How car qualities make a difference – Which car qualities do consumers prefer when it comes to associations with electric cars in relation to combustion engine cars?

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Analysing the relationship of qualitative car qualities in connection to supplementary demographic variables, by conducting a multiple correspondence analysis.

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Abstract

Almost thirteen percent of European CO2 emissions are produced by passenger cars and the automotive industry. Still, electric cars, either hybrid or fully electric, are not yet adopted to a sufficient degree in order to reduce those emissions drastically. Therefore, this study explores how electric cars can be designed and built more attractively, especially for consumers who do not yet desire an electric cat, by answering the following research question: "Which car qualities do consumers prefer when it comes to associations with electric cars in relation to combustion engine cars?". To do so a multiple correspondence analysis was conducted with the data of an online survey and a non-random sample of 221 participants. The main findings are first, that dimension one of the joint plots of categories proceeds from conventionality to exuberance, and dimension 2 proceeds from traditionality to modernity. Second, it was found that older and middle-aged participants desire to drive a hybrid or fully electric car, whereas younger participants prefer a combustion engine car. Third, four clusters of associations could be identified. The first one represents the middle-aged participants who desire to drive fully electric. The second cluster represents no specific age group or car type, but the data points overlap in their extreme direction. The third cluster represents the younger target group desiring combustion engine cars. Finally, some practical implications in regard to car design are provided. Those are, considering the car sizes of sedan cars and SUVs and implementing a normal engine size and 151-250 HP. Moreover, the car brands BMW and Mercedes might develop a new target group of younger consumers. Furthermore, the car should trigger feelings like coolness and sublimity and have dark colours, a normal engine sound, and boxy/robust car body shapes.

1. Introduction

Climate change is one of the most concerning threats to the human future (Richards et al., 2021). As it causes increasingly severe environmental issues, environmentally-friendly solutions have been developed in different areas of life (Ma et al., 2020). CO2 pollution counts as one of the main drivers of global warming (Letcher, 2021). Therefore, the car industry constantly works on eco-friendly solutions for the future. Battery Electrical Vehicles, Hybrid Electrical Vehicles, or Fuel Cell Electrical Vehicles were invented as alternatives or even future replacements for Combustion Engine Vehicles. In the scope of global warming, companies took different actions like marketing campaigns, brand extension, and brand identity shaping to sell their cars. Also, governments helped to facilitate the transition to carbon low mobility by subsidising purchase costs and reducing taxes. However, resistance to adopting electric cars still exists. In many countries, the sales of electric vehicles either increased only slightly, remained static, or even decreased from 2016 until 2020 (Sanguesa et al., 2021). Hence the existing potential to sell more electric vehicles must be explored in greater detail to the current preferences of consumers. Research has been conducted regarding qualities that

influence the preference of a consumer by examining brand identification as it serves as a basis for investigating consumers buying decisions. Büyükdağ and Kitapci (2021) for instance studied antecedents of consumer-brand identification and determined, amongst others, memorable brand experience, as a crucial concept. It refers to how customers experience brands as a whole. Offering a good customer experience works as a bond between brand and consumer because the retailer remains a positive preference in the customer's memory (Büyükdağ and Kitapci, 2021). Stokburger-Sauer et al. (2012) even found that memorable brand experience has a significant effect on consumer brand identification, which makes it a possible contributing quality to consumer preferences.

However, not only brand identification but also brand image is a considerable approach to identifying consumers' preferred car qualities. Lee, et al. (2019, as cited in Wu, 2019) argue that the brand image consumers have in mind influences consumers' purchase intentions. Wu (2019) adds to that by inferring that brand image influences brand identification and consumer preferences. Therefore, both concepts have to be considered in the scope of this research.

While brand identification factors have been studied, little research has been conducted on consumer preferences that influence specifically the brand identification of car brands. In this scope, especially the difference between electric and combustion engine cars has been understudied. Moreover, the contributing consumer preferences to the brand image of vehicle models have not been addressed, yet, either. Lashari et al. (2021) for example suggest in their paper that future research has to investigate consumers' attitudes and perceptions toward electric vehicles more in order to understand their purchase behaviour better. Similarly, Long et al. (2019) add to that and stress that future research should examine the character of brands in relation to electric vehicle concerns and favouritism, due to its importance to vehicle purchase behaviour. Therefore, this study aims to fill this research gap by exploring consumer preferences that contribute to the brand image of electric cars in relation to cars with combustion engines.

The importance of studying this research aim infers the social need of reducing carbon emissions in the long run. Making electrical vehicles more attractive increases the chance of consumers' purchase decisions. Exploring Consumer preferences that are associated with the brand image of combustion engine cars could facilitate the development of electric cars that are more adjusted to those preferences. In that way, the consumers who tend to buy combustion engine cars can be addressed also by the brand image of electric vehicles, and hence the consumer-brand identification with electric cars can be facilitated. Therefore, the research question is as follows: Which car qualities do consumers prefer when it comes to associations with electric cars in relation to combustion engine cars? To address this research question, the following six frameworks will be introduced, which facilitate exploring consumer preferences in the scope of this research. These are

brand experience, product design, interior design, shape grammar, brand preference, and technical aspects.

Because this research focuses on car qualities the method used for analysing the data is a multiple correspondence analysis (MCA), which fits this exploratory statistical research. The participants were gathered via social media accounts of the researcher and the instrument for collecting the data was an online survey. The data analysis was conducted in the program SPSS. The main findings were extracted by analysing the joint plots of categories, entailing the qualitative, in combination with the supplementary variables.

2. Theoretical Framework and Expectations

First, the distinction will be made between electric and combustion engine vehicles. In order to understand those concepts better, their definition and a historical recap on the different car types will be provided in the following, as well as expectations for consumers' preferences in relation to both car types. Second, it will be elaborated on brand image and brand identification in the scope of electric cars in relation to combustion engine cars. Third, six frameworks of contributing qualities to consumer preferences in relation to cars will be introduced, as well as expectations for consumer preferences regarding those qualities will be formulated.

2.1. Electric versus Combustion engine Cars

In the course of this study, it will be distinguished between electric cars and combustion engine cars. When the term electric engine car is used, cars with engines using electricity to power the engine and thus the car. The electric energy that is released by the production of magnetic fields, is converted into mechanical energy, which powers the engine (Tong, 2014). Because this process does not result in any direct waste product, those cars are considered new/clean cars. For the results of this study, it is expected that younger people in the sample prefer a fully electric car over hybrid and combustion engine cars. This expectation is grounded in the fact that younger generations must face the consequences of global warming for most of their lifetime. Research suggests that younger drivers show a higher willingness to change their lifestyle to be more eco-friendly, by for example adopting electric cars (Barbarossa, et al., 2017). Moreover, movements like Fridays for Future, which were founded by young people, prove their engagement in fighting global warming.

Between choosing a combustion or a fully electric car there is also the option of the hybrid car. When that term is used, cars are meant that can make use of both an electric and a combustion engine, if necessary. An advantage of this is that a long-distance ride is not bounded to the condition of a charging station, because of the combustion engine. Still, it is more eco-friendly than only using a combustion engine. This makes the hybrid car a compromise for people who are willing to adapt to technology but do not want to miss the comfort of the old technology. Therefore, it is expected that participants who are middle-aged desire a hybrid car.

When the term combustion engine car is used, cars with engines that use diesel, petrol, or gas in the fuel-air mixture to combust, are meant. Since the waste product of this chemical process is CO2, which is known to destroy the Ozon layer, those engines are considered old/polluted cars (Yoro, 2020). It is expected that older participants prefer those cars over Hybrid or fully electric cars because older people tend to stick to what they know and are less willing to adopt new technologies in comparison to younger people (Barbarossa, et al., 2017). To give a better understanding of the evolution of car technology, a short historical recap is provided in the following.

Even though the first electric car was not invented much later than the combustion engine car, the latter has been adopted 100 years earlier. In fact, the first practical combustion engine car, the "Benz Patent Motorwagen Nummer 1", was produced in 1886 (Reif & Kuhlgatz, 2014). Whereas the first electric car was produced in a small series only eleven years later, from 1897 to 1907 (Vervaeke & Calabrese, 2015). The latter, however, has not been successful in its practical usage and its production thus has been ceased (Vervaeke & Calabrese, 2015). Also, other trials to diffuse this innovation failed and the combustion engine car prevailed (Burton, 2013). For over 100 years the combustion engine car was nearly the only option for consumers to choose from (Burton, 2013). But when the threat of global warming started to emerge, the interest in electric cars increased around the early 1990s again (Fayziyev et al., 2022). Even though the electric car seemed to have a comeback, and countries like Norway facilitated the adoption through several subsidies, at the end of 2016 only 5% of the cars on the roads were electric (Fayziyev et al., 2022). Sources however predict, that due to the emerging need for lower carbon emissions and the consequential political agreements on CO2 thresholds, electric cars or equivalent alternatives must become the main option for customers in the future (Martins et al., 2021). Therefore, the overall consumer experience from evaluation of purchase until owning an electric car has to be designed more attractively. Especially the product design itself must meet consumers' preferences better, meaning the consumer's brand image has to match their preferences and demands. Hence there is a need for exploring contributing qualities to consumers' preferences for both electric and combustion engine cars in greater detail. To provide a basis for that, the subsequent paragraph provides an explanation of the concepts of brand identification in comparison to brand image in relation to consumer preferences.

2.2. The Role of Brand Image and Brand Identification (in Relation to Consumer Preferences)

In the scope of this study, two approaches in the function of identifying consumers' preferred car qualities have to be considered, brand identification and brand image. The first concept is brand identification, which refers to the extent to which a consumer identifies him or herself with a certain brand. Choosing to use a product of a certain brand in daily life, for example, driving a car, is often not only reasoned in its usability. Coelho (2018) suggests that brand identification occurs in two

directions, inwardly consumers can strengthen their feeling of self-identity with a product. Outwardly, they can portray this identity to the outside, by using these products in public. Büyükdağ & Kitapci (2021) add that customers often choose a product or service based on their long-term relationship with a certain brand. Especially in the car industry consumers tend to be loyal to a brand, sometimes lifelong. The brand itself works as the bond between customer and company. This means that brand identification plays an important role when it comes to identifying consumers' preferences.

