.009, 0.00739)
Product Description Category	3, 123	13.8	0	(0.017, 0.0195)	(0.031, 0.0247)
Product Images Small Category	3, 124	1.39	0.248	(0.008, 0.0118)	(0.013, 0.0181)
Product Main Image Category	3, 214	0.816	0.486	(0.017, 0.0209)	(0.015, 0.0241)
Product Summary Category	3, 216	28.3	0	(0.034, 0.0344)	(0.038, 0.0447)
Quantity Category	1, 47	0.438	0.511	(0.005, 0.00918)	(0.010, 0.0336)
Related Products Category	3, 216	2.48	0.062	(0.003, 0.00443)	(0.005, 0.00693)
Review Summary Category	3, 212	0.934	0.425	(0.002, 0.00362)	(0.003, 0.0073)
Summary Reviews Category	2, 10	0.275	0.765	(0.001, 0.00311)	(0.000, 0.00215)
Technical Details Category	3, 147	9.53	0	(0.006, 0.0071)	(0.016, 0.0137)
Title Category	3, 185	12.2	0	(0.012, 0.0141)	(0.020, 0.0249)
Top Critical Review Category	2, 2	31	0.031	(0.005, 0.00117)	(0.004, 0.00037)
Top Positive Review Category	2, 9	0.536	0.603	(0.001, 0.00643)	(0.001, 0.00835)
Top Reviews Category	3, 94	5.87	0.001	(0.052, 0.0337)	(0.046, 0.0312)

Table E.17: ANOVA and associated pairwise ANOVA results on fixation duration proportion for all AOIs for product category combinations

AOI	**df**	**F value**	**p**
Additional Details Computer Couch	1, 49	10.2	0.002

Additional Details Computer Helicopter	1, 52	2.83	0.098
Additional Details Couch Helicopter	1, 37	6.6	0.014
Compare Similar Products Computer Couch	1, 48	3.04	0.088
Compare Similar Products Computer Helicopter	1, 75	7.53	0.008
Compare Similar Products Computer Mikado	1, 65	5.35	0.024
Compare Similar Products Couch Helicopter	1, 73	0.596	0.443
Compare Similar Products Couch Mikado	1, 63	0.455	0.503
Compare Similar Products Helicopter Mikado	1, 90	0.0365	0.849
Customer Questions and Answers Computer Couch	1, 53	2.64	0.11
Customer Questions and Answers Computer Helicopter	1, 49	10.2	0.002
Customer Questions and Answers Computer Mikado	1, 54	2.97	0.091
Customer Questions and Answers Couch Helicopter	1, 52	1.22	0.274
Customer Questions and Answers Couch Mikado	1, 57	0.532	0.469
Customer Questions and Answers Helicopter Mikado	1, 53	5.08	0.028
Detailed Negative Reviews Couch Helicopter	1, 6	3.8	0.099
Detailed Negative Reviews Couch Mikado	1, 7	16	0.005
Detailed Negative Reviews Helicopter Mikado	1, 9	14.8	0.004
Product Description Computer Couch	1, 63	0.347	0.558
Product Description Computer Helicopter	1, 80	15	0
Product Description Computer Mikado	1, 48	3.01	0.089
Product Description Couch Helicopter	1, 75	18.2	0
Product Description Couch Mikado	1, 43	8	0.007
Product Description Helicopter Mikado	1, 60	14.5	0
Product Summary Computer Couch	1, 100	12.6	0.001
Product Summary Computer Helicopter	1, 122	7.68	0.006

Product Summary Computer Mikado	1, 118	39.7	0
Product Summary Couch Helicopter	1, 98	31.5	0
Product Summary Couch Mikado	1, 94	65.2	0
Product Summary Helicopter Mikado	1, 116	13.8	0
Technical Details Computer Couch	1, 51	4.67	0.035
Technical Details Computer Helicopter	1, 99	14.4	0
Technical Details Computer Mikado	1, 73	11	0.001
Technical Details Couch Helicopter	1, 74	1.53	0.22
Technical Details Couch Mikado	1, 48	0.295	0.59
Technical Details Helicopter Mikado	1, 96	1.73	0.192
Title Computer Couch	1, 90	10.7	0.002
Title Computer Helicopter	1, 115	10.9	0.001
Title Computer Mikado	1, 96	17.2	0
Title Couch Helicopter	1, 89	3.52	0.064
Title Couch Mikado	1, 70	1.87	0.176
Title Helicopter Mikado	1, 95	15.8	0
Top Critical Review Couch Helicopter	1, 2	2.48	0.256
Top Critical Review Couch Mikado	1, 1	23.3	0.13
Top Critical Review Helicopter Mikado	1, 1	244	0.041
Top Reviews Computer Couch	1, 34	7.22	0.011
Top Reviews Computer Helicopter	1, 42	7.42	0.009
Top Reviews Computer Mikado	1, 26	6.9	0.014
Top Reviews Couch Helicopter	1, 68	3.14	0.081
Top Reviews Couch Mikado	1, 52	2.34	0.132
Top Reviews Helicopter Mikado	1, 60	10.2	0.002

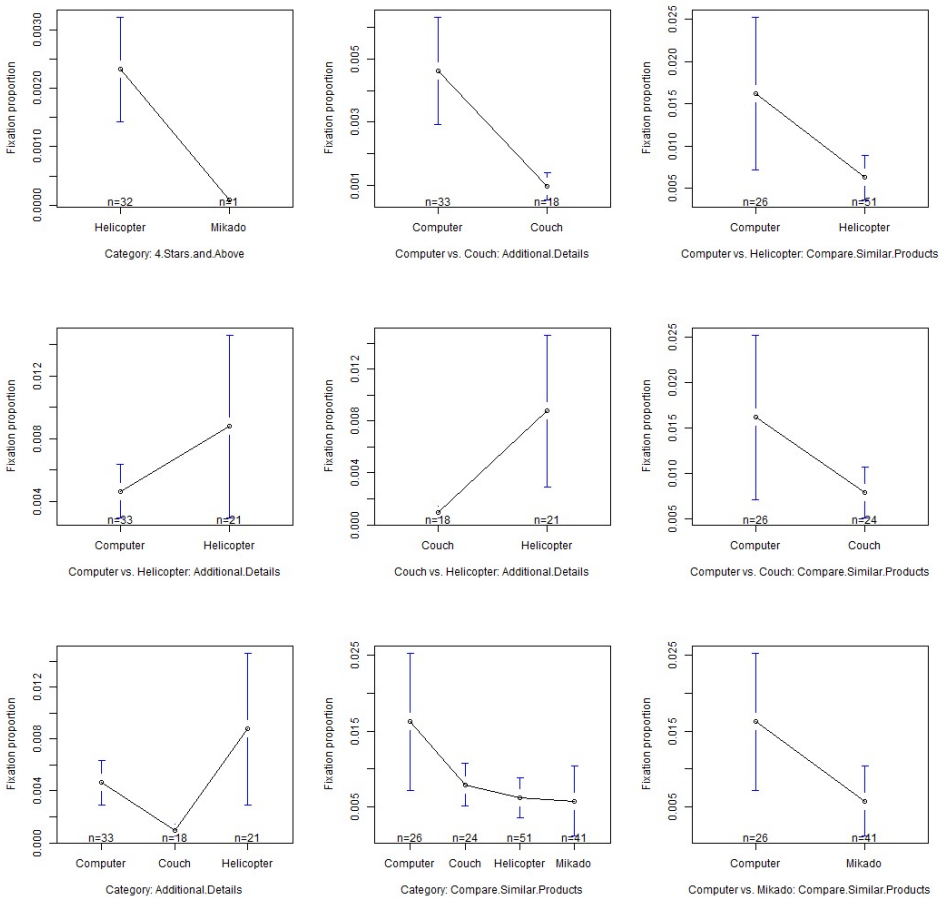

Figure E.34: Associated plots of ANOVA results on fixation duration proportion for all AOIs (1-9) for product category combinations

