Master Thesis

Carstomization

An Empirical Study Investigating the Usability of an Online Mass Customization Configurator and Attitudes for High Involvement Products in The Automotive Industry

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Zusammenfassung

E-Commerce gewinnt im Alltag der Österreicher ständig an Bedeutung. Nicht nur junge Altersgruppen, sondern auch ältere Nutzer entdecken das Internet für sich. Zudem steigt auch die Anzahl der verfügbaren Produkte und Services, die man im Internet erwerben kann. Onlineshops und Plattformen müssen hierbei also möglichst benutzerfreundlich aufgebaut werden – vor allem im Bezug auf die wachsende Altersbreite der Online-Shopper. Bei der Unterscheidung von Produkten und Services kann zwischen Low- und High-Involvement-Produkten/Services unterschieden werden. Der erfolgreiche Verkauf von High-Involvementprodukten erfordert online besondere Verkaufsstrategien. Hier sind Personalisierungstechniken sowie die Implementierung von Konfiguratoren, die das eigene Zusammenstellen und Individualisieren der jeweiligen Produkte ermöglichen, oft genutzte Vorgehensweisen.

Das Ziel dieser Arbeit ist es infolgedessen, die Benutzerfreundlichkeit eines Online-Konfigurators für ein High-Involvementprodukt (Auto) zu untersuchen und darüber hinaus die Einstellungen von Österreichern im Hinblick auf Online-Autokäufe zu erforschen. Die Untersuchung der beiden Themengebiete erfolgte hierbei zweistufig: Die erste Forschungsfrage sowie die zugehörigen Hypothesen wurden mittels Literaturrecherche erarbeitet. Es erfolgte die empirische Untersuchung, welche hierbei mittels einer Triangulation durchgeführt wurde: Zu Beginn wurde eine Eyetracking-Studie mit anschließender Diskussion und Befragung durchgeführt. Auf Basis dieser Erkenntnisse wurden die zweite Forschungsfrage sowie die zugehörigen Hypothesen formuliert. Untersucht wurden diese mittels eines Fragebogens, der online von 214 Teilnehmern durchgeführt wurde. Die Zielgruppe für beide Themengebiete waren Österreicher im Alter von 30-60 Jahren, wobei die Teilnehmer in zwei Altersgruppen geteilt und diese miteinander verglichen wurden.

Die Ergebnisse der Arbeit zeigten unterschiedliche Wahrnehmungen der Benutzerfreundlichkeit des Konfigurators, sowie unterschiedliche Einstellungen zum Online-Kauf von Autos. Die größten Unterschiede sind zwischen den beiden Altersgruppen zu finden. Eine generelle Offenheit gegenüber Online-Käufen von

Autos ist feststellbar, sowie der Wille zum Online-Konfigurieren eines Autos. Jedoch spielt hierbei die Benutzerfreundlichkeit eine hohe Rolle, die laut der Wahrnehmung der Probanden vernachlässigt wurde.

Abstract

E-Commerce constantly gains in significance in the daily life of Austrians. Not only young age groups but also older users keep discovering and using the internet. Besides that, also the number of available products and services that can be purchased online increases. This is why online shops and e-commerce platforms need to be built and designed as user-friendly as possible – especially concerning the broadening age range of the online shoppers. When distinguishing between products and services, a difference between low- and high involvement products can be made. For selling high involvement products online, specific sales strategies are needed. Personalization techniques as well as the implementation of online configurators that allow customizing of the products and services are often used approaches.

The goal of this thesis is to examine the usability of an online-configurator that lets people customize a high-involvement product (car) and also to investigate Austrian users' attitudes towards the online purchase of cars. The examination of these two topics therefore was conducted double-staged: The first research question and the corresponding hypotheses were developed based on literature reviews. The empirical investigation was administered afterwards by using a triangulation: at the beginning, an eye-tracking study was executed, followed by a discussion and a questionnaire.

Based on findings that were gained there, the second research question and the corresponding hypotheses were formulated. These were answered with the aid of a questionnaire that was filled out online by 214 participants. The target group of both topics were Austrians aged 30-60, whereas the participants were split up into two age groups and compared with each other.

The findings and insights of the thesis show different levels of perception of the usability of the online configurator as well as different attitudes towards the online purchase of cars. The biggest differences can be seen between the two age groups. There is, however, a general open-mindedness towards the online purchase of cars, as well was customizing cars online. Nevertheless, the usability looms largely in this context but, however, was heavily neglected, referring to the participants' perception and opinions.

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1. Preface

1.1 Introduction of the topic

E-commerce is an important part of commerce for already 20 years now. Revenues are increasing, and more goods and various kinds of products and services can be bought online. Starting the e-commerce business two decades ago, people on E-Bay and Amazon were mainly selling a small number of products such as books or CDs. Nowadays there are just a few things to find that can*not* be bought online. Buying products and services online can be relieving for customers as well as companies, yet, there are some things that need to be considered, such as returning policies or how to present the product/service online. Customers are keener to buy products (online) that don't require much intellectual effort and are not that pricey, such as clothes, books or similar products (see Handelsverband Österreich, 2018b). The decision to buy products is also positively influenced when the returning policy is advantageous to the customer, like Amazon's returning policy is (see Nissenbaum, 2001). However, high involvement products are still preferably bought in regular stores than in online shops (see Handelsverband Österreich 2018b; Handelsverband/KMU Forschung Austria (2017). High involvement products are not bought as often as products of daily use like clothes, shoes, etc. as they require a bigger amount of money and also a more involved way of thinking when it comes to considering buying the product or not. The combination of a higher price and durability make the consumer consider the buying process more precisely. Due to this, consumers often prefer buying such articles in regular stores over buying them online, as they can examine them, touch them and talk about them with salespeople. It is therefore interesting and important how e-commerce can be improved so that people start buying (or buy more) high involvement products online. There are already some features that improve the functionality of online shops, such as personalization functions, e.g. several kinds of recommender systems. These systems gather information about users and use them to tailor the website that's presented to the customer with information and products that are most relevant for them. Yet, recommender systems often still fail or don't work well enough as the consumers' needs and thoughts are not always as clear and linear as the systems

may presume. Especially in the high involvement sector (e.g. TV systems, furniture, cars), it is problematic to personalize websites as the amount of collected data about the user is insufficient for appropriate recommendations. This is why many companies that manufacture and sell high involvement products have launched online configurator systems where potential customers can customize their products the way they want them to be. Therefore, the companies are able to avoid the mentioned difficulties that can occur while using recommender systems/other personalization methods. Many different kinds of products are customizable online now, such as surfboards[1], furniture[2] or even cars.

Car configurators have been online for some time, yet they keep on being improved with latest technology features such as 3D views or other possibilities to see the car in virtual reality views[3]. With the growing number of internet users and their target groups, car sellers need to be aware that now a bigger number of prospective customers visits their configurator sites, also with an broadening age range. This means that the configurators have to be designed as user friendly as possible, for people of different age groups. Usability is a big and important factor when it comes to designing websites and therefore cannot be regarded as negligible concerning customization sites such as car configurators. The perceived quality of usability decides, if users feel comfortable on a website, if they are able to navigate themselves and determinates the time spent on a website. In e-commerce, usability has an even bigger importance as it can influence the potential customer in a negative way (leaving the site and not returning, not buying anything, bad (e-)word of mouth…) as well as in a positive way (spending much time on the site, strolling around, buying (initially not even desired) products, recommending the site to friends…). These reasons showcase why usability is highly significant in e-commerce.

[1] https://www.cisurfboards.com/board-builder/#

[2] https://tylko.com/de/regal/bucherregale/85542/

[3] https://www.bmw.de/de/ssl/configurator.html#/7N51/FPDSW,P0668,S01AG,S01CB,S01L2,S0205,S0230,S0249,S0255,S02PA,S02VB,S03MB,S0423,S0428,S0450,S0493,S0494,S04P5,S0544,S0548,S0563,S05A1,S05A2,S05AQ,S05DA,S05DM,S06AE,S06AF,S06AK,S06C1,S07LE,S0801,S0851,S0879,S08KB,S08TF/modelFinder/

1.2. Research objective

Customizing (high involvement) products can be a fun thing to do, but it can be also confusing and exhausting. Usability plays, as already mentioned, an important role. Distinguishing between the usability of ordinary e-commerce sites and the usability of online configurators is needed. Online shops need to garner as much attention as possible from users through visual attractiveness (in the form of product pictures, buttons, colors, etc.), while an online configurator must as well provide all of these things, but due to the customization character, it also needs to be more user-friendly because the users need to *learn* how to operate the online configurator in the first place – ideally as intuitive as possible. This is why especially for configurators usability is important and can sometimes be challenging.

