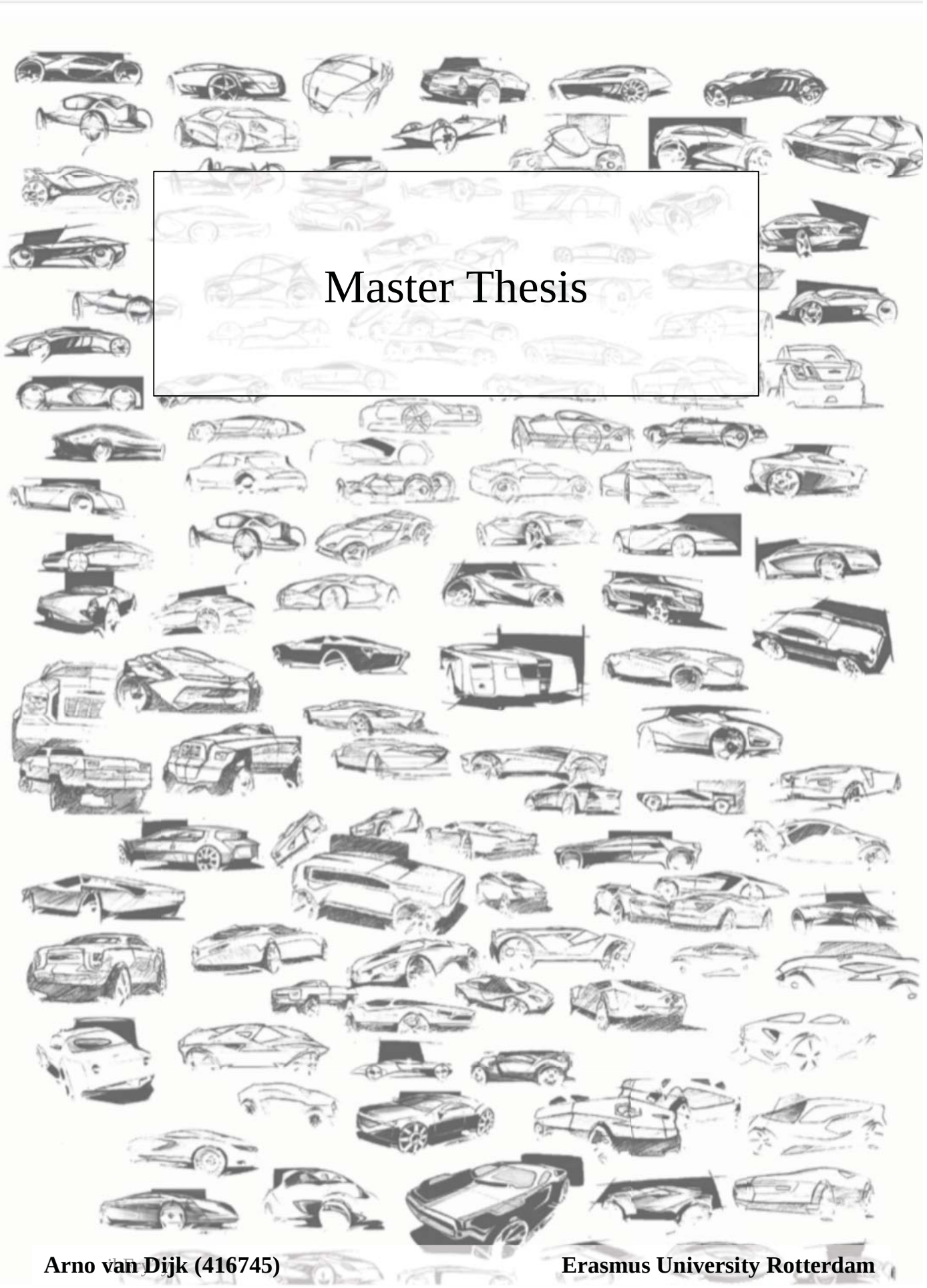

Master Thesis

Arno van Dijk (416745) **Erasmus University Rotterdam**

MANAGEMENT SUMMARY

Over the last couple of years, there has been a sharp decrease in the average CO_2 (carbon dioxide) emissions of new cars, which is partly due to a greater supply of fuel-efficient cars. It was expected that the emissions factor would be more pronounced in the Dutch market compared to the previous studies in other countries. This can largely be explained by the Dutch fiscal CO_2 based system. This research is focused on the Dutch car market, and it investigates the factors that influence people to buy a car. The following research question is therefore formed: *"What is the dominant factor in preference when choosing among cars on the Dutch market?"* Design, performance, emissions, and price were the key car attributes used in this research. This study also analyzed the possibly moderating effects of consumer psychographics; the personal values of the Schwartz theory were used to determine these effects.

A choice-based conjoint analysis was used to identify the dominant factor in preference. Respondents were asked to choose between two car models. Using a logistic regression, the log odds ratio of the investigated attributes indicates the factor dominating the respondents' preferences.

The logistic regression before introducing any moderating effects confirms that all investigated car attributes do affect car preference; it revealed car design to be the biggest factor. The factor of emissions ranked comparably to performance. With the personal values included in the analysis, the interaction effects of these values showed a significant effect between the attributes design and technology and car preference.

Design proved to be highly important to consumers. The results of this research can be used by marketing managers, who should invest more in design, the dominant factor in consumer preference. The study also found a difference in personal values, which influence design to car preference. Self-enhanced people find design more important than self-transcended individuals. Suggestions for further research are included in this study. In particular, it is recommended that further research will change the factor design in their research.

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I. INTRODUCTION

There has been a sharp decrease in the average CO_2 emissions from new cars in recent years, partly due to a greater supply of fuel-efficient cars. According to Kok (2013), there has also been a change in demand. Since 2008, the market share of large and heavy car types with a lot of power has substantially decreased. The market share of small economical cars with low CO_2 emissions has sharply risen. This contrasts previous years in which the effect of technological advances was partly offset by an increase in the demand for larger cars with more power and higher CO_2 emissions (Hoen & Geilenkirchen, 2006). In the last couple of years, there has been a decrease in average CO_2 emissions per vehicle in Europe. The Netherlands recorded the lowest average CO_2 emissions per car, followed by Greece, Portugal, and Denmark (EEA, 2014). Appendix I illustrates the decrease in CO_2 emissions in The Netherlands, compared with the average decrease in Europe. However, in other countries like India and Germany, exterior design and performance are bigger drivers in consumers' purchase decisions (Kaushal, 2014; Talke, Salomo, Wieringa, & Lutz, 2009).

Since last year, the car market has been getting even more attention. On September 18, 2015 the United States Environmental Protection Agency (EPA) announced that diesel cars from the Volkswagen Group were equipped with manipulating software. This software could detect when the car was being tested and would change the vehicle's performance accordingly to improve its emissions results (Kaul, 2015). Volkswagen admitted that they used this software to cheat during tests in the US and acknowledged that eleven million cars worldwide were fitted with the software (Russel, 2015). Cars from other manufacturers were also tested to ensure that they were not using similar software. Mercedes-Benz, BMW, Opel and PSA cars are also suspected of using software to manipulate emissions results (Archer, 2015). The sales of diesel vehicles were already in decline prior to the scandal. Richard Gane, automotive expert and Director of Consultants at Vendigital, said the scandal would lead to a further decrease in demand for diesel engines (Clements, 2015). It is interesting to investigate whether the increased attention to emissions results caused by the Volkswagen scandal has impacted consumers' car preferences.

This study investigates whether consumers' buying decisions are primarily driven by the factor of design, performance, emissions or price. It is expected that the emissions factor will be more pronounced in the Dutch market when compared to previous studies in other countries. This can largely be explained by the Dutch fiscal CO_2 based system (Kok, 2015; Leaseplan, 2014). The Dutch government uses three tax-based instruments to charge car usage. These three tax incentives are described in Appendix I. Zahedi and Cremades (2012) concluded that The Netherlands charges more vehicle taxes (Circulation Tax and Fuel Tax) than other European countries. The Volkswagen scandal also may have made consumers pay greater attention to lower emissions vehicles. Consumers could be more aware of the environmental damage caused by high fuel consuming cars.

PROBLEM STATEMENT AND RESEARCH QUESTIONS

Based on tax incentives in The Netherlands, it is expected that emissions are an important factor in consumer preference. This research focuses on the Dutch car market, and it investigates the factors that drive people to buy a car. This study investigates three factors that could influence that decision: (1) design, (2) technology, and (3) price. The second factor consists of two components: performance and emissions.

To better understand why people prefer to buy one car over another in the Dutch market, this main research question was formulated:

What is the dominant factor in preference when choosing among cars on the Dutch market?

The automobile market is very competitive (Bruce, Desai, & Staelin, 2005). Consumers may consider many factors and combinations of product attributes in their decision-making. When consumers are asked about the relative importance of different car attributes, they answer that most of the attributes are important (Wu, Liao, & Chatwuthikrai, 2014). However, for manufacturers it is of great importance to know which attributes most affect consumers' decisions to buy an automobile (Kabadayi, Alan, & Özkan, 2013).

Many papers have studied possible attributes impacting car preferences, and various studies have analyzed the effects of consumer demographics on these preferences (e.g. Adjemian, Lin, & Williams, 2010; Bhat, Sen, & Eluru, 2009; Fang, 2008). However, there is a lack of literature on the effects of consumers' psychographic attributes on car preference (Baltas & Saridakis, 2013). There is no generally accepted definition of 'psychographics'; Wells (1975) tried to make a common definition based on thirty-two definitions on psychographics research: "Quantitative research intended to place consumers on psychological—as distinguished from demographic—dimensions." Psychographic attributes could include activities, interests, opinions, needs, values, attitudes, and personality traits.