The second concept, brand image, is what the consumer perceives the brand as, referring to associations and connotations (Barbu, 2016). In other words, brand image is the consumer's picture in mind that occurs when thinking of a certain brand. Moreover, the brand image reflects what consumers associate with a certain brand, meaning values and reputation (Riezebos & Riezebos, 2003, p. 66). Keller (2013) adds to that by defining the brand image as the consumer's view of, and favouritism for a brand. Bilgin (2018) agrees with that by stating that brand image refers to the brand's position in the consumer's mind, meaning how the brand is evaluated by the consumer. This Image is the product of marketing communication, consumer experience, and social influence (Riezebos & Riezebos, 2003, p. 66). Thus, it appears that brand image is a distinctive concept that can differ from person to person. In other words, the brand image depends on the consumers' sociostructural disposition, values, and beliefs. Therefore, also brand image plays an important role when it comes to identifying consumers' preferences. Since this research explores car qualities preferred by consumers, both brand identification and brand image will serve as perspectives to view those qualities in the scope of this study.

2.3. Possible Contributing Qualities to Consumer Preferences of Cars

In the following paragraph six frameworks with corresponding possible contributing qualities to consumers' preferences for electric and combustion engine cars, will be introduced.

2.3.1 Brand experience

The first framework is brand experience which comprises the possible contributing qualities memorable brand experience, and emotional and social value.

Büyükdağ and Kitapci (2021) found that memorable brand experience has a significant effect on consumer-brand identification. When consumers experience a brand, respecting logo, name, and advertisement, a certain perception of that brand is formed in their minds (Das et al., 2019). In other words, brand experience is a contributing factor to brand image. According to Nysveen et al. (2013), brand experience incorporates four aspects, of which one is the affective facet, which refers to emotions. Emotional value is also identified by Büyükdağ and Kitapci (2021) as a quality of brand experience. It refers to the responses, in the form of feelings, that arise in connection to a product. The alignment of the emotional value of a product with the cognitive or psychological demands of a

consumer is a positive contributor to the purchasing conduct (Hur et al., 2013). Furthermore, Büyükdağ and Kitapci (2021) identify social value as a facet of brand experience. It refers to the rationale behind purchasing a product due to the ensuing social status or the ability to build and maintain relationships (Sangroya and Nayak, 2017). Therefore, the social value identifies as a quality that influences the consumers' preferences for electric and combustion engine cars. Examples of emotional value in relation to cars are for example how drivers or passengers feel during the drive, regardless of what the outside world might think about them. In this study, it is expected that older participants for instance prefer a feeling of calmness, whereas younger people might prefer a feeling of adrenaline when driving. An example of social value in this context could be how passengers or drivers want others to think about them when they see them driving a certain car. Expected for this study is that participants who prefer a fully electric car also prefer being perceived as eco-friendly. Participants who prefer a combustion engine car on the other hand might prefer to be perceived as cool or important when driving for example sportscar with a loud engine sound.

2.3.2 Product Design

Another possible contributing framework to consumer preferences is product design. Karjalainen (2003) found that his research clearly reveals the importance of strategically managed product design. In his study about strategic brand identity and symbolic design cues, using Volvo and Nokia as investigation cases, Karjalainen (2003) found that the invention and management of a brand's design language is utterly case-specific. Meaning that semantic design cues do not always result in similar perceptions, but that the comprehensibility and consistency of design cues play a much bigger role. Examples of those design cues are the grille, head, and rear lights design. Landwehr et al. (2011) for instance assert that people tend to see facial expressions in-car fronts. The grille resembles the mouth and the headlights the eyes. Thereby the authors distinguish two basic expressions, those are aggression and friendliness. They found that the friendly look provokes the feeling of pleasure, and the aggressive look provokes the feeling of arousal inside the viewer (Landwehr et al., 2011). Since the feeling of arousal stereotypically fits people who like other extremes, like high speed, loud sounds, and social validation it is expected that rather younger participants prefer an aggressive look over a friendly look. On the other hand, it is expected that older participants prefer the feelings of pleasure since it is a more quiet and soothing feeling, which means they probably prefer a friendly look. When it comes to the size of a car, often consumers it depends on their life circumstances, like budget or if they have a family (Wu & Chen, 2021). The average age for women to have babies is 29 in for instance Germany and the Netherlands (Suhr, 2019). Therefore, it is expected that middle-aged people prefer a station wagon or Van since that age group is most likely to have children. For younger participants, however, it is expected that they prefer a sedan or compact car because it is likely for them to live alone or only with their partner.

2.3.3. Interior Design

However, not only exterior but also interior design can act as a framework that helps explore consumer preferences. Research has shown that interiors have a direct influence on consumers' perceptions and that increasing interest in the Link between strengthening brands and interior design has emerged (Izadpanah, 2021). Warell and Young (2011) add to that by stating that interior design has a high relevance when it comes to brand experience and hence consumers' purchase decisions. According to them, feelings like achievement, pleasure, and inspiration can be triggered by interior design (Warell & Young, 2011). Furthermore, they explain that the experience of interior design differs from person to person because it is grounded in personal factors. This indicates that different life circumstances demand different interior designs. Since younger people are the most agile compared to the other ones, it is expected that younger people mostly prefer a sporty interior design.

In terms of materials in interior design, it is expected that older people prefer cosy fabrics, to experience a car ride as comfortable and pleasurable as possible.

Another interesting part of interior design can be the scent. Manufacturers even intentionally design a recognizable scent for their interiors (Kamp, 2012). Also, here expectations are formulated. It is expected that participants who prefer a traditional overall car experience over a futuristic one, also prefer an old car scent over a new one. On the other hand, it is expected that neutral car scent is preferred by participants who attach importance to practicality.

2.3.4. Shape Grammar

Another possible framework needs to be addressed, which is shape grammar. McCormack et al. (2004) proved that shape grammar is a key factor in brand identification. It refers to the shapes, used in the car body design. By using the term grammar, the authors describe the systematic manner behind the usage of the shapes in the design. As an example, they refer to the company Coca-Cola, which successfully managed to design a plastic bottle as an alternative to the glass bottle. Even though the bottle is not the same, the use of a shape grammar, makes the bottle recognizable, anyhow (McCormack et al., 2004). This is also valid for cars. In the same study, the authors also studied the shape grammar of Buick, an old American car brand with cult status. The brand was designed to arouse feelings of security and reliability, which shows that car bodies are designed to stimulate feelings inside the viewer (McCormack et al., 2004). Hyun et al. (2017) similarly add that brand appearance can be analysed by evaluating its stylistic design. This in turn indicates that a consumer's preferred shape of car body design can tell something about his preference for both a feeling triggered by the car's appearance or a certain brand. Frizziero et al. (n.d.) state in their study that a nowadays typical design style for cars is the advanced style which makes use of futuristic and aerodynamic shapes and stands for power and future. Therefore, it is expected for this study that

people who prefer a fully electric car, which is the most futuristic type in this study in terms of technology, also prefer shapes in the car body that are fluent and aerodynamic. The authors also mention the retro design, which resembles strongly with the look of previous Volvo models. The typical attributes are sharp-cornered. This leads to the expectation that older or middle-aged participants, who lived in the time, when the retro style was popular, prefer robust and boxy shapes over aerodynamic shapes for example.

2.3.5. Brand Preference

Brand preference is another framework potentially contributing to exploring consumer preferences. Qualities like the brand itself and the overall performance of the car, meaning an overarching term that fits the car, are comprised in this framework. The terms brand comprises a lot of different aspects. As stated, before brand image and brand identification are two important perspectives to consider when considering a brand. Since the brand works as a bond between consumer and company it follows that consumers' preferences are influenced by brands. Especially cars are products that enable a driver to portray an image to the outside world. Cars are considered status symbols (Niklas & Sadik-Zada, 2019). Mercedes-Benz for example managed to establish its brand as representing Quality and Status. There is phrase used in German, which reads as follows "Das ist der Mercedes unter…" (Engl.: this is the Mercedes among the…) (Wie lange fährt das deutsche Auto noch, 2017). This phrase is used if a product meets the highest standards in its category. On the other hand, there are brands that intentionally position themselves on the opposite side like Dacia. They once advertised in German TV with the slogan "Das Statussymbol für alle die kein Statussymbol brauchen." (Engl.: The status symbol for those who don't need a status symbol) (Schreier & Biethah, 2016, p. 117). This leads to the assumption that consumers' preferences are clearly influenced by car brands. Frizziero et al. (n.d.) for instance suggest that the so-called retro design, which according to them is a popular design style for cars, resembles strongly with previous models of Volvo. Therefore, it is expected in this study that older or middle-aged participants, who experienced this retro-style as a new style, in the past, prefer the brand Volvo over a Tesla for example, since this brand is quite new. Similarly, it is expected that younger participants tend to prefer newer car brands like Tesla over brands like Volvo.

2.3.6. Technical Aspects

Finally, the technical aspects of a car serve as a framework for exploring consumer preferences in association with electric and combustion engine cars. As Morton et al. (2016) argue technologies always have to pass through the diffusion of innovation process, which holds innovativeness as a central aspect. According to the same-titled theory, consumers adapt technology in accordance with their innovativeness. If a person is highly interested in innovation, he or she is more likely to adopt the technology early, than a so-called laggard, which usually shows a low

interest in innovation (Morton et al., 2016). This indicates that technical aspects help in order to explore consumer preferences for the more innovative car type (electric car) and the already established car type (combustion car). Chowdhury et al. (2016) for instance identify engine power as the most relevant quality for consumers who already drive an electric car. Engine power is dependent on horsepower and engine size, which therefore are qualities that need to be considered. Expected for this study is that participants who prefer electric cars also prefer small engines, since they are more eco-friendly, over big engines. On the other hand, participants who prefer a combustion engine car are expected to prefer a normal engine size or a big engine size over a small one. Especially because combustion engine cars need a higher engine speed to reach the full torque of the engine, in contrast to the electric engine, which releases the full torque shortly after starting it. The same tendency is expected for horsepower, meaning that participants who desire a combustion engine car are expected to prefer 151-250 HP or 251-350 HP, whereas people who desire an electric car desire the lower engine category, which is 50-150 HP.