Literature and research have been providing answers to several questions about this topic. yet, there is still a gap in research when it comes to analyzing the usability of tools that are used for customizing high involvement products, such as cars. Particularly regarding the broadening age range of consumers – not only young people use the internet, but also elderly people who lack experience and intuitivism when it comes to browsing the web – needs to be considered. Yet there are no studies or research that analyze the usability – especially for non-digital natives. This is why this study researches this topic and is exclusively accepting participants aged 30-60.Thus, the usability of an online car customization program (Volkswagen Konfigurator) will be analyzed and evaluated. It will be compared to a conventional method of customizing a car, namely customizing it by use of a leaflet. The usability of those two customization ways will be analyzed and measured with the help of an eye-tracking study which was conducted by the author.

Therefore, important insights could be gained regarding the usability of online configurators, especially in comparison with a conventionally used method (the leaflet). Based on the insights the study provided, guidance and recommendations for improvement were worked out.

32 voluntary study participants attended the study where they were asked to customize themselves a car to individual preference while their eye movements were being tracked during the time they used the configurator (online/leaflet) via two different eye-tracking devices (glasses for leaflets, stationary device for online

configurator). The participants were divided into groups which allowed the author to compare the groups which used the online configurator directly with the group which used the leaflets.

Additionally, the participants also were asked to fill out questionnaires before and after the study, what adds more complementary information to the eye tracking data. Therefore, the eye movements and the questionnaires (including a short discussion after the study) deliver an extensive amount of insights and information regarding the usability of the configurators. After the eye-tracking study, an online questionnaire with 200 participants from Austria was conducted, again asking for car buying behavior, attitudes towards cars and online shopping. In the end, the online configurator and the leaflet were compared and rated.

1.3. Structure of thesis

The thesis consists of a theoretical, a methodical and an empirical part. The theoretical part delivers information about e-commerce in general, discusses important topics will be discussed, and summarizes the current scientific knowledge regarding this topic. Personalization and customization will be a big part of the theoretical part as those two topics are different, yet similar and strongly connected to each other. Big data and artificial intelligence are also mentioned as there are already some online shops that already work with these kinds of technology. It is also necessary to discuss customer journey and consumer behavior as they are as well necessary topics. The consumers' behavior is what needs to be considered and thought of most, which makes it important to know them as best as possible. Accordingly, consumer journey and consumer behavior are also taken up with.

The methodical part explains the study methods which were used in this thesis: first the eye-tracking study which was used to analyze the usability of the two configurators. This method was used to answer the first set of hypotheses that were formulated based on the current scientific knowledge. A new set of hypotheses was developed based on the insights of the eye-tracking study. Those were answered based on the information and insights that were gained by a quantitative questionnaire with 200 participants who filled it out online.

The empirical part consists of analysis and evaluations of the two studies. The insights are interpreted qualitatively (eye-tracking) and quantitatively (online

questionnaire). It is important to mention that the eye-tracking study data not only consists of the eye gaze movements but also of the questionnaires and the verbally expressed opinions people gave directly after the eye-tracking study was finished. The eye-tracking data therefore was interpreted manually, while the online questionnaire was interpreted with the help of statistics software SPSS.

After interpreting the data, the rest of the hypotheses will be verified or falsified, and the research question will be answered finally. The thesis concludes a with a summary and future implications.

2. Current Scientific Knowledge

This chapter gives an overview about the current scientific knowledge of the topic of the thesis. Several studies and insights that have been conducted and will be presented in a chronological order. Since the research question and the research object have changed during the process of research, the demonstration of the following studies will not be holistic. Research was drawn from several databases like SpringerLink, Sage Journals, and Elsevier. Due to the change of subject the search terms were rather versatile, such as “Personalization for high involvement products”, “(Online) Consumer Experience”, “Customization of High Involvement Products” or “Customization in e-commerce”. After completing the literature review, the first research question was conducted. The former topic of the thesis consisted of personalization methods for online shops selling high involvement products. Research about this topic has led to the realization that customization and personalization are both important topics when it comes to e-commerce, yet there are hardly any new developments concerning personalization methods when it comes to e-commerce personalization during the last ten to fifteen years (see Handelsverband Österreich 2018b; Handelsverband/KMU Forschung Austria (2017**)**. High involvement products, in particular, have been difficult to sell on a personalized basis. This is why customization has been on the rise for some years now. This insight was the trigger to alter the research topic (or the focus) and analyze customization for high involvement products more detailed. Still, as the research has led to this change, some of the articles and studies are still relevant because customization and personalization tend to flow into one another sometimes as well. As the thesis deals with different topics, the chapter will also split up into these different topics as far as possible to ensure clarity.

Buying Cars (Online)

The first study “Buying cars online: The adoption of the Web for high involvement, high-cost purchases” is from 2001, and was conducted by **Molesworth and Suortti**. They investigated the adoption of the web when it comes to the buying process of high-value and high involvement products, such as cars on the internet. In the beginning, they analyzed the e-commerce market in the UK, followed by striving to answer the question, why people avoid buying high involvement or high-value

products online. Although car sales on the internet already were on the rise back then (growth from 17.000 units in 1999 to 1.3 million expected units in 2004), many people had inhibitions buying cars online, due to the novelty and the length of the process. As the process of buying a car online is seen as an innovation, the authors cited a typology of innovation resistance. This kind of resistance consists of functional (usage, value and risk barrier) and psychological elements (tradition and image barrier). The research goal was to explore the value of innovation parameters and innovation resistance theory by conducting interviews with eight people who were 18 years and older, car owners and internet users with online shopping experience. Based on the theory the authors found out reasons for the consumers' resistance towards innovation:

After analyzing the interviews, it became clear that people do use the internet to find information about the car, because often they don't trust salespeople, which is actually a factor for the acceptance of the innovation. On the other hand, people expressed a high number of disadvantages of buying cars online like missing information online, missing the human interaction (for asking questions). While stating offering a chat could in fact solve this problem, which is interesting, because yet no automotive seller was found that has implemented this at their configuration sites (at least on their normal homepages). Responders also complained about the missing feeling of sitting in the car and test driving it, and the lack of opportunity to bargain with the seller (both usage and tradition barriers). Another fear that derives from risk and image barriers is that when the car is damaged or faulty, people were afraid they won't get proper service because they didn't buy it from a car dealer. As a consequence, the authors found that trust in salespeople is decreasing, which is why people want to pre-arm themselves with knowledge they find on the internet. Still, they do not want to miss out on the feeling of the actual buying process with the merchant (which consists of test-driving the car, bargaining the price, have the guaranty that merchants give them sufficient service in case of malfunctions, etc.). This indicated that the web is crucial to car-buyers in the sense of information and assurance, becoming more important for salespeople to demonstrate the car and offer decent service, while information and especially persuasion becomes less important. Yet, this study is more than 15 years old, which decreases its reliability, especially regarding the fast-moving character of e-commerce.

