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When consumers do not compromise - An Eye Tracking Study!

Pronobesh Banerjee[1]
Tamara Masters[2]

[1]Assistant Professor, Marketing Management, Indian Institute of Management, Kozhikode, IIMK Campus PO, Kunnamangalam, Kozhikode, Kerala, India; Email - pbanerjee@iimk.ac.in, Phone Number - 0495-2809239

[2]Assistant Professor of Marketing, Brigham Young University, 682 TNRB, Campus Dr, Provo, UT 84602
Email: Tamara.masters@byu.edu, Phone Number - 801-422-4367

Abstract

Compromise effect, or when one chooses the middle alternative, which has moderate values on both the attributes, is one of the most robust findings in the domain of context effect. In this paper, we show that when attributes are rated such that one of the attributes has high values, lying towards the higher end of a scale, while the other attribute has low values, lying towards the lower end of a scale, consumers will prefer an extreme alternative. We use an eye-tracking study to show the underlying process why this will happen.

Suppose you are planning to buy a laptop and is presented with two options: Laptop A having 12GB RAM and weighs 2.5kg and Laptop B having 8GB RAM and weights 2kg. Both the alternatives look equally attractive as one of the options is better in one attribute while the other is better on the other. Now suppose, a third alternative is introduced into the choice set – Laptop having values 6GB RAM and weights 1.5kg. Post research shows that with the introduction of a third alterative such as Laptop C, the choice of the middle alternative – Laptop B increases, which is popularly known as the compromises effect (Mao 2016; Simonson 1989; Wernerfelt 1995). A large body of research, including a meta-analysis shows that compromise effect is very robust.

In this research we try to test whether under certain circumstance consume may prefer an extreme alternative. We hypothesize that when the attribute values are rated on a scale from 1-100, such that one attribute scores very high while the other scores very low, focus will shift to the attribute that has low values. More important, consumer will choose the alternative that has the best values on the attribute that scores low. For Example, suppose there are three laptops which are rated on the same two attributes as above and has the values (100,10), (90,20) and (80,30). In other words, attribute RAM, has values (100,90,80) that are way above the attribute weight, that has values (10,20,30). We reason that given such attribute distributions; focus will shift to the second attribute. Consequently, with the introduction of the third alternative to the set (80,30) the preference will shift to the third option, which is the extreme option. Thus, we show that under certain circumstances instead of preferring the middle alternative consumers may prefer an extreme.

STUDY

In our explanation of why consumers may prefer an extreme option we argue that when comparing attributes when there is difference in discriminability, individuals will shift their focus to the more discriminable attribute. In this study, the more discriminable attribute distribution was as follows: 10-20-30 and 10-30-50, while the distribution of the other attribute remained the same, namely, 100-90-80.

The aim is to investigate the differences in cognitive processing as measured by eye tracking through gaze patterns when there is a difference in the discriminability of attribute values. Gaze patterns, also known as saccades, are the rapid jumps of the pupils from one fixation point to another. Saccades can provide information on whether attention is shifting from one area of interest to another and provide insight into the decision process (Kimchi et al. 2016; Król and Król 2019; Yu et al. 2016). In this study we look at where saccades (fixations) occur and in particular, in what order the last 14 fixations occur before making a decision.

Method

One hundred and eight undergraduate students took part in this study for partial course credit. Participant were age 18–29 years (M = 22.2 years), and 59% were male. We collected the data using a high frequency (120 Hz) eye tracker (Tobii T120) that collected raw eye-movement data points every 8.3 milliseconds. The eye tracker is integrated into a 17-inch monitor wand with no visible eye-tracking devise that might affect a participant's behavior. The eye tracker uses near infrared illumination to create reflection patterns on the viewer's cornea and pupil with two image sensors that capture images of the eyes. Participants came individually to the lab every ten minutes. After a calibration procedure, the eye-tracking recording began. The study was a 2 (choice: 3 brands vs. 2 brands) × 2 (product: headphones and laptop) mixed design.

Choice was between-subjects, and products (headphones and laptops) were within-subject. We chose these products from a pretest of products with which our test population was familiar. Participants were randomly assigned to a condition with two or three sets of alternative brands, with each described on two attributes (please refer to Table 1 and 2).

Results

Choice results

Data came from 104 participants after 4 of the original 108 did eye tracking data did not fully capture and were excluded from analysis. Fifty-four were in the 2-brand condition and 49 in the 3-brand condition. All participants passed the attention check. Analysis of headphone choice revealed participants chose brand y (81%) when there were 2 choices, but in the 3 choice condition participants shifted away from brand y (27%) to brand z (56%). These results illustrate a preference for the extreme alternative (see table 1). Participants in the laptop condition also had a preference for brand z (59%), the extreme alternative (see table 2). Thus, our results are in line with our conjecture.