3. Methods

This research is conducted to explore which car qualities consumers prefer when it comes to associations with electric cars in relation to combustion engine cars. Since the research question asks for qualities, the research design of this study is based on multiple correspondence analysis (MCA). The MCA is built upon the principal component analysis (PCA) which is a multivariate technique to analyse quantitative data (Nguyen, 2020). Meaning for example scale variables extracted from a survey with a Likert scale. MCA however analyses qualitative data, like the data gathered in this study, meaning nominal, categorical variables. The PCA aims to reduce the dimensionality in order to obtain the important data and makes use of normal Euclidean distance to locate inertia. In contrast, MCA uses the chi-square statistic to identify the distance between data points. Moreover, MCA is able to compare rows and columns, whereas PCA can only compare rows with rows. This advantage of MCA is especially important in this exploratory statistical research because it can identify patterns of relationships of multiple categorical variables (Doey & Kurta, 2011). In other words, MCA is powerful in analysing the data of this study since relations of qualities are measured.

3.1. Participants

The aim was to find 250 participants for this survey study. In fact, eventually, 211 participants took part. The target group is people between the age of twenty and seventy. This specific age range was chosen because it entails a large group of people who can have different experiences with cars and driving and it entails the main ages of car drivers. Besides that, and the ability to understand English or German, there are no other exclusion criteria for participants. As displayed in Table 1 most participants belong to the age category young, meaning they are between 20 and 30 years old. Then the category old follows, which entails the ages 51-70. The least represented category in this dataset

is the middle age category, meaning 31 to 50. Furthermore, most participants have an annual gross household income that belongs in the middle category, which comprises 61.000 to 105.000 Euros. The second most represented income category is the lowest one, entailing 30.000 to 60.000 Euros The category of participants with a higher income, meaning 106.000 to 135.000 and more Euros, is represented the least. Finally, by far, most participants own a combustion engine car, meaning fuelled with diesel, petrol, or gas. In contrast to that, only 5.7 percent of the participants own a fully electric or hybrid car.

The sampling method for this study is voluntary-response-sampling, which counts to the non-probability sampling methods. Participants voluntarily clicked a link, distributed via social media channels, owned by the researcher. This enabled a high amount of collected data in a rather short amount of time. However, this also means that the statistical inference drawn from the population is weaker than with probability sampling. Data for this research was collected via a survey that was generated in Qualtrics. The link to this survey was distributed via social media channels, owned by the researcher. Facebook, Instagram, and WhatsApp were the social media apps that the researcher made use of. In total, the survey was active for eleven days. On the first day, both a post and a story on Facebook and Instagram were generated to share the link with the researcher's followers. Additionally, the survey link was distributed via several WhatsApp groups and chats and via the Teams channel of the researcher's workplace. As expected, most responses were collected on the first day, when the link was initially posted. After five days a decrease in daily responses was recognizable, therefore another reminder on Facebook, Instagram, and Teams was posted. Afterwards, some more responses could be recorded.

Before the actual Analysis could be conducted, the dataset derived from Qualtrics was cleaned. Unnecessary variables like locational longitude have been deleted for a better overview. The variables Age and Household income have been recoded into different variables in order to categorize them into smaller groups of three. Furthermore, missing data was excluded by using the select cases command. All responses with progress below 100 were excluded, which lead to 194 valid active cases.

Table 3.1.

Demographics of participants

Question	Options	Frequency (N=194)	Percentage
What is your age?	Young	127	65.5
	Middle	20	10.3
	Old	47	24.2
What is the annual gross income in Euros in your household?	Lower	53	27.3
	Middle	107	82.5
	Higher	34	100.0
Which type of car do you own?	Diesel/Petrol/Gas	149	76.8
	Hybrid	7	3.6
	Fully Electric	4	2.1
	I don't own a car	34	17.5

3.2. Instrument

The instrument used in this study was a survey that consists of an introductory page and 22 questions. On the introductory page, the study is being explained to the participant, including the research aim and purpose. Furthermore, participants are educated about possible risks, anonymity, and the right to withdraw at any time. At the end of the first page, the contact details of the researcher are given, and the participants are asked for consent to voluntarily take part. After that, the part "Demographics" follows, asking for personal details. Then, the section "brand experience" follows, with questions about feelings associated with cars. Afterwards, in the sections "product design" and "interior design", questions regarding the participant's preference for both the outside and the inside of a car, are asked. Those sections are then followed by the part "shape grammar", which asks for preferences in shapes used in the chassis and logo design. Next, a block named "brand preference" asks for the consumer's preferred car brand and association. The block "technical aspects" ends the survey with questions about what the participants prefer in terms of technical aspects like engine size and horsepower. As stated earlier, the whole design of the instrument is targeted at MCA. This means that the questions asked for preferences of a given group of quality choices as answer options. Moreover, the questions were formulated to ask for the most preferred option over another option. For example: "Which of the following colours do you prefer most on a car?". An overview of the questions and answer options can be found in Table A1. of Appendix A. Moreover, In the settings of the survey, it was determined that participants must answer every question before moving on to the next page. Finally, participants had the possibility to finish the survey another time if they stopped in between.

3.3. Procedure of Analysis

To Analyse the data from the online survey, a multiple correspondence analysis has been conducted in the program SPSS. The MCA attempts to explain the variance of a model, meaning it allows to analyse the structure of relationships of multiple categorical dependent variables (Doey & Kurta, 2011). This geometric modelling technique reveals patterns in categorized data and bears resemblance to the Principal Component Analysis for nominal data (Roose et al., 2010). Each column and row of the two or multiway tables of the output become a point on a multidimensional graphical map, also called biplot, consisting of two or three dimensions (Doey & Kurta, 2011). The distance between those points is measured by means of the chi-square statistic, meaning the association between variables. When points are close to each other, the variables are associated with one another. If they are far away from each other, they are not associated with each other. In this way, connections in the sociostructural dispositions of consumers and connections in their tastes influencing brand image can be disclosed.

In this case, the independent, also called supplementary or quantitative variables are the demographic variables, which are age, household income, profession, and car-owning. All the other variables, including brand experience, product design, interior design, shape grammar, brand preference, and technical aspects, are the dependent variables, also called active or qualitative variables.

At first, the multiple correspondence analysis was run with five dimensions. The output displayed below shows that all five dimensions were significant with eigenvalues <1. However, the Kaiser Criterion only applies to single nominal, ordinal, or numerical level variables (Di Franco, 2016). Since this research, however, as explained earlier, analyses multiple nominal variables, it is not possible to apply this criterion here. Instead, it will be relied on the elbow criterion. This is visualized in Figure 3.1., which shows that the graph's elbow point, also called break away point, is located in the second dimension. The third, fourth, and fifth dimension had no significant difference between each other, meaning they do not add any reasonable value to the analysis. Moreover, Table 3.2. shows that the Cronbach's Alpha of the third fourth, and fifth dimension was below the threshold of .70, which counts as a satisfactory level (Taber, 2018). Therefore, only two dimensions have been included in the analysis.

Figure 3.1.

Scree plot of the Eigenvalues of each dimension

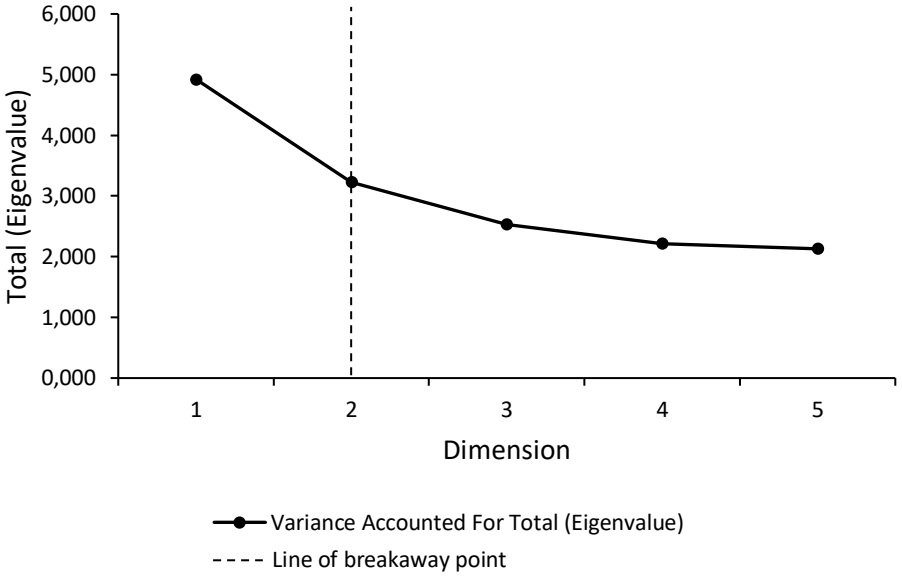


Table 3.1.

Model Summary

		Variance Accounted For	
Dimension	Cronbach's Alpha	Total (Eigenvalue)	Inertia
1	.844	4.924	.274
2	.731	3.231	.180
3	.641	2.533	.141
4	.581	2.218	.123
5	.562	2.130	.118
Total		15.036	.835
Mean	.707[a]	3.007	.167

a. Mean Cronbach's Alpha is based on the mean Eigenvalue.

Table 3.2.

Discrimination Measures

	Dimension		
	1	2	Mean
Impression feeling	.404	.304	.354
Connection feeling	.401	.198	.300
Car size	.389	.272	.330
Grille	.483	.094	.288
Headlights	.464	.054	.259
Engine sound	.389	.230	.309
Interior materials	.302	.125	.213
Horsepower	.436	.226	.331
Engine size	.359	.202	.280

Note. The data in the table below only displays categorical variables with discrimination measures larger than .3 within the two dimensions. All categorical variables with a discrimination measure <.3 were removed for aesthetics but the complete list can be found in the appendix (Table A1). The larger the discrimination measures the greater the spread between the categorical variable's levels, making it easier to distinguish.