It is generally accepted that there is a connection between personal values and consumer behavior (Vinson & Scott, 1977). These values are defined as organized sets of preferential standards in making choices and actions (Rockeach, 1973). Thus, the values of individuals guide the consumers' preferences and buying behaviors.

Based on the assumption above, it was expected that this research would reveal some differences in preference based on personal values. In many other fields of research, evidence has been found to show that cultural values can have a moderating role in preferences and buying decisions (e.g. (Babin, Darden, & Griffin, 1994). This study also analyses the moderating role of consumer values concerning their car preferences.

SCIENTIFIC AND MANAGERIAL RELEVANCE

Preference of design or technology in the automotive industry has been a subject of research since the early 1970s when it was investigated whether changes in style pay off (Hoffer & Sherman, 1971). More recently, research was done to understand the attributes that have the best payoff (Hoffer & Reilly, 1984; Purohit, 1992; Rubera & Droge, 2013). These research studies indicated that the vehicle's style is an important factor in the consumer's decision to purchase. Both studies from Hoffer and Sherman (1971) and Hoffer and Reilly (1984) found that major style changes increased the sales rate for manufacturers.

However, even the launch of successful new products may not lead to a financial benefit for the firm due to the high costs of research and development and the ease with which competitors can imitate the product (Bayus, Erickson, & Jacobson, 2003). It is easier to imitate a company's technological improvements than their design, because in most cases the design is associated with the brand. Design innovation can, like technological innovation, reduce the production costs of a car, improve the car's quality and performance, differentiate the car from cars of competitors, and create a new product segment (Roy & Riedel, 1997). Manufacturers can use the results of this research to understand the most important factors on the Dutch market. Marketing managers can build a marketing strategy based on consumers' personal values.

THESIS OUTLINE

A chapter on theory follows this introduction and provides theories to support the hypotheses presented in the conceptual framework later in Chapter 2. The methodology used in this study is written in Chapter 3, which describes how the hypotheses are tested. After that, Chapter 4 gives the results of the study and an analysis of the data. This report concludes with a general discussion that answers the research questions, gives academic and managerial implications, and notes limitations of the study and suggestions for further research.

II. THEORY

There is no lack of scientific research on consumer behaviors in the automotive industry. Researchers from all over the world have analyzed consumers' buying behaviors in the automotive industry from different angles. An Indian study by Kaushal (2014) found the following factors to be the most important in the decision to purchase a car: (1) Value, (2) Safety and Security, (3) Performance, (4) Quality, and (5) Technology. J. D. Power and Associates annually publishes a report that indicates the most important factor in the decision-making process of American consumer. The most important factors in 2015 were: (1) exterior styling, (2) previous experience with the brand or a particular model, (3) reputation and reviews, (4) ride and handling, (5) price or payment, and (6) fuel economy/driving range.

LITERATURE REVIEW

Car preference

For marketing managers, it is of great importance to understand the factors that determine consumers' choices. Marketing managers can use this information to develop a marketing strategy. Preference is based on ordering the different options involved in a decision-making process. The option with the maximum overall utility score indicates the consumer's preference (Menasco & Curry, 1989). Preference is a major contribution of research to decision-making behaviors, since consumer preference indicates the product(s) that will sell best (Novemsky, Dhar, Schwarz, & Simonson, 2007). Many studies use preference to forecast future product demand (Lee, Cho, Lee, & Lee, 2006; Hauser, Urban, Liberali, & Braun, 2009; Wittink & Bergestuen, 2001). Preference is perceived as more realistic as indicator compared rankings or ratings (Louviere & Woodworth, 1983).

The most common method for modeling consumers' preferences among multi-attribute alternatives is conjoint analysis. A person making a multi-attribute decision must decide among two or more attributes. In this case, the person prefers the product with the highest utility. Conjoint analysis makes it possible to identify patterns in consumers' preferences (e.g. parts' worth, importance weights, ideal points) (Green &

Srinivasan, 1978). The downside of measuring preference is that buying intention is analyzed instead of real purchases. However, following Patch, Tapsell and Williams (2005), intention can be seen as a conscious plan to accomplish a particular behavior and the motivation to perform that behavior. Measuring choice makes it possible to determine the "truth" of why consumers choose one product over another (Louviere & Woodworth, 1983). As mentioned earlier, it is often difficult for consumers to know why they chose a particular product.

Many researchers have attempted to identify the importance of different car attributes using consumer preference. For example, Kabadayi, Alan, and Özkan (2013) used conjoint analysis to evaluate the factors that affect a consumer's decision to buy a particular car. They found that fuel is an important factor in consumers' decision-making process. Euro NCAP security level, automobile type, and price also have some effect on the purchase decision. Euro NCAP is a safety rating system that helps consumers compare cars' safety ratings (Euro NCAP, 2015a). A paper from Haaijer, Wedel, Vriens, and Wansbeek (1998) also used conjoint analysis to investigate consumers' car preferences. The car experiment concluded that the number of doors and the engine capacity are the biggest factors, followed by fuel consumption and price. The paper compared different models in the car experiment, so the importance of different car factors was not the main purpose of the paper. For that reason, it is also unclear why those factors were used for the experiment. Eggers and Eggers (2010) made a model to predict the adoption of electric vehicles. By using individual-level preferences, the research found that more than 50% of the respondents were willing to buy a hybrid car in Germany in 2018.

Car attributes

Design

Design is the first factor related to consumer preference that will be analyzed. In this research, design is defined as the external appearance of a car. Other studies have also measured car design's impact on consumer behaviors. Wu, Liao, and Chatwuthikrai (2014) did a conjoint analysis and found appearance to be the most important factor, followed by fuel efficiency, price and safety. For each attribute, they used two levels (high vs. low, or attractive vs. unattractive) to measure the importance of each

attribute towards buying intention. The study used preference on the external appearance of a car to measure the importance of design. Performance appeared to be the least important factor. However, the study used models from 1995 and 2013, which is a big range. Consumers would probably rather consider a choice between two car models that are fewer than six years apart. The study also compared a performance range of 30 horsepower (HP), while the range is currently over 160 HP in the investigated market. It is expected that the importance of appearance will be lower with a smaller range and that the importance of performance will be higher when the range of performance is larger. In other words, the wider the range of a product attribute in a conjoint study, the more important this attribute will be.

Research by Purohit (1992) showed that the factor of design has the biggest effect on consumer behavior, as related to cars. Purohit studied the importance of different attributes on the secondary market. The research used changes in performance, downsizing, and style changes as factors that have an influence on the depreciation of cars. The secondary market responds to the automobile's observed quality. When consumers do not view the styling of the new car model positively, the older model will sell better.

The paper by Kabadayi et al. (2013) also investigated the factor of design. However, their results concluded that an automobile's style did not have a strong effect on consumer preference. The study defined 'automobile style' as the different car types (small mini, small family car, big family car, sport car, minivan). Therefore, the study used 'car design' in a different way than the other studies.

Performance

Almost all the research on the impact of different car attributes on consumer behavior investigated performance. The studies used different metrics to interpret performance. Some studies (Haaijer, Wedel, Vriens, & Wansbeek, 1998; Agarwal & Ratchford, 1980) used engine capacity as a factor and concluded that performance is a big factor in consumers' buying behaviors. Next to engine capacity, Agarwal and Ratchford also used acceleration to explain the factor of performance. Cernov (2010) used this factor to discuss the effect of environmental awareness on consumers' car choices.

However, most of the studies researched (Achtnicht, 2002; Cernov, 2010; Purohit, 1992; Wu et al., 2014) used horsepower as metric for performance. As described earlier, Wu et al. (2014) used range of the performance attribute in their study compared to the factor of appearance. When a wider range was used, the factor would probably more important.

Emissions

Many studies also investigated emissions-related factors in consumer behaviors related to cars. Most studies considered fuel consumption in metric measurements (Cernov, 2010; Haaijer et al., 1998; Kabadayi et al., 2013; Wu et al., 2014). In particular, Cernov (2010) and Haaijer et al. considered this factor as important to buying behavior. Other studies investigated the factors of fuel type (Achtnicht, 2002; Kabadayi et al., 2013) and emissions (Achtnicht, 2002). Using a preference choice experiment, the Achtnicht study concluded that CO_2 emissions are a relevant factor in car choice. The study also used fuel type, price, horsepower, fuel costs, and fuel availability as factors for the experiment.

Price

Price is an important factor in car-buying, as it is in most research on product attributes. Most of the above-described studies used this factor in their research. Price is defined as the amount of money that the consumer must give up to get the product he/she wants, and it is therefore negatively related to the product purchase (Lichtenstein, Ridgway, & Netemeyer, 1993). However, several studies indicated that price also has a positive effect on sales; for example, it can impact consumers' perception of quality (Tellis & Gaeth, 1990; Kukar-Kinney, Ridgway, & Monroe, 2012; Erickson & Johansson, 1985). Erickson and Johansson (1985) showed that price and quality have a mutual impact. Premium-priced cars are perceived as detaching more quality, and high-quality cars are normally perceived as being more premium priced than they actually are.

A summary of the above-described studies is included in Appendix II. This appendix also details the methods of the described studies.

Cultural Values

As mentioned earlier, various studies analyzed the effect of consumer demographics on consumer behavior. However, there is less research about the effect of consumers' cultural values on this behavior, while in other fields of research, evidence is found that these values can have a moderating role in preferences and buying decisions (e.g. (Babin et al., 1994). The most important cultural frameworks were made by Hofstede, Schwartz, and Inglehart (de Jong, 2009; Okazaki, 2012). Many papers used these frameworks to study the relations between cultural values and economic phenomena (de Jong, 2009).

