Designing Menus for a Sustainable Future: The Role of Non-Meat Decoy

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Introduction

As the global population increases, the demand for food is also increasing, and the consumption of ruminant and poultry meat results in higher greenhouse gas emissions compared to plant-based alternatives (Rust et al., 2020). Individual food-related behaviors, such as transitioning to plant-based diets and consuming foods with a low carbon footprint, are important for sustainability (Abrahamse, 2020).

Studies show that **nudges** can be a significant tool for encouraging sustainable food choices (Garnett et al., 2019). As a menu-based nudging, **the decoy effect** is being studied to promote sustainable food choices. The decoy effect refers to the observation that an individual's preference between two options can be modified by context and the introduction of a third option that is similar to one of the existing options (Attwood et al., 2020).

Additionally, recent studies that examined participants' gazing behavior during food choices in the presence of different menu designs suggest that there may be a relationship between eye movements and food preferences (Smith et al., 2019 ; Vu et al., 2016).

Fig.1: Decoy Effect

In this study, we investigated;
1) Whether the **presence** of a **more expensive non-meat decoy** option on a menu affects the selection of a target non-meat option compared to a competitor meat option
2) The role of **basic menu features (main course, side dish and price)** and **eye movements** in the menu **selection** process

Method

247 participants (212 online experiment, 35 eye-tracking experiment) aged 18-32 who did not follow a special diet were included in the study.

10 images, three distinct menus (target non-meat, meat, and decoy non-meat)
Intervention Group and Eye-Tracking Study: Non meat menu and meat menu: ₺55, decoy non-meat: ₺75.
Control Group: Non meat menu and meat menu,decoy non-meat: ₺55

Instruction: 'Select a menu number by typing it on the keyboard' for both modalities
Online experiment was conducted via JATOS - Gaze behavior was collected by the GP3 Eye Tracker Device

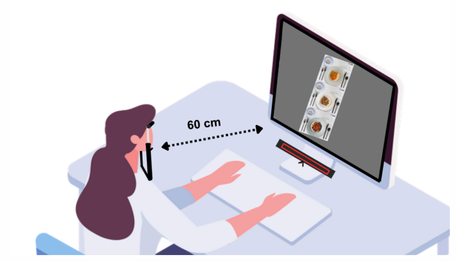


Fig.2: Eye-Tracking Experimental Setup

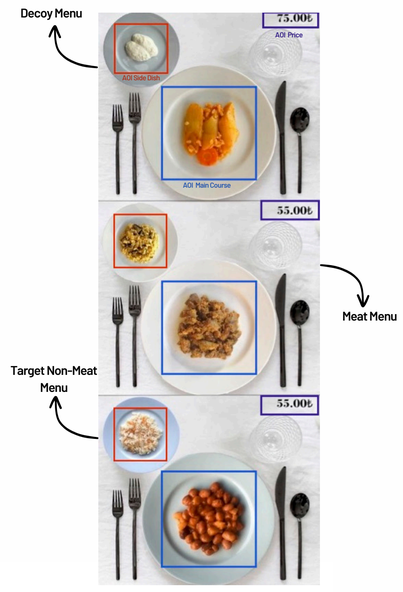


Fig.3: Stimulus and AOI

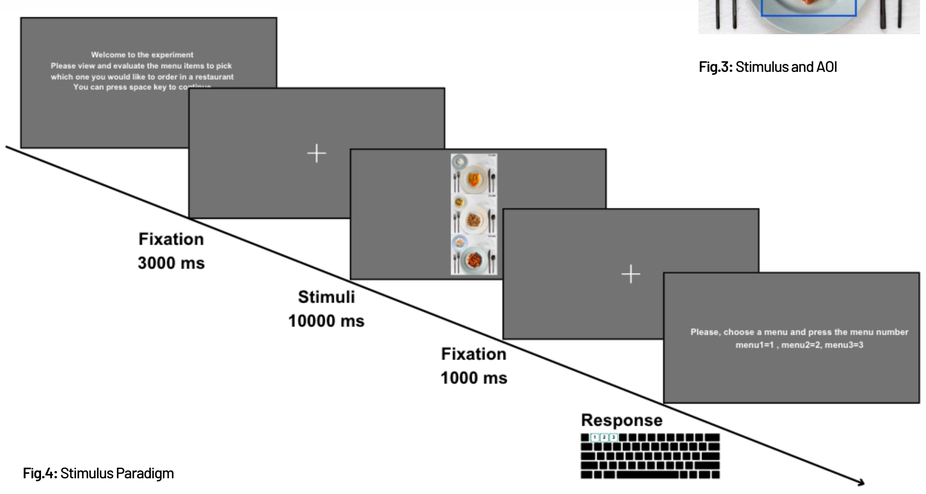


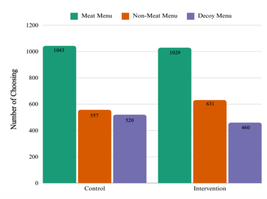
Fig.4: Stimulus Paradigm

Acknowledgement

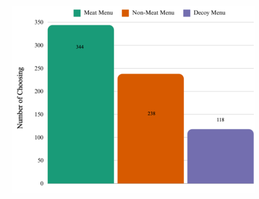
We would like to thank Kardelen Soyalp and Nur Fisun Inanc for creating the food stimuli.

