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Gender Differences in Financial Consumer Service Behavior: Exploring Eye-Tracking Technology

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Abstract. Understanding the factors that influence the attention of financial service consumers when viewing advertisements is crucial for effective marketing strategies. Furthermore, considering the impact of gender and cognitive behavior on consumer behavior provides valuable insights for companies seeking to tailor their ads to individual preferences. This investigation aims to determine the key visual factors that influence the attention of financial service consumers, with a specific focus on gender and cognitive behavior. By conducting an experiment using Tobii's eye tracking device and employing quantitative analysis, the study explores the impact of visual factors on financial consumers based on gender. The study consisted of two parts. First, an experiment was conducted using Tobii's eye tracking device to collect visual data on four mutual funds tombstone ads. This allowed for the measurement of participants' eye movements and fixation durations while viewing the advertisements. Second, a quantitative analysis was performed on the collected data using discriminant analysis in SPSS. This analysis aimed to identify the visual factors that influence financial consumers based on their gender. The findings of the study indicate that several visual factors capture the attention of participants. These factors include Time to First Fixation (TTFF), First Fixation Duration (FFD), Total Visit Duration (TVD), and Visit Count (VC). Among these factors, FFD was identified as the most significant factor in distinguishing between males and females. This investigation provides valuable insights into how male and female consumers of financial products perceive visual information. The study's findings highlight the importance of FFD in capturing consumers' attention and suggest that gender differences play a role in the visual perception of financial advertisements.

Keywords: Cognitive behaviour, Visual factors, Advertisement, Discriminant analysis.

1. Introduction

Today's financial service world has become the most critical sector and the most significant contributor to the GDP of an economy. Financial Service provider customizes their products according to the need of the investor. Financial product mobilizes the flow of saving in an economy. The government is protecting the interest of investors by regulating the financial sector. (Naveen Gogia, 2021) analyzed the increase in the share of financial services in India from 6% (Financial Year 2001) to 24% (Financial Year 2021). But still, India's market is penetrating slowly across subsegments of banking and financial services compared to developed countries. This is happening due to the thinking process the people have in India about financial services. To change the thinking among Indians, the armed financial companies use their smart devices to reach the corners of the country. The armed devices are technology and innovations in financial sector which brings radical changes in Indian financial services (Statista, 2023). More than 12000 start-ups and massive development in financial service sector was happened from 2012-2021. Almost 239 billion U.S. dollar increased in year 2021 (Livemint, 2022). Due to the development online platform for investing the total transaction value will reach to US$ 40 Bn in 2023. It has been projected that the annual growth rate (CAGR) from 2023-27 will be 13.73%. It has been surveyed that 9 out of 10 Indians preferred to invest in market through online. Increase in online financial service platform, enhances the competition among the financial firms. Increase competition in financial market urge the study of investor behaviour (Negi & Mitra, 2020).

Traditionally researchers have used statistical measures to understand behavioral finance theories. But certain extraneous factors are not captured in the statistical measures. Such limitations lead to the promotion of the experimental studies, which collect the data in a controlled environment for theory evaluation. Davis and Holt, (1993); Roth, (1995), explain that experimental studies help in understanding the individual decision-making and market phenomenon. Certain market theories and phenomena cannot be explained with rational behavior instead, it requires irrational behavior and sub-optimal decisions. Such phenomenon requires the insights from sociology and psychology to understand the underlying individual decision. The newer technology helps to understand the individual perception and the underlying process of the decision-making. The behavioral finance literature suggests that the experimental studies with new technologies can process the information which can impact the decision making. Many technology-based methods are available that study brain imaging, etc., but they are very complex and expensive (Xue et al., 2010). To record the unbiased investor behaviour, previous researchers have used eye tracking tools to record significant and considerable facts about participants (Sharafi, et al., 2020). Eye tracking software records the visual information like reading patterns and visual cues observed during interactions. Visual information helps in recording the cognitive processes and efforts of investors in knowing the decision making process (Ceravolo et al., 2019). Hence the current research brings in an alternative method called eye - tracking to study the cognitive parameters through experimental design for the individual decision making.