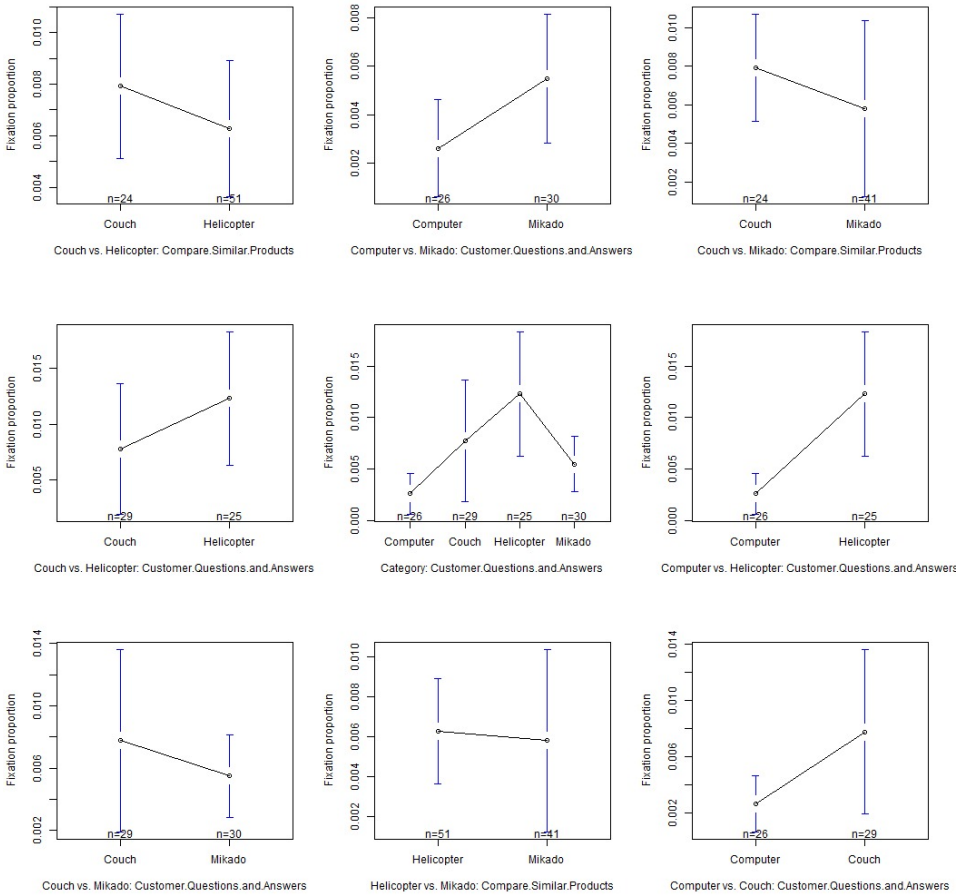

Figure E.35: Associated plots of ANOVA results on fixation duration proportion for all AOIs (10-18) for product category combinations

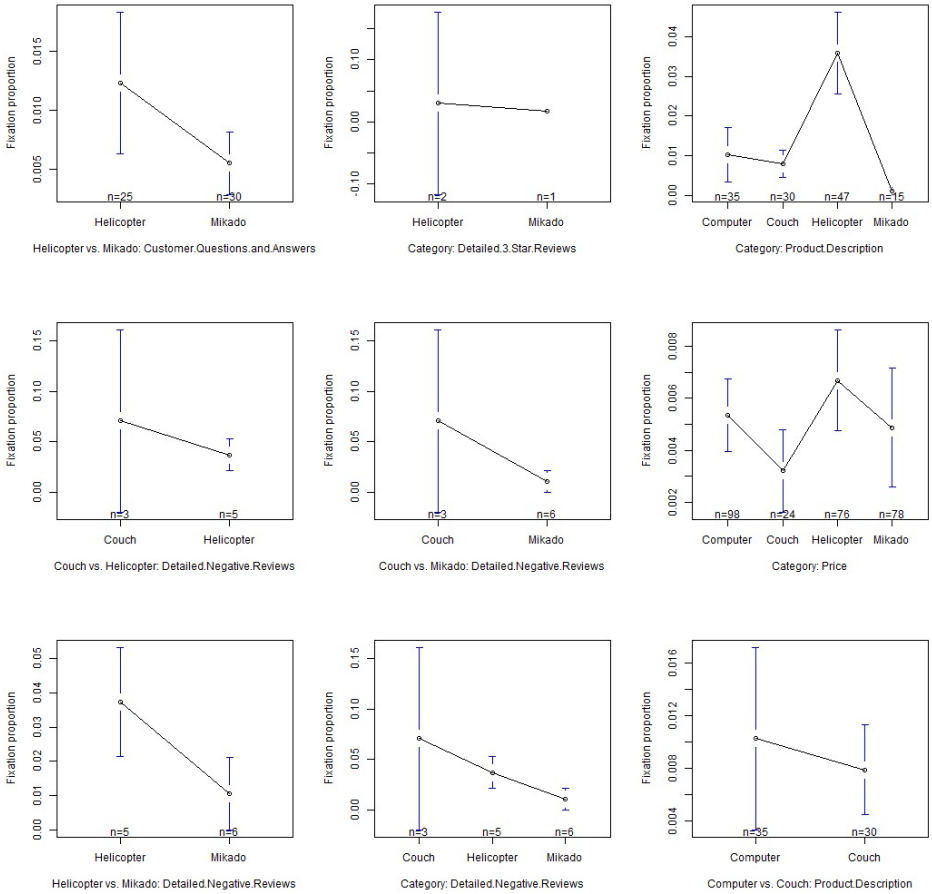

Figure E.36: Associated plots of ANOVA results on fixation duration proportion for all AOIs (19-27) for product category combinations

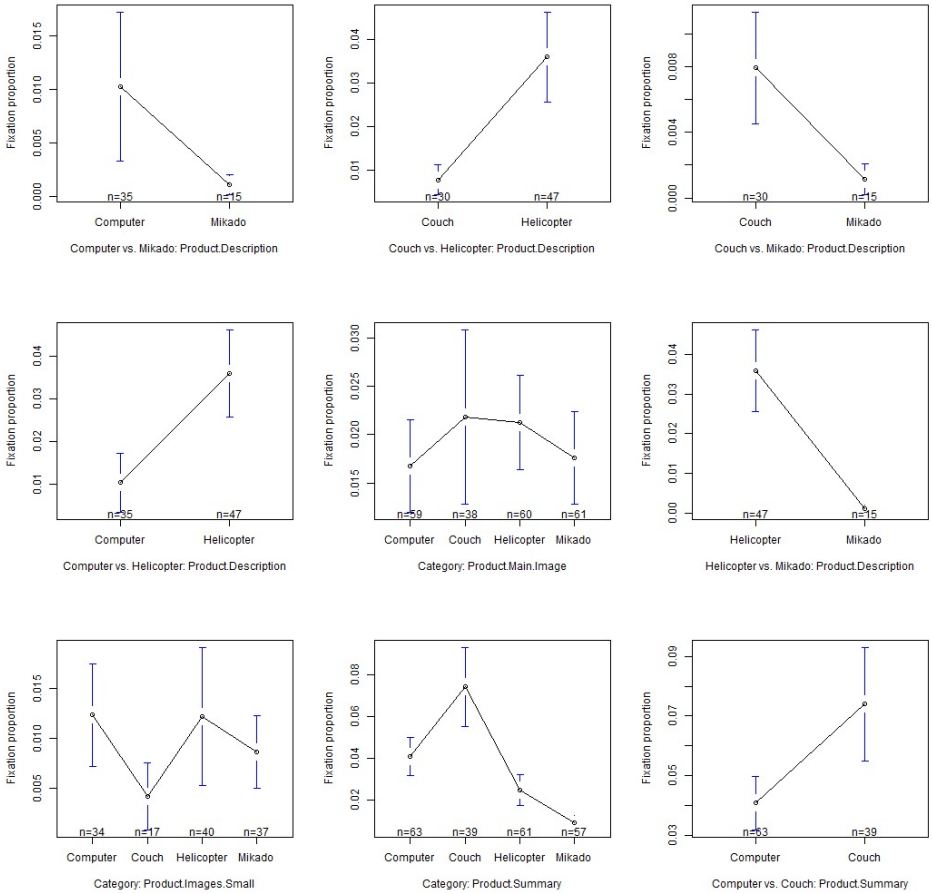

Figure E.37: Associated plots of ANOVA results on fixation duration proportion for all AOIs (28-36) for product category combinations

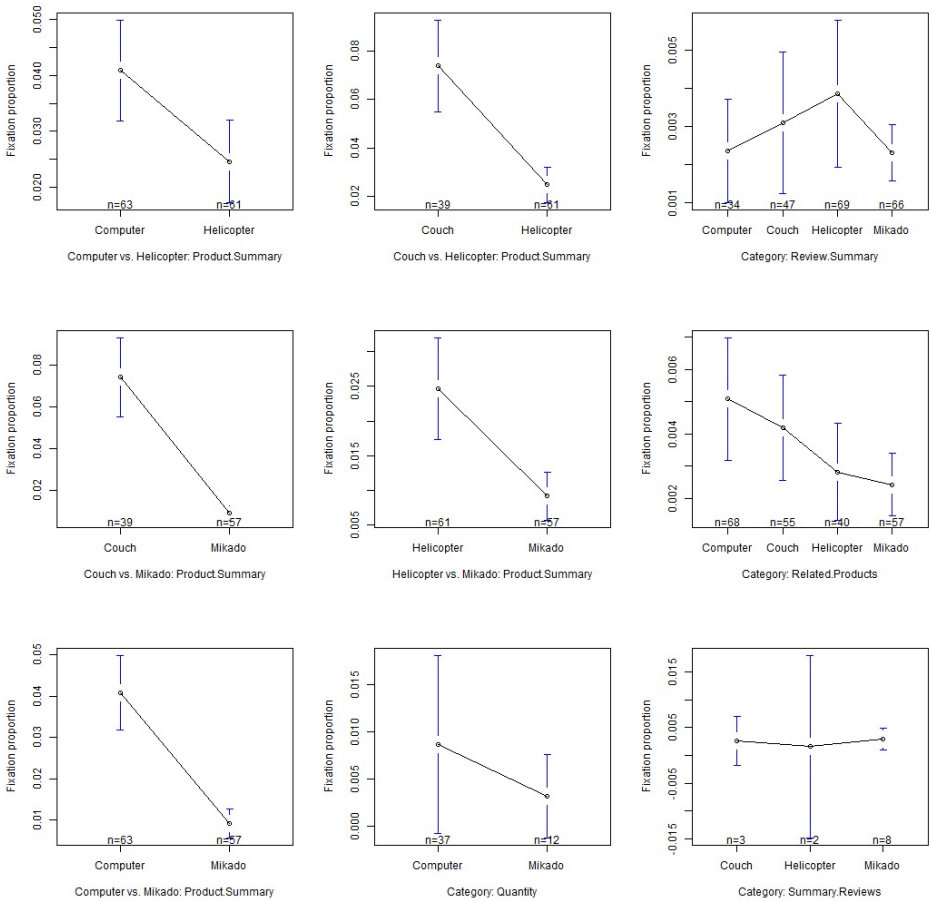

Figure E.38: Associated plots of ANOVA results on fixation duration proportion for all AOIs (37-45) for product category combinations

