

# Visual versus Text Attribute Analysis for Online Delivery Platforms

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## Abstract

*In this report, we aim to analyze the use of text and visual attributes in the context of online delivery platforms and design choice experiments to depict the difference in consumers' perceptions of these attributes. We assess a person's perception of the choices when the visual presentation accompanies the text representation. In our experiment, we use serial stated attribute non-attendance to account for the participant's self-reported attributes. We modify the choice sets in the original paper according to the Indian context, considering our general food preferences in urban lifestyle and purchasing power. We found that the changes in preferences coincide with the changes in perception of visual attributes.*

*Index Terms* — Serial Stated Attribute non-attendance (ANA), Discrete Choice Experiment, Willingness to Pay (WTP), Representation Format.

## 1. INTRODUCTION

### 1.1. Visual Versus Verbal (Text) Attributes

Choice experiments are commonly used in behavioural economics to study the individual preference between various items. Usually, these experiments are conducted in a survey format and the questions comprise of product choices which are either presented in textual format (description of the product) or visual format (image of the product). In the Visual Treatment, participants are given choice sets that used snapshots of the product and its attributes, whereas in the Text Treatment, participants see a list (text) of the attributes of each product.

As per Dual Coding theory [6], two distinct channels are responsible for processing information for visual and text representation. The visual channel deals with graphical information processing, and the verbal channel deals with linguistic processing. These two systems are distinct and are activated by different information. Researchers went a step further and used this knowledge to classify people based

upon their ability to perceive visual and textual information ([5], [3]). Therefore, it is likely that in choice experiments conducted by behavioural economists, visual representations have had played a critical role and might have affected the decisions made by the participants.

We emanate our inspiration from [1], where they have assessed the effect of attribute presentation design in choice experiments on WTP and serial stated attribute non-attendance. They demonstrated the significance of the attribute representation format in designing choice experiments using random parameters logit models while accounting for serial stated ANA. Unlike [1], we set up our experiment to assess the importance of visual and textual representation in the online delivery platform and consider four different food items. We consider Base Random Parameters Logit with and without ANA to model our observations, considering the significance of the ANA dummy variables as revealed in [1].

### 1.2. Attribute Non-Attendance (ANA)

We account for ANA in the choice experimentations to study how attributes in visual versus text presentation format affect the choices. Several prior researchers in choice experiments ([9], [8], [2]) have studied ANA. It appears when a participant does not consider one or more details shown in an investigation. These are employed to facilitate the choice procedure. Weller [10] showed that the larger the number of choice sets and alternatives, the smaller the number of attributes attended, while the number of details is not expected to affect attendance.

There are various methods to determine the presence of ANA. One of them is stated ANA, where participants are asked if they considered the given attributes when making a choice, and they self-report if they did. This procedure can be further classified into two tasks, serial stated, and task stated ANA. In serial stated ANA, at the end of choice tasks, participants must answer self-reported statements about whether or not specific attributes factored into their decisions about the product in the choice set. Meanwhile, the task stated ANA participants must answer ques-

tions about whether particular attributes were ignored after each choice task.

In light of this, we choose to investigate the effect of presentation format (visual or verbal) on WTP while accounting for serial stated ANA. Considering the conclusions in [1], we establish the following hypothesis: preferences and WTP estimates will differ depending on the attribute representation method (visual versus text) and that more attributes are significant in the Text Treatment than in the Visual Treatment. We test this hypothesis by compulsorily accounting for ANA since it may vary depending on the presentation format of the attributes.

### 1.3. Willingness to Pay (WTP)

WTP is an old concept and has been widely studied and tested. It is the maximum amount a person is willing to pay for a product. It is essential to study this concept as customers may end up paying lower than WTP but ideally, they will not pay a higher amount. The representation format of attributes in a choice experiment likely impacts consumer WTP since research has demonstrated individuals' dissimilarities in visual versus verbal (text) cognitive types ([7], [4]).

Extending on this prior research, our purpose is to determine if there is a dissimilarity in consumer WTP for food item attributes in a choice experiment relying on whether product attributes are presented using a text format compared to a visual format that resembles the product as it would appear in an online delivery app. This is critical since the format upon which the attributes or product alternatives are presented could affect the WTP estimate, which is crucial for such apps to consider while designing the interface.

## 2. METHODOLOGY

For the purpose of the experiment, we set up an online experiment. The details are as follows.

### 2.1. Design of the experiment

Participants were randomly presented with either text or visual treatment. Each treatment had 4 choice sets. In each choice set, we defined the scenario with the participant in a situation who wanted to order a specific kind of food. An example of the scenarios stated is - "It's summertime! In the scorching heat of Hyderabad, you decided to go for a chocolate ice cream bar. Which of the food items presented below are you willing to buy? Assume their price to be equivalent." Given this situation, the participant had to choose one of the two alternatives presented.