Eye-tracking results

Gaze patterns, also known as saccades, are the rapid jumps of the pupil fixations from one point to another and provide information on attention shifting from one area of interest to another (Kimchi et al. 2016; Król and Król 2019; Yu et al. 2016). In this study, saccades can take three directions. First, horizontal movement between areas of interest would signify that the participant is comparing different attributes within a brand, alternative based processing (Chernev 2004). Second, saccades displaying vertical movement between areas of interest would indicate that the participant is comparing a given attribute between brands, attribute-based processing (Chernev

2004). This vertical movement should be the predominant pattern based on our theorizing, where we posit that consumes will shift their focus to the more discriminable second attribute and choose an alternative that has the highest value, leading to the choice of an extreme option. Third, diagonal movement between areas of interest would mean that the participant is moving from one brand attribute combination to a different brand attribute combination. For example, one may move from size of brand x to style of brand y. In particular, the comparison between attribute-based processing and alternative-based processing will let us know about the cognitive processing underlying the choice of an extreme alternative. We defined nonoverlapping areas of interest to regions of the choice table.

We used areas of interest to determine eye-gaze movement (saccades). We coded and counted saccades in terms of whether the participant processed based on attribute (vertical movement between rows), alternative brands (horizontal movement between columns), or moved from one product–attribute mix to a different product–attribute mix (diagonal movement to a different column and row). Oblique movement is not indicative of attribute or alternative based processing. We combined results for both products (laptop and headphones) which revealed significantly more attribute-based processing (43%) than alternative-based processing (29%; $\chi^2 = 87.94$, $p < .0001$) (see Figure 1). This illustrates most comparison was attribute versus alternative based. We find similar results by product, with headphones attribute-based processing was greater (44%) than alternative-based processing (27%; ChiSq = 65.15, p = <.0001) and with laptops 42% movement was attribute-based compared to 30% being alternative-based movement (ChiSq = 32.32, p = <.0001).

We then analyzed fixations within attributes, that is how much of the attribute-based processing was focused on the more discriminable attribute. When we combine the data for headphones and

laptops analysis reveals a significant difference with fewer (43.3%) fixations occurring within attribute 1 compared to in attribute 2 (54.1%; $\chi^2 = 20.74$, $p < .0001$) with an additional 3% looking at the brand name. Analysis by product type revealed more laptop fixations occurred along attribute 2 (60.5%) than attribute 1(37.2%; $\chi^2 = 46.66$, $p < .0001$). Fixations for headphones occurred equally along attribute 2 (48.1%) compared to attribute 1(49%; $\chi^2 = .07$, $p = .78$). Interestingly, attribute 2 values for headphones were 10-20-30 compared to laptop's 10-30-50, which led to greater relative discriminability of attribute 2 for laptop compared to headphones, resulting in a greater movement along attribute 2 compared to attribute 1 for laptop.

We next analyzed the last 14 fixations before a decision was made. Figure 2 provides a graphical presentation of combined laptop and headphone time series percent of fixations on attribute 1, 2 and the brand name, leading up to the decision which occurred after 14. We see increasing attribute-based processing with fixations within attribute 2 (lavender) closer to the time of decision.

Analysis of the combined data yields a significant difference between the attribute 2 and 1 slopes was significant ($t = 2.59$, $p = .023$). Using a second method of analysis for time series data, the Chow test, yielded a significant difference between the time series data to decision of fixation count percent between attribute 1 versus attribute 2. A Chow test of the difference in time series data regression of the number of saccades fixating on attribute 1 versus 2 revealed significant difference ($F(2,24) = 4.12$, $p = .02$). A Chow test of the difference in the time series data of the percent of saccades of attribute 1 versus 2 leading to final decision was also significant ($F(2,24) = 6.86$, $p = .004$. See Appendix A for the graphics of headphones and laptop fixations leading to the decision.

This eye tracking study reveals greater focus along attribute 2, particularly as an individual nears their decision which points to the mechanism that drives the choice of an extreme option. In each case the values with greater discrimination shifted the focus to that particular attribute, which was attribute 2. For headphones, the lower values of attribute 2 (10-20-30) provided greater discrimination than those of attribute 1 and we see choice shifted to reflect this. Laptops provided greater discriminability in both range (10-30-50) and lower numbers than attribute 1 which result greater focus on attribute 2 compared to attribute 1 and choice of the extreme alternative. This is in line with our conjecture where the greater discriminability of attribute 2 compared to attribute 1, drives the choice process, which is reflected in a gradual movement to attribute 2 with time.

