

Quantifying Perception-Based Attributes in Design: A Case Study on the Perceived Environmental Friendliness of Vehicle Silhouettes

by

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To the Great Master Designer of all - God
John 1:3

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CHAPTER I

Introduction

Design optimization problems have traditionally used engineering functionality attributes to inform the design of products and systems. However, the quantification and inclusion of subjective attributes has become a necessary part of the product design process. Numerous methods have been developed to model and quantify the subjective preferences of consumers and use them to inform design decisions. These methods have been applied to assess a variety of subjective design attributes such as aesthetics, beauty, luxuriousness, and sportiness to name a few. However, there is little research that attempts to quantify consumer judgments of environmental friendly design characteristics, including applicability to automotive vehicles. Methods such as Kansei engineering [*Nagamachi (1995)*] are used to assess emotional qualities of a product through the use of semantic word pairs and multivariate statistical analysis and engineers often use conjoint analysis [*Green and Srinivasan (1990)*] to quantify consumer preferences using utility functions. These methods are applicable to the current study, however they each have limitations. Kansei engineering measures consumer assessments of product characteristics, but does not assess consumer's actual choice [*Gonzalez et al. (2010)*]. Conjoint analysis is a useful tool for assessing consumer choice, but the number of attributes have to be kept low (no more than 6 attributes is ideal) in order to reduce the fatigue on subjects [*Green and Srinivasan*