### 2.2. Participants

The information was collected from 40 participants, most of whom were 19-25 year old. We could collect 21

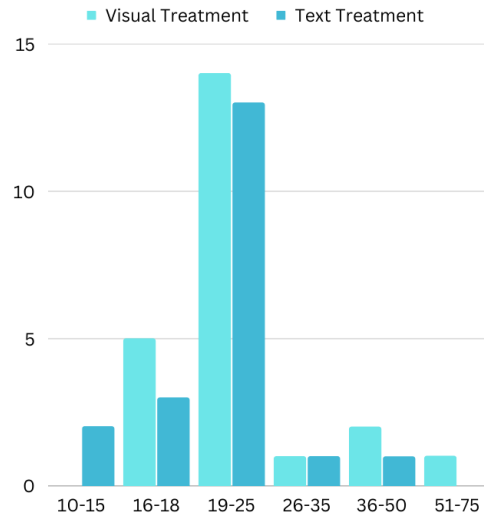


Figure 1. Age-wise distribution of participants in visual and text treatment

responses for visual treatment and 19 for text treatment. All the participants are literate and hold at least a high school degree. Both treatments had a significantly higher percentage of women, with 80% in the text treatment and 75% in the visual treatment.

### 2.3. Serial Stated ANA

At the end of every choice set, participants were asked - "Can you please mention if you considered the given attributes while making the decision?" and it was followed by the attributes from every choice set. The participant had to either answer yes or no, corresponding to every attribute. In the end, they were also asked if they considered any other details while deciding. The table summarizes the attributes considered in all the choice experiments.

### 2.4. Questionnaire

The examples of text and visual treatment are presented in fig 2 and fig 3, respectively.

### 2.5. Data Analysis Method

Consumer choices were modelled with the Base Random Parameter Logit (RPL) model. To consider serial stated ANA in our models, we also include the parameters corresponding to the ANA attendance modifying the RPL to account for attribute attendance as in [1].

Set no.	Attributes
1	Flavour, Brand, Cost (MRP)
2	Item name, Description, Item Ratings
3	Item name, Description, Offer, Rating, Cost (MRP)
4	Description, Offer, Item Ratings, Restaurant Name, Restaurant Ratings

Table 1. Choice Experiment Attributes in four choice sets

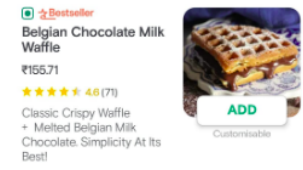
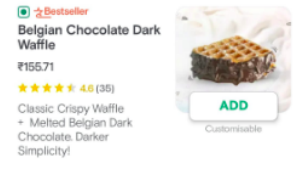
Alternative 1 (Delivery service 1)	Alternative 2 (Delivery service 2)
	

Figure 2. Example of choice experiment question that appeared in the Visual Treatment.

Alternative 1 (Delivery service 1)	Alternative 2 (Delivery service 2)
<b>Belgian Chocolate Milk Waffle</b> Classic Crispy Waffle + Melted Belgian Milk Chocolate Simplicity At Its Best! Rs 155.7      4.6/5 (71)	<b>Belgian Chocolate Dark Waffle</b> Classic Crispy Waffle + Melted Belgian Dark Chocolate Simplicity! Rs 155.7      4.6/5 (35)

Figure 3. Example of choice experiment question that appeared in the Text Treatment

### 3. RESULTS

In reference to serial stated ANA, in the first two choice sets, 33% of the respondents in the Text Treatment and 35% in the Visual Treatment stated that they attended to all the attributes in the choice experiment. In the third choice set, 5% of the respondents in the Text Treatment and 38% in the Visual Treatment stated that they attended to all the attributes in the choice experiment. In the last choice set, the percentages stand at 21% and 29% (refer image 5). Therefore, as the number of attributes increased in the choice sets, the percentage of participants attending to all the attributes in the text treatment decreased significantly, whereas, in the visual treatment, the drop was minimal.

Participants attended to price, ratings, and offer less frequently in text treatment than in visual treatment. However, these observations differ from [1], who speculated that the pictures used in the experiment can cause distraction which results in the non-attendance to the cost attribute. When similar attributes are pictured in our setting, our experiments show the opposite. The presentation of these at-

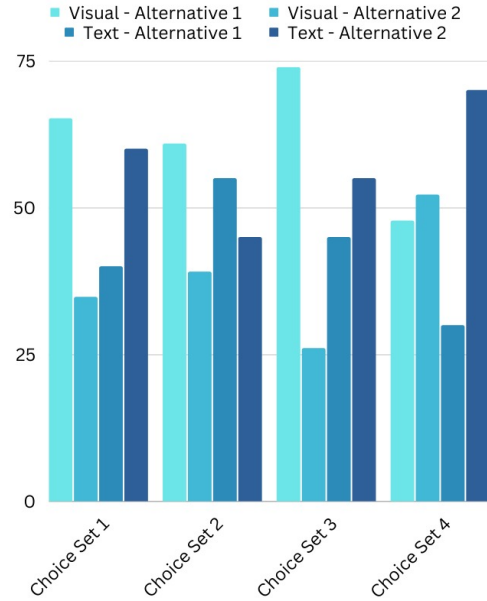


Figure 4. Choice alternatives in four choice experiments

tributes in the visual format helped more people attend to these attributes.