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Table 1

Two versus 3 Headphone Brands Rated on two attributes

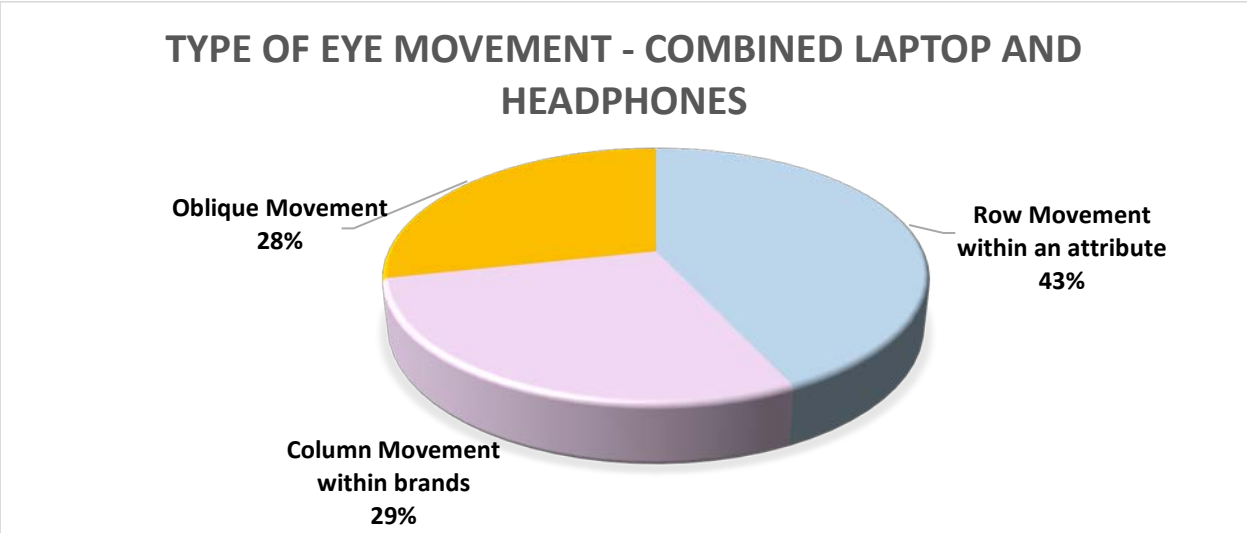
Headphones	Size (Rated on a scale from 1-100)	Style (Rated on a scale from 1-100)	Two option preference	Three option preference
Brand x	100	10	19%	17%
Brand y	90	20	81%	27%
Brand z	80	30		56%

Table 2

Two versus 3 Laptop Brands Rated on two attributes

Laptops	Size (Rated on a scale from 1-100)	Style (Rated on a scale from 1-100)	Two option preference	Three option preference
Brand x	100	10	13%	2%
Brand y	90	30	87%	39%
Brand z	80	50		59%