Results

In the **control group**, 49.19% of participants chose the meat menu and **26.27%** chose the **non-meat menu**. In the **intervention group**, the presence of the decoy menu led to 48.53% choosing the meat menu and **29.76%** choosing the **non-meat menu**. In the **eye-tracking** study, the meat menu was chosen by 49.14% (N=344), the **non-meat** menu at **34%** (N=238) and the decoy menu at 16.86% (N=118).

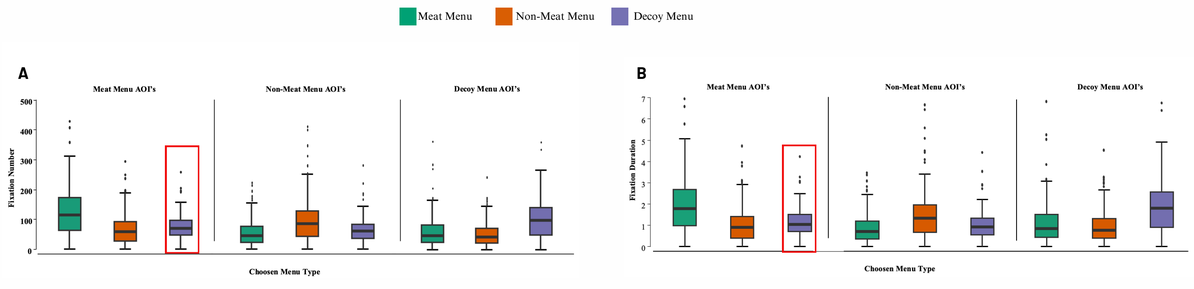


Graph.1: Menu Selection Counts in the Online Experiment



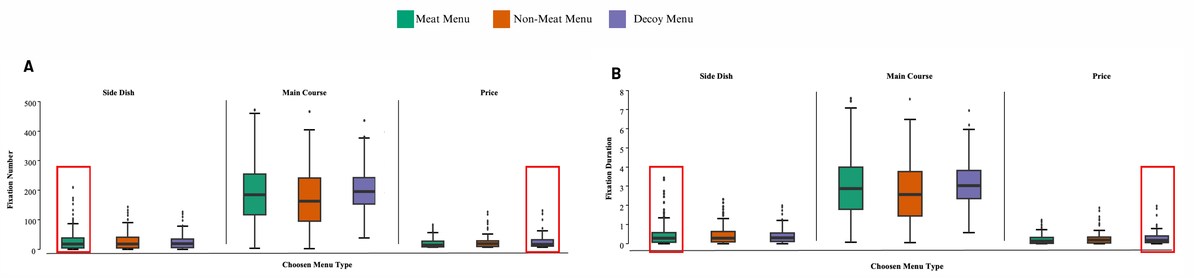
Graph.2: Menu Selection Counts in the Eye-Tracking Experiment

Those who prefer **meat menu** have demonstrated **longer and more frequent gazes** towards the **decoy menu** after inspecting the meat menu.



Graph.3: Fixation Duration (A) and Number of Fixation (B) Total AOI based on Selected Menu Type

For all menus, more time and fixation have been allocated to the **main course.**
Meat menu selectors focused more on the **side dishes**. **Decoy menu** selectors focused more on **pricing** and the **main course**.



Graph.4: The Fixation Duration (A) and Number of Fixation (B) on Menu Compenents and Choosen Menu Type

Discussion

Our study shows that different menu choices have an effect on food selection.

In this experiment we have put a decoy menu to be able to encourage people to choose more plant-based options (Attwood et al., 2020). Our study shows that with the presence of decoy, participants chose **%51.47** (online) and **%50.86** (eye-tracking) **vegetable-containing menu**.

Expanding on Attwood et al.'s findings, our results suggest that **meal images** might be more effective than meal names in sustainable menu design, as visualizing the product facilitates mental simulation (Elder and Krishna, 2012).

Duerrschmid and Danner (2018) demonstrated that the number and duration of fixations are positively related to food choices. In our study, we observed a relationship between food choices and fixations and differences in fixation behavior based on menu types. During the selection of the **decoy menu**, we observed that all three options were looked at **multiple times for short periods**. Those choosing the **meat menu** spent more time looking at **side dishes** than other menu choosers, while decoy menu choosers focused more on the main dish and price areas. **Fixation duration** is generally regarded as an indicator of **visual attention** retention, and spending more time on an AOI (Area of Interest) could suggest greater information complexity (Cludius et al., 2019; Peng et al., 2021; Kim et al., 2019).

Additionally, gaze points were mainly **directed** at the main dish (**middle of the image**) and side dish (**top-left of the image**), coinciding with the findings of Choi (2010) and Smith (2019).

Conclusion

Our findings suggest that the **decoy effect** can be used to promote **sustainable food choice**s and that eye-tracking data can be helpful in consumer types and self-negotiation processes. According to our findings, menus can be supported by highlighting certain **visual elements**(e.g., main course) to enhance the decoy effect. The visual menu can present the **side dish** for the **meat option** in a **smaller portion** or a **less appealing** manner. Additionally, **placing vegetable menus** in the **middle and upper sections** of the menu can enhance sustainable food preferences. These approaches can create **more effective strategies** in menu design, promoting the selection of healthy and sustainable food options.

Future Study

In a future study, we will examine the effect of odor priming on sustainable food choices with a similar paradigm using a within-subjects design.

References