Analyzing the Effect of Complexity on Consumer Decision Strategies

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Every time a consumer buys a product she has to make a decision, potentially using a different strategy each time. The strategies differ depending on how complex the decision problem is in terms of available information and amount of product alternatives present (Payne et al., 1993). When a great amount of information is available (complex decision) the decision maker can switch from processing all relevant information and trading it off against each other (compensatory decision) to selectively processing information avoiding tradeoffs (heuristics) (Bettman et al., 1998). If a strategy is applied in which the individual uses only selective pieces of information, this might lead to "substantial decision errors" (Payne et al., 1993). We investigate the extent to which consumers use heuristics by analyzing the effect of complexity on choice. We test how the amount of information offered affects selectivity in information processing, and in particular if the number of products offered influences consumers' decision strategies.

We combine discrete choice experiments (DCEs) with eye tracking. DCEs are frequently used to analyze decision making but they can only measure choice. They cannot measure if a consumer viewed a label or looked at all products available. We use eye tracking to measure how much attention consumers pay toward the information presented and vary choice complexity by presenting different amounts of product alternatives to choose from. By tracking eye movements, we can directly analyze different decision strategies, while accounting for choice complexity. Our objective is to gain a better understanding of how complexity in decision making drives attention. In other words, how does attention change when the number of available products increases?

This study synthesizes literatures on product choice in economics, marketing and psychology (Payne et al., 1993). Eye-tracking is a commonly used method in psychology, but is relatively new to the economics literature. Reutskaja et al. (2011) use eye-tracking to provide insight into choice making under information overload and time pressure. Without a formal choice experiment, however, they were unable to measure whether the decision was compensatory or heuristic. Dellaert et al. (2012) investigate the impact of the complexity of the choice situation and show that both, the decision-making strategy and final choice are altered. Choice complexity is based on the number of choice attributes and perceived similarity of choice options. Using a similar approach, Caussade et al. (2005) vary number of choices, attributes and number and range of attribute levels. They find that choice complexity has an impact not only on choice variability, but error as well. Jacobsen et al. (2012) come to similar conclusions when varying the number of projects subjects are required to complete in several projects in the context of natural resource evaluation. Without eye-tracking these studies were unable to determine the decision strategies used. Balcombe et al. (2015) combined DCEs and eye-tracking finding that most information provided in their experiment was attended to by subjects. However, they did not account for complexity in choice making. Grebitus and Roosen (2018) tested the effect of complexity on choice using DCEs and eye-tracking. They focused on non-attendance finding that more complex choices were characterized by ignoring more alternatives. We are extending previous research by accounting for the effect of complexity on decision strategies.

The use of eye-tracking enables measurement of consumers' attention, which is a critical precursor, and revealing metric of preference, to choice (Bojko, 2013). For example, attention captures whether attributes/alternatives are actually perceived and included in the choice-making process. Eye-tracking permits assessment of which and how much information is acquired (Payne et al., 1993). Eye-tracking measurement recognizes that preferences may change depending on the information provided. Our study design accounts for the relationship between attention and choice-making relative to the product alternatives presented. The data collected include subjects' eye movements and gazing time, while making choices over consumption bundles that vary in the amount of information and number of products offered. In particular, complexity is modeled by varying the number of alternatives present.

Data were collected in 2017 with 115 subjects. The study combines a DCE and eye-tracking. DCEs are adequate to simulate decision-making by prompting respondents to choose a product out of a choice set. Based on this decision the relevance of different attributes can be revealed (Batsell & Louviere 1991). Respondents are asked to make repeated choices between different consumption bundles. Their utility depends on attribute levels of the choices made from these bundles. This procedure allows to test which attributes influence choice strategies (Louviere et al., 2000). We measure the decision strategies by recording the attention towards attributes and alternatives while subjects are making choices. The combination of DCEs and eye-tracking allows to account for the amount of information being processed, and the selectivity in the information processing to measure whether the choice was compensatory or heuristic. In this regard, eye-tracking is an appropriate method as it is known to be a reliable measure for attention (Lohse & Johnson, 1996, Russo, 2011). Among others, eye-tracking measures fixations where objects are processed in detail (Wedel & Pieters, 2007). Participants' eye movements are tracked while they make their choices.

The choice experiment included two treatments. In *treatment one* the subjects received choice sets with 4 attributes and 2 alternatives. In *treatment two* they received choice sets with 4 attributes and 4 alternatives. The product under investigation is toothpaste. The attributes used are price and various information/labels, e.g., 'whitens teeth,' that are either present (higher amount of information) or absent (lower amount of information). Comparing the treatments and absence/presence of information shows how decision strategies change when the amount of information offered differs, e.g., whether selectivity of information processing increases. Data were analyzed using random parameter logit models focusing on fixation count. Preliminary results show that fixation count by alternative significantly affects choice for both, the 2- and 4-alternative design, indicating that the amount of attention paid to alternatives as a whole affects choice.