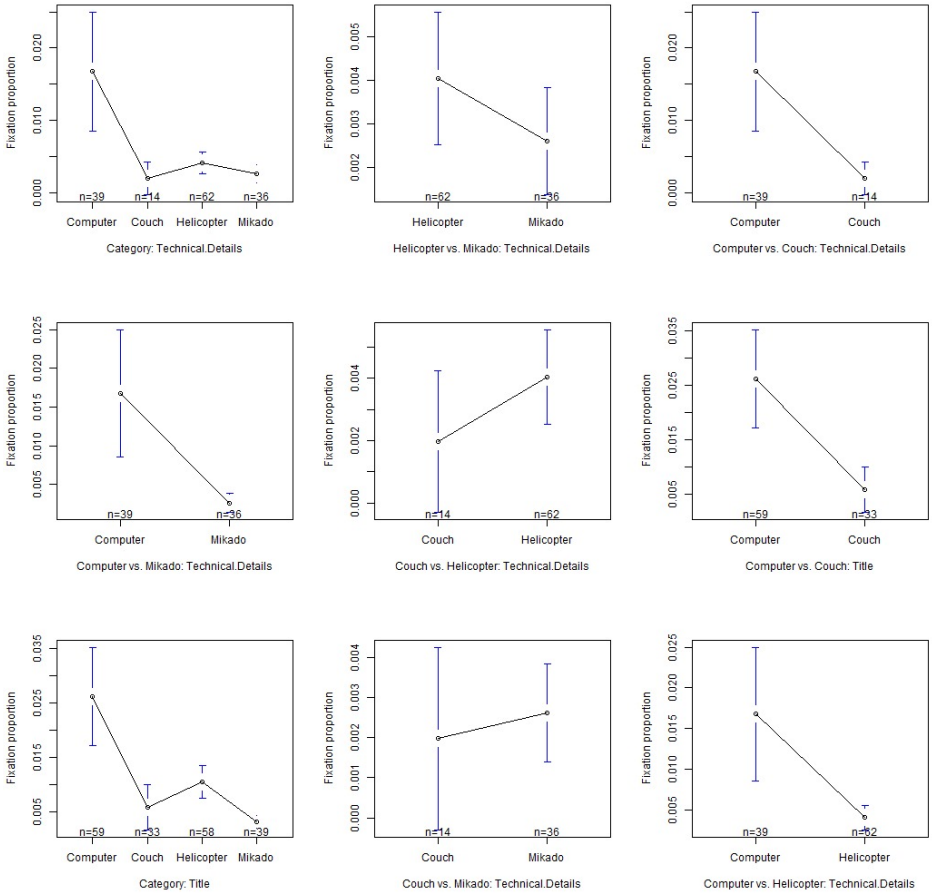

Figure E.39: Associated plots of ANOVA results on fixation duration proportion for all AOIs (46-54) for product category combinations

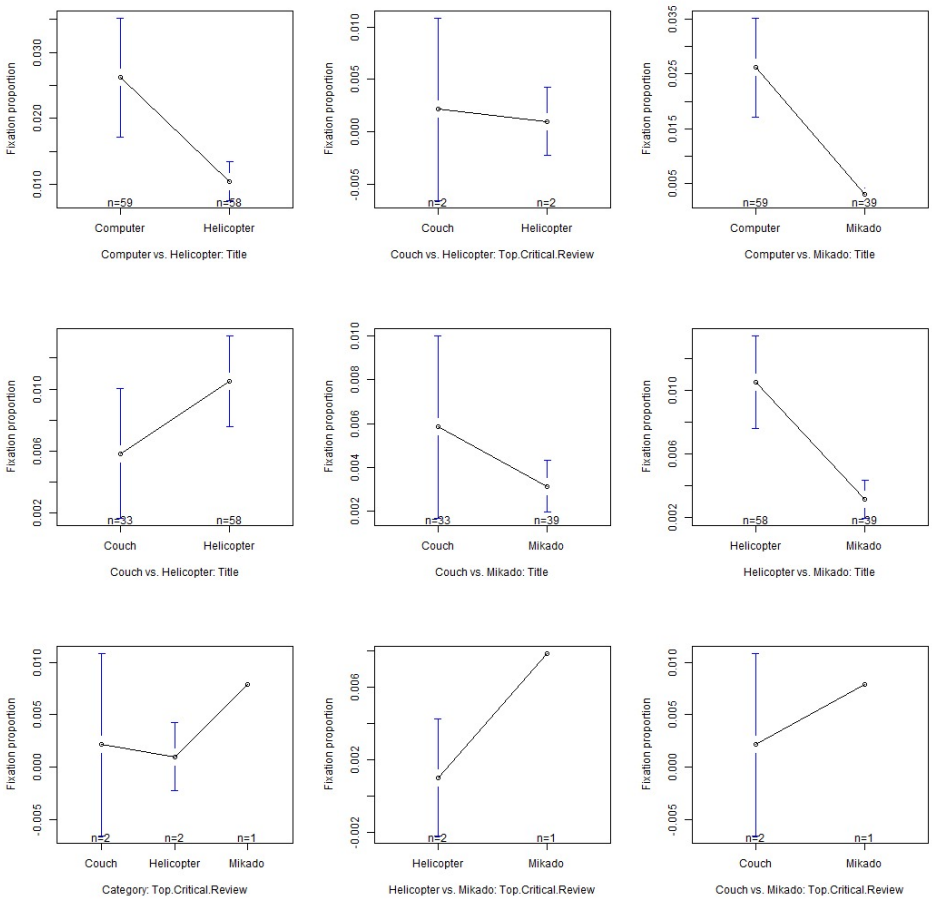

Figure E.40: Associated plots of ANOVA results on fixation duration proportion for all AOIs (55-63) for product category combinations

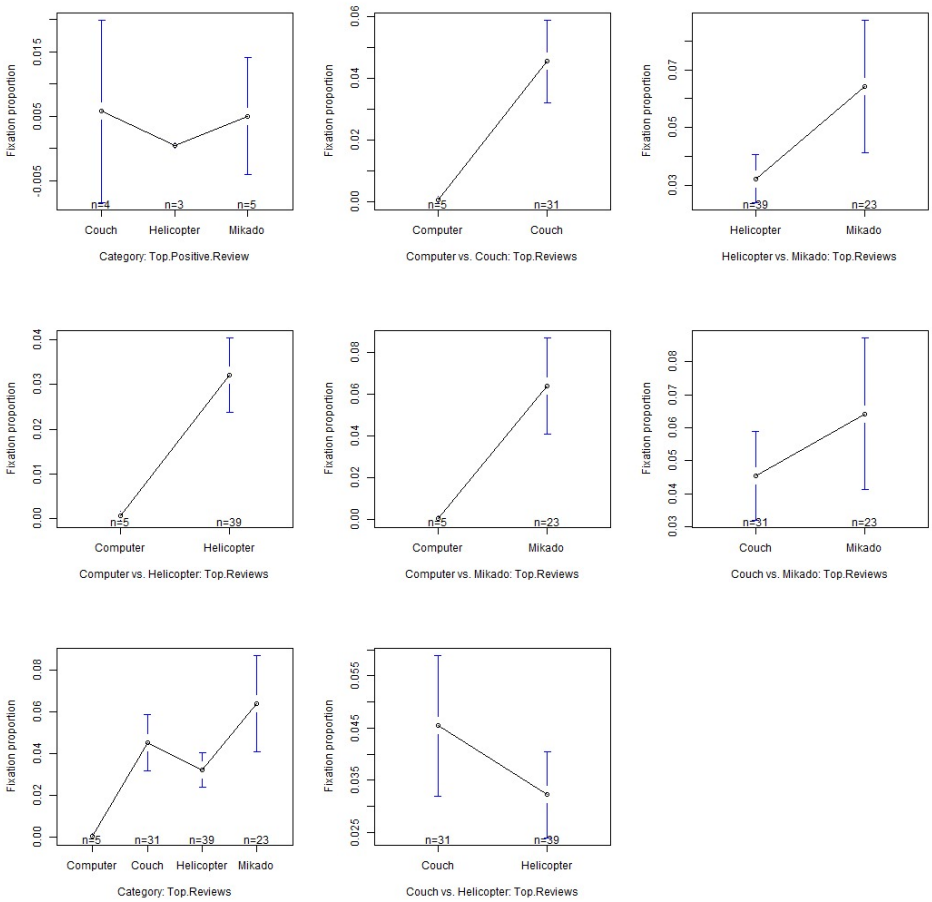

Figure E.41: Associated plots of ANOVA results on fixation duration proportion for all AOIs (64-71) for product category combinations