Hofstede (1980a) was responsible for a popular theory on national culture value dimensions. He based his theory on data from 116,000 surveys from IBM employees from seventy-two different countries. The theory consists of four different national culture dimensions (Hofstede, Hofstede, & Minkov, 1991):

- Power Distance Index (PDI): The Power Distance Index measures the extent to which inequality in power is perceived by less powerful members of organizations and institutions.
- Uncertainty Avoidance Index (UAI): The Uncertainty Avoidance Index measures the degree of comfortableness by people in a society when something unexpected happens.
- Individualism vs. collectivism (IDV): This dimension measures the extent to which people in a society work independently.
- Masculinity vs. femininity (MAS): This index measures the degree to which masculine values have a dominant effect.

Hofstede's framework can easily be implemented in research in a business culture, because the dimensions are based on business-related circumstances.

Inglehart and Baker (2000) found two cultural dimensions with the use of the World Values Survey (WVS). The WVS is the largest investigation of cultural values, including almost four hundred thousand respondents from almost one hundred countries (World Values Survey Association, 2016). The WVS dimensions are summarized as follows:

- Traditional vs. secular-rational: This dimension measures the importance of religion, the nation and traditional family values.
- Survival vs. self-expression: This index concerns the importance of the relation between the individual and the society. High survival values mean that economic and physical security is highly valued. High self-expression values give high priority to subjective wellbeing and quality of life.

The WVS is not as popular as Hofstede's framework, but it still receives a lot of scholarly attention because of its size and the scope of its data collection (Hsu, Woodside, & Marshall, 2013).

Schwartz (2006; 2012) developed a framework of ten basic, motivationally distinct values. These values can be ordered in a two-dimensional space based on their similarities and conflicts (Fischer, Vauclair, Fontaine, & Schwartz, 2010). The data for this research paper was collected from eighty-two countries through two major methods: the Schwartz Value Survey (SVS) and the Portrait Values Questionnaire (PVQ). The SVS was used as a questionnaire for educated adults, and the PVQ was used for children and uneducated adults. The dimensions are summarized as follow:

- Openness to change vs. conservatism: 'Openness to change' includes values that express independence of thought and the importance of change (such as self-determination and stimulation), while 'conservation' values include self-restriction, preservation of traditional practices, and resistance to change (such as safety, conformity and tradition).
- Self-enhancement vs self-transcendence: 'Self-enhancement' values emphasize the pursuit of individual success and dominance over others (for example, power and performance), while 'self-transcendence' values concern the acceptance of others as equals and the concern for the welfare of others (for example, universalism and benevolence)

Although the framework has a strong theoretical foundation, the model is still not well-known in marketing (Steenkamp, 2001). The ten basic values are summarized in Appendix III.

This research used the Schwartz Value theory instead of its alternatives. Hofstede (1980b) acknowledged that the country-level analysis he made cannot predict individual behavior. Inglehart's frameworks identify cross-country cultural structures, whereas Schwartz discriminated different sets of value designs at both the individual and country levels (Fischer et al., 2010). In comparison, Schwartz's value theory is based on a priori theorizing; the other frameworks are developed by post hoc data examination (Schwartz, 2006; Hsu et al., 2013).

Multiple studies proved that cultural values could have a moderating effect on consumer behavior (Kirkman, Lowe, & Gibso, 2006; Steenkamp, Hofstede, & Wedel, 1999; Yoon, 2009). The culture values of "Schwartz's theory" showed moderating effects in several fields of study (Fischer & Smith, 2004; Wu T.-f. , 2010; Saroglou, Delpierre, & Dernelle, 2004; Camacho & Stremersch, 2014). Examples of these moderating effects are described later in this section.

CONCEPTUAL MODEL + HYPOTHESES

Figure 1 shows the conceptual model of the study. The car attributes on the left side of the model are the independent variables. The culture values are analyzed for possible moderating effects, and preference of different car models is the dependent variable. The arrows connecting the model represent the hypotheses.

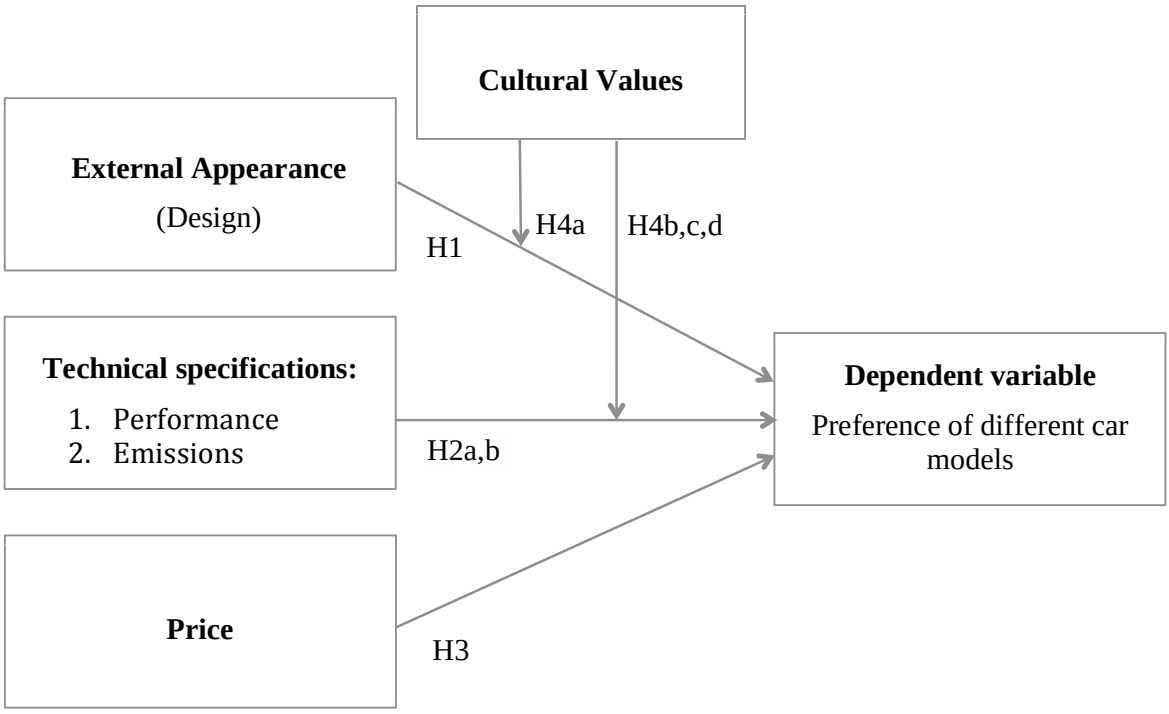

Figure 1. Conceptual model

The theoretical background and development of these hypotheses is presented below.

The earlier-described research identifies the following key attributes: horsepower, number of doors, appearance, safety, price, quality, fuel consumption, maximum speed, acceleration, performance, Euro NCAP security, and CO_2 emissions. The following section describes the attributes used in this research.

Hollins and Pugh (1990) noted that in a product consideration set, the visual normally comes first. Therefore, external appearance was denoted as an important factor to be included in this research. In this case, 'external appearance' stands for the exterior styling (design) of a car. Because exterior styling is denoted as one of the most important factors in a decision-making process, the following hypothesis is proposed:

Hypothesis 1: *External appearance positively affects consumers' car model preferences.*

Performance is also considered to be an important factor in the car buying decision-making process. Other studies included horsepower, acceleration, and maximum speed to define this factor. Purohit (1992) found that horsepower is highly related to acceleration and top speed and works as a proxy for it. The research also noted ride and handling as interesting attributes, but these factors are difficult to rate and tend to be arbitrarily chosen. Therefore, only horsepower and fuel consumption are technologic attributes. As a result, this research proposes the following hypothesis:

Hypothesis 2a: *Higher performance positively affects consumers' car model preferences.*

Fuel consumption and emissions are also highly correlated to one another (Ericsson, 2001). Emissions are expected to be an important factor in The Netherlands because of the Dutch fiscal CO_2-based system; therefore, emissions were considered as a factor in the research. Based on this assumption, the next hypothesis was created:

Hypothesis 2b: *Lower emissions positively affect consumers' car model preferences.*

Kabadayi et al. (2013) also indicated safety as key attribute in a decision-making system. The research used Euro NCAP security ratings to measure safety levels. The Euro NCAP security rating is the most common way to measure safety in Europe. However, almost every car model since 2011 in the studied car segment has the maximum Euro NCAP stars[1] (Euro NCAP, 2015b). Therefore, safety was not considered in this research.

Research by Haaijer et al. (1998) used the number of doors as a key attribute, but it will not be included in this research. The reason for this is that marketing managers cannot improve this attribute. They can, however, make an option for consumers to choose between a three- or five-door car.

[1] Since 2009, twenty-seven cars received a five-star Euro NCAP rating, and two cars received four stars in car segment C. No ratings lower than four stars were given in this segment. In the chapter on method, the reasons why segment C was studied will be discussed.