4. Data Analysis and Results

As a basis for the following analysis first, the ranges and locations of supplementary variables will be considered. Second, the two axes will be defined regarding their content and meaning for the analysis and results. For age, there are three groups, which are young (20-30 years), middle-aged (31-50 years), and old (51-70 years). The category young is located approximately around the coordinate (0.1, 0.0), while the coordinate for middle-aged can be found at (-0.1, 0.1), and the coordinate for old at (-0.2, -0.1). Household income also is also grouped into three, those are low (30.000 - 60.000 Euros), middle (61.000 - 105.000 Euros), and high (106.000 - 135.000 Euros). The coordinate of category low lies approximately at point (-0.15, 0.2), the middle category is located at point (0.0, -0.1), and the category high has the coordinates (0.2, 0.0). In the figures 4.1 to 4.8, it appears that the coordinates for old (-0.2, -0.1) and middle-aged (-0.1, 0.1) are close to the coordinates of the category lower household income (-0.15, 0.2). Interesting is that the coordinates of the age category young (0.1, 0.0) are the closest to the category higher household income (0.2, 0.0).

By considering the distribution of data points on the joint plots of category, meaning figures 4.1 to 4.8, in their entirety, the two axes can be defined in regard to their meaning for the results. On the X-axis (dimension 1), a tendency can be recognized that proceeds from the meaning of conventionality, in the negative range of the x-axis, to exuberance, towards the positive range on the

X-axis. This definition is grounded in the tendency that the data points with the lowest value on the X-axis resemble strongly associations like normality, conventionality, or usualness. For example, the values on the X-axis of the datapoint for engine size increase as the quality increases, respectively. Meaning engine size starts with small engine size (-1.1, 1.1), is followed by normal engine size (-0.1, -0.2), and ends with big engine size (1.2, 0.4). The exact same development along the X-axis applies to most of the other qualities. Hence this tendency from conventionality to exuberance is defining the X-axis. The Y-axis (dimensions 2), on the other hand, can be defined as proceeding from the meaning of traditionality to modernity the higher the values on the Y-axis become. One example of that is the desired car type. Combustion cars (0.4, -0.6) have the lowest value on the y-axis, followed by hybrid cars (0.0, -0.3), whereas fully electric cars (-0.1, 0.4) have the lowest Y-value. The same tendency can be recognized for qualities like car performance, age, and car type owning.

The subsequent exploration is justifiable because car preferences are more related to car qualities, which is grounded in the fact that the variables do not have a linear relationship with each other. Figure 4.1. below displays the entity of all responses of participants as a point in the plot. The data points are labelled with the number of each participant. The shape of the cluster is recognisable as a horseshoe, which counts as a typical distribution pattern in MCA (Manté, 2020). In other words, the datapoints show an arched or parabolic shape. In other words, most of the data points cluster together around point zero, representing the average. Whereas outliers, located in the upper positive range of dimension two, represent exceptions. This type of shape is grounded in the fact that second dimensions have a nonlinear relationship with the first dimension.

Figure 4.2 visualizes the inertia of the variables and gives the most defining qualities for the exploration in the sample. Those are the data points with the highest coordinate values on both dimensions. These are impression feeling, driving feeling, and connection feeling, belonging to the framework of brand experience. Moreover, car size of the framework product design and car brands from the framework brand preference belong to the most defining qualities. Finally, the qualities horsepower, and engine size, belonging to the framework technical aspects, are included in the most defining qualities. In contrast, there is little inertia to the supplementary variables age and household income.

Figure 4.1

Cloud of individuals

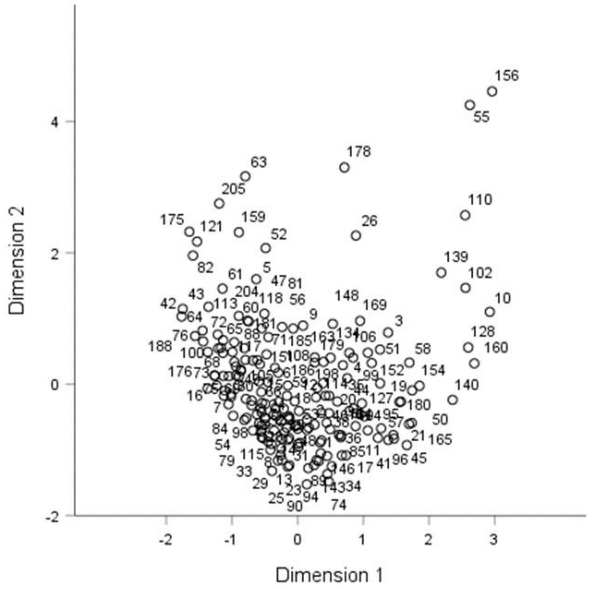
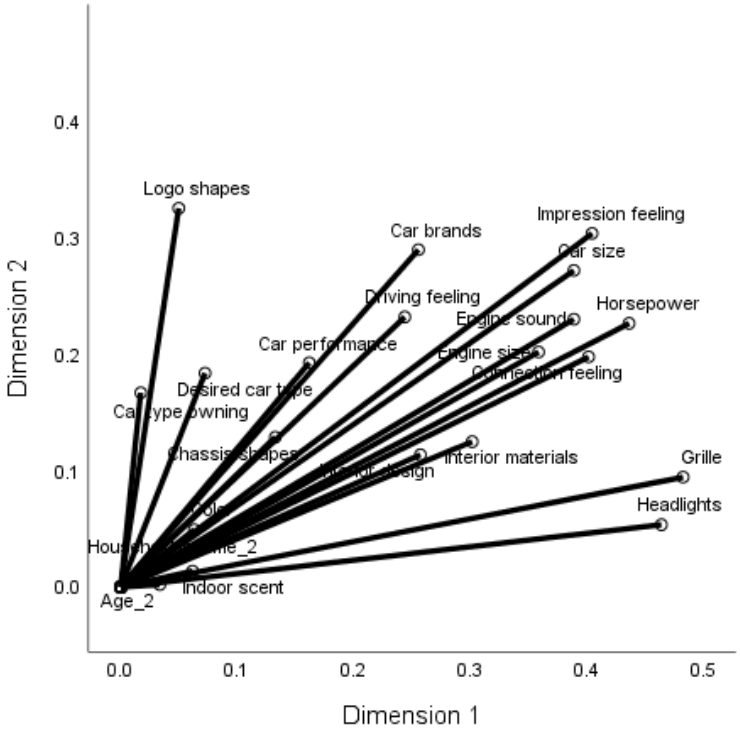


Figure 4.2

Inertia of variables



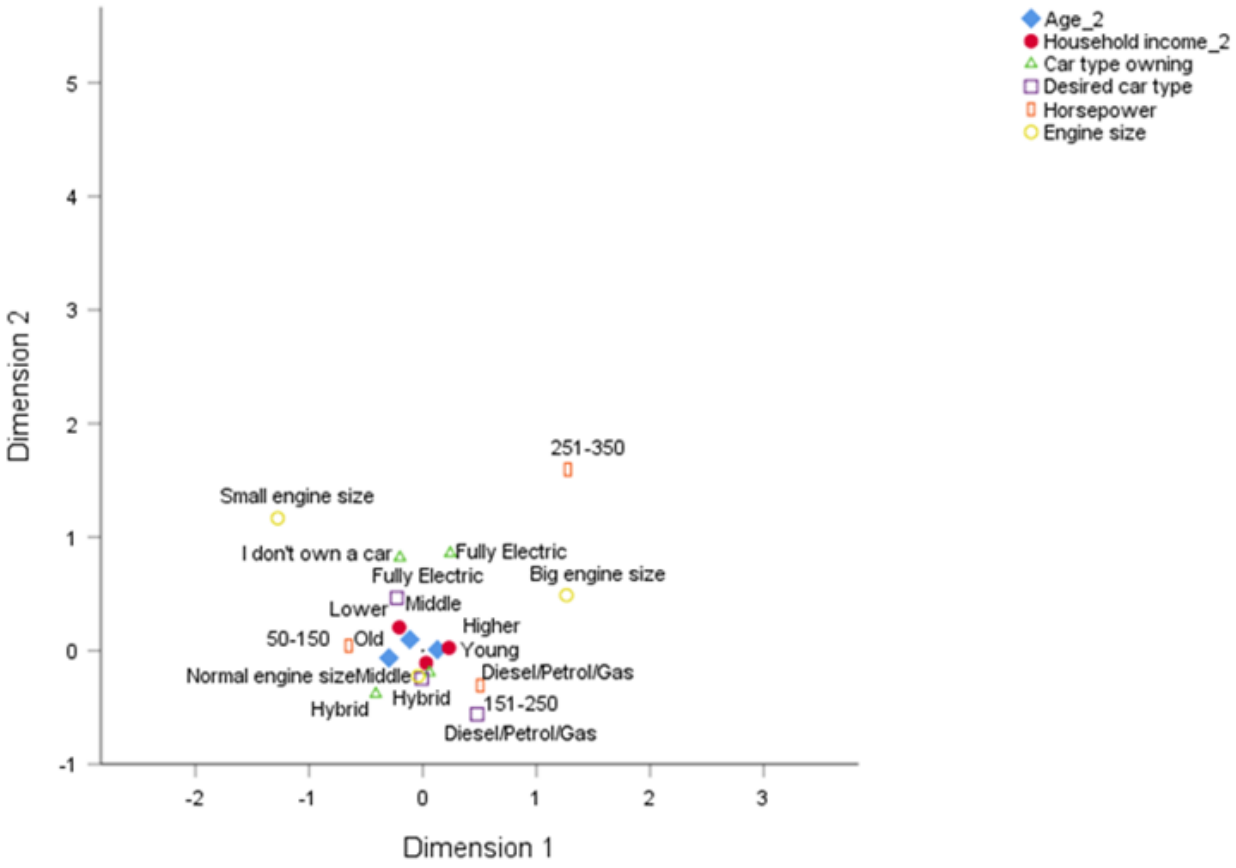
All the plots displayed below include the supplementary variables Age and Household income and the active variable desired car type. Every categorical variable is displayed with those variables in one plot.