Table E.18: ANOVA and associated pairwise ANOVA results on dwell time for all AOIs for all product categories

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
4 Stars and Above Category	1, 31	0.444	0.51	(6.43e+03, 8.17e+03)	(5.34e+03, 1.38e+04)
Additional Details Category	2, 69	3.18	0.048	(1.37e+04, 2.49e+04)	(2.63e+04, 4.6e+04)
Compare Similar Products Category	3, 138	5.88	0.001	(2.18e+04, 2.22e+04)	(2.85e+04, 3.21e+04)

Customer Questions and Answers Category	3, 106	3.67	0.015	(1.56e+04, 2.44e+04)	(2.75e+04, 4.99e+04)
Detailed 3 Star Reviews Category	1, 1	0.448	0.625	(4.86e+04, 7.67e+04)	(NA, 4.67e+04)
Detailed Negative Reviews Category	2, 11	6.24	0.015	(2.09e+05, 1.58e+05)	(3.04e+05, 2.61e+05)
Price Category	3, 272	3.08	0.028	(1.6e+04, 1.29e+04)	(3.99e+04, 2.26e+04)
Product Description Category	3, 123	10.2	0	(5.8e+04, 7.64e+04)	(1.36e+05, 1.34e+05)
Product Images Small Category	3, 124	1.01	0.389	(1.6e+04, 2.22e+04)	(2.1e+04, 2.68e+04)
Product Main Image Category	3, 214	2.02	0.113	(5.08e+04, 6.35e+04)	(5.73e+04, 8.85e+04)
Product Summary Category	3, 216	18.4	0	(1.09e+05, 1.14e+05)	(1.42e+05, 1.82e+05)
Quantity Category	1, 47	0.65	0.424	(5.45e+03, 1.03e+04)	(5.74e+03, 2.49e+04)
Related Products Category	3, 216	2.36	0.073	(8.96e+03, 1.24e+04)	(1.23e+04, 2.43e+04)
Review Summary Category	3, 212	0.442	0.724	(7.3e+03, 8.63e+03)	(1.37e+04, 1.55e+04)
Summary Reviews Category	2, 10	0.272	0.767	(5.89e+03, 1.16e+04)	(1.52e+03, 1.03e+04)
Technical Details Category	3, 147	6.6	0	(2.12e+04, 1.98e+04)	(6.52e+04, 3.54e+04)
Title Category	3, 185	9.31	0	(2.86e+04, 3.26e+04)	(3.87e+04, 4.59e+04)
Top Critical Review Category	2, 2	1.62	0.382	(2.63e+04, 2.8e+03)	(2.66e+03, 1.5e+03)
Top Positive Review Category	2, 9	0.988	0.409	(6.81e+03, 1.79e+04)	(9.69e+03, 1.93e+04)
Top Reviews Category	3, 94	3.54	0.018	(2.12e+05, 1.09e+05)	(2.7e+05, 1.07e+05)

Table E.19: ANOVA and associated pairwise ANOVA results on dwell time for all AOIs for product category combinations

AOI	df	F value	p
Additional Details Computer Couch	1, 49	4.81	0.033
Additional Details Computer Helicopter	1, 52	1.45	0.234
Additional Details Couch Helicopter	1, 37	4.91	0.033
Compare Similar Products Computer Couch	1, 48	0.171	0.681
Compare Similar Products Computer Helicopter	1, 75	7.16	0.009
Compare Similar Products Computer Mikado	1, 65	10.2	0.002
Compare Similar Products Couch Helicopter	1, 73	6.27	0.014
Compare Similar Products Couch Mikado	1, 63	11.1	0.001
Compare Similar Products Helicopter Mikado	1, 90	1.84	0.178
Customer Questions and Answers Computer Couch	1, 53	4.81	0.033
Customer Questions and Answers Computer Helicopter	1, 49	7.49	0.009
Customer Questions and Answers Computer Mikado	1, 54	6.74	0.012
Customer Questions and Answers Couch Helicopter	1, 52	1.29	0.261
Customer Questions and Answers Couch Mikado	1, 57	0.947	0.335
Customer Questions and Answers Helicopter Mikado	1, 53	4.02	0.05
Detailed Negative Reviews Couch Helicopter	1, 6	4.41	0.081
Detailed Negative Reviews Couch Mikado	1, 7	8.6	0.022
Detailed Negative Reviews Helicopter Mikado	1, 9	2.44	0.153
Price Computer Couch	1, 120	0.414	0.521
Price Computer Helicopter	1, 172	2.89	0.091
Price Computer Mikado	1, 174	3.75	0.055
Price Couch Helicopter	1, 98	1.3	0.258
Price Couch Mikado	1, 100	0.555	0.458

Price Helicopter Mikado	1, 152	5.57	0.02
Product Description Computer Couch	1, 63	0.0774	0.782
Product Description Computer Helicopter	1, 80	12.2	0.001
Product Description Computer Mikado	1, 48	2.06	0.158
Product Description Couch Helicopter	1, 75	12	0.001
Product Description Couch Mikado	1, 43	6.66	0.013
Product Description Helicopter Mikado	1, 60	8.35	0.005
Product Summary Computer Couch	1, 100	14.5	0
Product Summary Computer Helicopter	1, 122	0.639	0.426
Product Summary Computer Mikado	1, 118	22.2	0
Product Summary Couch Helicopter	1, 98	16.9	0
Product Summary Couch Mikado	1, 94	41.6	0
Product Summary Helicopter Mikado	1, 116	10.5	0.002
Technical Details Computer Couch	1, 51	3.37	0.072
Technical Details Computer Helicopter	1, 99	9.99	0.002
Technical Details Computer Mikado	1, 73	7.71	0.007
Technical Details Couch Helicopter	1, 74	0.965	0.329
Technical Details Couch Mikado	1, 48	0.358	0.552
Technical Details Helicopter Mikado	1, 96	0.858	0.357
Title Computer Couch	1, 90	12.5	0.001
Title Computer Helicopter	1, 115	2.45	0.12
Title Computer Mikado	1, 96	25.6	0
Title Couch Helicopter	1, 89	3.75	0.056
Title Couch Mikado	1, 70	2.86	0.095
Title Helicopter Mikado	1, 95	10.3	0.002

Top Reviews Computer Couch	1, 34	5.12	0.03
Top Reviews Computer Helicopter	1, 42	5.27	0.027
Top Reviews Computer Mikado	1, 26	2.7	0.113
Top Reviews Couch Helicopter	1, 68	3.83	0.054
Top Reviews Couch Mikado	1, 52	1.24	0.27
Top Reviews Helicopter Mikado	1, 60	6.04	0.017

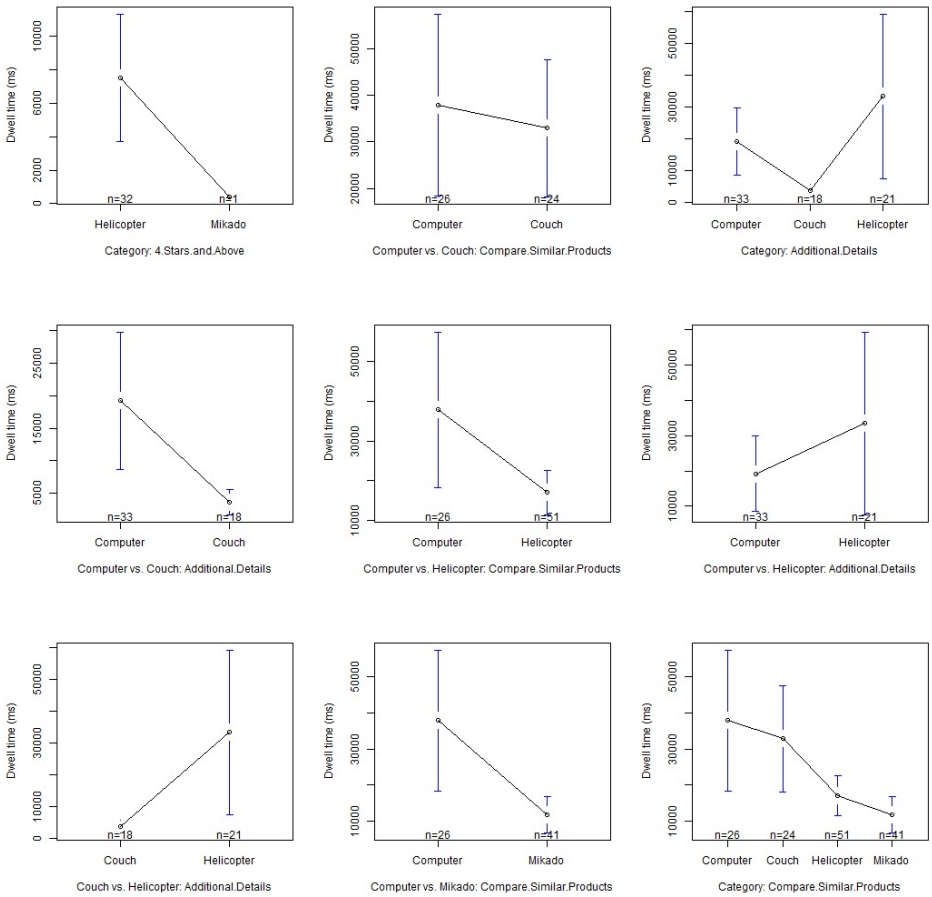

Figure E.42: Associated plots of ANOVA results on dwell time for all AOIs (1-9) for product category combinations