One of the most important product cues is the price. It is defined as the amount of money that the consumer must give up to get the product he or she wants, and it is therefore negatively related to the product purchase (Lichtenstein et al., 1993). However as mentioned before, several studies indicate that price also has a positive effect on sales since higher prices suggest higher quality (Tellis & Gaeth, 1990; Kukar-Kinney et al., 2012; Erickson & Johansson, 1985). Erickson and Johansson (1985) showed that price and quality have a mutual relationship. Premium priced cars are perceived as being of a higher quality, and high quality cars are normally perceived to be more expensive priced than they actually are. The research also concluded that price is perceived as a good indicator of quality. Price is included in this research because of its importance in consumers' decision-making processes. All the studies mentioned are listed in Appendix II; those that analyzed price found negative price effects on consumer behavior. Therefore, it was expected that price would have a negative effect on car preferences. The hypothesis was stated:

Hypothesis 3: *Lower price positively affects consumers' car model preferences.*

These product attributes are the only ones analyzed in this study in order to maintain a manageable research size, ensure reliable estimation procedures, and sufficiently account for consumer preference.

As previously mentioned, multiple studies have proven that cultural values can have a moderating effect on consumer behavior. Therefore, it is expected that personal values will have a moderating effect in this research. Personal values examine cultural values from the standpoint of attitudes and personal motives (Vinson & Scott, 1977). If moderating effects are found in this research, it aids in understanding how cultural values affect consumer behaviors when they are establishing their car preferences.

Roccas (2003) investigated the moderating role of self-enhancement and self-transcendent values on group status. His research indicated that there is a high correlation between status and people identifying as self-enhanced over self-transcended. It is expected that self-enhancement values will influence both design and performance in considerations on buying a car. Research has found that these

factors are highly related to status (Rucker & Galinsky, 2009; Bloch, 1995). Therefore, the following hypothesis are stated:

Hypothesis 4a: *Self-enhanced individuals find design more important when buying a car than individuals who are self-transcended.*
Hypothesis 4b: *Self-enhanced individuals find power more important when buying a car than individuals who are more self-transcended.*

Personal values were also found to influence emissions. Poortinga, Spence, Demski and Pidgeon (2012) tested individuals' motivational factors in the acceptance of strategies to reduce CO_2 emissions. They found that both self-enhancement and conservatism are significantly associated with CO_2-reducing technologies. The study concluded that conservative people are less likely to engage in CO_2-reduced behavior. In contrast, the study also concluded that self-transcendent values are positively related with a greater willingness to reduce CO_2 emissions. It is expected that these personal values will also interact in this study. Therefore, the following hypothesis are stated:

Hypothesis 4c: *Conservative individuals find emissions less important when buying a car than individuals who are more open to change.*
Hypothesis 4d: *Self-transcended individuals find emissions more important when buying a car than individuals who are more self-enhanced.*

III. METHOD

Statistic test

A conjoint analysis was used to determine the attribute that has the most influence on consumers interested in buying a new car in the Dutch market. Conjoint studies analyze how consumers develop an overall preference for goods by assuming that they add all the attributes of a product together and choose the product with the highest utility score (Green & Rao, 1971). Analyzing the product features independently rather than collectively can reduce the reliability of the study. With the use of conjoint analysis, different factors are analyzed together to better simulate preference in a car decision analysis. Probably because of this reason, all the studies mentioned in Appendix II used conjoint analysis to measure the importance of each factor in the decision-making process.

Conjoint analysis is an equally popular method for analyzing consumer behavior in other markets. A classic study by Paul and Wind (1975) used conjoint measurement to design a carpet cleaner. They described the carpet cleaner using the following five features: package design, brand name, price, Good Housekeeping's seal of endorsement, and a money-back guarantee. The research assumed that the overall preference was a sum of the part-worth utilities of the different factors. A regression analysis was used to estimate the contribution of each attribute to the overall preference. Respondents were asked to rank or rate profiles, which is called Conjoint Value Analysis (CVA). The popularity of this method declined with the introduction of Choice-Based Conjoint Analysis (CBC). Louviere and Woodworth (1983) wrote an important paper with a theoretical structure of this method. They combined conjoint analysis with discrete choice modeling. With this method, respondents were asked to give their preference by choosing among different profiles (also known as cards).

Green and Srinivasan (1978) made a model with various issues that involved implementing a conjoint analysis into research. The steps of the model are illustrated in Table 1. The methodology from this research was followed to design and analyze the conjoint analysis.

Table 1

*Steps involved in conjoint analysis**

Step	Alternative methods
1. Preference model	Vector model, ideal-point model, part-worth function model, mixed model
2. Data collection method	Two-factors-at-a-time, full-profile
3. Stimulus set construction	Fractional factorial design, random sampling from multivariate distribution
4. Stimulus presentation	Verbal description, paragraph description, pictorial or three-dimensional model representation
5. Measurement scale for the dependent variable	Paired comparisons, rank order, rating scales, constant-sum paired comparisons, category assignment
6. Estimation method	MANOVA, PREFMAP, LINMAP, Johnson's nonmetric tradeoff algorithm, multiple regression, logit and probit model

*Adapted from Green and Srinivasan (1978)

The aim of this research is to verify the partial values of each studied car attribute. Therefore, a part-worth model was used in this research. This model made it possible to compute the levels of each attribute as numerical utility values (Green & Srinivasan, 1990).

To keep the conjoint as realistic as possible, a full profile approach was chosen as the data collection method. With this approach, respondents choose between different products that have all the given attributes. The two-factor-at-a-time procedure is another option in which respondents are asked to rank various combinations of factors (Green & Srinivasan, 1978). This approach does not take into account the potential correlations between different factors, such as the possible correlation between emissions and performance in this study.

Instead of using a full factorial design, this study used an orthogonal array design to reduce the number of profiles; it was not necessary to obtain results on all the possible combinations (Huber, Herrmann, & Gustafsson, 2003). The advantages of an orthogonal design are obvious for the respondent. For one, completing the survey is

less time-consuming. However, the orthogonal array also allows the main effects of attributes in the conjoint study to be measured. Finally, the orthogonal design yields a prime prediction even if some profile cards are not realistic (Rao, 2013). If a full factorial design is used, respondents are exposed to two hundred fifty product combinations (5*5*2*5). Later in this chapter, these combinations are explained. The orthogonal design tool of IBM SPSS Statistics 21 reduced the number of combinations to twenty-five combinations. Orthogonal array has been investigated since the early years of conjoint analysis. Carmone, Green, and Jain (1978) concluded that orthogonal array is a robust design in the use of metric analysis. Later studies also implemented orthogonal designs in their research (Dahan & Hauser, 2002; Evgeniou, Boussios, & Zacharia, 2005).

It is difficult for respondents to determine the relative importance of a number of key product features as they may view all of them as important (Moore & L., 2004). Therefore, a choice-based conjoint was used to force respondents to choose between two car models with different features (paired comparison). Based on suggestions from a pretest, comparisons between two car models were chosen. Respondents indicated that a clear comparison of more than two products would be difficult on a small screen, as on a smartphone. It was expected that many respondents would complete the survey on their mobile device. The design for the pretest is discussed later in this section.

Choice-based conjoint is an indirect method of discrete choice experiment that can give much richer insights into tradeoffs than a direct method. The method is naturally linked with real choices since it looks like a real purchase decision; therefore it should be more externally valid (Desarbo, Ramaswamy, & Cohen, 1995; Elrod, Louviere, & Davey, 1992; Louviere & Islam, 2008; Louviere & Woodworth, 1983; Toubia, Hauser, & Simester, 2004). The factors were therefore presented both visually (pictures of design) and with words (descriptions of performance, emissions, and price).

Choice-based conjoint studies have present some challenges. Respondents must process a lot of information when doing profile ratings; they should make their preference decision based on all the shown attributes. Another implication of the

choice-based method is that only a limited number of attributes can be used. If too many attributes are included, respondents may base their preference off of a few attributes instead of all the shown attributes (Pullman, Dodson, & Moore, 1999). Green and Srinivasan (1990) recommend not using more than six attributes in a full-profile conjoint.

In a standard regression, it is assumed that there is a linear relationship between variables. This method violates this assumption because the choice variable is categorical (choice A or B). Therefore, a model is used to express the linear regression in logarithmic terms. Both logit as probit are estimation methods that relate the paired-comparison to a choice probabilistic model, which overcomes the problem of violating the linearity assumption. The models can be used to measure the probability of a binary response based on one or more predictor. In this case, the model was used for modeling the selected car models. Both logit and probit produce the same qualitative results. However, the logit model has the advantage that it can be used to analyze the effect of a product attribute on the odds ratio, while the probit model cannot guarantee this (Bowen & Wiersema, 2003). The other alternative methods, as discussed in Table 1, are not well-suited for paired-comparison.

This study used a logit model to explain the variation of preference as much as possible on the basis of the car attributes of this research (Janssens, Wijnen, Pelsmacker, & Kenhove, 2008). This model was chosen because the odds of an event occurring can be far more easily explained using the odds ratio in the logit model than in the probit model (Hoetker, 2007; Bowen & Wiersema, 2003). A one unit change in each car attribute changes the odds by a factor of the odds ratio ($\exp(\beta)$).

The following regression model allows the utility-score of each factor's level, based on the respondents' preferences, to be calculated:

Equation 1

$$\text{Probability} = \frac{e^z}{1 + e^z}$$

Where $Z = \beta_0 + \beta_1(\text{design}) + \beta_2(\text{performance}) + \beta_3(\text{emissions}) + \beta_4(\text{price}) + \beta_5(\text{design*conservatism}) + \beta_6(\text{design*self-transcendence}) + \beta_7(\text{performance*conservatism}) + \beta_8(\text{performance*self-transcendence}) + \beta_9(\text{emissions*conservatism}) + \beta_{10}(\text{emissions*self-transcendence})$

And e = 2.71828

The coefficients β1, β2, β3 and β4, are linked to the independent variables. The dimensions of conservatism and self-transcendence are linked to the coefficients β5, β8, and β10, where a moderation effect is expected. The coefficients β6, β7, and β9 are included to make possible a correct interpretation of the moderation effect. Positive coefficients mean that the probability that the event will occur increases; negative coefficients mean that it will decrease.