Mavridou et al. published an article in 2013, addressing a mass-customization recommender system (a mixture between personalization and mass customization) exclusively for the automotive industry. First, they described the problem: Mass customization has been implemented for some years already, also for automotive industry companies, yet some functions were missing. They also have introduced mass customization methods for their cars in order to offer more personalized cars to customers. However, the authors criticize that the consumer's (affective) needs are not taken into consideration, when it comes to the customization process. They describe a phenomenon called *mass confusion* which customers experience when they have too many choices for a product and therefore end up confused, overwhelmed and dissatisfied. When customizing cars, customers also tend to neglect functionalities and pay more attention to characteristics that satisfy sentiments, such as design. Thus, existing car configurators require advanced techniques to increase the costumers' satisfaction (in the form of an additionally further developed recommender system). After formulating the problem, they undergo literature research including recommender systems, affective needs and possible design support systems for configurators. They developed a so-called affective needs recommender system, for "translating customer affective needs into vehicle configurations" (see Mavridou et al., p. 254). Possible vehicle configuration was split up into design elements and design parameters. Customer surveys were conducted face to face as well as via web interface, where interviewees (140 truck drivers and 261 car drivers from China, Finland, France, Germany, Greece, India, Italy, Malaysia, Netherlands, Singapore, Sweden, Switzerland and the UK) were asked to evaluate design elements based on the emotions they evoke. After data collection, classifiers were built to explore the relationships between affective needs and the design parameters, so it can be used for predicting values for new customers. After collecting the data, the recommender system was designed. The authors decided for an agent-based design approach, because it is dynamic and could handle multiple users' requests. Three agents that connect which each other constantly, were built: the User Agent which handles user profile data (demographic data, preferences), the Recommender Agent which receives and deals with the user

and provides fitting recommendations (which are found by application of data mining techniques on user data) and the Evaluator Agent, which gives feedback about the user's behavior and uses new data for data mining. The architecture of the system and the procedure looks as like depicted on the right side:

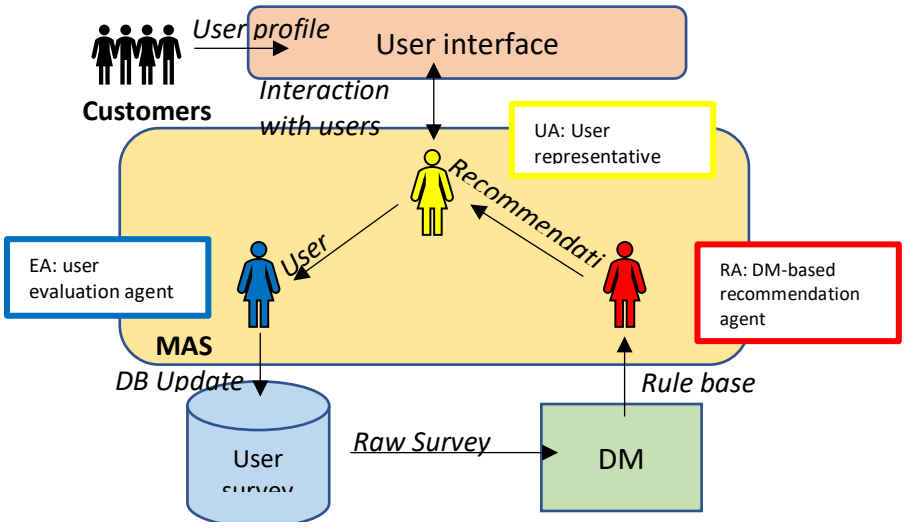


Figure 1: Architecture of recommender system, referring to Mavridou et al., 2013: p. 258

After implementing these systems, ten potential users were asked to test the configurator. After entering information such as region, gender and age, they had to select a word that describes the car they were interested in first place ("classic", "modern", "sporty", "cool", "cute"). After that, recommendations for cars in a 3D illustration appeared, which were also customizable. The tool was reviewed well: 80% of the participants found the system useful, 70% would use the system

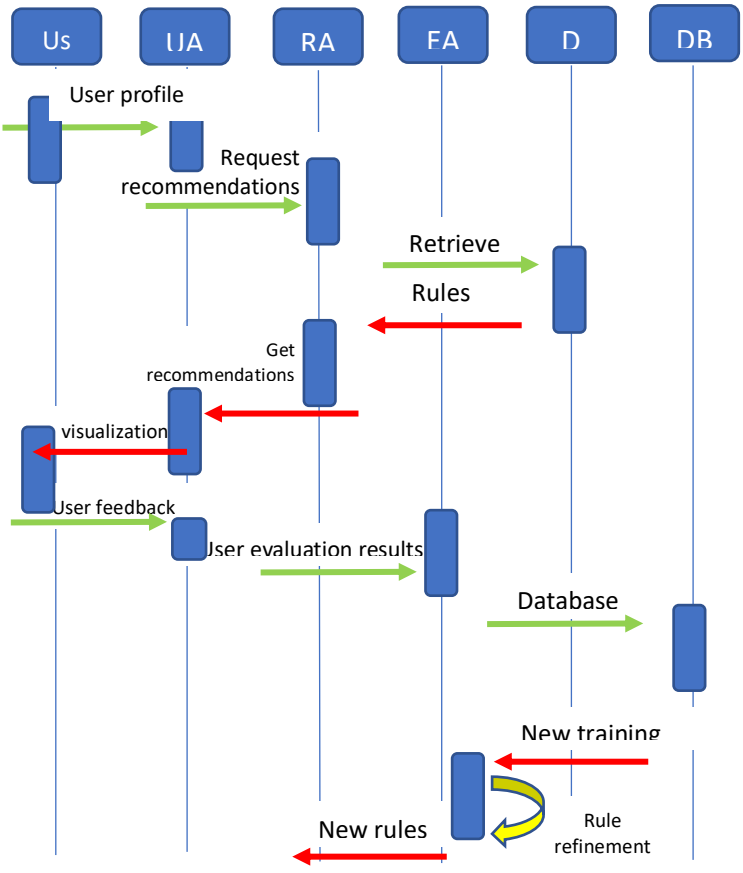


Figure 2: Process of interactions between the elements of the framework, referring to Mavridou et al., 2013: p. 259

again, its effectiveness was confirmed by 70%. 60% found it reliable, 90% rated the system as assisting. 70% responded that it had a positive impact to them and 80% found it pleasant to use.

The new framework seems to have turned out well, especially based on the positive feedback. The motivation was to make customization configurators more user-friendly and enable users to save time. based on data mining techniques that enable a new way of recommending car features (or even whole cars). Still, the validity of the study is limited: Emotions are an important factor when it comes to buying products especially for high involvement products and cars since there are many car companies whose cars do not differ that much technically. As a result, manufacturers have to address costumers on an emotional level as well (and costumers do make their decisions unconsciously influenced by emotions, too.). Still, it is questionable if recommendations based on affective emotions are so helpful for making such a big buying decision like for cars at the end of the day (or if it is just fun to experiment and play around with the configurator and not buy the car). Also, the number of testers (ten) is too low to make a solid statement about the functionality and usability of the framework (especially regarding that when reading the opinions, there was *always* the possibility for a neutral answer which was given mostly apart from the positive ones which may evoke the question of social desirability). Still, it is an interesting and important investigation and development for car configurators.

Manhartsberger conducted a study in 2014 that examined web sites of car brands based on eye-tracking technology. The goal of the study was to rate the usability of certain web sites. Four car brands were tested (VW, Fiat, Renault, Opel) and the eye-tracking data was interpreted via heatmaps. Key elements that were considered were the navigation of the site, the general overview, model information and search for retailers. The end result was presented in a five-star rating system, where VW gathered four stars, Fiat and Renault three stars and Opel two stars. Opel was rated the lowest, because of inconsistent design- and navigation styles, appearance of autoplay videos and information unclarity. Unfortunately, there was no information about the number of participants, or further details about the procedure of the study (operationalization of terms, theoretical basis or framework), consequently the rating of the study sometimes seems subjective or farfetched.

Personalization and Customization

Sundar and Marathe compared personalization and customization on a news-aggregator website in their research article in 2010. 82 undergraduates were recruited to consume the Google news page, while being split up into a controlled group, a personalization condition group and a customization condition group. Results showed that heavy users that read news often preferred the customization method, where they were able to tailor the content and also the sections themselves, including giving own titles, search terms and source locations. Meanwhile, light users are more reactive to personalization methods, so already provided personalized information based on what is known about them. Still, the feeling of security decreases since the website is automatically collecting information. In conclusion, perceived security of private data keeps remaining an important factor when it comes to personalized/customized sites. The study was conducted detailed and carefully, yet, the chosen participants (undergraduates) are not sufficient for making generalizing assumptions.