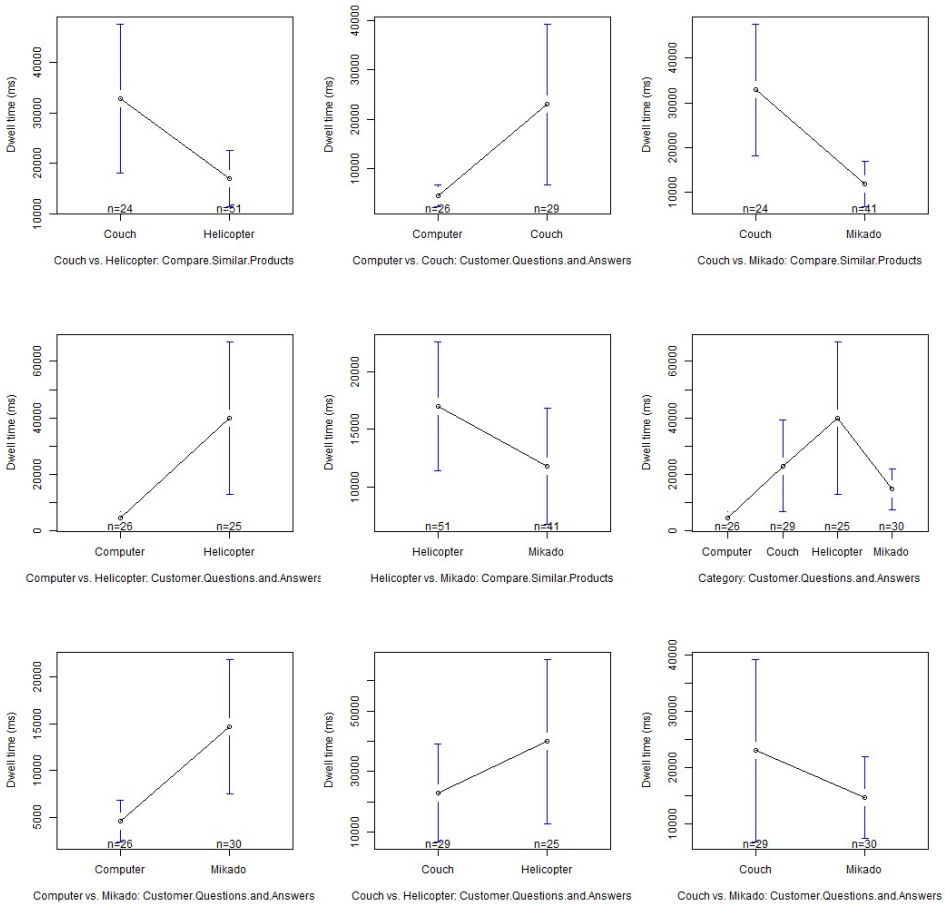

Figure E.43: Associated plots of ANOVA results on dwell time for all AOIs (10-18) for product category combinations

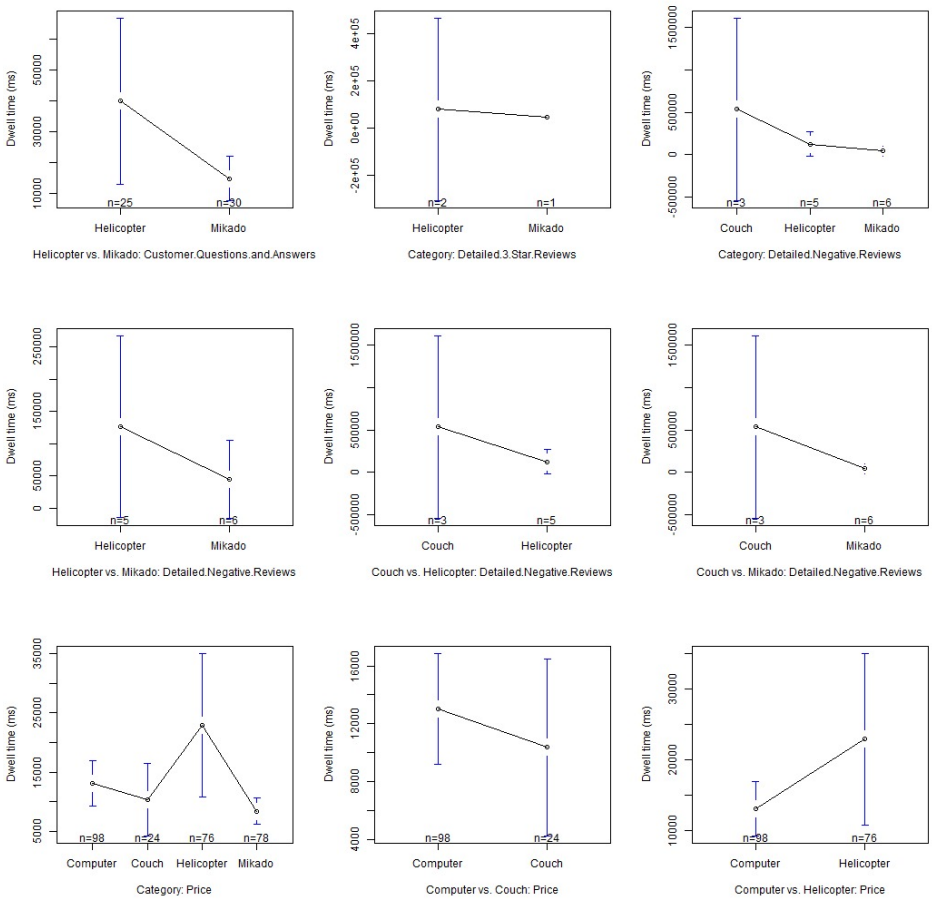

Figure E.44: Associated plots of ANOVA results on dwell time for all AOIs (19-27) for product category combinations

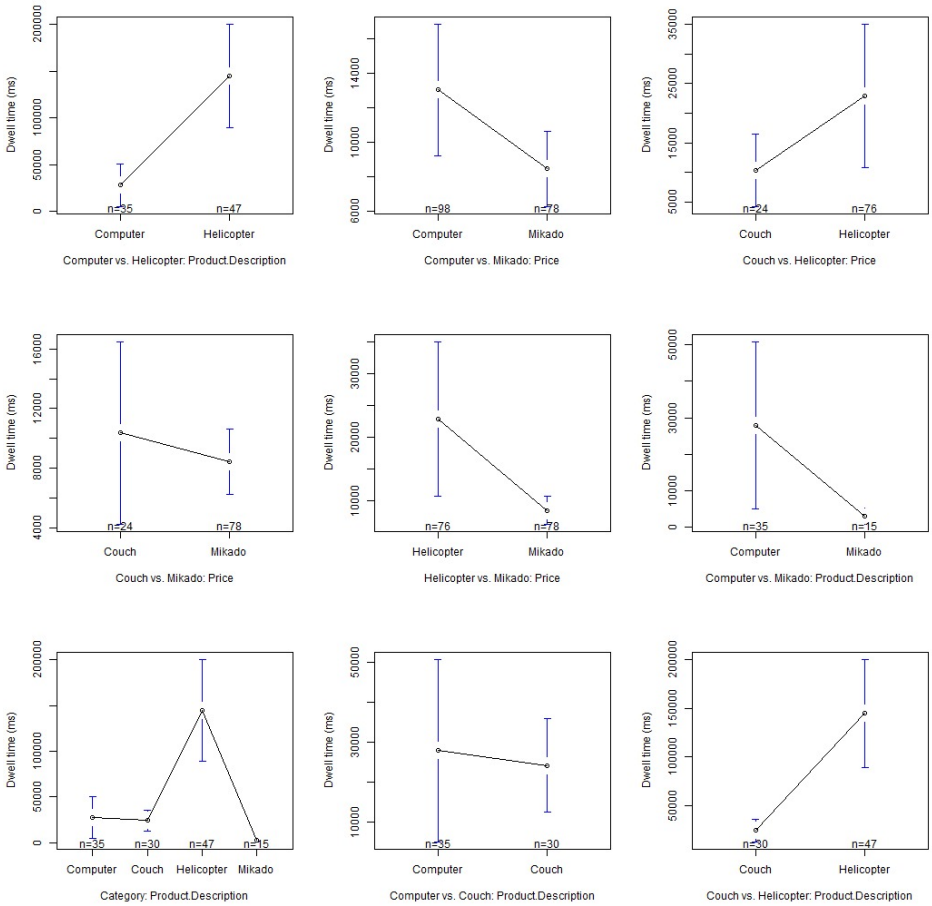

Figure E.45: Associated plots of ANOVA results on dwell time for all AOIs (28-36) for product category combinations