The key assumptions of a logistic regression differ from most key assumptions of a standard regression. As mentioned before, a standard regression has a linear relationship between its dependent and independent variables. The dependent variable of a logistic regression is categorical, yet it also has to concern with linearity. It is assumed that there is a linear relationship between the continuous predictors and the logit of the outcome variable (Field, 2013). Although a standard regression has to do with normality and homoscedasticity, a logistic regression can overcome these problems (Hosmer, Lemeshow, & Sturdivant, 2013).

To analyze if the linearity assumption was met, a logistic regression was run; it included all the predictors arising from interactions between each predictor and the log itself. Next to linearity, the logistic regression also has to deal with the assumption of multicollinearity. Because this research has more than one predictor (four car attributes and the moderating effects), a high relationship between the variables was

not expected. The data was analyzed on tolerance statistic and variance inflation factor (VIF) through a correlation diagnosis.

Sample size

The sample size in conjoint studies varies greatly. Commercially-used conjoint studies generally range from one hundred to one thousand respondents. Less complicated conjoint studies with a low number of variables mostly have sample sizes between 100 and 150, with a mean of 138 respondents (Cattin & Wittink, 1982).. This study used four variables; therefore, the anticipated need for a representative analysis was less than 150 respondents

Design

Making ‘design’ an interval-scaled variable was challenging, since it is difficult to give a value to the factor design. As mentioned in the chapter on theory, Wu et al. (2014) used attractive and unattractive design as attribute levels. This research also used this method but adopted a smaller range of attractiveness, as defined by the model year. A new car design and a four-year-old design were chosen; it was assumed that this range will be adopted earlier in a real consideration set than that from the study of Wu et al. (2014). The range of four years is based on the maximum range of a normal lease contract (Dasgupta, Siddarth, & Silva-Risso, 2007). In addition, researchers Busse, Knittel, and Zettelmeyer (2013) collected 1,096,874 observations of used car, and the median age of used cars in their datasheet is also four years; the average is 3.98 years and an SD of 2.4 years.

A pretest was used to measure if the newer model of a well-known car was viewed as more attractive. Measuring this hypothesis was the only goal of the pretest. Therefore, a survey was held since the reason why the respondents made their preference falls outside the scope of this research. The three most-sold car models in the C-segment were illustrated for the respondents in the survey. The respondents were asked to choose the model that they found more attractive: the 2011 model or the 2015 model of each car. The three most-sold cars in the C-segment were the Volkswagen Golf, Peugeot 308, and Ford Focus. The preference between the two models was measured by showing respondents a paired-comparison, as illustrated in Appendix IV. The

respondents' preference concludes that the car model is found as more attractive compared to the other model.

Technology

Earlier research used horsepower, acceleration, and fuel consumption to quantify the technologic attributes (Atkinson & Halvorsen, 1984; Purohit, 1992). Horsepower is highly related to acceleration and works as a proxy for it. Purohit (1992) indicates that horsepower is negatively related with fuel consumption. However, Appendix V shows that this is not the case with hybrid cars, as compared with petrol cars. Therefore, both horsepower and fuel consumption were used as technologic attributes. To measure fuel consumption, the average liters of fuel per one hundred kilometers were measured. To measure average fuel consumption, manufacturers drive the car within urban areas for one third of the time and then spend the rest of the time outside urban areas

Sample attributes levels

This research's sample focused on compact cars (described by the European Commission as C-segment cars), because this, is in sales numbers, the biggest car segment in The Netherlands (Verboven, 2002; Stichting BOVAG-RAI Mobiliteit, 2015). Therefore, it was expected that this car segment would be well known by the respondents and would likely be taken into potential car buyers' considerations.

The most common attribute range of the compact cars was used to prevent that one factor was bigger because of its high range. The table in Appendix V shows most of the compact cars sold in The Netherlands in 2015. The table shows the minimum and maximum horsepower per car model, along with the associated emissions rating and price. Ranges for performance, emissions, and price were based on these numbers. Table 2 shows the levels of each attribute considered in this research.

Table 2

Attribute levels

Attribute	Range				
Emissions	40 g/km 7%	70 g/km 14%	100 g/km 20%	130 g/km 25%	160 g/km 25%
Performance	90 HP	125 HP	160 HP	195 HP	230 HP
Design	2011 model		2015 model		
Price	€ 18,000	€ 22,500	€27,000	€ 31,500	€ 36,000

As previously mentioned, a four-year range was used to compare car models' appearances. The models used in this sample were a 2011 Peugeot 308 and a 2015 Peugeot 308. This model was chosen because it was completely renewed between 2011 and 2015; therefore the respondents should see a significant difference in appearance. This well-known car was chosen because its design is accepted in the Dutch market. Choosing an unknown car model can cause the older model to be rated as more attractive by some respondents (Rugman & Collinson, 2004). Consumers' tastes are partly created through regional trends (Rugman & Hodgetts, 2001). The downside of using a well-known car model is that respondents recognized the design. Some respondents recognized the brand; they may have had previous positive or negative experiences with the car. To keep this from influencing the respondents' decisions, only one car model was used in the experiment. When different car models were use, for example from different brands, it can cause that consumers choose their preferred brand instead of the preferred design. As mentioned earlier, a pretest was used to determine if the 2015 model was considered to be more attractive than the 2011 model.

Demographics

As mentioned in the theory section, Kabadayi et al. (2013) found some correlations between different demographics details of respondents and the analyzed factors. It was also expected that these study would find some connections between preference and different demographics. Respondents were asked to provide the following gender, age, car ownership status, education level, income, and annual mileage.

Data source

A survey was conducted using Qualtrics to collect data for the conjoint analysis. The survey design is presented in Appendix VI. The survey was distributed to 205 respondents in March 2016. Most of these respondents were approached via social media. The results from the Qualtrics survey were imported to SPSS. In SPSS, the results were converted and analyzed.

IV. RESULTS

PRETEST

A pretest was performed to determine which car designs were viewed as unattractive and which were considered to be attractive. The 2011 and 2015 models of three cars were presented, and the respondents were instructed to choose their preferred model: either the 2011 or the 2015 model. The survey was completed by twenty-seven respondents to determine which car model was viewed as more attractive. The aim of this pretest was to determine if the older model of a well-known car would be seen as less attractive than the newer model. Three different car models—the Volkswagen Golf, Peugeot 308, and Ford Focus—were used. Of the respondents, 18.5% found the older Volkswagen Golf model more attractive, 11.1% favored the older Ford Focus, and 3.7% preferred the older Peugeot 308. Because the majority of the respondents found the newer Peugeot 308 model to be more attractive, this car model was used to define the design variable.

DESCRIPTION FINAL DATASET

A total of 205 respondents replied to the survey in March 2016. There were no participants detect who speed through the survey and completed the whole survey in less than four minutes. However, some respondent took more than an hour to fill in the whole survey, while most respondents filled in the survey in less than fifteen minutes. Results from respondents who did not complete the entire survey or who took more than an hour to complete the survey were excluded to ensure the reliability of the data (Sauro & Lewis, 2012). Only 176 of the completed surveys were usable; the other respondents did not fill in the whole survey or took longer than an hour to complete the survey.

Respondents' characteristics

The respondents were 68% male and 32% female, and most of them were under 35 years of age (74%). Respondents who indicated being in possession of a car totaled 69%, with 82% of those respondents owning a private car and 18% leasing their vehicles. Most of the respondents were high educated (65%), and the median income was 2000–2999 euros monthly. The majority of the respondents reported driving less

than 15,000 kilometers yearly (67%), while 11% noted driving more than 30,000 kilometers.

ANALYSIS FINAL DATASET

Model without personal values

Prior to testing the hypotheses, the assumptions underlying the logistic regression (used to test the hypotheses) were tested.

First, I tested the assumptions for the measurement without the moderating variables and tested the dataset on linearity. To test this assumption, I ran a logistic regression and included the predictors that are the interaction between each predictor and its log. The regression results were not significant (values greater than .05), which means that the assumption of the linearity of the logit function was met.

Secondly, the assumption of the independence of errors was tested. I ran a Durbin-Watson test in a linear regression analysis to test the assumption. The test gave a Durbin Watson score of 1.894, which indicated that there was a positive correlation between the variables. However, because the residuals were close to the value of two, it did not cause concern (Field, 2013).

The dataset was also tested for multicollinearity. To do so, I analyzed the data on a tolerance statistic and a variance inflation factor (VIF), running a correlation diagnosis. Neither regression showed high collinearity between the factors. The lowest found tolerance was greater than 0.1 (tolerance = 0.874), which means that there were no serious problems (Menard, 1995). The VIF also showed that there was not a strong relationship between the predictors. The highest measured VIF was 1.156; a value greater than 10 is problematic (Myers, 1990).

Table 3

Variable in the Model without interaction effects

Independent variable	Beta	Standard Error	Exp(B)	95% C.I. for Exp(B) Lower	Upper
Design	.637***	.086	1.891	1.653	2.162
Performance	.009***	.001	1.009	1.008	1.011
Emissions	-.011***	.001	.989	.988	.991
Price	.000***	.000	1.000	1.000	1.000

Note. R^2 = .181 (Cox and Snell) .243 (Nagelkerke). Model X^2 = 458.173, p = .000. *** = p < 0.01, ** = p < 0.05, * = p < 0.1

After that, the model was tested to determine if it fit the data model. Table 3 shows the results of the regression without moderating variables. The table showed a Cox and Snell R Square of .181. The Cox and Snell R Square can be compared with the R Square in a linear regression; a higher value corresponds to a better model fit. However, the Cox and Snell R Square cannot reach the maximum value of 1, like in the R Square of a linear regression. The Nagelkerke R Square fit this condition, considering a value range between 0 and 1. Results showed a Nagelkerke R Square of .243.