4.1 Analysis of Technical Aspects

Figure 4.3 displays the supplementary variables with car type owning and all variables of the framework technical aspects, which are desired car type, horsepower, and engine size. Considering the most defining qualities, engine size, and horsepower, for each a u-shape, which is common for MCA, is recognizable when connecting the coordinates imaginarily. It appears, that the desired car type fully electric (-0.2, 0.4) has the lowest distance to the lowest horsepower category, 50 to 150 HP (0, -0.6), whereas the coordinates of desired car type combustion car (0.4, -0.7) are the closest to the coordinates of horsepower 151 to 250 HP (0.5, -0.4). Another interesting finding is that the coordinates for car type owning diesel/petrol/gas (0.1, -0.2) is overlapping with the coordinates of desired car type hybrid (0.0, -0.2). Moreover, the coordinates for car type owning hybrid (-0.4, -0.4 is the closest to the coordinates of desired car type hybrid (0.0, -0.2). The same applies to car type owning fully electric (0.3, 0.8), which has the lowest distance to the coordinates of desired car type fully electric (-0.2, 0.4). Another interesting finding is, that the coordinates of the desired car type hybrid (0.0, -0.2) appear to show the smallest discriminant measure along both dimensions to all the age categories, however, when parting the cluster of datapoints into four quadrants with the coordinates (0.0, 0.0) in the middle, it shows that the coordinates for diesel/petrol/gas (0.1, -0.2) are located more in the quadrant on the negative range of dimension 2 and on the positive range of dimension 1, where also the coordinates of age category young (0.1, 0.0) are located. Furthermore, the coordinates for desired car type fully electric (-0.2, 0.4) appear to be located more in the quadrant on the positive range of dimension 2 and in the negative range of dimension 1, where also the coordinates for age category middle (-0.1, 0.1) can be found. Finally, the coordinates for the desired car type hybrid (0.0, -0.2) are located more in the quadrant on the negative ranges on both dimensions, where also the coordinates of category old can be found (-0.2, -0.1).

Figure 4.3.

Joint Category Plot for Technical Aspects



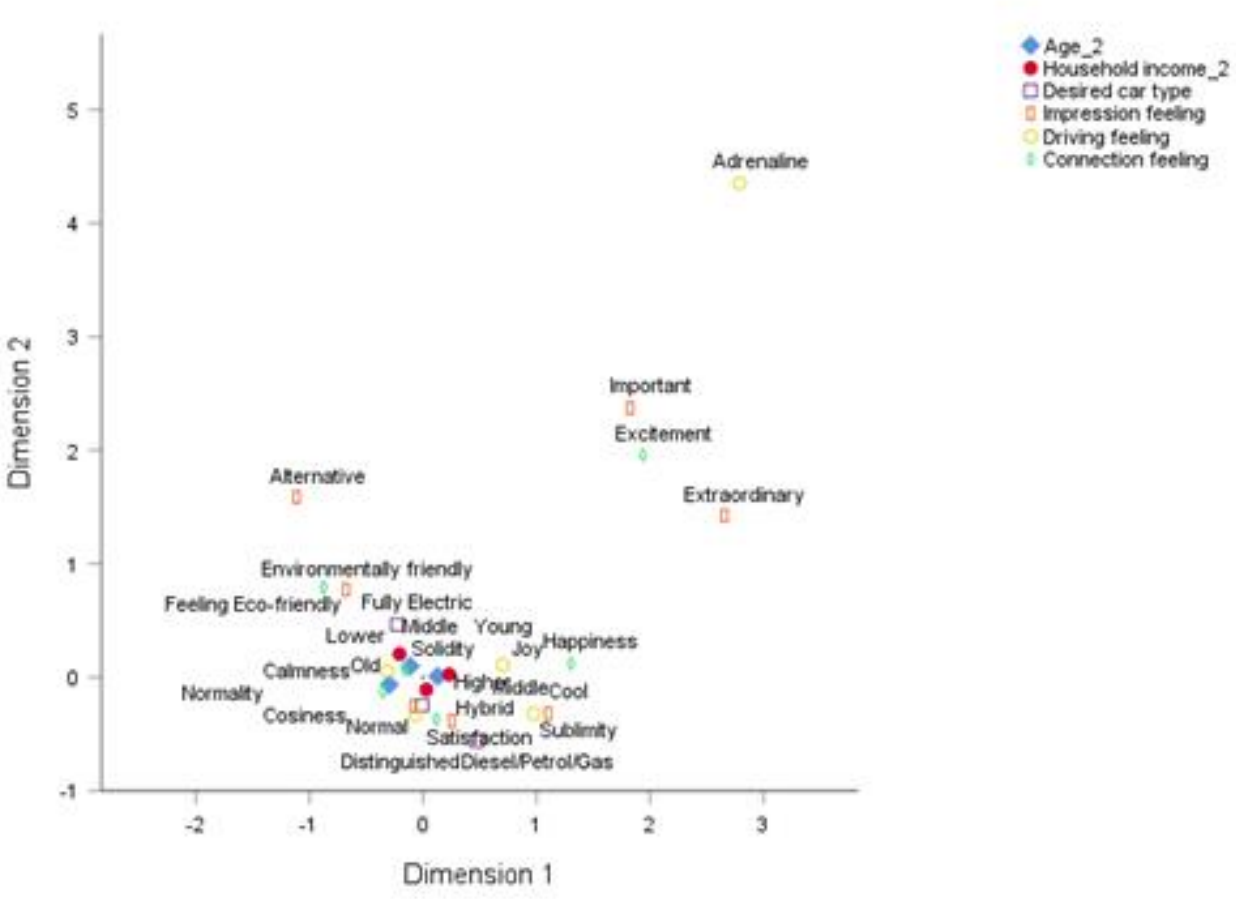
4.2. Analysis of Brand Experience

Figure 4.4. shows the supplementary variables with desired car type and all variables of brand experience, which are impression feeling, driving feeling, and connection feeling. All three count as the most defining qualities. For the structure of the coordinates for connection feeling and impression feeling a u-shape can be identified. The coordinates of impression feeling environmentally-friendly (-0.7, 0.8) are the closest to the coordinates of desired car type fully electric (-0.2, 0.4). In contrast to that, the coordinates for desired car type Diesel/Petrol/Gas (0.1, -0.2) show the lowest difference to the coordinates of the impression feeling distinguished (0.3, -0.4) and cool (1.1, -0.4). Concerning driving feeling the coordinates of joy (0.7, 0.1) and sublimity (1.0, 0.3) hold the lowest distance to the age category young (0.1, 0.0). The coordinates of the age category old (-0.2, -0.1), however, are located the closest to the coordinates of driving feeling calmness (-0.3, 0.1). Moreover, it appears that for connection feeling normality (-0.4, -0.1) shows the lowest distance to the coordinates of age category old (-0.2, -0.1). The coordinates for young (0.1, 0.0), however, are the closest to the data points of the connection feeling satisfaction (0.1, -0.4). Finally, important to

consider is that the coordinates of the age category young (0.1, 0.0) show the lowest distance to coordinates of desired car type diesel/petrol/gas (0.1, -0.2), whereas the coordinates for age category old (-0.2, -0.1) is located the closest to desired car type hybrid (-0.4, -0.4). Furthermore, the coordinates for age category middle (-0.1, 0.1) hold the lowest distance for the coordinates of desired car type fully electric (-0.2, 0.4).

Figure 4.4.

Joint Category Plot for Brand experience



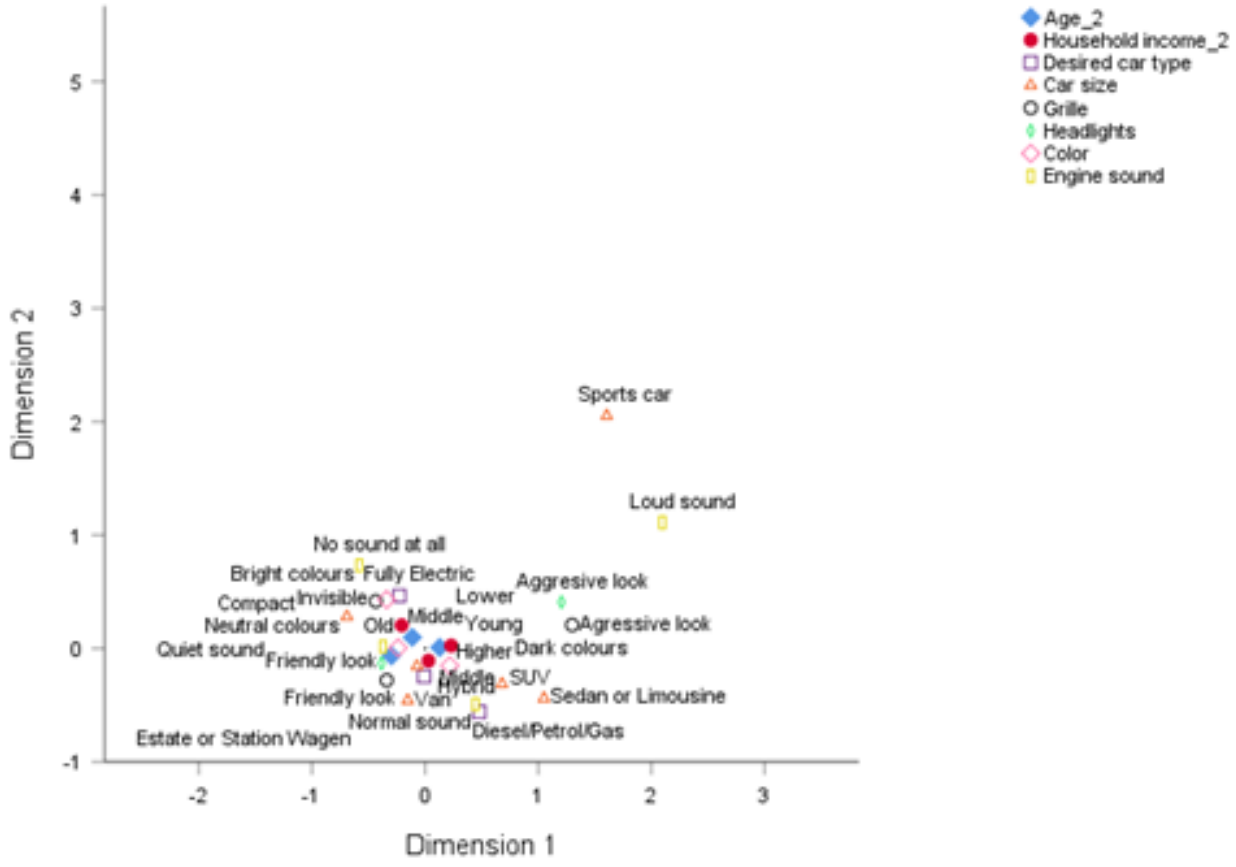
4.3. Analysis of Product Design

Figure 4.5. shows the supplementary variables with desired car type and all variables of Product Design, meaning car size, grille, headlights, colour, and engine sound. Car size is the most indicating quality of this framework. At first sight, this plot shows that the coordinates for car sizes SUV (0.7, -0.4) and sedan are the closest to the coordinates of age category young (0.1, 0.0). For the age category middle (-0.1, 0.1) on the other hand, the smallest distance can be recognized towards the car size compact (-0.7, 0.3). The coordinates for the category old (-0.2, -0.1) are located the closest to the coordinates for car size estate or station wagon (-0.1, -0.2). Concerning grille and

headlights design the coordinates for aggressive (respectively (1.3, 0.2),(1.2, -0.6) are located the closest to age category young, whereas friendly (respectively(-0.3, -0.3), (-0.4, -0.1)) shows the lowest distance to age category old (-0.2, -0.1).