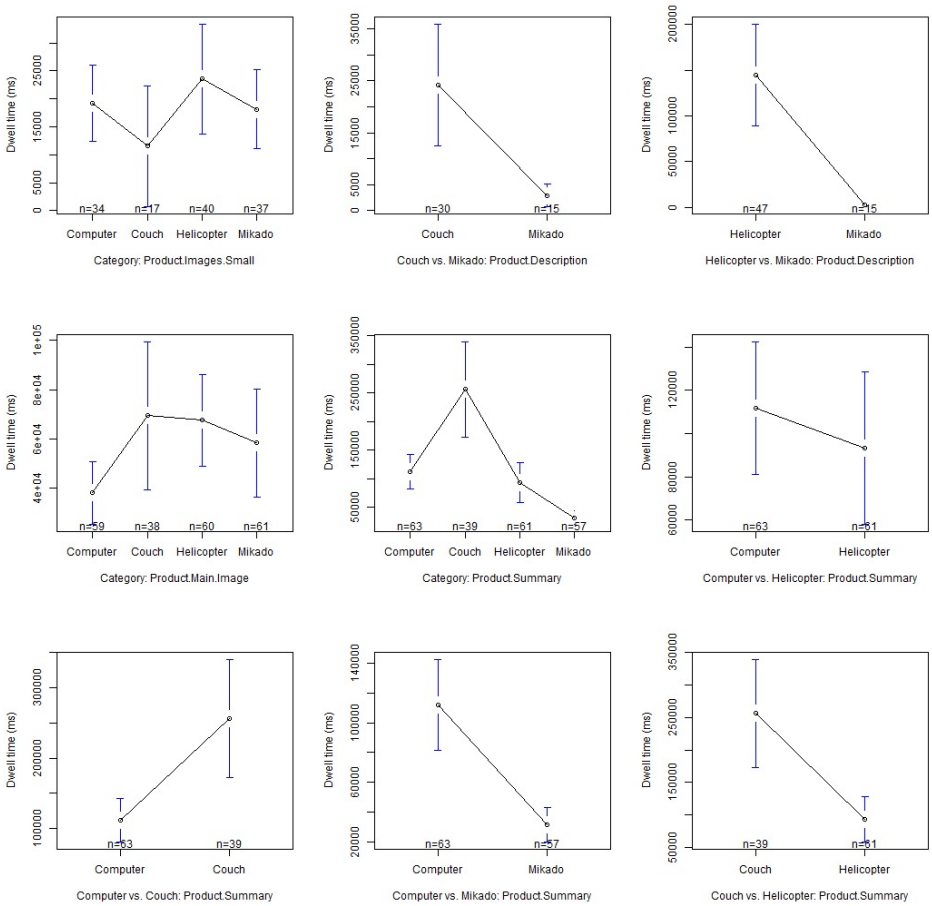

Figure E.46: Associated plots of ANOVA results on dwell time for all AOIs (37-45) for product category combinations

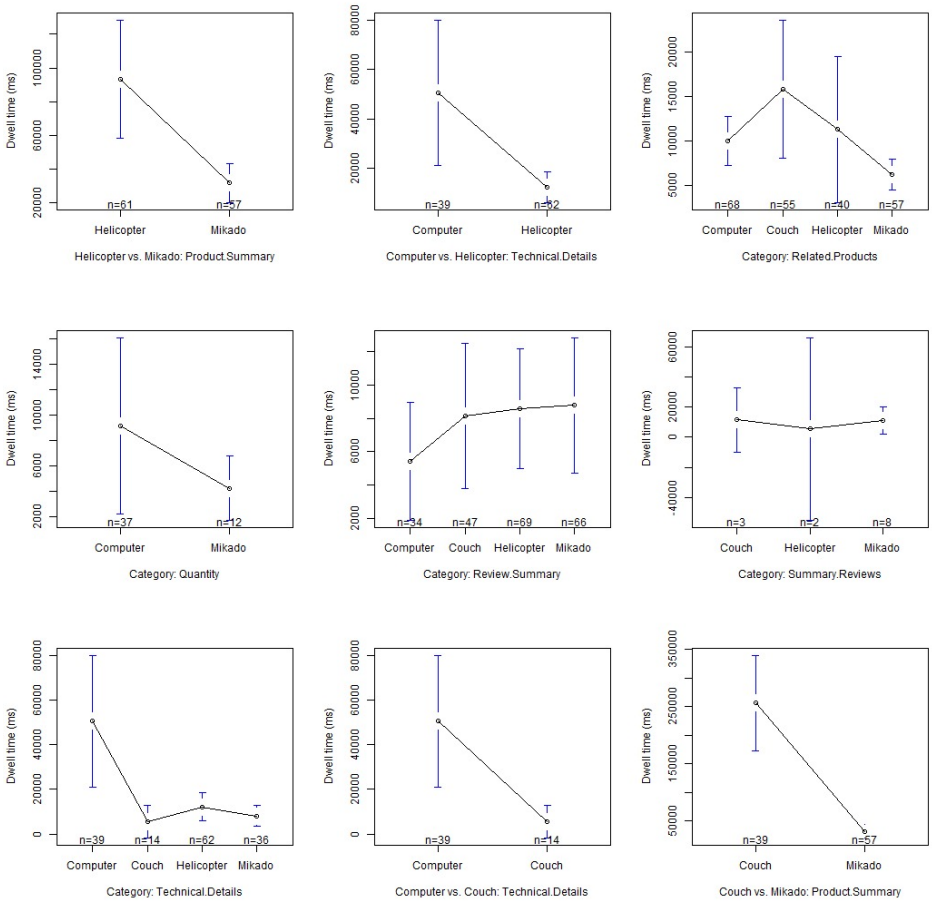

Figure E.47: Associated plots of ANOVA results on dwell time for all AOIs (46-54) for product category combinations

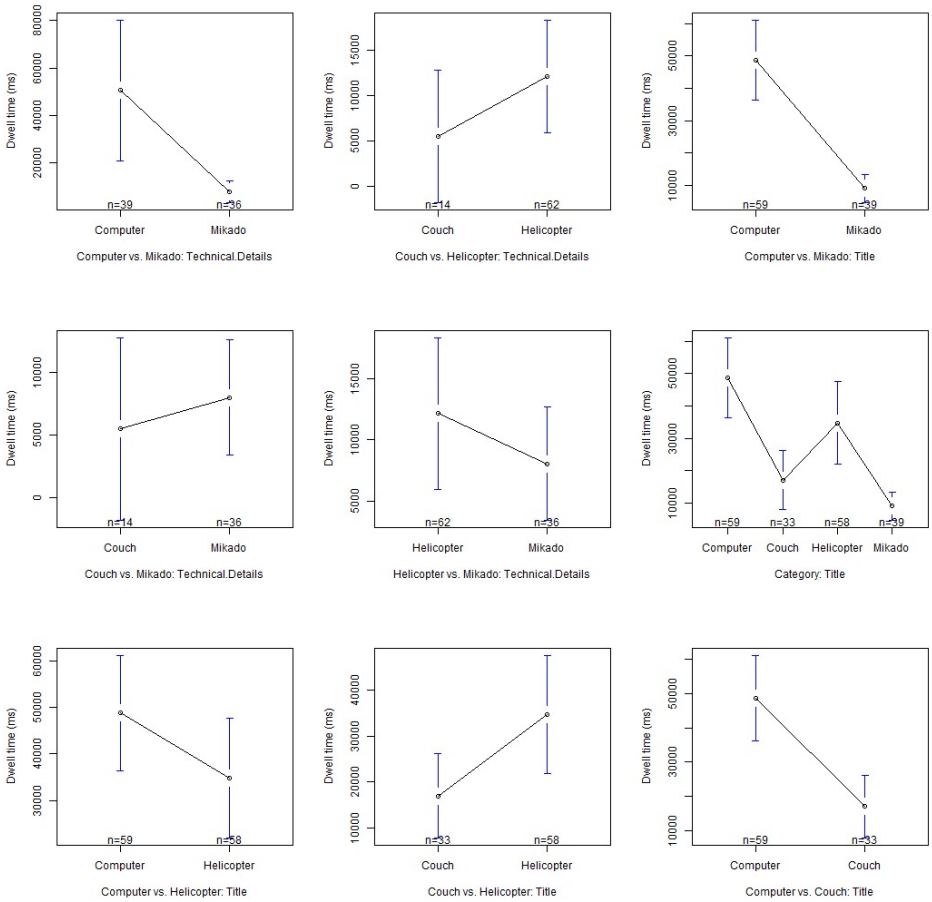

Figure E.48: Associated plots of ANOVA results on dwell time for all AOIs (55-63) for product category combinations