Thirumalai and **Sinha** conducted a study in 2010 in which they researched the customization of online purchases processes in conjunction with customer satisfaction. Based on the Web Acceptance Model, they created a study where they investigated 422 online shops and their customization processes for decision making- and transaction processes, which are the two constituent sub-processes of the online purchase process. This study uses the term *customization* in a definition which is usually called *personalization*, because the authors claim: “Customization is the tailoring of products to the individual needs and preferences of customers.” (Thirumalai/Sinha, 2010: p. 497), they define the customization methods made by the retailers as “(…) while retailers customize the purchase experience for its customers by offering decision aids such as personalized product recommendations, pricing and promotions, they offer standard off-the-shelf products.” (ibid, p. 498). After analyzing the homepages, they asked three participants to rate randomly chosen websites from the overall list of 422 websites. The results indicate that “customization” has positive effects on the customer satisfaction. Still it is not entirely clear, if it can be defined as customization, as there is not a new product but just the presentation of the product and the transaction

processes are *personalized* for the customers. The number of participants (three) in this study is too low to offer definite results as well.

Lee and **Chang** investigated consumer attitudes towards online customization for clothes in 2011. The study was constructed using the extended Technology Acceptance Model as a framework. Other used variables were web skill and fashion involvement. Over six weeks, 749 students from a university in Seoul filled out a questionnaire (self-administered survey). 75,6% of the participants were female, 95% of the participants were between the age of 18-26. The students were given color printed pictures of the mass customization process of a shoe configurator of a website of a well-known brand. The students looked at the pictures of the different stages of the configurator and were then asked to fill out a survey asking how they evaluated the configurator. Web skill, fashion involvement, perceived usefulness, perceived ease of use, perceived enjoyment, perceived control, attitudes toward online mass customization, willingness to purchase mass customized products through online retailers and willingness to recommend to friends to purchase mass customized products through online retailers were the nine variables that were tested. Findings showed that perceived ease of use directly determined the perceived usefulness and indirect influence on attitudes towards online customization. In addition, perceived enjoyment had a strong effect on attitude towards the online retailers. The study also showed that the consumers enjoyed learning about the online mass customization process, which implies that 'online mass customization retailers should consider providing a pleasurable, useful and user-friendly online environment for consumers when incorporating an online mass customization process' (ibid, p.191). Yet, consumers who rated themselves as skilled web users experienced the process as easy to use, manageable and enjoyable. Also, fashion involvement influences the perception of the customization process (higher involvement: more useful). Although control is also an important factor, ease of use and enjoyment seem to be more important. However, users who had the feeling that they could control the process also had more positive feeling towards the configurator, so perceived control is crucial when it comes to designing and implementing mass customization configurators. In the end, perceived usefulness, perceived ease of use, perceived control and perceived enjoyment are the most crucial factors when it comes to evaluating customization configurators.

The study showed some interesting findings, peculiarly regarding the Web Acceptance Model. The high number of participants has to be evaluated positively Still there are some perceived limitations: Three of four quarters participants were female, which is an unequal segmentation and therefore not universally applicable. the study was merely researching the fashion sector, which makes it one-dimensional, also shoes are generally low-involvement products, so it is not entirely fitting for this thesis. Furthermore, the nature of this study is not sufficient because merely handing out printed pictures without offering the site itself and giving the opportunity to try it out is not enough to give generalizable implications about usefulness about the site and the other factors.

In 2014, **Nurkka** and **Jumisko-Pyykkö** researched online customization methods concerning high involvement products, using an online configurator for surfboards. The researchers conducted semi-structured interviews with 22 surfers who were asked to look at (not test) the customization interface and rate it. Participants were asked to give their general opinion on the opportunity to design a surfboard, the customization methods and resulting possibilities. Throughout their research, the authors found out that there are different levels of customization for companies. For high involvement products that are to be customized, it is recommended to offer a high level which consists of “parametering” (the configurator guides the customer through the specification process) and “tailoring” (the product is designed and manufactured to the customers’ needs). Other findings show that the value of online customization is crucial and can be split up into 1. product value and 2. mass customization experience. Connected values with mass customization are *functional, aesthetic, symbolic, uniqueness, emotional and self-expression* values, and for the customization experience, the variables consist *creative achievement*, *control* and *influence* values. However, the success of mass customization configurators also depends on the user’s experience and acceptance of online retail as well as their perceived benefit of the outcome.

The participants were given information about the configurator (screenshots), so they could look at it, rate it and discuss it in the following. The interviews were carried out individually by the researchers. The results are summarized in the following table (*not every aspect was perceived by every participant, so the arguments can be interfering sometimes.*).

Positive aspects	• Interface was considered understandable • Customizable dimensions of board were liked • 3D picture of surfboard was appreciated • Possibility of "rebuilding" the former old/worn out/broken board • Can be useful if customers know what they want and are experienced enough
Negative aspects	• Too limited number of customization features • Too high restriction of number of dimensions and features • No possibility of choosing own colors or graphics • Feeling of overwhelm when insufficient knowledge about board dimension → need to ask someone for advice • Tool was too technical and therefore unappealing as emotional factor/right "feeling" is lacking • Value conflict (environmental, local sellers)
Derived requirements for an online customization tool	• Number of design options must be sufficient and versatile (functional and creative) • Guidance in designing (balance between guidance and control) • Transparent pricing • Promise of product quality • Social interaction

Table 1: Experiences with online surfboard customization tool. Own depiction.

Since the negative aspects outweigh the positive aspects, a number of necessary requirements for customization tools can be derived. Although the study is very specific, and surfboards are a market niche, it is useful because they are high involvement objects and interesting findings can be seen in this study.

Kaptein and Parvinen introduced a framework followed by a case study in 2015. Their topic of research was how e-commerce personalization could be improved, based more on customers' needs, focusing more precisely on psychological effects. Personalization methods often are based on recommender systems which sometimes do not have sufficient knowledge or ability to recommend products the user actually wants to see or is interested in. Due to wrong assumptions about his personality or his psychological constitution. Some people react more intensively to certain kinds of recommendations, like authority arguments, than others. They state these traits of people have to be learned dynamically, based on experiences and data mining. This is one of the two parts the framework consists of. The other part is a summary of the technological requirements