Figure 4.5.

Joint Category Plot for Product Design



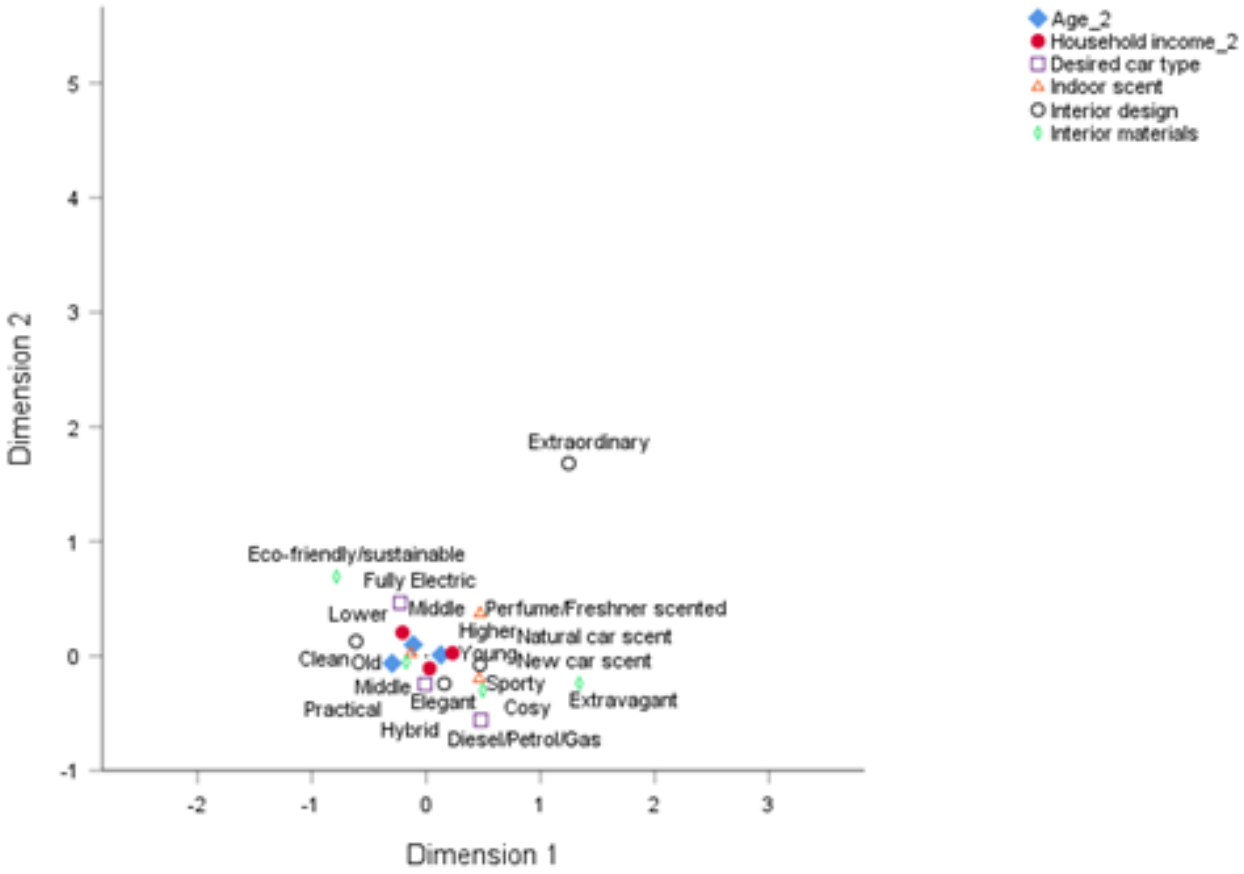
4.4. Analysis of Interior Design

Figure 4.6. shows the supplementary variables with desired car type and all the variables of Interior design, which are indoor scent, interior design, and interior materials. The coordinates of interior design clean (-0.6, 0.1) are the closest to the coordinates of the age category old (-0.2, -0.1), whereas the coordinates of category young (0.1, 0.0) show the lowest distance to the coordinates of interior design elegant (0.2, -0.3) and sporty (0.5, -0.1). Considering the variable interior materials, the coordinates for practical (-0.2, -0.1) hold the lowest distance to the coordinates for age category

old (-0.2, -0.1). The coordinates for age category young (0.1, 0.0), however, are located the closest to the coordinates for indoor materials cosy (0.5, -0.3).

Figure 4.6.

Joint Category Plot for Interior Design

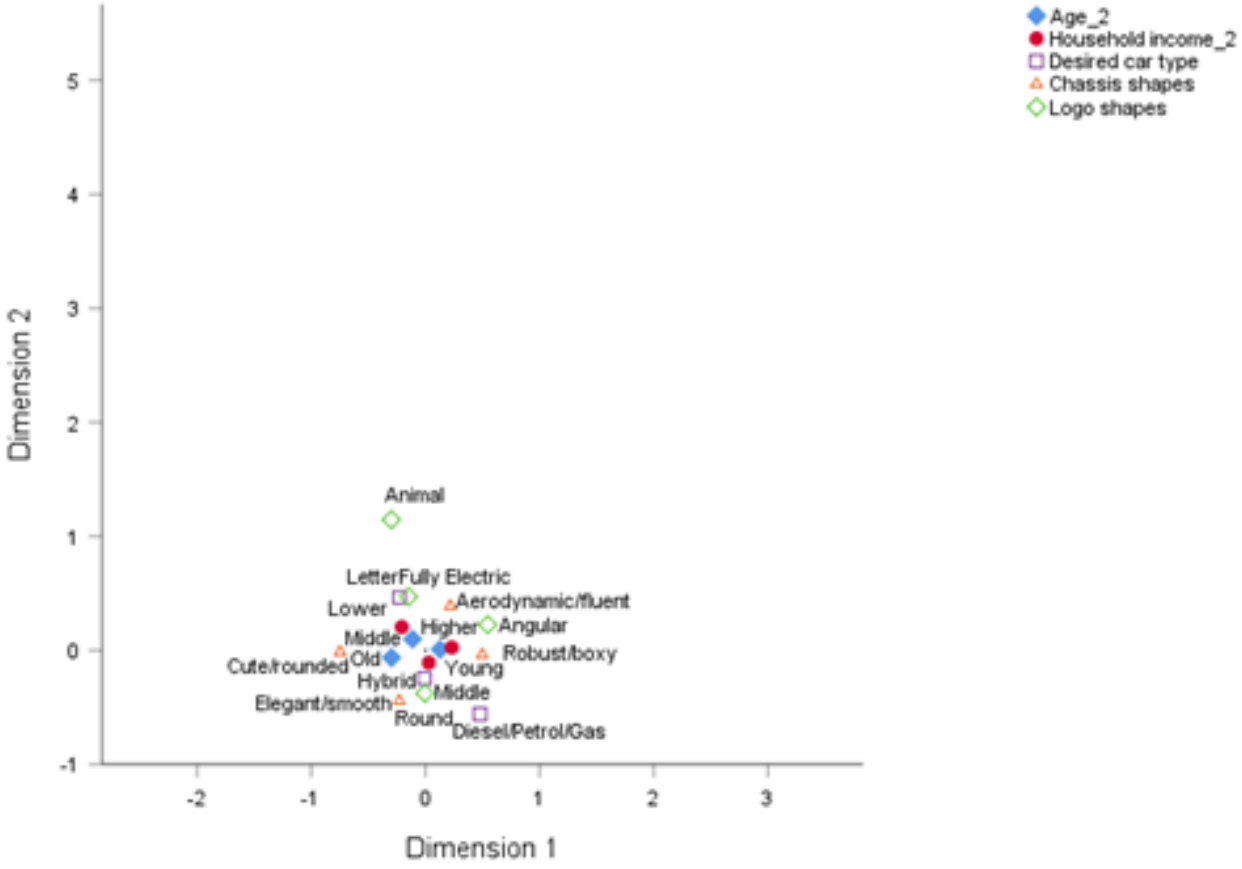


4.5. Analysis of Shape Grammar

Figure 4.7 shows the supplementary variables with desired car type and all the variables of shape grammar, which are chassis shape and logo shape. The coordinates for desired car type fully electric (-0.2, 0.4) show the smallest distance to the coordinates for aerodynamic/fluent (0.2, 0.3), whereas the coordinates of the age category old (-0.2, -0.1) yield the smallest discriminant measure along dimension two to the coordinates of chassis shape elegant/smooth (-0.2, -0.5), and the smallest discriminant measure along dimension one to the coordinates of chassis shape cute/rounded (-0.8, 0.0). It can be found, however, that the coordinates for the chassis shape robust/boxy (0.5, -0.1) are located the closest to the coordinates for age category young (0.1, 0.0).