After testing the goodness fit of the model, the hypotheses were tested. The results are analyzed without moderating effect in Table 3.

Design (Hypothesis 1)

Hypothesis 1 was stated as follows: *External appearance positively affects consumers' car model preferences.*

Table 3 shows that the car design had by far the greatest effect on car preference (β = .637, p = .000). The odds of a consumer preferring a car with the 2015 model design were 1.891 times higher than of them preferring a car with the 2011 model design. This concludes that external appearance positively affects consumers' car preferences. Hypothesis 1 is therefore accepted.

Performance (Hypothesis 2a)

Hypothesis 2a was stated as follows: *Higher performance positively affects consumers' car model preferences.*

Performance showed some positive effect (β = .009, p = .000). The odds of a consumer preferring a particular car increased 1.009 times when the horsepower increased by 35. These results support the hypothesis; higher performance positively affects consumers' car model preferences. Hypothesis 2a was therefore accepted.

Emissions (Hypothesis 2b)

Hypothesis 2b was stated as follows: *Lower emissions positively affect consumers' car model preferences.*

The emissions variable showed a negative effect (β = -.011, p = .000). The odds ratio in this model was .989, which means that higher emissions of 30 g/km CO2 lowered the consumer preference by 0.011 times. This is in line with the hypothesis. Hypothesis 2b was therefore also accepted; lower emissions positively affect consumers' car model preferences.

Price (Hypothesis 3)

Hypothesis 3 was stated as follows: *Lower price positively affects consumers' car model preferences.*

Table 3 showed that price had very small effect (β = .000, p = .000) on consumer preference. Increases or decreases in price produced little to no change in consumers' preferences. This means that price had an insignificant influence on car preference. Hypothesis 3, which stated that a lower price would have a positive effect on consumers' car preferences, was therefore rejected. Price does not positively affect consumers' preferences for a particular car model.

Model including personal values

The same underlying assumptions were also tested for the model including the moderating variables. First, a logistic regression analysis was done to analyze to model for linearity. The regression's results were not significant (all values greater than .05), so the assumption of linearity was also met for this model. Second, a Durbin Watson test was done to test the assumption of independence of errors. With a score of 1.909, the test also showed a positive correlation between the variables for this model. Because the value was close to the value of two, it did not cause concern. Third, the model was tested for multicollinearity. The lowest found tolerance was greater than 0.1 (tolerance = 0.134), and the highest VIF was lower than the value of 10 (VIF=7.465). Therefore, there were no problems with multicollinearity.

Table 4

Variables in the Model Including Interaction Effects

	Beta	Standard error	Exp(B)	95% C.I. for Exp(B) Lower	Upper
Design	.189	.174	1.208	.859	1.700
Performance	.006 **	.002	1.006	1.002	1.011
Emissions	-.012 ***	.002	.988	.984	.993
Price	.000 ***	.000	1.000	1.000	1.000
Design*Conservatism	.192 **	.096	1.212	1.005	1.461
Design*Self-Transcendence	-.202 **	.074	.817	.708	.944
Performance*Conservatism	.001	.001	1.001	.999	1.004
Performance*Self-Transcendence	-.002 *	.001	.998	.997	1.000
Emissions*Conservatism	.001	.001	1.001	.999	1.003
Emissions*Self-Transcendence	.001	.001	1.001	.999	1.003
Price*Conservatism	.000	.000	1.000	1.000	1.000
Price*Self-Transcendence	.000	.000	1.000	1.000	1.000

Note. R^2 = .195 (Cox and Snell) .262 (Nagelkerke). Model X^2 = 460.824, p = .000. *** = p < 0.01, ** = p < 0.05, * = p < 0.1

After that, the model was test for goodness of fit. Table 4 shows the results of the logistic regression, including moderating variables. The table showed a Cox and Snell R Square of .195 and a Nagelkerke R Square of .262.

Consequently, the hypotheses were tested. Table 4 was used for analyzing the results, including the moderating effect.

Design and Self-Transcendence (hypothesis 4a)

Hypothesis 4a was stated as follows: *Self-enhanced individuals find design more important when buying a car than individuals who are self-transcended.*

Some personal values showed significant interaction effects between a car attribute and car preference. Self-transcendence negatively affected the influence that design has on car preference (β = -.202, p = .006). This means that self-enhancement positively affected the influence that design has on car preference. Self-enhanced individuals therefore find design more important when buying a car than individuals who are self-transcended. Hypothesis 4a was therefore accepted.

Design and Conservatism

The dimension of conservatism also showed a significant interaction effect between design and car preference (β = .192, p = .045). The dimension positively affected the influence that design has on car preference; this means that the contrary dimension of openness-to-change negatively affected the influence that design has on car preference. This finding was unanticipated. No hypothesis was formulated on how conservatism might affect the influence that design has on consumer preference.

Preference and performance (Hypothesis 4b)

Hypothesis 4b was stated as follows: *Self-enhanced individuals find power more important when buying a car than individuals who are self-transcended.*

Self-transcendence showed a marginally significant interaction effect between performance and preference (β = -.002, p = .096). Self-enhancement therefore positively affected the influence that performance has on car preference. This effect supported hypothesis 4b and was therefore accepted.

Emissions and Conservatism (Hypothesis 4c)

Hypothesis 4c was stated as follows: *Conservative individuals find emissions less important when buying a car than individuals who are more open to change.*

There was no significant effect found to suggest that conservatism affected the influence that emissions have on car preference ($p = .380$). Therefore, hypothesis 4c was rejected; there is no difference between conservative individuals and individuals who are more open to change in regard to the impact of emissions on car preference.

Emissions and Self-Transcendence (Hypothesis 4d)

Hypothesis 4d was stated as follows: *Self-transcended individuals find emissions more important when buying a car than individuals who are more self-enhanced.*

No significant effect was found to suggest that self-transcendence affects the influence that emissions have on car preference ($p = .486$). Hypothesis 4d was therefore also rejected; there is no difference between self-transcended individuals and individuals who are more self-enhanced in regard to the importance of emissions when buying a car.

Answering main question

After testing all the hypotheses, the main question could be answered: “What is the dominant factor in preference when choosing among cars on the Dutch market?” The results of table 3 showed that the factor of design had the biggest effect on car preference. Therefore, design proved to be the most dominant factor, followed by emissions and performance. Price had the smallest impact on car preference.

An overview of the results of the tested hypotheses is showed in table 5. For every hypothesis it is presented if the hypothesis is supported or rejected.

Table 5

Overview Results Hypotheses Testing

Hypothesis		Supported
H1	*External appearance positively affects consumers' car model preferences.*	✓
H2a	*Higher performance positively affects consumers' car model preferences.*	✓
H2b	*Lower emissions positively affect consumers' car model preferences.*	✓
H3	*Lower price positively affects consumers' car model preferences.*	✓
H4a	*Self-enhanced individuals find design more important when buying a car than individuals who are self-transcended.*	✓
H4b	*Self-enhanced individuals find power more important when buying a car than individuals who are self-transcended.*	✓
H4c	*Conservative individuals find emissions less important when buying a car than individuals who are more open to change.*	✗
H4d	*Self-transcended individuals find emissions more important when buying a car than individuals who are more self-enhanced.*	✗

V. GENERAL DISCUSSION

ANSWERING RESEARCH QUESTIONS

The main purpose of this study was to determine the dominant factor in consumers' preference when choosing among cars. The research examined the product attributes of design, performance, emissions, and price. Respondents were asked to choose between two car models. Using a logistic regression, the log odds ratio of the investigated attributes indicated the dominant factor in respondents' preferences. The logistic regression without moderating effect confirmed that all the investigated car attributes affected car preference and that car design was the biggest factor. However, when personal values were included in the analysis, the attribute of design only showed a significant effect with the personal values as moderating effect.

Design

In line with the studies from Purohit (1992) and Wu et al. (2014), this research showed that design is the biggest factor in consumers' considerations. However, a study by Kabadayi et al. (2013) considered design to be a lesser important factor in consumers' decision-making processes. A possible reason for this difference may be the definition of design that was used. The study by Kabadayi et al. (2013) measured the automobile type as an attribute; other studies used external appearance as a factor.

Performance

In the literature section of this study, it was mentioned that many studies investigated performance as a factor that impacts consumer behavior. Some studies considered performance to be an important factor (Haaijer et al., 1998; Agarwal & Ratchford, 1980). This study, however, found performance to have only a marginal effect in comparison to design. This result was more in line with the findings of Wu et al. (2014).

Emissions

The factor of emissions had little effect on consumer preference in comparison to design. Because of the Dutch tax incentives, it was expected that the factor of emissions would have a bigger impact than that of performance. With a beta

coefficient of -.011, the effect of emissions was slightly larger than that of performance (β = .009). The coefficient also directed the other way. The beta coefficient of emissions was negative, which means that the lower a car's emissions, the greater the odds that it will be selected. The beta coefficient of performance was positive, which means that the higher the performance of a car, the greater the odds that it will be chosen.

Price

Price can affect the considerations for a product purchase in two ways, as described in the literature section. However, the results of this study showed that the impact of price is barely significant. Because the beta coefficient of price was 0.000, the effect was neither positive nor negative. It was expected that price would negatively affect the respondent's preference. The limitation of this variable is discussed later in this thesis.