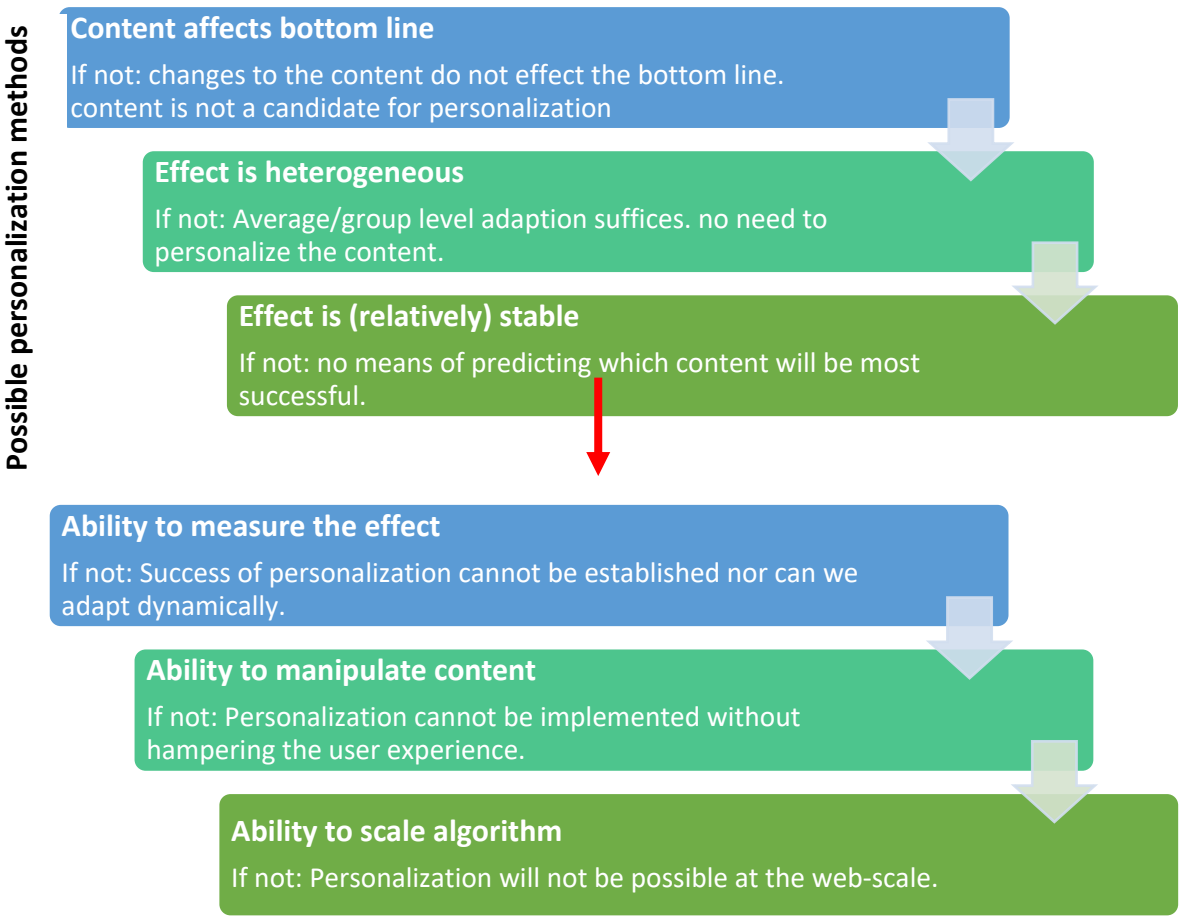


Figure 4: A process framework for e-commerce personalization. Referring to Kaptein/Parvinen, 2015: p. 9

After introducing the framework, the case study was conducted, which included alternations at the homepage based on *scarcity* and *consensus* strategies. The formulated framework additionally allowed to dynamically adapt the content to individual customers, depending on psychological and technological requirements. An e-commerce site selling children clothes was used, with two versions (the normal and the adapted one). The trial was tested for 73 days. During that period, 1449 customers visited the site, while half of the users were directed to the "normal" page and the other half was directed to the altered page. Results showed that the personalized site increased the click-through rates for the offered clothes as well as the conversion rates. The researchers found out that speed and scalability are important when it comes to personalization, especially based on customers' needs, as well as implementing dynamically changeable recommender systems that moreover consider psychological effects.

Park and **Yoo** published a study in 2018 where they researched the benefits of mass customized products online by using clothes as an exemplary product. This may seem similar to an already mentioned study, but participants in this study actually tested the configurator. It also doesn't use the Technology Acceptance Model as the theoretical background but the Hierarchy of Effects Model, justifying that it covers influences on attitudes and behavioral intentions. The study assumes that the perceived benefits of a mass customized product influences the emotional product attachment and attitudes towards the mass customization program, which will subsequently influence loyalty intentions towards the brand. Two more effects were as well considered: involvement and fashion innovativeness, based on the Elaboration Likelihood Model by Petty and Cacioppo (Petty/Cacioppo, 1981). The researchers then conducted an online survey questions where 290 female apparel shoppers were recruited. After giving information about product involvement and fashion innovativeness, they were asked to customize a trench coat themselves on an online configurator. After that, they had to answer survey questions. The results showed that the benefits that were perceived when customizing the clothes positively influenced the emotional product attachment and also the attitudes towards the program itself. The loyalty intention was not directly increased by the product attachment, but indirectly by developing a positive attitude towards the program.

Although this study is useful as the configurator was actually tested and rated by the participants, it has limitations, too. There were only female participants. Also, a trench coat is a low involvement product. to conclude, there were some important insights regarding emotional product attachment and perceived feelings and experience when using an online configurator for a daily product such as a trench coat (compared to a niche product such as a surfboard).

High Involvement Products in e-commerce

Lian and **Lin** researched in 2008 how consumer characteristics influence the acceptance of online shopping. The study compared different product types. One product type is also to be clustered as a high involvement product ("high outlay, infrequently purchased goods; tangible physical product"), namely a TV gaming

system. Literature review revealed four factors that determine user acceptance of online shopping: *consumer characteristics, personal perceived values, website design and the product itself*. Also, five consumer characteristics were defined: personal innovativeness of information technology, internet self-efficacy, perceived web security, privacy concerns and product involvement. After the research, 220 undergraduate students in Taiwan with online shopping experience were recruited as participants in the study and had to fill out questionnaires. Consequently, the results indicated that, regarding the gaming system, product involvement and highly perceived web security positively affect attitudes towards purchasing such products online. Purchase behavior is, however, negatively affected by individual privacy concerns. Personal innovativeness of information and internet self-efficacy have no effect on the purchasing. This may be the case as the product itself indeed is a high involvement product, but the shop where you can buy it is not new or unusual, so this is why personal innovativeness is irrelevant.

In 2013, **Chen** and **Wang** developed a new recommendation component that supports established recommender systems when it comes to selling high involvement products by clustering and re-using reviews from buyers. high involvement products (or 'high-risk products' as the authors call them) are not bought that often which results in a lower number of (useful) reviews. Additionally, apart from the cold-start problem (first-time users cannot get proper recommendations as the system knows nothing or not enough about them), the authors criticize that the recommendation and critiquing ability where a user is able to give feedback to the recommended products and can request other product suggestions is not sufficient for high involvement products. Their approach allows to use the ratings and the textual part of the review by categorizing them into feature-level opinion values to identify reviewers' preferences. This preference data is used for data mining to develop rules for the latent class regression model (for clustering the reviews) and as well as for feature-level recommendation, so that the features which were approved and liked by reviewers can be used for recommending. An additional use for the probabilistic regression model is predicting preferences. After mining the feature-level opinion from useful reviews containing sentiments, reviewers' weight preferences are interfered and clustered. Depending on these results, different algorithms are used to recommend products (such as nearest-

neighbor algorithm). Ultimately, the Latent Class Regression Model scores better and more satisfying results as it solves the sparsity of data by clustering and efficiently using the existing data while the Probabilistic Regression Model shows biased results by only relying on the reviewers' self-provided information. It therefore generates more accurate preferences.

This approach is based on reviews for high involvement products which is why it was considered here. The method seems to have brought up a new and effective method for enhancing recommender systems. Still, there were no tests made with real people who could evaluate if it is a useful addition and really helps for finding products. Moreover, the limitation of this article is obvious as only two products (cameras and laptops) were taken into the study.

Jiang et al. researched collaborative filtering techniques for high involvement products, which partly makes it a topic for the personalization/customization section, but because the topic is a high involvement approach, it is listed here. The study is from 2014 and the authors researched the problem that there is no such thing as a well-working personalization method (recommender systems such as collaborative filtering) for the selling of high involvement products in e-commerce. Also, user reviews were taken into consideration and used to form a system for recommending high involvement products. Yet, the problem is that people tend to buy more low-involvement products than high involvement products (as high involvement products have more complex functionality, a high price and last longer). So, there is a sparsity of data which hinders analyzing buying behavior and writing recommendation systems based on this data that works reliably enough.

The authors analyzed existing data from high involvement products like digital SLR cameras and laptop computers. Due to a lack of research insights about recommender systems for high involvement products, the authors considered using online reviews to design a new recommender system. There are already some review-based recommender systems for high involvement products which are based on product features and preferences. When conducting the study, for the camera dataset, a sentiment analysis was done, splitting the people who wrote reviews into Pro Photographer, Semi-pro Photographer, Casual Photographer, Photo enthusiast and Null, as the reviews from professional photographers are more reliable. After that, opinion words were defined, for being able to interpret words

such as “beautiful” when describing a camera correctly. Besides, dynamics of the ratings were researched. While former studies described temporal and sequential dynamics when it comes to rating low-involvement products, the reviews of examined high involvement products didn’t show a high form of temporal dynamics, which can be explained by the kind of product – consumers are more sensitive to product features than in the case of low-involvement products. Earlier ratings tend to be lower, which is why reviewers ponder if the effort of posting a high review gets outweighed by the impact of the review. Based on these insights, the authors designed a framework of review-based hybrid collaborative filtering, that takes user’s reviews with high quality, analyzes them with the help of time a sentiment score and the topic and therefore generates a dynamic item-topic-rating matrix. This matrix then is used for the comparison of similar items, also for comparison of similar users, which then ends up in the final recommendation results.