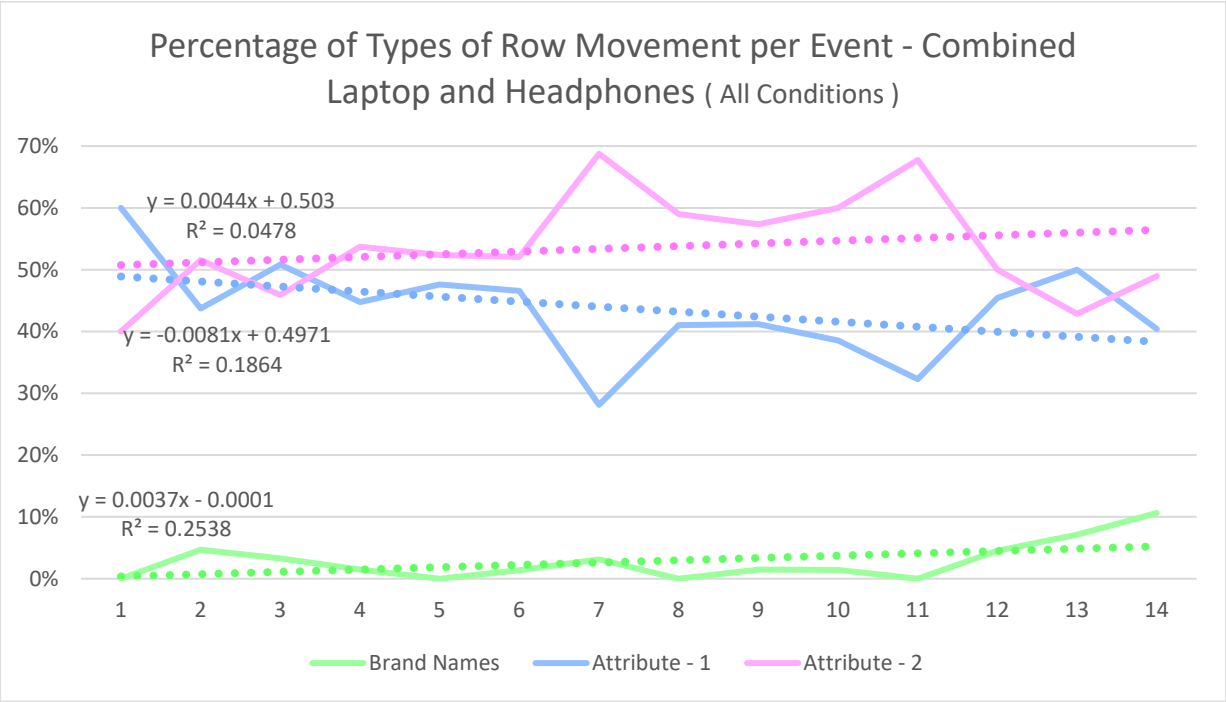
Figure 1



	Saccade Count (%)
Row Movement	889 (43.0%)
Column Movement	592 (28.6%)
Oblique Movement	587 (28.4%)

Difference between Column% and Row% = Chi Sq = 87.94, p <.0001

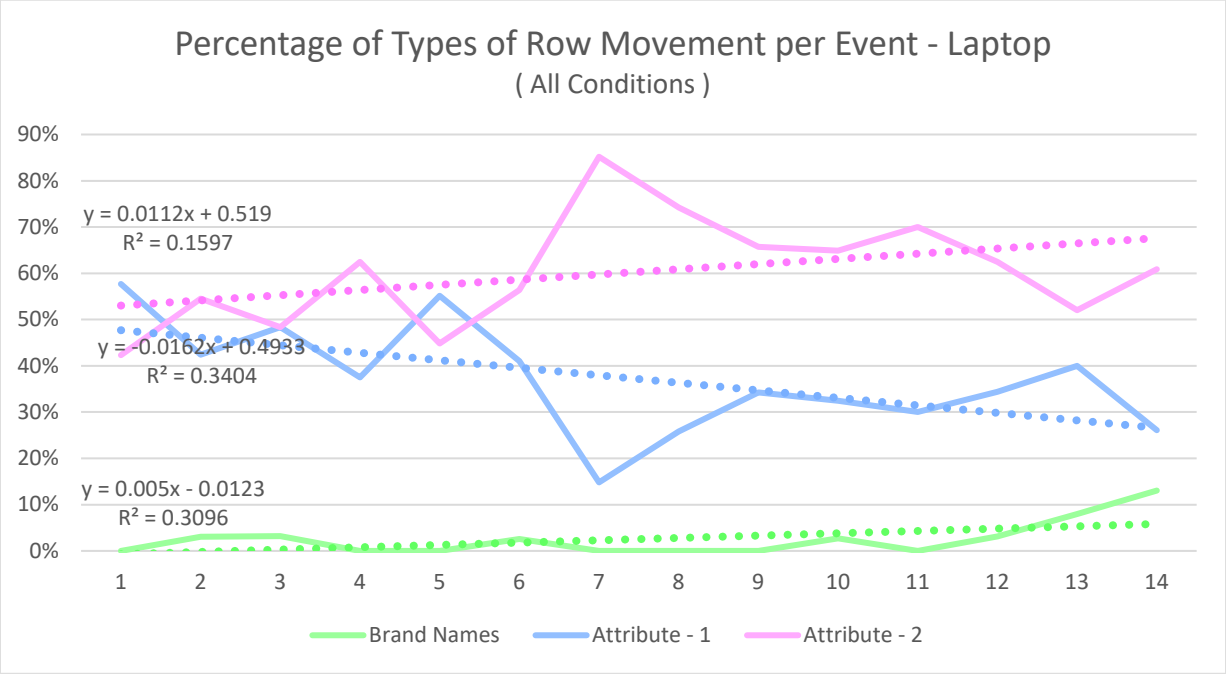
Figure 2


Percentage of Types of Row Movement per Event - Combined Laptop and Headphones (All Conditions)
70%
60%
50%
40%
30%
20%
10%
0%
y = 0.0044x + 0.503
R² = 0.0478
y = -0.0081x + 0.4971
R² = 0.1864
y = 0.0037x - 0.0001
R² = 0.2538
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Brand Names
Attribute - 1
Attribute - 2

APPENDIX A

Laptop and Headphone Time series percent of fixations graphs leading up to the decision

Laptop showed this effect the most with:



Research Office
Indian Institute of Management Kozhikode
IIMK Campus P. O.,
Kozhikode, Kerala, India,
PIN - 673 570
Phone: +91-495-2809238
Email: research@iimk.ac.in
Web: https://iimk.ac.in/faculty/publicationmenu.php