Personal values

This study used the Schwartz Value Survey to determine the respondents' personal values. Previous studies proved that these values could have an impact on consumer behavior, as mentioned in the literature section. This study also found some moderating effects between car attributes and car preference. Both conservatism as self-transcendence showed moderating effects between design and consumer preference. Personal values related to the product attributes of performance, emissions, and price showed no significant moderating effect between the independent variables and car model preferences.

ACADEMIC & MANAGERIAL IMPLICATIONS

Marketing managers could use this research for different purposes. The results of this study can help marketers understand the impact of the investigated car attributes on consumers' preferences. Introducing a car into the market involves high research and development costs, and awareness of the importance of different attributes helps marketing managers best spend their budget. This study showed that design is the car attribute with the greatest impact on car preference. This conclusion is in line with the

other studies that investigated the importance of design. Marketers can use this information to further invest in improving car design.

The study also showed that personal values can mitigate the impact of design on car preference. Self-enhanced people find design more important than self-transcended individuals. Marketing managers can use this information in their marketing strategy to specifically target the best audience for a particular car.

LIMITATIONS & FURTHER RESEARCH

To better understand consumer behaviors in the automotive industry, this study used conjoint analysis to analyze the effect of different car attributes on consumer preference. Conjoint analysis is more reliable and valid than measurement methods that study car attributes independently of one another. However, there were limitations to this study; these present opportunities for further research.

First, the factor of design had a much larger impact on preference than the other attributes investigated in this study. This result may have been influenced by the illustrated cards used in the questionnaire. The factor of design was the only factor that was presented visually; the other factors were presented through textual descriptions. Vriens, Loosschilder, Rosbergen, and Wittink (1998) found that visual effects more compared to textual information. A suggestion for further research is to use visuals for the other car attributes as well to provide for a better comparison of the factors. Wu et al.(2014) used visuals for most of the investigated car attributes. However, it may be difficult to use visuals for attributes such as emissions and price.

Another reason why the factor of design may have had a greater impact than the other attributes is that well-known cars were used for the study. This might have influenced the results for the factor of design. A suggestion for further research is to use relatively unknown models; a pretest would be needed for this study to measure if the unknown design is found to be more attractive than another design.

Third, in this research, an old (“unattractive”) model was compared with a new (“attractive”) car model. Further research could investigate the attractiveness of two

similar car models. In such research, the design factor may be less dominant. However, participants should be unfamiliar with the car models used in order to prevent brand recognition, which can lead to brand preference instead of preference for the car design.

Furthermore, the price attribute had a small effect on car preference in this study. A reason for this could be that no real purchases were investigated. Because the research involved a simulation of a real purchase, the respondents did not pay to purchase their preferred model. They were therefore not deterred from choosing more expensive models. Future studies could provide respondents with a "budget", which they could "spend" on any given car. Another method to prevent this limitation could be to use figures from real purchases instead of simulating the purchase decision. Instead of using a conjoint setting, the time series of sales per car model could be analyzed to find the dominant factor in consumers' decision-making.

Lastly, this research did not consider the repeated measurement of respondents' preferences in the logistic regression analysis. In other words, this study did not analyze the individuals' choices based on their preference patterns. Without repeated measurement, it is not possible to track an individual's dominant preference factor. To properly analyze individual data, a study should collect repeated measurements in a choice-based conjoint analysis.

This study found that personal values could influence car preference. The personal values were measured by Schwartz's two dimensions. These dimensions consist of ten basic values. Additional studies could be completed to investigate if there are differences among these ten values. Marketing managers could use this information to target the most suitable audience for each particular car.

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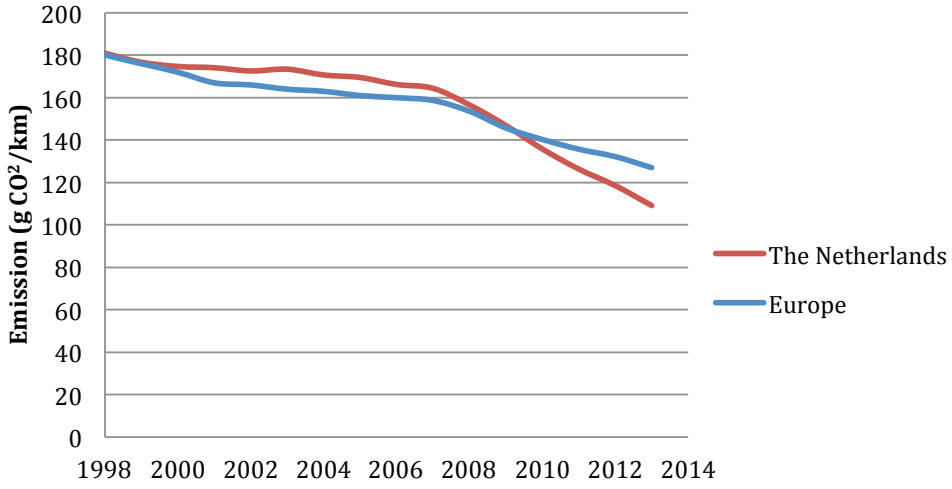
APPENDIX I

AVERAGE CO_2 EMISSIONS AND TAX INCENTIVES



Evolution of CO_2 emissions from new passenger cars. Source: (EEA, 2014)

The Dutch government uses three tax-based instruments to charge car usage. These three tax incentives are described below.

Private motor vehicle and motorcycle tax (bpm)

Consumers who buy a car in the Netherlands need to pay a one-time charge when registering the car. This tax was introduced in 1992, when consumers needed to pay a percentage of the net list price. In 2007, the tax was based on the energy label. The more energy-efficient the car was, the lower the fee that had to be paid. Since 2010, the tax has been based on CO_2 emissions instead of on energy labels. The practice of charging a baseline tax that was a percentage of the net list price was abolished in 2013; since then, the tax has been fully based on the CO_2 emissions (Belastingdienst, 2015a; Belastingdienst, 2015b).

Additional tax on company car

Privately used company cars are taxed as a percentage of the value of the car. The standard annual charge is 25% of the gross list price of the car. However, since 2008, cars with zero or low CO_2 emissions have had a reduced taxation rate. The year-on-year rates are described in the figure of this Appendix (Belastingdienst, 2015c).

Annual circulation tax

In the Netherlands, an annual circulation tax is applied to vehicles based on their weight, fuel type, and emissions rate, as well as on the owner's province. From 2008 through 2013, diesel cars with emissions of no more than 110 g/km and gasoline cars with emissions below 95 g/km were not impacted by this tax. Since 2014, this cutoff has only been applicable to cars with emissions below 50 g/km. The cars are divided in weight classes from 550 through 5050 kilograms. Every class has a range of 100 kilograms. The heavier the car is, the higher its weight class and its circulation tax (Rijksoverheid, 2015).

APPENDIX II

OVERVIEW OF STUDIES OF CAR ATTRIBUTES

Study	*Explanatory variables*	*Dependent Variable*	*Empirical context*	*Test*	*Country*
Achtnicht (2002)	CO_2 emissions, fuel type, price, horsepower, fuel costs, and fuel availability	Willingness to pay	Experiment	Choice-Based Conjoint	Germany
Cernov (2010)	Horsepower, price, quality, fuel consumption, maximum speed, acceleration and performance,	Environmental awareness	Experiment	Choice-Based Conjoint	Belgium, France, Germany, Italy and United Kingdom
Eggers & Eggers (2010)	Drive train technology, range-per-battery charge, and price	Preference	Experiment	Choice-Based Conjoint	Germany
Haaijer et al. (1998)	Price, fuel consumption, engine capacity, power steering, number of doors, and airbag	Preference	Experiment	Conjoint choice analysis	The Netherlands
Kabadayi et al. (2013)	Fuel type, price, Euro NCAP security, fuel consumption level and automobile style	Preference	Experiment	Adaptive Choice-Based Conjoint	Turkey
Purohit (1992)	Horsepower, downsizing and styling	Depreciation	Observation	Chow test	United states of America
Wu et al. (2014)	Power, external appearance, safety, fuel efficiency, gadgets and price	Buying intention	Experiment	Conjoint Value Analysis	Thailand
This study	Design, performance, emissions, and price	Preference	Experiment	Choice-Based Conjoint	The Netherlands

An overview of studies of car attributes

APPENDIX III

THE SCHWARTZ THEORY OF BASIC VALUES

Self-Direction

People who score high on this value type feel that it is important to be independent of others and do not want others to have any power over them. Associated values include creativity, freedom to choose their own goals, curiosity, and independence.

Stimulation

People who score high on this value find excitement, innovation, and challenges important. Similar values include risks and leading a varied and exciting life.

Hedonism

People who score high on this value type believe that it is important to be pleased or sensuously gratified. Values included in this value type are: pleasure, self-indulgence, and enjoying life.

Achievement

This type of value indicates the degree to which people care about personal success. Values that apply to people who score high on this value type include being ambitious, successful, capable and influential.

Power

This type of value indicates the degree to which people acknowledge that it is important to have social status and prestige. Someone who scores high on the value type of "power" will consider it important to have control over others, and this power will be expressed through the domination of others and the control of resources. Similar values are authority, wealth, social power, keeping face, and social recognition.

Security

People who score high on this type consider safety, harmony, and stability in society to be important. Values that belong under this type are: social order, family security, national security, health, and beauty.

Conformity

This value type indicates the degree to which people try to limit actions, inclinations, and impulses that are likely to upset or harm others or that violate social norms or expectations. Values that fall under the value type of "conformity" are: obedience, self-discipline, politeness, and the honoring parents and elders.