The experimental studies using eye tracking were dated back to 1800 (Holmqvist et al., 2011). Initially, it was used in education research, but later on, it reached commercial studies and marketing studies to optimize the programs. It is a methodology that records the eye positions and captures the subject's images and pupil dilation. The systems record automatically and convert the captured gaze into computer screen coordinates; hence the eye trackers are a very video-based reliable method to capture pupil movement (Majaranta and Donegan, 2012). The assumption behind the method is that the eye movement is coupled with the attention, and hence any shift in the attention leads to the eye movement (Franco-Watkins and Johnson, 2011b; Hoffman, 1998; Rayner, 1998). The technique helps to understand the association between cognitive processes and eye movement. It explains that until the word is being processed, the eye is fixated on it (Just and Carpenter, 1980) which play an important role in capturing the effect of different factors that influence the cognitive behaviour across

several disciplines such as economics, marketing, education, and psychology. In perspective of financial decision making, there are very few studies which recognized the application of eye tracking in recording the behaviour of financial consumers (Liu, de Goeij, 2020). The behavioral studies examine what information is processed by the individuals before deciding or a choice (Rama Muhra, S.K., 2022). Eye-tracking will thus help the examiner understand the psychology and the cognition an individual goes through before deciding in a personal financial investment. This captures the irrational behavior of the individuals that bounds rational and heuristic approaches for decision making. Thus, eye tracking is a technology in which the participant's viewing pattern is observed and understand what a participant wants to see. The application of technology provides widespread data with the help of standardized matrices (Borozan et al., 2022). These matrices include easy to read visualization ("heat maps, gaze plots, opacity maps and area of interest many more") and statistical indicators ("Fixation Count, Fixation Duration, and fixation before etc.") (Burch, et al., 2015). The metrices helps in recording the response of participants that which parts of the ads or information has attracted most. Metrices helped in understanding how a financial information is being packed in different way. In this paper, mandatory and other relevant information of mutual fund visuals are shown to record the factors that affect the attention of financial consumers. Through the medium of study, we are endorsing a mechanism to study the behaviour of financial consumers from perspective of cognitive behavior and gender.

Based on these premises, the current study purpose is to assesses the behavior of the financial consumer by using eye tracker and to find whether there is difference in financial consumer behaviour based on gender. The study will address the research question: Is eye tracker helpful in assessing the behavior of financial consumers. And if yes, then there is a difference in financial consumer behaviour of male and female. We anticipate that the responses to this query will broaden financial readers' knowledge and financial service provider in developing the advertisement campaign for financial products.

This section I is followed by the literature review and conceptual framework. Section three explains the research methodology, and section four discusses the results and findings. The fifth and sixth section explains the discussion and the conclusion, respectively.

2. Literature Review

Eye tracking is a recognized method to obtain information through visualization as the data gathering based on the location where participants are seeing. Human eyes are visual of mind which reveals the underlying cognitive processes. It's a resourceful application of behavioral studies which is used to evaluate the sentiments, decision making and attention including shift in decision-making due to risk. In financial decision making, selection of financial products involve the sharp attention toward the risk and return analysis. Financial companies while marketing the financial products provide limited information which restrict the attention of investors (Basdekis, et al., 2022). To understand the financial risk taking, biometric indicators are used to measure the attention, mental effort, sentiments, and physiological measures. The previous literature has explored the linkage of risk taking and eye tracking. Such as (Franco-Watkins, & Johnson, 2011) researched "the decision-moving window paradigm" which presents the stimulus information about the eye fixations. In a similar manner researcher (Keller, et. al., 2014) explored the precondition of risk understanding and decision making. Studies found that there are systematic differences in quality of raw eye tracking data in terms of behavior difference occurred in between different set of populations (Wass, Forssman, & Leppänen, 2014). (Rubaltelli, Agnoli, & Franchin, 2016) explained that investment decision of participants with larger pupil dilation are sensitized with affective information and influenced by past performance of funds. There is another experimental research in which participants eye movements are recorded while trading in a simulated bubble market. Study applied the linear and nonlinear approaches to know the effects of sentiments, attention, and disengagement. The results of the studies found the

positive influence of sentiment on return, but the effect of sentiment decreased due to increased attention and on the other side, disengagement effect will be negatives at reduced attention level (Toma, et al., 2023). One important aspect that influences financial decision-making is gender. Numerous studies have explored the role of gender in investment patterns and risk perception. Gender differences can be attributed to diverse cognitive strategies employed by men and women when processing information. Selectivity theory suggests that females tend to process income data more thoroughly, while males often rely on heuristics and preconceived notions (Meyers-Levy & Maheswaran, 1991; Darley & Smith, 1995; Benyamini et al., 2000). Furthermore, females demonstrate a higher sensitivity to emotional experiences and non-verbal cues, which has implications for financial service advertisements (Barnett et al., 2001; Rosip & Hall, 2004).