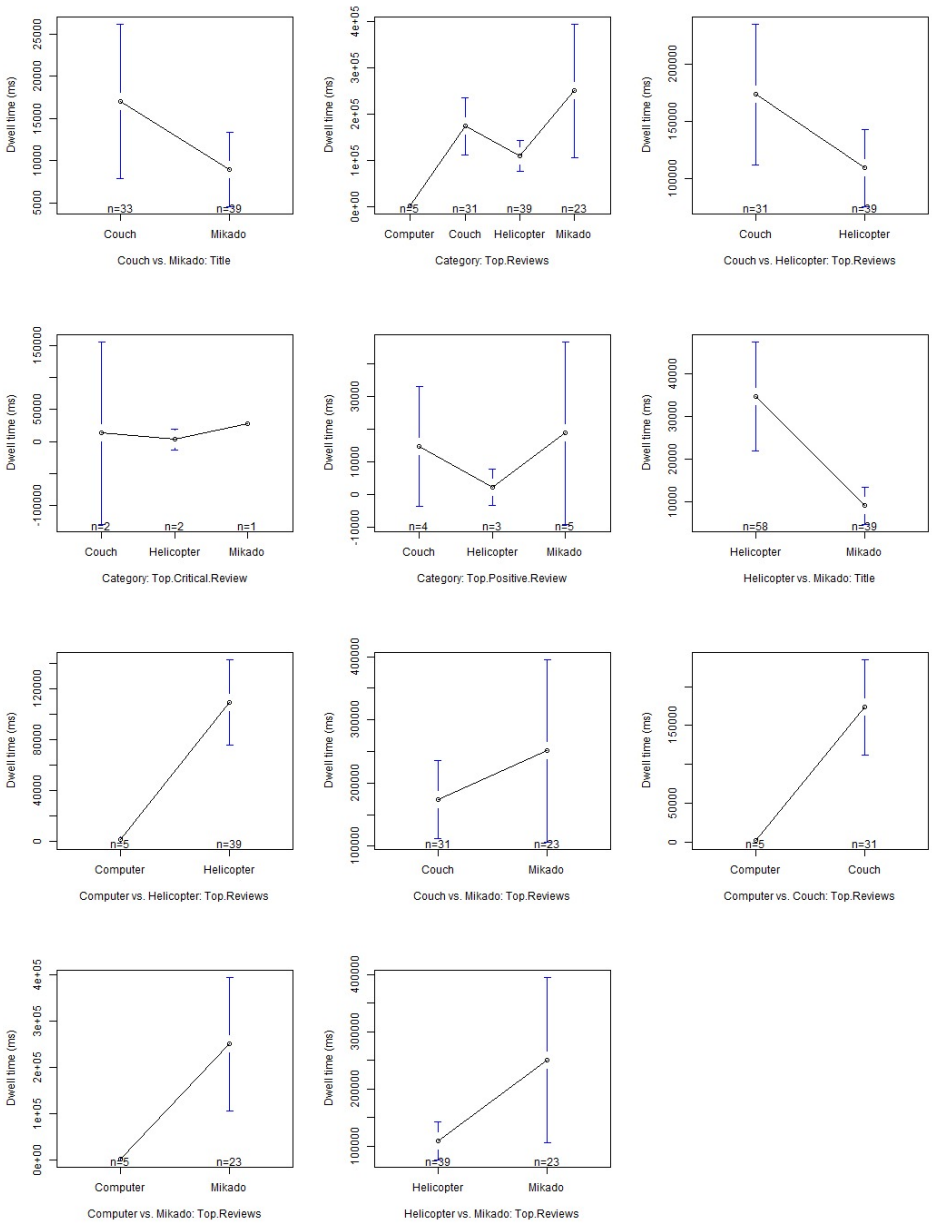

Figure E.49: Associated plots of ANOVA results on dwell time for all AOIs (64-74) for product category combinations

Table E.20: ANOVA and associated pairwise ANOVA results on pupil dilation for all AOIs for al product categories

AOI	df	F value	p	Mean(No, Yes)	SD(No, Yes)
4 Stars and Above Category	1, 31	0.058	0.811	(3.327, 3.188)	(0.456, 0.398)
Additional Details Category	2, 68	3.89	0.025	(3.313, 3.330)	(0.469, 0.500)
Compare Similar Products Category	3, 103	0.805	0.494	(3.268, 3.349)	(0.474, 0.489)
Customer Questions and Answers Category	3, 91	1.57	0.202	(3.350, 3.166)	(0.559, 0.478)
Detailed 3 Star Reviews Category	1, 1	4.89	0.27	(3.372, 3.375)	(NA, 0.030)
Detailed Negative Reviews Category	2, 11	0.0653	0.937	(2.965, 2.992)	(0.430, 0.382)
Price Category	3, 183	1.06	0.368	(3.238, 3.281)	(0.487, 0.508)
Product Description Category	3, 121	2.19	0.092	(3.331, 3.304)	(0.502, 0.460)
Product Images Small Category	3, 124	5.7	0.001	(3.080, 3.110)	(0.362, 0.415)
Product Main Image Category	3, 210	1.13	0.336	(3.259, 3.288)	(0.457, 0.472)
Product Summary Category	3, 209	1.29	0.278	(3.255, 3.295)	(0.479, 0.488)
Quantity Category	1, 46	1.7	0.199	(3.055, 3.140)	(0.418, 0.401)
Related Products Category	3, 133	0.565	0.639	(3.303, 3.292)	(0.406, 0.497)
Review Summary Category	3, 159	2.48	0.063	(3.265, 3.268)	(0.501, 0.523)
Summary Reviews Category	2, 8	0.637	0.554	(3.195, 3.146)	(0.241, 0.284)
Technical Details Category	3, 124	1.17	0.323	(3.263, 3.225)	(0.500, 0.495)
Title Category	3, 179	0.702	0.552	(3.257, 3.279)	(0.501, 0.517)
Top Critical Review Category	2, 2	24.6	0.039	(3.427, 3.560)	(0.294, 0.359)
Top Positive Review Category	2, 7	0.615	0.567	(3.143, 3.211)	(0.546, 0.218)
Top Reviews Category	3, 93	0.799	0.497	(3.258, 3.363)	(0.484, 0.562)

Table E.21: ANOVA and associated pairwise ANOVA results on pupil dilation for all AOIs for product category combinations

AOI	df	F value	p
Additional Details Computer Couch	1, 48	4.97	0.03
Additional Details Computer Helicopter	1, 51	0.939	0.337
Additional Details Couch Helicopter	1, 37	5.91	0.02
Product Images Small Computer Couch	1, 49	2.22	0.143
Product Images Small Computer Helicopter	1, 72	1.7	0.196
Product Images Small Computer Mikado	1, 69	7.06	0.01
Product Images Small Couch Helicopter	1, 55	8.38	0.005
Product Images Small Couch Mikado	1, 52	16.4	0
Product Images Small Helicopter Mikado	1, 75	2.47	0.12
Top Critical Review Couch Helicopter	1, 2	46.2	0.021
Top Critical Review Couch Mikado	1, 1	67.9	0.077
Top Critical Review Helicopter Mikado	1, 1	0.881	0.52