In the Text Treatment Base RPL, the item name, description labels, and ratings positively affected consumer utility. Meanwhile, in the Visual Treatment Base RPL, consumer utility increased when the following features were present: ratings, offer, cost, brand and flavour. Thus, for the Base-RPL model, attributes such as restaurant ratings in the Text Treatment significantly impacted utility more than in the Visual Treatment (refer table 2, table 3, table 4, table 5). Attributes such as description and restaurant ratings are generally concealed around the other major labels, such as brands, offers, and item ratings in the visual treatment.

In both treatments for the ANA RPL (refer table 5), the Restaurant name and item name had a negative, and the price and offer had a positive and significant impact on utility (refer table 2, table 4, table 5). Respondents who attended to the negative impact attributes exhibited significant heterogeneity in preferences. 83% of the participants who attended to offer and price attributes chose option 2 in set 4 and showed strong homogeneity in their choices. This choice behaviour strongly supports the RPL model specifics.

The participants who did not attend to price attribute paid significantly higher in text treatment than in visual treatment. In additional remarks, textual representations partic-

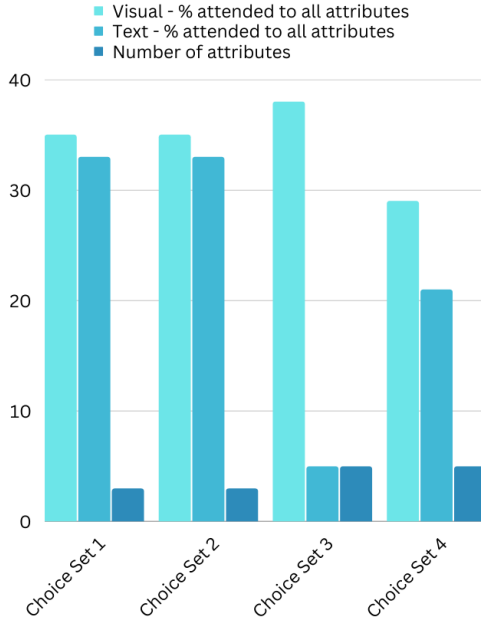


Figure 5. Percentage of participants who attended to all attributes in visual and text format for all the four choices.

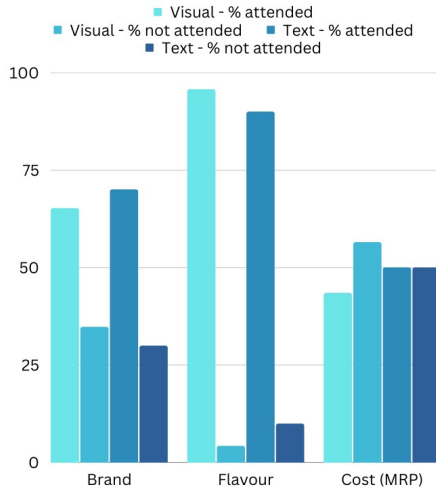


Figure 6. Attribute attendance for choice set 1.

ipants explicitly considered the features. They frequently mentioned the perceptual appeal in visual treatment. Our observations are consistent with the Weller's[10] conclusions, larger the number of choice sets and alternatives, the smaller the number of attributes attended, while the number

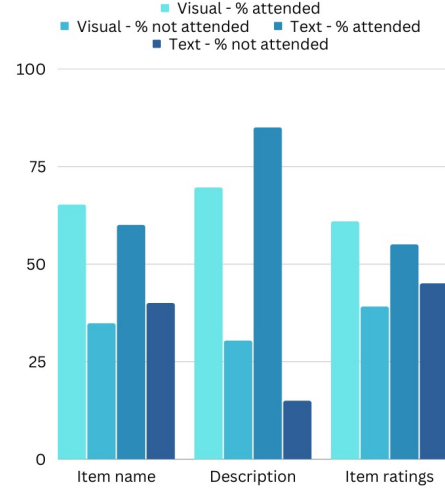


Figure 7. Attribute attendance for choice set 2.