The human mind retains the visual effect, which enhances the cognitive load. The way information is presented greatly influences financial investment decisions (Roggeveen,2015). Information visualization and the perseverance of risk affect investor behavior towards the market (Kai- Ineman et al., 1979). To improve the risk, investors look forward to the aspects of behavioral finance while constructing the portfolio. Several studies have been conducted on modern portfolio theory and behavioral finance for portfolio construction (Curtis, 2004). Modern portfolio theory is the best to understand the capital market's operations. Still, to have better insight, investors should be aware of how other investors are behaving in the market by studying behavioral finance aspects. Individual investor financial decisions are affected by behavioral biases. In their study, (Rasool and Ullah, 2020) investigate that financial literacy negatively correlates with behavioral biases. It means that an increase in financial education reduces behavioral biases. Of these behavioral biases, one of the biases is psychological biases, in which investors' attitudes and beliefs play an important role in financial decision-making (Sahi et al., 2013). There are lots of psychological factors that affect financial consumer investment decision-making (Lintner,1998). (Deshmukh et al., 2016) discusses the perception, motivation, incentive potential, and intensity of cues that affect the mutual funds' investor purchase decisions. The risk perception drives investors' purchase decisions in their minds. Risk perception is affected by presenting financial information (Linciano et al., 2018) and investigates the influence of different financial information disclosure on financial consumer risk perception. Gender, age, personal features, behavioral biases, and financial knowledge contributed to investor risk perception. But many studies concluded that gender affects investment decision-making patterns (Beckmann and Menkhoff, 2008, Kunnanatt, 2012). The investment phenomenon also depends on the culture prevailing in that area.

2.1. Gender and Financial Service Advertisement

Certain theories in the literature explain gender differences (Charnes and Gneezy, 2007). One of the theories, called selectivity theory in consumer research, suggests that each gender processes the information differently and exercises different strategies. The theory emphasizes that females digest the income data more comprehensively and thoroughly (Meyers-Levy and Maheswaran, 1991; Darley and Smith, 1995; Benyamini et al., 2000; Graham et al., 2002). The female has a high level of relevant information to make the assessment. Males, on the other hand, decide more based on heuristics. Decisions by men are based on more silent information, like themes and cues and preconceived notions. The intensity of the emotional experiences is more observed by the females (Barnett et al., 2001). Women also need more persuasion relative to men from the advertisers to show a significant change in their emotional wellbeing (Dube and Morgan, 1998). (Rosip and Hall, 2004) explain that the women use more non-verbal cues and scan more data, for example, they perform more eye fixations with more eye movements. It is evident from the research that women appeal differently to financial service advertisements.

(Olsen et al., 2001) examined how professional women investors respond towards risk inheritance compared to male colleagues. Suggest that males are less prone to cognitive bias (Oreng et al., 2021). The study concluded that both genders have the same knowledge and experience. Women

professional investors weigh risk attributes like the possibility of losses and uncertainty more than male professional investors. Women focused more on risk decrease than men in investment portfolio creation. Researchers revealed that women are less confident, risk-averse, and earn less return than men (Graham et al., 2002; Kansal and Singh, 2013). The two groups have characteristics that motivate them to invest their funds in investment instruments. Many studies found that men have more risk tolerance than women. The risk-return characteristics among them, to know the risk-bearing capacity of women. Past studies expose those women are risk-averse and have less confidence. In today's era, women are having their ventures (Constantinidis et al., 2006), and their behavior toward financing is being analyzed. The past literature exhibit that women are risk averse. They prefer avenues which are having reduced risk. Still, in the present context, the study is being conducted among young individuals with more risk-bearing capacity due to cultural changes among Indian Families. The study is trying to know whether young, educated, and financially literate women have risk-bearing capacity compared to men. As women empowered themselves in actively participating in business as entrepreneurs and intrapreneurs. The current study focuses on tracking men's and women's behavior towards the financial product using an eye-tracking application by looking at this scenario. The application result has been used to analyze the risk-return characteristics among men and women using SPSS. In previous studies, eye-tracking has also been used to investigate human behavior. (Reali et al., 2015) investigate the effect of gender on what they perceive is highly correlated in tracing the behavior through eye-tracking. One of the studies conducted by (Man et al., 2016) used eye-tracking to examine whether the own gender bias has a relationship with differential processing strategies. The analyst found gender bias in female participants, not in males. They have also concluded that in the aspect of social cognitive account, women have their own gender biases.

2.2. Application of Eye-tracking

An application of eye-tracking has been used to judge the economic behavior among gender. (Kee et al., 2021) study revealed that experiments might incorporate eye-tracking devices without provoking changes in the behavior of the experimented group. (Lahey et al., 2021) examine laboratory experiments with eye-tracking to know the effect of race on employment prejudice. (Lewandowski and Kammerer, 2021) used the application of eye-tracking to understand the behavior of an individual. To know the focus point of participants with the eye-tracking system they are following, whether it is saccades or fixation. Saccades are a movement of the eye that is very fast, while fixation is for a concise duration. Hence, eye tracking is an application used in multi-disciplinary areas to know the user's behavior.

