



# Categories shape preferences: A model of taste heterogeneity arising from categorization of alternatives



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## ABSTRACT

We propose and test a choice model based on the notion that the category an alternative is perceived to fall into determines the attribute importance weights used to evaluate that alternative. For example, space is more important than fuel economy for an SUV, but the opposite is true for a commuter car. In our model, the weights associated with different categories are stable, but categorization decisions can be subject to significant context effects; that is to say, we suggest that context effects are due to task interpretation rather than to preference construction. We demonstrate that the model can correctly detect experimental manipulations of product categorizations, supporting its suitability as a tool to capture preference heterogeneity arising from categorization outcomes. The model is then employed to analyze data from a discrete choice experiment and the results provide rich behavioral insights into how categorization influences choice processes.

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## 1. Introduction

What a challenge it would be to evaluate an object without a first determination of what type of object it is! Is this object a great dining table or a badly designed coffee table? Could it be a decent cocktail or a terrible sports drink? How would you assign importance weights to its attributes? In this paper, we propose that categorization is an essential precursor to evaluation and choice because understanding what type of object we are dealing with determines what the object is useful for and, therefore, which attributes are important.

To test this proposition, we develop and test a choice model which assumes that categorization occurs prior to choice and that it determines attribute importance weights. The model uses stated preference choice data (Louviere et al., 2000) to estimate (1) the number of categories employed by the decision maker, (2) the attribute importance weights that are associated with each category and (3) the likelihood that each alternative has been assigned to each category. Our contribution, then, is to propose a model of how the *output* of categorization becomes input for the choice process. It does not propose to identify the categorization process *per se*; this agnosticism with respect to categorization process implies that the choice model works equally well for categorization based on prototypes, exemplars, or rules (see the next section for a discussion of categorization models).

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The analysis begins with choice outcomes and identifies a set of preference models that capture heterogeneity associated with people using a different preference model for each category, such as higher weight for gas mileage in econo-cars compared to SUVs. The number of preference models is chosen by a best-fit criterion; as with Multidimensional Scaling, the process stops when the next model does not add significantly to the fit. Next, we assess the likelihood that each choice option was evaluated according to each preference model; for example, it might be the case that the Ford Explorer SUV was most likely evaluated using preferences linked to Model 2 (say). Finally, the identified preference models are examined and associated with natural categories; for example, it may be discovered that all the options associated with Model 2 are SUVs.

The assumption that the models are associated with categories is tested in two ways. In Experiment 1, we manipulate categorization and show that the preference models identified by the analysis and the alternatives associated with them are consistent with the primed categories. In Experiment 2 we analyze stated preference data for a complex decision and demonstrate how the model identifies categories in survey data.

While we view the linking of categorization and preference heterogeneity in choice as our primary contribution, the present work has important implications for the literature on preference construction (e.g., Bettman et al., 1998, 2008). As discussed subsequently, the presupposition of that literature is that context effects directly impact the generation of preferences, hence preferences are the product of context. We contribute to this perspective a cautionary note, perhaps even an alternative hypothesis to preference construction, by suggesting the possibility that preferences are stable but associated with categories and that it is categorization itself that is subject to context effects.

In light of these goals, the paper adopts this structure: we briefly review relevant literature in categorization and preference construction, with the objective of informing choice model formulation; we then present the development of a categorization-based choice model termed the Categorization Generalized Extreme Value (CatGEV) model, a new exemplar of the GEV family of choice models (McFadden, 1978); following, we present results for an experiment designed to test the ability of the CatGEV to correctly detect product categorization manipulations; next, we apply the CatGEV to choices elicited through a standard discrete choice experiment (Louviere et al., 2000); and finally, we close with a discussion of some implications of our work and future research directions.

## 2. A targeted literature review

### 2.1. Categorization

The capacity to discriminate between objects and classify them into categories is a basic function underlying human decision making (for reviews see Loken et al., 2008; Loken, 2006; Medin and Smith, 1984; Rosch, 1978). This classification task facilitates decision making by providing the decision maker with rapid access to relevant information. Categorization models generally assume that the categorization process starts with the decomposition of an unfamiliar object into component attributes or dimensions. These components are then matched up with some mental representation in order to assign the new object to a category. One key division in the literature is between prototype and exemplar based models. Prototype models assume that decision makers construct a prototypical category member whose attributes are either the most desired or most common within the category (David and Minda, 1998, 2002; Medin and Smith, 1984; Smith and Minda, 2000). Each category has a prototype and newly encountered objects are matched to the most similar prototype. As an alternative, exemplar models propose that within each category there are multiple exemplars and new objects are matched to the category whose exemplars most closely correspond to the attributes of the new object (Medin and Schaffer, 1978; Nosofsky, 1984, 1986, 1987, 1988). Critically, the exemplars are actual category members rather than an abstracted or averaged representation. Understanding the way in which the categorization process occurs remains an active and important area of research.

A key advantage of categorization is that it facilitates fast and appropriate reactions to similar objects (e.g. Medin and Smith, 1984; Rosch, 1978). The importance of categorization in choice has received attention previously in the context of inferences (Gill and Dube, 2007; Gregan-Paxton et al., 2005; Moreau et al., 2001). Assigning an alternative to a category helps the decision maker in making inferences about unobserved attributes, by resolving uncertainty, and facilitating choice. Decision makers show a strong preference for assigning alternatives to single rather than multiple categories (Rajagopal and Burnkrant, 2009), a tendency that has been labeled “the single category belief problem” since marketers hoping to invoke associations from multiple product categories (Rajagopal and Burnkrant, 2009) consider it an undesirable barrier. Consumers frequently encounter ambiguous or hybrid products that might be categorized differently depending on labeling (Moreau et al., 2001), appearance (Gregan-Paxton et al., 2005), dominant associations (Noseworthy and Goode, 2011), or competitive context (Noseworthy et al., 2012). This variation in categorization leads to changes in evaluation and choice.

Buyers' categorizations of consumer products have been studied extensively because of the relevance of this work to brand extensions and new product entry (Alba and Hutchinson, 1987). Prior work has shown that categorization can influence choice because of the affect or cognitions prompted by the category (Fiske and Pavelchak, 1986; Moreau et al., 2001; Sujan and Bettman, 1989; Yamauchi and Markman, 2000), but the mechanism of this influence is not well understood.

This literature shows that categorization provides information about what attributes to expect, sometimes what attribute levels are typical, and the attractiveness of, or preference for, objects in the schema. We suggest, in addition, that categories can signal the importance of each attribute. For example, gas mileage typically receives more attention in the purchase of a sedan than in the purchase of an SUV, and conversely for space or safety. Our approach suggests that merely recognizing

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