Still, the implications of the study show that most of collaborative filtering systems do not work well when it comes to high involvement products, because of problems such as data and ratings sparsity, infrequent purchase of high involvement products (as people tend not to buy these kinds of products very often) and dynamic opinions.

Usability in e-Commerce

Lee and Koubek tested the effects that usability and web design attributes have on user preferences in e-commerce web sites in 2010. Nine online bookstore web sites were tested. The study was conducted qualitatively: ten participants tested all of the nine bookstores regarding their usability, performance measures, evaluation of the design factors and decisions of preference on the sites. The participants were asked to perform four tasks and rate the online book stores afterwards. Famous bookstores like amazon.com and barnesandnoble.com were left out, because participants were expected to already be familiar with them.

The study procedure for each participant looked like the following:

1. Subjective rating on pre-use usability of the websites before using
2. Conducting usability testing with three task scenarios (each website)
3. Subjective rating of the design attributes of each web site
4. Naming of the best perceived web site after the use.

Results of the studys showed a positive correlation between the pre-use usability and task completion time, indicating that participants could already estimate their productivity before the use of the website. Also, the relationship between pre-use usability and user preference is important, such as the design attributes. Still, user preference is less correlated with the aesthetic quality than organizational structure and layout, which reinforces that navigation and orientation are perceived more important than aesthetic design (see Lee/Koubek, 2010).

The study had participants test several kinds of online shops, which is good for gathering comparison values afterwards. It also made sense to use the same kind of online shop (book seller). Yet, that there were only ten participants and the number of online shops was comparably high (nine). On the one hand, the number of participants is too low. On the other hand, the number of online shops may have been too high, considering that after the first few online shops, attention span isn't given fully anymore.

Grigera et al. researched how refactoring methods influence the usability in e-commerce platforms in a study published in 2016. They define the term "usability refactoring" as following: "usability refactoring is a change over the navigation or presentation of a web application that is perceived by the final user. It is intended to improve the application's usability, and it preserves the set of use cases and requirements that the application satisfies, (sic!) and can be checked through acceptance tests." (Grigera et al., 2015: p. 1228f.) So, refactorings have been applied on e-commerce web sites, and participants have been asked to rate the quality in use before and after applying the refactorings. The purpose of this was to identify effects that the refactoring changes had on perceived usability for users. The experiment was conducted with two groups, in Argentina and in Spain. The Spain set-up was tested by 22 students, Argentina set-up was tested by 27 students. The Argentinian students were software developers, while the Spanish students were future iberians. An online store and an auction website were chosen for the investigation. Three components were tested: effectiveness (average time for task completion), efficiency (time spent per activity that the students had to perform online) and satisfaction (questionnaire with Likert-scale that the students had to fill out in the end). The students had to undergo some tasks such as looking for products online, choosing them, putting them into the cart, etc. The site was

designed differently, showing changes after and before the refactorings, e.g. information was added or left out. The results of the study show that effectiveness, efficiency and satisfaction were positively affected by 11 of the 21 refactoring measures in use. There were some minimal differences between the two countries, but in general, informative measures were praised mostly (system status, confirmation, breadcrumbs, processing page). The study showed how changes on a web site can immediately change its perception and the perceived usability. However, with a number of only 49 participants, this study does not carry statistical power.

In the following, the articles are summarized in a grid to provide a quick and clear overview.

Umbrella Term	Author	Country	Year	Title	Method	N	Results
Buying Cars (Online)	Molesworth/Suortti	UK	2001	Buying cars online: The adoption of the Web for high involvement, high-cost purchases	Qualitative interviews	8	People don't like buying cars online due to the fear of missing services.
Buying Cars (Online)	Mavridou et al.	Greece	2013	Mining affective needs of automotive industry customers for building a mass-customization recommender system	Experiment: testing: an online configurator for cars was test	10	People like if affective and emotional needs are considered when buying cars and perceive it as helpful when making decisions.
Buying Cars (Online)	Manhartsberger	Austria	2014	Virtuelle Probefahrt	Experiment: eye-tracking	n/a	Inconsistent information architecture and optics reduce usability of car homepages, which makes them less usable.

Personalization and Customization	Sundar/Marathe	USA/ South Korea	2010	Personalization versus Customization: The Importance of Agency, Privacy, and Power Usage	Experiment: rating homepages	82	Heavy media users enjoy customization possibilities while light users are more reactive towards personalization methods
Personalization and Customization	Thirumalai/Sinha	USA	2010	Customization of the online purchase process in electronic retailing and customer satisfaction: An online field study	Experiment: rating homepages	3	"Customization" possibilities have positive effects on customer satisfaction
Personalization and Customization	Lee/Chang	USA/South Korea	2011	Consumer Attitudes Toward Online Mass Customization: An Application of Extended Technology Acceptance Model	Quantitative questionnaire	759	People who like shopping clothing online are open to customization methods, assuming that control, joy and usefulness are given
Personalization and Customization	Nurkka/Jumisko-Pyykkö	Finland/Netherlands	2014	Exploring online customization of a high	Experiment: looking at online configurator /	22	When customizing a high

				involvement experience product	Qualitative interviews afterwards		involvement product (surfboard), negatively experienced aspects outweigh positively experienced aspects which is often reasoned with the lack of emotion → it depends on the kind of the product
Personalization and Customization	Kaptein/Parvinen	Finland/Netherlands	2015	Advancing E-Commerce Personalization: Process Framework and Case Study	Experiment: a Homepage was tested	1149	When testing a newly personalized homepage, especially speed and scalability are important to users, as well as dynamically changeable recommender systems
Personalization and Customization	Park/Yoo	South Korea	2018	Benefits of mass customized products:	Experiment: testing of online configurator/	290	Customizing clothes strengthens the

				moderating role of product involvement and fashion innovativeness	Online Survey afterwards		emotional bound to clothes and is perceived as an enjoyable activity.
High Involvement Products in e-commerce	Lian/Lin	Taiwan	2008	Effects of consumer characteristics on their acceptance of online shopping: Comparisons among different product types	Quantitative questionnaire	220	product involvement and highly perceived web security positively affect attitudes towards purchasing high involvement product online. Individual privacy concerns negatively affect purchasing behavior.
High Involvement Products in e-commerce	Cheng/Wang	China	2013	Preference-based clustering reviews for augmenting e-commerce recommendation	Sentiment analysis	/	Valuable Reviews were used to build a recommendation component system which was exclusively built for high involvement products online.

High Involvement Products in e-commerce	Jiang et al.	China/USA	2014	Hybrid collaborative filtering for high involvement products: A solution to opinion sparsity and dynamics	Sentiment analysis	/	A sentiment analysis based on camera reviews was made to research recommender system functionality for high involvement products. Most of them have limited functionality.
Usability	Lee/Koubek	USA	2010	The effects of usability and web design attributes on user preference for e-commerce web sites	Experiment: people were testing and rating 9 e-commerce websites	10	Good usability is positively correlated with efficiency and effectiveness. Navigation and orientation are perceived more important than aesthetic designs
Usability	Grigera et al.	Argentinia/Italy/Spain	2015	Assessing refactorings for usability in e-commerce applications	Experiment: people were testing and rating e-commerce	49	Refactoring has positive impact on usability of website if they consist of useful

					websites with alterations		information and the information is shown clearly.

Table 2: Current Scientific Knowledge. Own depiction.