Eye-tracking software catches the area of fixation and saccades. (Balcombe et al., 2017) revealed not the considerable effect of eye-tracking software with stated preference characteristics. (Holmqvist et al., 2012) defined to measure eye data quality matter to know the area of fixation where the respondents' eyes are stable.(Gödker and Lukas, 2021) shared the results that define the fixation duration are relatively higher where the relation found in relation to extreme stock returns. A study (Lahey, 2008) found the effect of age, gender, and race discrimination's effect on the recruitment and selection process. In this study fixation period is studied whether recruiter eye stability affected by gender. Among gender, face recognition skill in women is superior (Sammaknejad et al., 2017). The researcher found that gender differences are not occurring due to fixation difference but happen due to frequent eye movement. Analysts found these effects by looking into the images of faces to know the effect of visual appeal, efficiency, and trustworthiness (Djamasbi et al., 2010). The study showed a strong relationship between imaging and trust. Other than this, to know the individual investment pattern their sensitivity toward information and emotional intelligence. (Rubaltelli et al., 2016) revealed that a large number of respondents' fixation is toward the information about the fund's past performance. To be aware of the respondent's behavior through eye, there is a direct relationship between eye fixation and the cognitive thinking process. Among gender discrimination, their fixation, saccades, period of fixation, eye visit movement to a particular scene, number of counts to a picture

helps an analyst judge their behavior (Holmqvist et al., 2012; Liu and de Goeij, n.d.; Sammaknejad et al., 2017; Xu and Riedl, 2011; Zhan et al., 2019).

Among the variety of investment avenues available in the financial markets with different levels of risk. Mutual funds are considered diversified investments and have a range of risk levels depending on their type. This character makes it's an attractive class. The research problem is investigated in the perspective of decision-making of this financial product.

The individuals born between 1981-and 2000 are categorized popularly as Millenials and are an important class of emerging investors (Alexender and Sysko, 2013). The parents of this age group have seen the 2007-2008 and its financial losses; hence this class of investors and highly risk-averse and less trusting (Barua and Hogan, 2018; Gupta and Goyal, 2018). Millennials have different expectations of their financial developers and advisors, exclusively since most advisors are from previous generation (Weber, 2017).

Based on literature study, it has been explored that the previous researchers studied about the behaviour of financial consumer in terms of gender. But studies mostly included the analysis of gender behaviour while trading stock market. Previous studies also analyze the behaviour of gender while seeing the various advertisement related to financial and non-financial products. In view of past studies, current study analyzes the cognitive behaviour and visual attention of male and female while seeing the advertisements related to mutual funds.

The literature on millennial investors and the importance of mutual funds makes it an exciting area. Hence, the study investigates using an eye tracker to assess financial consumer behavior through visual attention for answering the research questions.

RQ1. Can we assess the behavior of the financial consumer by using the eye tracker?

RQ2. Does the financial consumer behavior differ based on gender?

The research questions can be answered by identifying the fixation factors that discriminate among the classification based on gender cognitive behavior. Hence the hypothesis is designed as:

H1: There is a significant difference in the independent factors that distinguish between gender-based cognitive behaviors.

While answering these research questions we wish to achieve the purpose of the study which is to identify the key visual factors that influence the attention of financial service consumers, based on gender and cognitive behavior. Using eye-tracking technology and statistical analysis, the study explores factors such as Time to First Fixation, First Fixation Duration, Total Visit Duration, and Visit Count, providing valuable insights to help companies tailor financial advertisements and improve investment decision-making.

3. Research Methodology

The research method used in the study is experimentation and quantitative analysis (Chini et al., 2021). The study examines if the attempt is made to see how individuals make investment decisions. The study uses Tobii Pro X3- 120 eye tracker to collect the participants' eye movements. It's an infrared light-based device, and based on the participant's cornea, it produces reflection waves and visual data (Tobii, 2017). Tobii's eye tracker technology helps the researchers understand how individuals pay attention and what they pay attention to? This attention is captured through visual effects. Eye Tracking technology is an upcoming technology, and there are very few experimental studies based on it. The study wants to know if the independent factors capturing participants' visual behavior differ depending on their gender. The participants are divided into 'Male' and 'Female.' The study investigates whether the factors attracting visual attention differ significantly depending on classification (Wadlinger and Isaacowitz, 2006). The study employs discriminant analysis (Lachenbruch and Goldstein, 1979; Rastogi, 2014) to determine whether the two genders differ in their perception of various advertisements via AOI. Discriminant analysis is appropriate because the independent variable is categorical.