Tradition

The goal of traditional values is to respect, to be involved, and to accept the customs and ideas that are imposed on the individual by the overall culture or religion. Values related to tradition are: respect for tradition, humility, devoutness, and acceptance of one’s portion in life.

Benevolence

This type of value refers to the degree to which people view the prosperity and well-being of themselves and others as important. Common values under the benevolence value type are: helpfulness, loyalty, forgiveness, responsibility, honesty, and true friendship.

Universalism

People who score high on this type consider it important to understand, appreciate, and tolerate others. They want to protect the prosperity and welfare of all people. Common values under the universalism value type are: open-mindedness, social justice, equality, wisdom, and the attainment of a peaceful world.

APPENDIX IV

SURVEY PRETEST

Introduction

In preparation for the research for my Master's thesis, I want to know which car designs found most attractive by using this pre-test. The survey takes about 2 to 3 minutes.

Demographics

What is your gender?

- ❍ Male
- ❍ Female

What is your age?

- ❍ Under 18 years
- ❍ 18-25 years
- ❍ 26-35 years
- ❍ 36-45 years
- ❍ 46-55 years
- ❍ 56-65 years
- ❍ 66-75 years
- ❍ Over 75 years _____

What's the highest level of education you've achieved?

- ❍ Less than high school
- ❍ Lower vocational education
- ❍ Intermediate vocational education
- ❍ School of higher general secondary education/Pre-university education
- ❍ Bachelor's degree
- ❍ Professional degree/doctorate degree

Conjoint questions

Which of these two models do you prefer?

Which of these two models do you prefer?

Which of these two models do you prefer?

Word of thanks

Thank you for participating in this pretest.

APPENDIX V

C-SEGMENT CARS

C-segment cars with accompanying features

	Performance		Emissions		BPM (in %)	Price	
Petrol							
Alfa Romeo Guilietta	105	240	144	157		€ 22,950	€ 37,950
Audi A3	110	180	114	149		€ 27,250	€ 31,630
BMW 1-series	109	218	116	151		€ 24,900	€ 36,854
Citroen C4 Berline	110	131	107	112	20%	€ 19,790	€ 20,990
DS DS4	131	200	114	138		€ 26,330	€ 31,240
Ford Focus	100	182	109	140	20%	€ 18,975	€ 26,445
Honda Civic	99	142	129	150		€ 24,490	€ 36,330
Kia Cee'd	101	204	109	170	20%	€ 19,995	€ 35,195
Mazda 3	101	120	119	129		€ 22,690	€ 29,390
Mercedes-Benz A-class	102	218	124	154		€ 25,995	€ 45,495
Nissan Pulsar	116	191	117	138		€ 19,750	€ 28,400
Opel Astra	105	150	99	117	20%	€ 19,995	€ 22,895
Peugeot 308	82	205	114	130		€ 19,620	€ 32,980
Renault Mégane	116	220	119	167		€ 24,190	€ 30,690
Seat Leon	116	180	110	129	20%	€ 21,800	€ 28,900
Skoda Rapid	90	125	107	114	20%	€ 16,090	€ 22,990
Toyota Auris	99	116	119	128		€ 18,950	€ 23,790
Volkswagen Golf	85	220	113	139		€ 20,590	€ 34,390
Volvo V40	122	152	125	129		€ 25,695	€ 27,695
Hybrid							
Audi A3 e-tron	204		34		7%	€ 40,720	
Lexus CT-200	136		88		20%	€ 27,990	
Toyota Auris	136		79		14%	€ 24,395	
Volkswagen GTE	204		35		7%	€ 38,190	

APPENDIX VI

MAIN SURVEY

Introduction

Thank you for participating in the research for my Master's Thesis. The survey will take 5 to 10 minutes and is completely anonymous.

Arno van Dijk

Explanation

Imagine you want to buy a car; this can be both a private as company car. On the next page you'll be asked a number of times to make a choice between two cars.

With this car models are the following specifications:

- Power noted in horsepower. In this study it is assumed that a car with more horsepower accelerates faster and can go faster.
- Emissions listed in grams of CO_2 per kilometer. This study assumes that higher emissions causes for a higher fuel consumption.
- Price in Euros.

Conjoint questions

Which of these two models do you prefer?

125 hp
130 g/km (25% additional tax)
€22,500

125 hp
100 g/km (20% additional tax)
€18,000

Which of these two models do you prefer?

90 hp
100 g/km (20% additional tax)
€27,000

90 hp
70 g/km (14% additional tax)
€22,500

Which of these two models do you prefer?

160 hp
100 g/km (20% additional tax)
€31,500

125 hp
160 g/km (25% additional tax)
€27,000

Which of these two models do you prefer?

125 hp
70 g/km (14% additional tax)
€36,000

90 hp
130 g/km (25% additional tax)
€31,500

Which of these two models do you prefer?

195 hp
130 g/km (25% additional tax)
€27,000

125 hp
40 g/km (7% additional tax)
€31,500

Which of these two models do you prefer?

90 hp
40 g/km (7% additional tax)
€18,000

195 hp
160 g/km (25% additional tax)
€31,500

Which of these two models do you prefer?

195 hp
40 g/km (7% additional tax)
€36,000

90 hp
160 g/km (25% additional tax)
€36,000

Which of these two models do you prefer?

195 hp
70 g/km (14% additional tax)
€18,000

160 hp
40 g/km (7% additional tax)
€22,500

Which of these two models do you prefer?

230 hp
40 g/km (7% additional tax)
€27,000

160 hp
130 g/km (25% additional tax)
€36,000

Which of these two models do you prefer?

230 hp
100 g/km (20% additional tax)
€36,000

195 hp
100 g/km (20% additional tax)
€22,500

Which of these two models do you prefer?

230 hp
160 g/km (25% additional tax)
€22,500

160 hp
160 g/km (25% additional tax)
€18,000

Which of these two models do you prefer?

230 hp
70 g/km (14% additional tax)
€31,500

230 hp
130 g/km (25% additional tax)
€18,000

Which of these two models do you prefer?

90 hp

100 g/km (20% additional tax)

€27,000

160 hp

70 g/km (14% additional tax)

€27,000

Demographics

What is your gender?

- ❍ Male
- ❍ Female

What is your age?

- ❍ Under 18 years
- ❍ 18-25 years
- ❍ 26-35 years
- ❍ 36-45 years
- ❍ 46-55 years
- ❍ 56-65 years
- ❍ 66-75 years
- ❍ Over 75 years _____

Are you currently the possession of a car?

- ❍ Yes
- ❍ No

If No Is Selected, Then Skip To What's the highest level of education you've achieved?

This car is a private or company car?

- ❍ Private car
- ❍ Company car

What's the highest level of education you've achieved?

- ❍ Less than high school
- ❍ Lower vocational education
- ❍ Intermediate vocational education
- ❍ School of higher general secondary education/Pre-university education
- ❍ Bachelor's degree
- ❍ Professional degree/doctorate degree

How much is your gross income per month?

- ❍ No income
- ❍ Less than 1000 euros
- ❍ 1000 - 1999 euros
- ❍ 2000 - 2999 euros
- ❍ 3000 - 3999 euros
- ❍ Over 4000 euros
- ❍ I do not say

How many kilometers you drive each year?

- ❍ Less than 10,000 km
- ❍ 10,000 – 14,999 km
- ❍ 15,000 – 19,999 km
- ❍ 20,000 – 24,999 km
- ❍ 25,000 – 29,999 km
- ❍ 30,000 km or more

Short Schwartz's Value Survey

Please, rate the importance of the following values as a life-guiding principle for you. Use the 8-point scale in which 0 indicates that the value is opposed to your principles, 1 indicates that the values is not important for you, 4 indicates that the values is important, and 8 indicates that the value is of supreme importance for you.

	0	1	2	3	4	5	6	7	8
POWER (social power, authority, wealth)	❍	❍	❍	❍	❍	❍	❍	❍	❍
ACHIEVEMENT (success, capability, ambition, influence on people and events)	❍	❍	❍	❍	❍	❍	❍	❍	❍
HEDONISM (gratification of desires, enjoyment in life, self-indulgence)	❍	❍	❍	❍	❍	❍	❍	❍	❍
STIMULATION (daring, a varied and challenging life, an exciting life)	❍	❍	❍	❍	❍	❍	❍	❍	❍
SELF-DIRECTION (creativity, freedom, curiosity, independence, choosing one's own goals)	❍	❍	❍	❍	❍	❍	❍	❍	❍
UNIVERSALISM (broad-mindedness, beauty of nature and arts, social justice, a world at peace, equality, wisdom, unity with nature, environmental protection)	❍	❍	❍	❍	❍	❍	❍	❍	❍
BENEVOLENCE (helpfulness, honesty, forgiveness, loyalty, responsibility)	❍	❍	❍	❍	❍	❍	❍	❍	❍
TRADITION (respect for tradition, humbleness, accepting one's portion in life, devotion, modesty)	❍	❍	❍	❍	❍	❍	❍	❍	❍
CONFORMITY (obedience, honouring parents and elders, self-discipline, politeness)	❍	❍	❍	❍	❍	❍	❍	❍	❍
SECURITY (national security, family security, social order, cleanliness, reciprocation of favours)	❍	❍	❍	❍	❍	❍	❍	❍	❍

Thanks

Thank you for participating in this survey. Thank you for taking the trouble to fill in this survey. In case you have any questions and/or concerns with regard to this investigation, please let me know.

Arno van Dijk
Email: arno.dijk@gmail.com
Phone: 06 437 49 247