2.1. Research Gap

After analyzing existing literature, it is obvious that certain topics are covered intensively, while others seem to have been left out. It becomes clear, that personalization in the e-commerce sector has undergone some interesting developments and recommender systems are constantly improving, also for high involvement products. Yet, the trend of customization seems to be continuing, especially now that many consumers want to have their own product, appreciate 'own' and individual products and services, explicitly tailored to their needs and wants. Seemingly contradictory, people value their privacy and often find it scary if personalized homepages know them "too well" which can hinder the success of recommender systems or personalization in general. There is, however, not enough spotlight on online customization methods for high involvement products. There is some research, but it is mainly focused on sentiments and, in addition to that, not sufficient when it comes to the topic. Aditionally, research about usability is insufficient in view of customizable products. There is some research with regards to usability in e-commerce, but not with a satisfactory relation to the topic. Especially when looking for papers in the usability sector, there was a very little low number of results. There are, however, many papers that compare meta level topics, such as usability evaluation methods for e-commerce (e.g. see Hasan/Morris/Probets, 2012), or creating frameworks for e-commerce website usability (e.g. see Sohrabi/Mahmoudian/Raeesi, 2011) or how to analyze usability, e.g. with eye-tracking (see Manhatsberger/Zellhofer, 2005; Chaparro, 2005; Schiessl et al., 2003; Petre/Minocha/Roberts, 2006; Eghdam et al., 2011) or Google Analytics (see Hasan/Morris/Probets, 2009). Yet, there is a big knowledge gap for the actual application of these frameworks and methods. Customer experience and especially usability are important factors for sellers and companies, especially when it comes to implementing new services, functions or even innovations such as configurators – especially older people who did not grow up with technology are prone to reject online services if they are not acquainted with them. Usability and user friendliness are integral parts of the customer experience, peculiarly in relation to digital services and innovations (as it is distinguished in researched literature that perceived joy and ease of use positively influence the general perception of online customization

tools). However, the question regarding customer experience, ***how usability and positive perception of customization tools that are made for high involvement products is perceived,*** pre-eminently for non-digital immigrants, mainly remains unanswered after the research. Accordingly, the first derived research question is:

1. How is the usability of online customizable high involvement products in comparison to conventional customization possibilities perceived by people at the age of 30-60?

3. Overview e-commerce

This thesis investigates a digital topic, which takes place in the e-commerce sector. In this chapter, e-commerce will be discussed and analyzed. First, the term will be explained, based on several definitions by researchers. Also, business models in e-commerce will be examined, as there are several models to sell or buy goods or services online and. Especially for the understanding of this thesis, it is crucial to draw a line between these models. Also, the types of e-commerce (or online shops) will be summarized. The last subchapter supplies an overview over Austria's current e-commerce situation, including its progress over the last years and the status quo.

3.1. Definition of e-commerce

E-commerce is a big and extensive phenomenon. The term *electronic commerce*, indicates the digitalization of commerce, which means using the internet to sell or buy goods or service world-wide. Yet, there are different conceptions and definitions by several researchers. Some will be discussed in the following to give an overview and a general understanding for the term.

E-commerce has been researched intensively, whereas several definitions have been formulated by researchers and practicioners. Some definitions will be delivered now to give an overview for the term.

The first definition is from **2006** by Papazouglu and Ribbers. They point out similarities and differences between "e-commerce" and "e-business", whereas e-commerce is described as a particular form of e-business. They define it as "*the buying and selling of goods and services, and the transfer of funds, through digital communications. This includes on-line (sic!) display of goods and services, ordering, billing, customer service and all handling of payments and transactions."* (Papazouglu/Ribbers, 2006: p. 3). This definition describes the process but misses the technology that e-commerce relies on (calling it "digital communications" is not sufficient).

Qin et al. define e-commerce as "*various online commercial activities focusing on commodity exchanges by electronic means, Internet in particular, by companies, factories, enterprises, industrial undertakings and consumers*." (Qin et al., 2009: p.

7) in **2009**. Here, the process is described well, yet the description is rather generic and does not go into detail sufficiently.

Mohapatra delivers an extensive definition for the term in **2013**, not only defining the meaning itself but also describing the processes behind it:

"*It implies transactions related to online buying and selling of products or services. These transactions are done using electronic systems such as the Internet and other computer networks. (…) Nowadays, a wide variety of business transactions are conducted in this way, such as electronic funds transfer, supply chain management, Internet marketing, online transaction processing, EDI, inventory management systems, and automated data collection systems. Thus, the definition of e-commerce in modern the modern times implies that a transaction is termed as electronic commerce if it typically uses the World Wide Web at least at any point in the transaction's lifecycle. This means e-commerce can encompass a wider range of technologies such as e-mail as well."* (Mohapatra, 2013: p. 8). This definition is the longest, as well as the most detailed one, giving detailed insights into the phenomenon of e-commerce.

While Laudon and Traver define e-commerce as "*the use of the Internet, the Web, and apps to transact business*" in their book in **2014**, the next edition from **2016** defines e-commerce as "*the use of the Internet, the Web, and mobile apps and browsers running on mobile devices to transact business*". Here, the trend towards mobile applications is visible.

The latest two definitions were formulated by Turban et al. in **2018**:

Electronic commerce (EC) refers to using the Internet and other networks (e.g., intranets) to purchase, sell, transport, or trade data, goods, or services." (Turban et al., 2018: p. 7) This definition of e-commerce is quite short and not entirely sufficient for describing and explaining the term.

The second definition is somewhat longer and more detailed: "*Electronic commerce (EC) is a business model in which transactions take place over electronic networks, mostly the Internet. It includes the process of electronically buying and selling goods, services, and information. Certain EC applications, such as online buying and selling stocks and airline tickets, are reaching maturity, some even exceeding non-Internet trade volume. However, EC is not just about buying and selling; it also is about electronically innovating, communicating, collaborating, and discovering*

information. It is about e-learning, e-customer service, e-government, social networking, problem-solving, and much more. EC is having an impact on a significant portion of the world, affecting businesses, professions, trade, and, of course, people. It is undoubtedly improving our quality of life."(ibid, p. V) However, in addition to the other definition, the term has become understandable. These two are also the definitions that this thesis will be based on when the term "e-commerce" is used in the following.

Turban et al. developed a classification of the different kinds of e-commerce. Splitting up the process from a customer's perspective, there are certain steps, such as ordering and payment, order fulfillment, and the delivery. Depending on what steps are carried out digitally and what steps are taken physically, it is defined as Pure EC, Partial EC and Non-EC:

Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Ordering, payment	P	D	D	D	P	P	P	P
Order fulfillment	P	D	D	P	D	D	P	D
Delivery (shipment)	P	D	P	P	D	D	D	D
Type of EC	Non-EC	Pure EC	Partial EC					
Legend: P physical D digital								

Table 3: Classifications of e-commerce, referring to Turban et al., 2018, p.7.

This is relevant because not all kinds of commerce take place online exclusively. Sometimes there are just some steps made online, but the rest manifests in the offline world, which is why this differentiation is important.

E-commerce is said to have eight unique features (see Laudon/Traver, 2016: p.351):

1. Ubiquity: The service is generally available to everybody, at any time
2. Global Reach: Unless it is blocked by a government, internet technology doesn't have national boundaries and is therefore available worldwide.
3. Universal Standards: the internet standards are the same
4. Richness: several different kinds of media are possible, such as pictures, videos, text
5. Interactivity: Technology works via interaction with the user
6. Information density: Information is available at bigger and higher qualitative amounts.

7. Personalization/Customization: personalized sites or marketing messages are possible, next to personally customized products or services
8. Social Technology: Users generate and share contents

Although not every feature can recklessly be taken into account (universal standards are not fully given, for example if you regard the development of internet accessibility in several countries; global reach is also a difficult topic concerning some republics even blocking Google or Facebook), it is a well-usable list to get an overview of the topic. Next to the arguments listed above, other arguments are important, such as richness (being able to display products and services in an appealing and interactive way) or personalization/customization, which will be analyzed and discussed later on.