3.1. Sample

For the study, in total, 24 university students voluntarily participated. The sample of 24 university students' data are collected based on convenient sampling (Raynowska, et al., 2018). Four stimuli/images are shown to the participants, and 1536 observations are captured. These observations include the 16 various eye-tracking variables for the four stimuli. The information is captured on the various AOIs and group AOIs. The information about the experiment was shared in advance to ensure adequate participation in the investigation. The participants were given a brief introduction to Tobii's eye tracker device, how it records the observations, and the experimental procedure they will go through. A window of two days is taken for the rigorous data collection to avoid students transmitting information about the experiment. Prior consent was taken from the participants. The gender ratio of the study consists of males (70.8 percent) and (29.2 percent). All the participants belong to postgraduate level in a business school. The participants belong to 22- 26, with an average of 23+_ The study captures the millennials.

3.2. Eye tracker Method

The study has used the Tobii eye tracker device. Eye-tracking is a method for determining where, how, and when individuals look. This provides valuable information about your behavior and performance that are significant to you. The analysis used in the study is on Area of Interest (AOI). This helps determine how long it takes the participants to see the AOIs. This uses the information on the time for the first fixation.

3.3. Task and Procedure

The participants were shown the images of the mutual fund investor digital posters of the different companies. The area of interest (AOI) is a point on the tested image where you can point to acquire more information about how people interacted with it. The poster must be marked with AOI as different rectangles, and the heat maps show how much time each participant took and see what information. The prominent marking is done based on the guidelines given on the SEBI guidelines (SEBI 2000) and the other information provided on the poster. SEBI has declared the procedures for all the registered mutual funds with SEBI. The guidelines are for the advertisements by mutual funds. Based on AMFI (Association of Mutual Funds in India) recommendations and a more in-depth conversation, the standards would also apply to mutual fund sales literature and communications. There are different forms of different advertisement for which the guidelines are given. One of the forms is Thomstone Advertisement. As the name implies, this commercial can only provide fundamental knowledge about a fund that has already been launched, is operational, and has an offer document available. This information included in such advertisement is as follows: Name of the mutual fund/ scheme and the name of the asset management company. Primary classification for the objective of the scheme like if the fund will give assured or regular return or capital appreciation. Logo or the trademark of the company. Information on the daily NAVs, daily fund sales, redemptions, etc., information on the entry and exit loads if the information is applicable. Risk factors may not be mentioned, but a general statement to refer to the offer document for details must be disclosed.

After corroborating his eyes on the eye tracker, the participant shows the images. And it is delivered to them for 60 seconds in a sequence. The period is recorded the participant's gaze and registered the information they have visually seen more than the significant period.

3.4. Dependent and Independent variables

This section elaborates the dependent and independent variables of the study which is mentioned below:

- Dependent variable:

It is the categorical variable, and the study creates the dummy variable. The male is coded as '1', and the female is coded with the '0'. The AOI for all the variables is taken for each participant. Each variable is estimated for all four images of different images

- Independent variables:

The independent variables used are the metric variables taken for the study are mentioned below.

✓ Time to first fixation (TTFF):

TTFF evaluates how much time it takes for a participant to be tested to fixate for the first time on an active AOI or AOI group. When the media containing the AOI is initially presented, the measurement begins.

When any of the mass media covering an AOI member of the group is first presented, the time measurement for the AOI group begins. The AOIs do not need to be operational for the time examination to begin. When the applicant fixates on the AOI while it is active, the timer stops. When a applicant fixes on any of the active AOIs in an AOI group, the timer stops.TTFF is a simple but useful metric in eye tracking because it can determine how certain aspects of a visual scene are prioritized. The study measures the mean AOI of all the images shown to the participant. If the TTFF by the respondent is more, this infers that the information is exciting or is presented with good graphics and colors like putting a human picture.

✓ First fixation duration (FFD):

This metric processes the time it takes for the first fixation on an AOI or an AOI group. The assessed fixation agrees to the group's first fixation on any of the AOIs when using AOI groups. If the FFD is more for any respondent, it shows that information is critical.

✓ Total visit duration (TVD):

This measure assesses the time of all visits in an active AOI. TVD is described as the sum of the visit intervals of all active AOIs. Individual visits for AOI groups are the time interval between the first fixation on any active AOI in the group and the end of the last fixation on any active AOI within the AOI group, wherever no fixations appeared elsewhere the active AOIs of the AOI group.

✓ Visit count (VC):

The number of visitors to an active AOI is counted in this metric (or AOI group). A visit count for an AOI group is demarcated as the time interval between the first fixation on any acti ve AOI in the group and the end of the last fixation on any active AOI in the group, assuming no fixat ions occurred outside of the AOI group. For the stimuli, if the TVD and VC is more, it signifies that the information given is not easy to understand, and hence respondent is taking more time.