Figure 4.7.

Joint Category Plot for Shape grammar

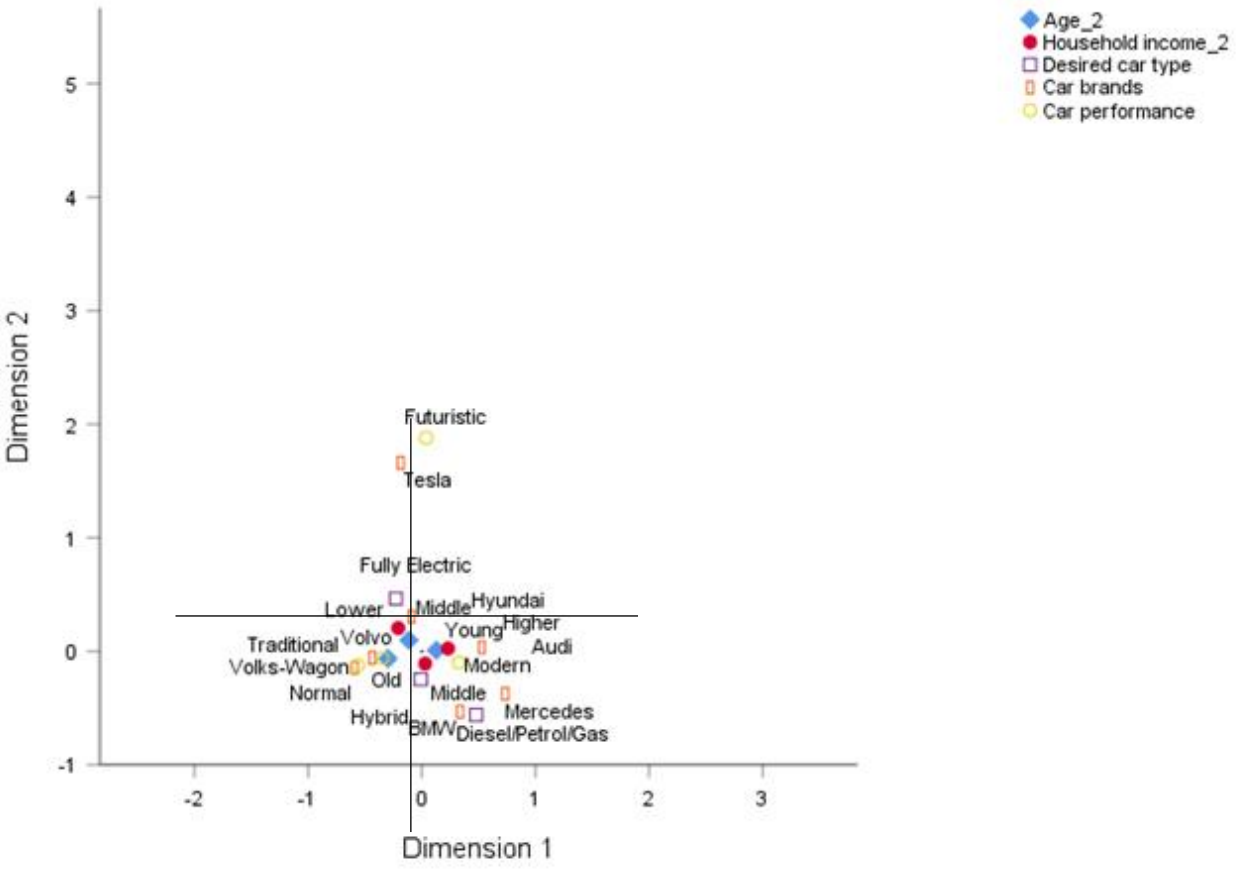


4.6. Analysis of Brand Preference

Figure 4.8 shows the supplementary variables with desired car type and all variables of brand preference, which are car brand and car performance. The most defining quality of this framework is car brands. For the coordinates of age category old (-0.2, -0.1) the smallest discriminant measure along both dimensions can be found towards the coordinates of car brands Volvo (-0.4, -0.1) and Volkswagen (-0.6, -0.2). In contrast to that, the coordinates of the age category young (0.1, 0.0) hold the smallest distance to the coordinates of the car brand BMW (0.3, -0.6) and Mercedes (0.8, -0.4). The coordinates of the car brand Tesla (-0.2, 1.7) are regarded as an outlier since it appears that they have a long discriminant measure among dimension two. The coordinates of the car brand Hyundai (-0.1, 0.3) however show the smallest distance to the coordinates of desired car type fully electric (-0.2, 0.4).

Figure 4.8.

Joint Category Plot for Brand Preference



5. Discussion and Conclusion

This research was conducted to answer the following research question: "Which car qualities do consumers prefer when it comes to associations with electric cars in relation to combustion engine cars?". To answer that question first the two dimensions and their meaning must be considered. The Analysis showed that dimension 1, proceeds from the meaning of conventionality to exuberance. This means that the higher the datapoint's values on the X-axis, the more exuberance their association appears to be. The second dimension proceeds from traditionality to modernity, meaning the higher the data points' values on the Y-axis the more modern their associations appears to be.

Considering the expectations formulated in the theoretical framework, in the sample the following deviations were found. Considering the framework brand experience indeed old participants show prefer the driving feeling calmness above for example adrenaline. The expectation that young participants prefer adrenaline as driving feeling however could not be met. Furthermore,

participants who desire an electric car appear to prefer being perceive as environmentally friendly by others. For younger participants, it was found that they do prefer to be perceived as cool by others, but instead of important they prefer distinguished over it. For the framework product design, the expectation for old participants to prefer a friendly grille and headlight design could be asserted. The same applies to the expectation for young participants to prefer an aggressive look over a friendly one. Also, the expectation that younger participants prefer a sedan car is met. However, it was also expected that young participants might prefer a compact car, which was found to rather apply to middle-aged participants. For the framework interior design only two expectations were formulated. The first one, that young people might prefer a sporty interior design is met. The second one, that old participants might prefer cosy interior materials, was not met. However, it was found that young participants prefer cosy interior materials, and old participants prefer practical interior materials above cosy interior materials. For the next framework, shape grammar, the first expectation is met. Meaning participants who desire a fully electric car prefer aerodynamic and fluent car body shapes. The second expectation, that old participants prefer robust and boxy car body shapes does not correspond with the results. In fact, they prefer cute and rounded shapes, whereas younger participants appear to prefer robust and boxy body shapes most. For the framework brand preference, it was expected that old or middle-aged participants prefer the car brand Volvo, which was found to be correct. Moreover, they also prefer Volkswagen. The expectation that young participants might prefer Tesla as a car brand, was proven wrong. Instead, they appear to prefer the car brands BMW and Mercedes. Finally, the expectations for the framework technical aspects, that participants who desire an electric car, prefer a compact car was also found to be correct. The expectation that participants who prefer a combustion engine car, prefer a normal or big engine size and normal to high amount of horsepower is partly asserted. Participants desiring a combustion engine car, namely appeared to prefer a normal engine size and the middle category of horsepower, meaning 151-250.

Besides, to which extent the expectations were asserted, the Analysis also revealed patterns in the preference of participants. The cluster of datapoints can be divided into four quadrants, of which each stands for a group of qualities in combination with the supplementary variables age and household income. The most meaningful clusters are the upper left and lower right quadrant since the desired car types fully electric and combustion engine cars can be found there. Starting with the quadrant on the negative range of both dimensions, or the lower left quadrant, associations between old participants and a lower household income can be recognised. Moreover, the desired car type Hybrid, the lowest amount of horsepower, and a normal engine size are located there. Those aspects in turn cluster together with cute/rounded or elegant/smooth chassis shapes, practical interior materials, and elegant interior design. Also located in the lower-left part are a friendly look, meaning

friendly-looking head and rear lights and a friendly-looking grille, as well as the preference for a quiet engine sound and station wagons and vans. This corner of the cloud is also associated with a lot of normality. A normal impression feeling, a connection feeling of normality and solidity, and the preferred overall car performance normal and traditional are located in the lower-left part. Finally, calmness and cosiness as preferred feelings when driving a car, and the brands Volvo and Volkswagen belong to that corner.

The lower right quadrant stands for the participants who prefer a combustion engine car, labelled as diesel/petrol/gas. Here the younger participants are strongly represented. It was revealed that for them a cool or distinguished image is most important, instead of for example being perceived as alternative, which can be found in the preferred design qualities, as well. Dark colours, extravagant interior materials, and a sporty interior design are qualities that portray coolness and modernity. Concerning the car types and brands, SUV and Sedan/Limousine and Mercedes and BMW can be found. Those qualities appear to match because the brands are well reputed and have images that portray richness, coolness, and a high-quality standard (Wie lange fährt das deutsche Auto noch, 2017). The car-type SUV can be connected to power, solely because of its physical huge appearance and a sedan/limousine may vary from the association elegant to cool.

The upper left part on the other hand represents the opposite, meaning associations of participants who desire a fully electric car. In the sample, it was found that these participants attach importance to an overall eco-friendly car. It appears that they prefer a small engine size and a compact chassis, meaning low energy use. Also concerning interior design, they prefer eco-friendly materials. Moreover, their taste for the car's design should fit those qualities, meaning no engine sound and no visible grille with an overall futuristic car performance. Finally, they prefer brands like Tesla and Hyundai, which indeed are two of the leading car brands when it comes to innovative, fully electric, and eco-friendly cars (Cho, 2021). However, this group of associations does not include any preferences for horsepower interiors design or car scent.

The lower left part represents the hybrid car. These data points can be described as the most neutral ones. Concerning technical aspects, the solidity and practicality seem to be most important, indicated by qualities like low horsepower and normal engine size. Overall, the middle categories and normal feelings dominate in this quarter, meaning they want to be perceived as normal by others and want to feel normal when driving, too. This can be found in the design preferences, as well. Participants here like neutral colours a neutral car scent and friendly-looking grille and headlights. Fitting to those aspects we found that a cute/rounded chassis design is preferred as well as a station wagon or van for car type. The preferred car type Volvo and Volkswagen perfectly match these images, since they stand for solidity and normality and portray the middle-class cars. However, interesting is that cliché wise one could have expected to find the combustion engine car in the lower

left part and the hybrid car in the lower right part. This is because the lower-left part includes more qualities that fit the laggard type of participant and the lower right part represents a younger and more modern lifestyle (Morton et al., 2016).