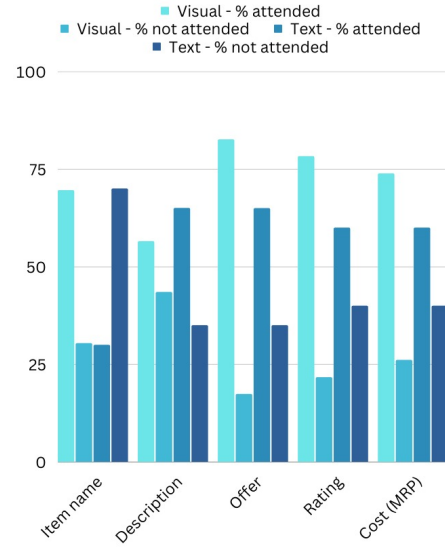


Figure 8. Attribute attendance for choice set 3.

	Text		Visual	
	Base	ANA	Base	ANA
Flavour	0.1506	2.8332	0.2310	0.6931
Price	0.0075	1.6094	0.0115	2.9957
Brand	0.1506	0.0000	0.2310	-0.0953

Table 2. Attribute Non-Attendance Random Parameters Logit (ANA RPL) and Base-RPL Model for choice set 1

of details is not expected to affect attendance. Please refer to fig 6, fig 7, fig 8, fig 9 for detailed results.

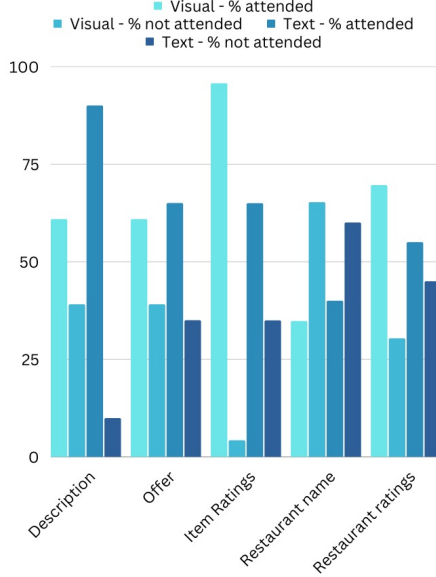


Figure 9. Attribute attendance for choice set 4.

	Text		Visual	
	Base	ANA	Base	ANA
Item Name	-0.1506	0.45199	-0.095	0.9162
Description	-0.1506	2.07944	-0.095	1.1631
Item Ratings	0.0041	0.22314	0.0026	0.6931

Table 3. Attribute Non-Attendance Random Parameters Logit (ANA RPL) and Base-RPL Model for choice set 2

	Text		Visual	
	Base	ANA	Base	ANA
Item name	0.0446	-0.6931	-0.2326	0.9162
Description	0.0446	0.6931	-0.2326	0.4854
Offer	-0.0044	0.6931	0.0232	2.2512
Ratings	-0.2231	0.4519	1.1631	1.7917
Cost	-0.0022	0.4519	0.0116	1.1631

Table 4. Attribute Non-Attendance Random Parameters Logit (ANA RPL) and Base-RPL Model for choice set 3

	Text		Visual	
	Base	ANA	Base	ANA
Description	0.1911	2.8331	0.0575	0.6932
Offer	0.1911	0.6931	0.0575	0.6931
Rating	0.9555	0.6931	0.2876	14.0943
Outlet Name	0.1911	-0.2231	0.0575	-0.6931
Outlet Ratings	1.9110	0.4519	0.5753	1.1631

Table 5. Attribute Non-Attendance Random Parameters Logit (ANA RPL) and Base-RPL Model for choice set 4

## 4. LIMITATIONS

The age group is a significant caveat in this study as it dominantly represents the age group of 19-25. The gender distribution is not even, as most participants are female. Unlike in the primary reference paper, The number of question sets were also limited. Our experiment majorly depicts urban food choices; therefore, the food items considered are not normalized according to the participant's demographic, so this experiment should not be used to conclude about the general demographic.

## 5. CONCLUSION

We conducted a between-subjects choice experiment for online delivery platforms. Participants were randomly assigned either text or visual representations of the food item. We also considered the non-attendance of the involved attributes in every choice set. From the experimental observation, we infer that participants attending to all the attributes in the text treatment reduced significantly as the choice sets became more complex in attributes. In the visual treatment, this drop was insignificant. Unlike [1], the pictorial representation used in the visual experiment, resulted in improved attendance of the price, ratings, and offer attributes. Visual representations of item ratings, offer, and price is essential while designing the app to sell the product better. The found results obey the method used to analyze RPL.

## 6. ACKNOWLEDGMENT

This report is based on the "Visual versus Text Attribute Representation in Choice Experiments [1]" paper. We want to thank Prof. Kavita Vemuri, Cognitive Sciences Lab, IIIT-Hyderabad, for her feedback and support throughout the project. Her input and guidance helped us to shape our final study.

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