4. Results

Participants cognitive behaviour is analyzed through eye tracking device based on the gender ratio of males (70.8 percent) and females (29.2 percent). All the participants belong to postgraduate level in a business school. The participants belong to 22- 26, with an average of 23+_ The study captures the millennials. The sample of the study belong to the state of Maharashtra, India. The post graduate students are pursuing their study in finance.

The study is divided into two stages, the first stage is the experiment, and the second stage is the quantitative discriminant analysis.

4.1. Experiment Stage:

The eye tracker has captured the cognitive behavior of the participants, the study selected a few important matrices referred from the literature. Table 1 takes the sum of all the AOI's groups.

Table 1: Sum of the Area of Interest of the groups of all the stimuli.

Gender	TTFF	FFD	TVD	VC
Female	82.87	0.73	22.28	284.8
Male	355.2	2.54	97.73	1078.18
Grand Total	438.7	3.27	120.01	1362.98

Source: Author's calculations.

Note: The table 1 explains the gender-wise factors TTFF: Time to First Fixation, FFD: First Fixation Duration, TVD: Total Visit Duration, VC: Visit Count. All matrix in seconds. VC is the number of counts.

Table 1 shows that the males' interest areas are keenly observed more than the females. The table shows all the means (estimated as total observations/number of responses). The TTFF for a female is 82.87 seconds, which accounts for 18.8 percent of the TTFF seconds, and the male has a TTFF is 355.2 seconds, which is 81.1 percent. The FFD for the female is accounted for 0.73, which is 22.3 percent of the total FFD seconds. At the same time, the male has 2.54 seconds which is 77.6 percent of the total FFD seconds. TVD was only 18.4 percent which is 22.28 seconds for the female participants, and the remaining is 97.73 seconds for the male participants. The VC for the make is 79 percent, and the total visit counts are 1078.98. The female-only visited 284.8 times.

Table (2.1) explains stimuli-wise the TTFF, FFD, TVD, and VC values. The table shows that stimuli 1 has the maximum TTFF and FFD for the total AOI. The TVD and visit count are maximum for stimuli 2. The one with the images with human figures show more time periods. Fixation duration is longer in the colored pictures. It is also observed that the material information on the various parameters for the mutual fund print ad is explained clearly in stimuli 1. The third stimuli had significantly less information, and also, it was not explained clearly. TVD and VC values of stimuli 2 and 3 show that the information is not clear, and participants could not understand it quickly, so they spent more time on the image. Stimuli 4 has higher values of TTFF but higher VC values. It is observed that the image consists of human figures, and the image was overloaded with a lot of information. Risk and return charges, a lot of numbers (quantitative data), can be why participants invested more time.

Table 2.1: Stimuli based Matrix

Stimuli	TTFF	FFD	TVD	VC
Stimuli 1	135.75	0.85	27.76	283.47
Stimuli 2	104.16	0.84	35.26	403.98
Stimuli 3	81.53	0.8	30.77	362.77
Stimuli 4	116.63	0.78	26.22	312.76

Source: Author's calculations.

Note: The stimuli mentioned in the table are the images of the financial product. The unit of the information in seconds.

Table 2.2: Stimuli Gender wise Matrix

Gender/Stimuli	TTFF	FFD	TVD	VC
1	135.75	0.85	27.76	283.47
0	24.1	0.19	5.26	58.93
1	111.65	0.66	22.5	224.54
2	104.16	0.84	35.26	403.98
0	19.57	0.2	6.13	86.84
1	84.59	0.64	29.13	317.14

3	81.53	0.8	30.77	362.77
0	15.26	0.17	5.99	75.16
1	66.27	0.63	24.78	287.61
4	116.63	0.78	26.22	312.76
0	23.94	0.17	4.9	63.87
1	92.69	0.61	21.32	248.89
Grand Total	438.07	3.27	120.01	1362.98

Source: Author's calculations.

Note: The stimuli mentioned in the table are the images of the financial product. Values are in seconds.

Estimation of the discriminant analysis

The study applies the discriminant analysis to find out how the predictor matrixes used in the experiment on the Tobii's eye tracker influence the gender of the participants. At the same time, they give visual attention to the financial ads. The eye tracker variables are the independent variables: TTFF, FFE, TVD, and VC. And the dependent variable is the gender taken as the dummy variable.

4.2. Quantitative Discriminant Analysis

The quantitative discriminant analysis results are discussed in the current section. The comparative mean table shows a variation in the means and the standard deviation of the factors for the different genders.