The opposite upper right part does not cluster with a specific car type, but it still shows associations. This group of participants prefers more extreme qualities, such as the highest category of horsepower, a big engine size, a loud engine sound, and the car-type sports car. Also concerning design, this part goes in a stronger direction, meaning an extraordinary interior design, aggressive head, and rear lights, and an aggressive grille design. Furthermore, these car drivers like strong feelings both on the inside as well as on the outside. For them, the feeling of adrenaline is important when driving and others should view them as important. An interesting finding here is that participants who already own a fully electric car can be found in this part of the cloud. Somehow it fits since a fully electric car is also a kind of extreme and has a high amount of horsepower. However, those aspects do not fit those participants who desire a fully electric car, since they seem to be more reduced. However, both parts lie next to each other, which means that there is indeed some overlapping possible. Finally, important to consider is that many of the data points in this quarter are quite far up, which indicated that those qualities are preferred by only a few participants.

To conclude, the most interesting finding is that older participants and middle-aged participants desire electric cars, whereas young people appear to prefer combustion engine cars. This finding is interesting because, as stated in the expectations, the major movements of young people fighting for higher protection of the environment, lead to the assumption that young people desire eco-friendly cars more than older or middle-aged people, who might seem to be even resistant to such drastic changes. This might be grounded in the fact that electric cars are not yet associated with coolness, as this sample suggests, and young people seem to need social validation more than for example old people. It might however also be grounded in the fact that younger people seem to have an antipathy towards Elon Musk, being the founder of the fully electric car brand tesla, as he made quite some bad headlines in the past years. The second possible explanation for that tendency might seem finances, since younger people may have a lower income due to their student status or similar. However, in this sample, it was found that young participants clustered together with the highest income category. This is probably due to the non-randomised sampling technique. Figure A3 of appendix A shows that only 24 of 194 participants indicated to be a student, and only one participant indicated to be unemployed. This means that most of the participants are employed, which might explain the high household income even for the young participants.

Moreover, this study was conducted to explore consumers' preferences in order to obtain practical implications on how the car design can contribute to reaching younger consumers. Therefore, the most defining qualities will be considered. First, the car sizes of sedan cars and SUVs

should be considered. Second, the engine size and amount of horsepower should be a medium size and 151-250 HP, respectively. Third, car brands like BMW and Mercedes were indicated as most preferred, meaning especially those brands seem to have the opportunity to close a market niche, or at least develop a new target group. Fourth, emotions triggered in connection to a car, while driving and when being seen by the public play a huge role. These feelings are targeted towards coolness, sublimity, and satisfaction. Besides the most defining qualities, there are other qualities that also have to be regarded. Those are dark colours, a normal engine sound, and boxy/robust car body shapes.

6. Limitations

Lastly, it is important to mention the limitations that this study was confronted with, in order to regard the findings with balance and give suggestions for future research. First, the research design itself has limitations, since this study used exploratory statistical methods. As explained earlier, this was the best fit, however, no post-hoc data technique, meaning no specific hypothesis has been formed, apriori. Hence no significance testing was conducted, either. Second, the sample was not collected randomly. In other words, there is a possibility that like-minded people are represented in this sample. Third, the feedback of one participant indicated that some questions were answered with no real preference since the participants were forced to answer every question before moving on to the next part. This may apply to more participants, which would have an impact on the findings. However, since nearly 200 valid responses were collected, this impact might not be too big.

Furthermore, it may appear that the sample does not fit the research very well, since most of the participants are between the ages of 20 to 30, who might not count as the new-car purchase audience. However, the assumption that due to age this sample does not fit well, can be invalidated because the results revealed that only 24 of 194 participants are students. Moreover, the younger participants mostly cluster together with the highest income category, which indicates that the financial conditions to purchase a new car seem to be given. Furthermore, in Germany for instance electric cars are highly subsidised, which invalidates this assumption even more. Still, it has to be considered that these arguments hold for this sample. Therefore, a suggestion for future research is to investigate how strong this target group in fact is, by using a randomized sample, taking nationality more into account in order to see where in Europe this target group is located.

Another limitation of this study is the cultural aspect. Büyükdağ & Kitapci (2021) mention that culture can act as a monitor when it comes to the concept of brand image. This means that in Albania for example other social values apply, due to its socialistic history. Therefore, a suggestion for future research is to see to what extent culture influences the preferences of consumers in regard do electric and combustion engine cars.

Finally, in this research, the concepts of brand image and brand identification were considered. Brand identity, however, was not regarded. Since brand identity, as Barbu (2016) indicates, also has an influence on brand image, future research should aim to investigate to what extent brand identity affects consumers' preferences when it comes to electric cars in relation to combustion engine cars.

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Appendix A

Table A1

Questions and answering options of the instrument with their frequencies (N) and percentages

Question	Options	Frequency	Percentage
How do you want other people to think of you the most when driving a car? As...	Distinguished	5	2.6
	Important	2	1.0
	Extraordinary	4	2.1
	Cool	19	9.8
	Normal	129	66.5
	Alternative	4	2.1
	Environmentally friendly	31	16.0
What is the most important feeling for you, in connection to a car?	Excitement	3	1.5
	Happiness	23	11.9
	Satisfaction	68	35.1
	Solidity	24	12.4
	Normality	49	25.3
	Feeling Eco-friendly	26	13.4
Which feeling is most important to you, when driving a car? (Regardless of how others think about you)	Adrenaline	2	1.0
	Calmness	97	50.0
	Joy	37	19.1
	Sublimity	4	2.1
	Cosiness	53	27.3
Which of the following colours do you prefer most on a car?	Dark colours	110	56.7
	Bright colours	38	19.6
	Neutral colours	46	23.7
Which car size do you prefer most?	Compact	54	27.8
	Sports car	9	4.6
	Sedan or Limousine	12	6.2
	Estate or Station-Wagen	74	38.1
	SUV	27	13.9
	Van	18	9.3
What grille design do you prefer most?	Agressive look	43	22.2
	Friendly look	103	53.1
	Invisible	48	24.7

Question	Options	Frequency	Percentage
What headlights and rearlights design do you prefer most?	Aggresive look	47	24.2
	Friendly look	147	75.8
Which engine sound do you prefer most?	Loud sound	9	4.6
	Normal sound	69	35.6
	Quiet sound	85	43.8
	No sound at all	31	16.0
Which interior design do you prefer most?	Clean	71	36.6
	Extraordinary	6	3.1
	Sporty	56	28.9
	Elegant	61	31.4
Which interior materials do you prefer most?	Extravagant	10	5.2
	Cosy	62	32.0
	Eco-friendly/sustainable	37	19.1
	Practical	85	43.8
Which indoor scent do you prefer most?	New car scent	34	17.5
	Perfume/Freshener scented	9	4.6
	Natural car scent	151	77.8
Which chassis shapes do you prefer most? (The body of the car)	Robust/boxy	27	13.9
	Elegant/smooth	66	34.0
	Aerodynamic/fluent	80	41.2
	Cute/rounded	21	10.8
Which Logo shapes do you prefer most?	Angular	22	11.3
	Round	126	64.9
	Animal	31	16.0
	Letter	15	7.7
Which of the following car brands do you like most?	Audi	48	24.7
	BMW	28	14.4
	Mercedes	16	8.2
	Volks-Wagon	55	28.4
	Volvo	24	12.4
	Tesla	16	8.2
	Hyundai	7	3.6

Question	Options	Frequency	Percentage
If you look at the overall performance of a car, which association would you prefer?	Futuristic	10	5.2
	Modern	112	57.7
	Normal	56	28.9
	Traditional	16	8.2
How much HP do you prefer?	50-150	94	48.5
	151-250	86	44.3
	251-350	14	7.2
Which engine characteristics do you prefer?	Big engine size	24	12.4
	Normal engine size	151	77.8
	Small engine size	19	9.8
If given a choice to pick any car you want, free of charge, what type of car would you like to drive?	Diesel/Petrol/Gas	42	21.6
	Hybrid	66	34.0
	Fully Electric	86	44.3

Table A2

Discrimination Measures

	Dimension		Mean
	1	2	
BE1 Impression feeling	.404	.304	.354
BE2 Connection feeling	.401	.198	.300
BE3 Driving feeling	.244	.232	.238
PD1 Color	.063	.049	.056
PD2 Car size	.389	.272	.330
PD3 Grille	.483	.094	.288
PD4 Headlights	.464	.054	.259
PD5 Engine sound	.389	.230	.309
ID1 Interior design	.257	.114	.185
ID2 Interior materials	.302	.125	.213
ID3 Indoor scent	.062	.014	.038
SG1 Chassis shapes	.133	.129	.131
SG2 Logo shapes	.050	.325	.187
BP1 Car brands	.255	.290	.272
BP2 Car performance	.162	.193	.177
TA1 Horsepower	.436	.226	.331
TA2 Engine size	.359	.202	.280
TA3 Desired car type	.072	.184	.128
D1_2 Age_2[a]	.034	.002	.018
D3_2 Household income_2[a]	.021	.018	.020
D4 Car type owning[a]	.017	.167	.092
Active Total	4.924	3.231	4.078

a. Supplementary variable.

Table A3

D2 Profession

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Legislators, Senior Officials and Managers	30	15.5	15.5	15.5
	Professionals	13	6.7	6.7	22.2
	Technicians and Associate Professionals	30	15.5	15.5	37.6
	Clerks	45	23.2	23.2	60.8
	Service Workers and Shop and Market Sales Workers	29	14.9	14.9	75.8
	Skilled Agricultural and Fishery Workers	1	.5	.5	76.3
	Craft and Related Trades Workers	11	5.7	5.7	82.0
	Plant and Machine Operators and Assemblers	9	4.6	4.6	86.6
	Elementary Occupations	1	.5	.5	87.1
	Unemployed	1	.5	.5	87.6
	Student	24	12.4	12.4	100.0
	Total	194	100.0	100.0	