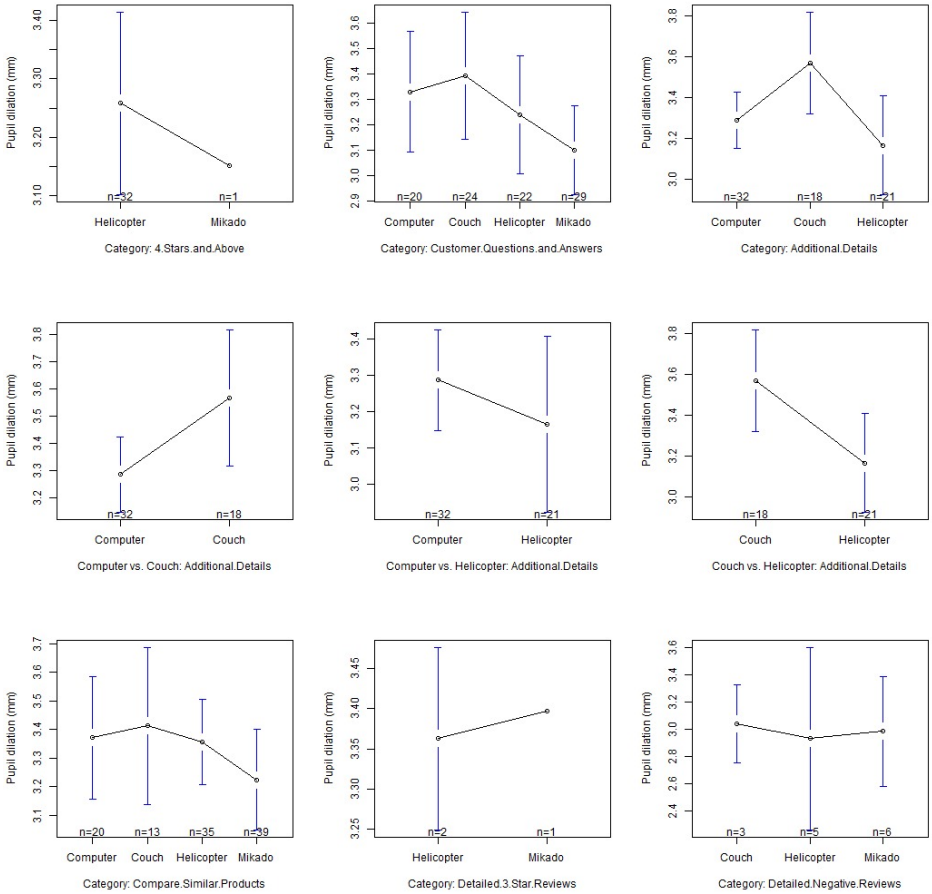

Figure E.50: Associated plots of ANOVA results on pupil dilation for all AOIs (1-9) for product category combinations

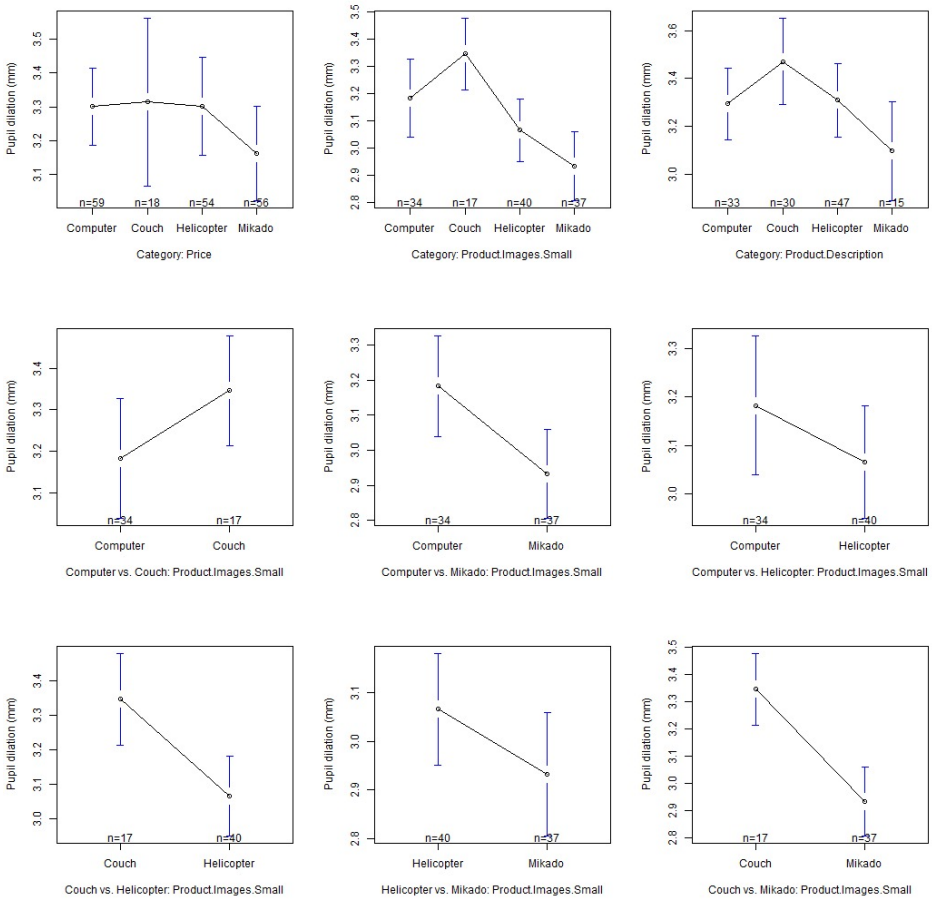

Figure E.51: Associated plots of ANOVA results on pupil dilation for all AOIs (10-18) for product category combinations

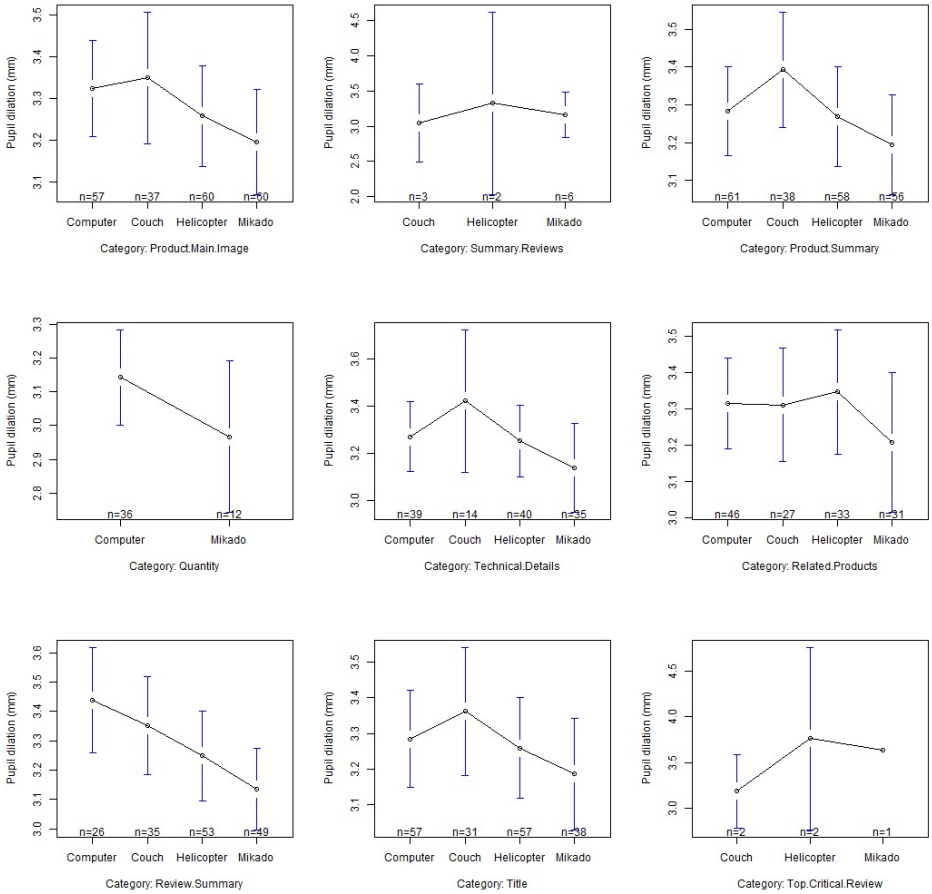

Figure E.52: Associated plots of ANOVA results on pupil dilation for all AOIs (19-27) for product category combinations

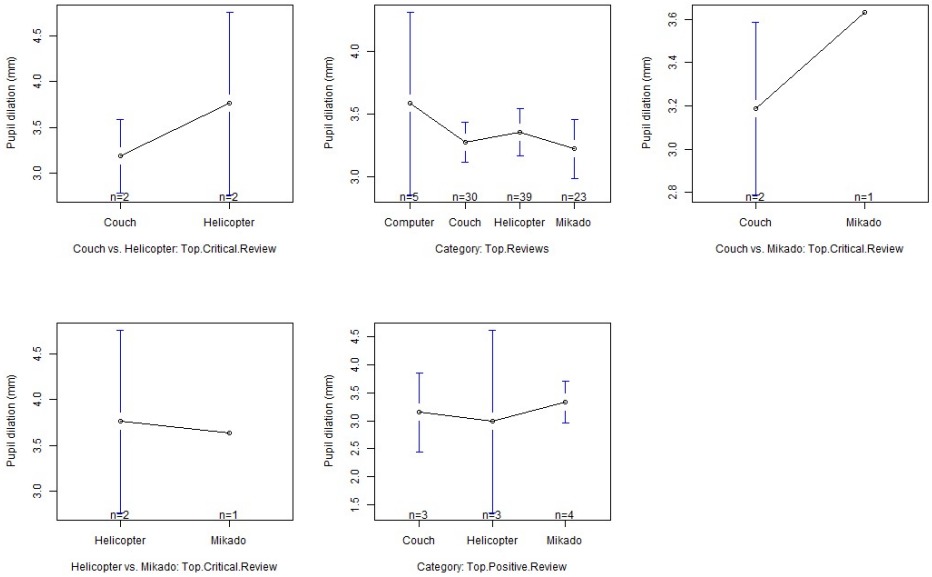

Figure E.53: Associated plots of ANOVA results on pupil dilation for all AOIs (28-32) for product category combinations

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Deciding What to Purchase

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