Table 3: Comparative mean of the independent variable

Group Statistics					
Gender		Mean	Std. Deviation	Valid N (listwise)	
				Unweighted	Weighted
0	TTFF	4.1435	1.99726	20	20.000
	FFD	.0365	.00671	20	20.000
	TVD	1.1140	.36480	20	20.000
	VC	14.2400	7.27185	20	20.000
1	TTFF	4.6737	1.86928	76	76.000
	FFD	.0334	.00555	76	76.000
	TVD	1.2859	.46040	76	76.000
	VC	14.1866	5.81046	76	76.000
Total	TTFF	4.5632	1.89822	96	96.000
	FFD	.0341	.00591	96	96.000
	TVD	1.2501	.44597	96	96.000
	VC	14.1977	6.10165	96	96.000

Source: Author's calculations.

Note: SPSS calculation for the discriminant analysis.

The study next explores the discriminating variables based on gender classification. The study applies stepwise discriminant analysis statistics. Table 4 explains and checks the value of the Wilks' Lambda. Wilks' lamda is a test of how each feature categorizes cases. It is equal to the share of the total variance in discriminant scores that group differences cannot explain. The value is ($p<.05$) significant at the level of 5 percent with the lamda value of .955. A significant value shows a good model fit.

Table 4: Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.955	4.332	1	.037

Source: Author's calculations

Note: The output of the discriminant analysis is estimated through SPSS

Table 5 explains the canonical discriminant functional coefficient through the stepwise process. The results show that the first fixation duration is significant and acts as the discriminating factor among males and females.

Table 5: Canonical Discriminant Function coefficient

		Wilks' Lambda							
						Exact F			
Step	Entered	Statistic	df1	df2	df3	Statistic	df1	df2	Sig.
1	FFD	.955	1	1	94.000	4.457	1	94.000	.037

Source: Author's calculations

Note: The variable is added to minimize the Wilks lamda, the max. steps taken are 8, minimum partial F to enter is 3.84. Max. Partial F to remove is 2.71.

The results explain that among the various eye tracker parameters used for the current study the amount of time taken for the first eye fixation is different for the males and female for the advertisements.

The table explains the validity and accuracy of the results. The table explains the cross-validation of the analysis. Cross-validation classifies each case using functions received from all other instances of that instance. Cross-validated grouped cases are classified in 78.1 percent of the cases. According to the results, the model predicts the discriminant model with 78.1 percent accuracy. '0' stands for the female, and the '1' indicates the male.

Table 6: Classification Results

			Predicted Group Membership		
		GENDER	0	1	Total
Original	Count	0	2	18	20
		1	3	73	76
	%	0	10.0	90.0	100.0
		1	3.9	96.1	100.0
Cross-validated	Count	0	0	20	20
		1	3	73	76
	%	0	.0	100.0	100.0
		1	3.9	96.1	100.0

Source: Author's calculations

a. 78.1% of original grouped cases correctly classified.

b. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.

c. 76.0% of cross-validated grouped cases correctly classified.

The findings enable the researcher to accept the alternative alternate hypothesis that there is a significant difference between male and female cognitive behavior.

5. Discussion

The study addressed the two research question in which one is about the assessment of financial consumption behaviour through eye tracking. In present study the financial consumption behaviour is assessed in which study found that females paid more attention to visual graphics than males and females focus on more detail information regarding the financial products which is also agreeing by the previous studies(Goodrich, 2014), (Hwang & Lee, 2018).

The second research question is about the difference in the independent factors that distinguish between gender-based cognitive behaviors. Result of the study accepts the hypothesis that there is a significant difference in the independent factors that distinguish between gender-based cognitive behaviour (Xu & Riedl, 2011), (Schiebinger, 2014), (Sammaknejad, et al., 2017). The application of eye tracker is used to understand the gender based cognitive decision making.

The current study identifies the eye tracker parameters do differ based on the gender, which explains that male and female visualize differently. The results of the study are similar to the existing studies that gender impacts the investments (Sirois et al., 2018). The studies in other areas also confirms that there is a significant gender difference in decision making (Lahey, 2008),(Hwang & Lee, 2018), (Gödker & Lukas, 2021),(Miloš et al., 2022). Previous studies also agreeing with the fact that visual graphics are more impactful (Duclos, 2015) The major contribution of the study is to confirm that tracking the eyes of the individuals and capturing their eyeball movements through the software named Tobii's and understanding the cognition of the gender.

The result from the experiment suggests that the Thom stone Advertisements of the mutual funds should be colored and have less human figure as the respondent gave more time to the figures and pictures than the texts and numbers. The information should not be overloaded as females because of their risk averse nature wants to understand the product better and hence the quantitative data should be decoded for the participants to be understood better. Texts in the ads attract more attention for the products like financial products which reveals more information about the product. It is also seen that the information which have graphics and that must be followed by the texts, this explains that the respondents move eyes from graphics/pictures to the text to be understood.

The present study has revealed that the first fixation duration of the areas of interest (AOI) acts as a discriminating factor among genders, indicating that male and female investors differ in their initial fixation while viewing images of financial products. These findings offer researchers a tool to capture investors' visual attention and comprehend their behaviour using eye tracker dimensions. Our study also highlights those males have a longer attention span than female participants, which implies that financial product information should be clear and concise, particularly as the literature suggests women are more risk averse.

Results demonstrate that stimuli, such as brand name, return on investment risk, and duration of investment, need to be presented with more clarity, and print ads with more information capture greater attention. The discriminant analysis results indicate that first fixation duration (FFD) serves as the differentiating factor for cognitive behaviour between males and females. These significant implications extend to how males and females visually perceive financial advertisements. To meet the requirements set forth by the SEBI (Securities and Exchange Board of India, 2000), financial advertisements must provide comprehensive information on ROI, risk, and duration figures. However, certain mutual funds do not always offer this essential information. The results suggest that women, who tend to be more rational and risk-averse, require more information and can only pay more visual attention when information asymmetry is not present.

The research implications of the study are to use eye-tracking to captures the cognitive behavior and the participants' visual attention. This brings new research in the financial domain and how the male and female financial product consumers visually perceive the information shown to them.

The significant implication comes to the results of the study can be used to check that how the females and males visually check the financial ads and decide on investment. The investment should provide more information (SEBI, 2000). Although SEBI has provided the guidelines for the ads, it is

still found that certain mutual funds do not provide all the basic information on ROI, RISK, and duration figures. It is found that females being more rational and risk-averse, need more information and can only have higher visual intention with more asymmetry in information. The practical implication of the paper is for the regulator to foresee if the firms are disclosing information according to the SEBI (2000). To increase the impact of the ads, strategic decisions on clear and easy disclosure should be made by the firms. Whereas the social implications are that the organization should understand that women investor is a big market to be tapped, but due to her more rational and risk aversive behaviour, the information revealed should be critically designed. The economic implication of the study is for fund's managers who strategically design the ads with the inclusion of more female investors in the financial markets, this can be a good opportunity for the financial companies to attract these prospective investors.

The study is limited to the state of Maharashtra, India. The study used the fixation to analyze the results of the study whereas the heatmaps may be used to explore the behaviour of participants.

Future research should focus on investigating behaviour based on surveys and determining its association with visual attention. Additionally, experiments with more participants of different geographical regions and including investment attributes could enhance the scope of this study. Different types of equity and financial products based on gender can be studied.

6. Conclusion

Present study analyzes the financial consumer behavior based on cognitive behavior, visual attention among male and female using eye tracking Tobii Pro X3- 120. To analyze the objective of the study, 24 university postgraduates of state Maharashtra, India data is collected. The results of the current study confirm the significant influence of gender on investment decisions. Consistent with previous research in this area, the study findings indicate that gender acts as a discriminating factor in determining investment choices. This aligns with existing literature that has consistently shown gender differences in investment decision-making.

What sets this study apart is its focus on capturing the visual and cognitive behavior of male and female participants. The study identifies several visual attention factors, such as TTFF, FFD, TVD, and VC, that play a significant role in capturing participants' visual attention. Among these factors, FFD emerges as the most significant factor distinguishing between males and females.

The findings of this study have practical implications for financial service providers. Understanding how male and female consumers perceive visual information and make investment decisions can help companies tailor their financial product advertisements accordingly. By aligning their marketing campaigns with the visual preferences of different genders, financial service providers can enhance the effectiveness of their strategies and gain a competitive edge in attracting and retaining customers.

To further expand the research in this area, future studies could consider surveying a larger sample size of participants. This would allow for the identification of additional discriminating factors related to gender classification and the exploration of the relationship between behavior and visual attention. Additionally, incorporating different investment attributes could provide insights into how male and female consumers respond to various investment options.

Replicating the study in different geographical regions would contribute to understanding whether the findings hold universal validity or are specific to a particular context. Moreover, conducting the study using different financial products could offer valuable insights into how male and female consumers respond to various types of financial services advertisements.

Furthermore, future research could explore the impact of visual attention on investment decision-making. By conducting experiments that manipulate visual attention and analyzing its effect on investment decisions, researchers can gain a deeper understanding of how financial service providers can design advertisements to increase the likelihood of favorable investment choices.

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