3.2. Business Models in e-commerce

In the following, business models in e-commerce will be introduced and explained. Generally, business models consist of several parts. Two concepts of general business models will be introduced and compared subsequently:

	Afuah and Tucci 2003		Laudon and Traver 2016	
Number	**Components**	**Description**	**Components**	**Description**
1	**Customer Value**	How can the company deliver value to the customers	**Value proposition**	How company fulfils the customers' needs (with products/services)
2	**Scope**	The right market segments that hold the fitting value mix to customers	**Market Opportunity**	To find a fitting space on an existing market with opportunities available
3	**Pricing**	Proper pricing strategies must be developed	**Management team**	People at the company that are responsible for ensuring the functionality of the business model
4	**Revenue sources**	How and with what sources is revenue generated	**Revenue Model**	How the firm earns revenue and gains profit
5	**Connected acvitivies**	What activities can be added to the offer (e.g.	**Competitive environment**	How other companies in the same space selling

		additional service)		similar products operate
6	**Implementation**	How the structure of the company, people and working environment are organized to deliver a result that guarantees customers' satisfaction	**Market Strategy**	The plan you make in order to enter a new market and attract new customers
7	**Capabilities**	Analyzation of the capabilities and filling eventual gaps	**Organizational development**	How a company will organize their tasks and the work
8	**Sustainability**	Ensuring the company's competitive advantage	**Competitive Advantage**	Firm can deliver products at a lower price than competitors

Table 4: Comparison of two business model frameworks.

Comparing these two models, overlaps become visible, despite the 13-year difference. Especially regarding e-commerce business models, it is important to keep those factors in mind as there are several kinds of e-commerce business models that do not work the same way, yet the companies have to ensure that the components mentioned above are fulfilled.

Rappa classifies 9 categories of e-commerce business models in 2010: 1. brokerage – facilitation of transactions (e.g. eBay), 2. Advertising – provision of contents and services mixed with ad messages (e.g. Yahoo!), 3. Infomediary – collecting and analyzing consumer data (e.g. DoubleClick/now: Google Marketing Platform), 4. Merchant – retailing goods and services (e.g. Amazon), 5. Direct Model – enabling manufacturers to directly interact with customers without the distribution channel (e.g. Dell Computer), 6. Affiliate – paying websites for banners (e.g. Amazon), 7. Community – Social Media and similar platforms (e.g. Instagram), 8. Subscription – membership with periodic fee for accessing the content (e.g. Netflix) and 9. Utility – online on-demand models based on actual usage rates (e.g. Microsoft Azure).

Although this list gives a good and informational overview at the first glance, it is not sufficient to give a general overview for the existing models due to its age.

A more specified and recent overview is needed, which is delivered by Laudon and Traver in **2016**. They differ between B2C and B2B business models. The B2B

models will be left out as they are not relevant in this thesis. The contents of the following table are taken from Laudon and Traver's table, have however been adopted because some examples are not known in the German-speaking market, or already redundant. The changes are highlighted grey color.

Business Model	**Variations**	**Examples**	**Description**	**Revenue Models**
E-Tailer	Virtual Merchant	Amazon	Online version of retail store, where customers can shop at any hour of the day or night without leaving their home or office	Sales of goods
	Bricks and Clicks	Walmart	Online distribution channel for a company that also has physical stores	Sales of goods
	Catalog Merchant	Quelle	Online version of direct mail catalog	Sales of goods
	Manufacturer Direct	Dell	Manufacturer uses online channel to sell direct to customer	Sales of goods
Community Provider		Facebook LinkedIn	Sites where individuals with particular interests, hobbies, common experiences, or social networks can come together and "meet" online	Advertising, subscription, affiliate referral fees
Content Provider		Wall Street Journal CNN	Information and entertainment providers such as newspapers, sports sites, and other online sources that offer customers up-to-date news and special interest how-to guidance and tips and/or information sales	Advertising, Subscription fees, Sales of digital goods
Portal	Horizontal/ General	Yahoo Netflix Spotify	Offers an integrated package of content, content-search, and social network services: news, e-mail, chat, music downloads, video streaming, calendars, etc. Seeks to be a user's home base	Advertising, Subscription fees, transaction fees
	Vertical/ Specialized	Reddit	Offers services and products to specialized marketplace	Advertising, Subscription fees,

				transaction fees
	Search	Google	Focuses primarily on offering search services	Advertising, affiliate referral
Transaction Broker		E*Trade Expedia	Processors of online sales transactions, such as stockbrokers and travel agents, that increase customers' productivity by helping them getting things done faster and more cheaply	Transaction fees
Market Creator		eBay Etsy	Businesses that use Internet technology to create markets that bring buyers and sellers together	Transaction Fees
Service Provider		PayPal	Companies that make money by selling users a service, rather than a product	Sales of Services

Table 5: B2C Business Models in eCommerce, referring to Laudon and Traver, 2016: p. 339.

This table shows that the e-commerce sector has become very broad and versatile. Next to various online shops, other platforms such as social networks such as Facebook or LinkedIn do generate revenue why they can call themselves members of e-commerce as well. This needs to be taken into consideration when researching topics that concern e-commerce as well.

3.3. Different forms of e-commerce

There are different types of e-commerce:

- **B2B**: e-commerce between two companies or enterprises (e.g. paper company sells paper to another company). In 2013, when Mohapatra published his book, about 80% of e-commerce was B2B. It consists of two parts: **E-frastructure,** that is the architecture of B2B – consisting of logistics, application service providers that are specialzed in deployment, hosting and management of software, outsourcing of functions, such as web-hosting, customer care solutions, auction solutions software for operation of real-time auctions, content management and web-based commerce enablers such as automation software. **E-markets** is the term for the web sites where buyers and sellers come and interact together. (see Mohapatra, 2013).

- **B2C**: e-commerce between a company and a consumer (e.g. purchaser sells tangible goods or digital goods to a private buyer). B2C also tends to get more effective and successful, now that more people keep buying things online. First, especially younger people were keen on shopping online, now older people also discover the advantages of shopping online and lose their inhibitions (such as being afraid of fraud or lacking self-efficacy when using the internet). B2C enables a whole new shopping world for end consumers as they can access a various number of products they want to have, often at cheaper rates than in stores, which is a substantial argument for many online shoppers. Consumers are in a mightier position now that they can get more information in a short period of time about goods or services they desire. It also reduces market entry barriers for retailers as setting up and hosting a web site is not as costly as putting up a brick-and-mortar structure for a company (see ibid).
- **C2C**: e-commerce between two consumers (a private person sells a laptop to another private person on eBay). This type of e-commerce is one of the oldest types (eBay was launched in 1995), and therefore characterized by the growth of electronic marketplaces and online auctions. It has become successful because it unites some advantages for spontaneous and cost-conscious buyers: products can be acquired for a good price, you can get it immediately and don't have to wait for the delivery (for example when buying products that are sold in the same area that you live in) (see ibid). Also, people who usually don't enjoy shopping online that much due to trust issues, consider buying things from these kind of platforms like *eBay Kleinanzeigen* or *willhaben*, because they can finish the buying process (paying and being handed the product) personally (see ibid).
- **C2B**: e-commerce between a consumer and a company (a consumer sells something online to a company, for example artists selling illustrations to Adobe Stock). E-commerce also enabled a kind of commerce which takes the opposite than the usual way: private people/internet users are now able to sell their opuses online, for example graphic designers, illustrators or photographs. This is useful because now this kind of artists don't have local

boundaries anymore which enables them to sell a higher amount of their goods more easily and efficiently (see ibid).

- **B2G**: e-commerce between a company and the government (such as licensing procedures). The internet is used for public procedures, like licensing or patenting. This sector is important as it is estimated to have the greatest need for making these sequences more effective. These processes are known to increase transparency, however the amount of the web-based purchasing policies existing nowadays is, compared to transaction between businesses or B2C insignificantly small and still needs to grow (see ibid).
- **C2G**: e-commerce between consumers and the government (such as the possibility for consumers to download organizational files from the local e-gov. site). This has also become an important part of e-commerce: enabling citizens to organize and handle visits to the authorities online which makes it easier for them by avoiding long ways, long latency times and also organizational struggles (nonpractical opening hours, etc.). This technology improves the situation for the employees of governments as they do still have the same work, but digitalization makes it easier to organize and structure it (see ibid).
- **M-commerce**, also called mobile commerce: generally, e-commerce, but the device the websites are accessed with is a mobile one, for example a smartphone or a tablet. Mobile usage keeps rising: 96% of inhabitants in Austria own and use a smartphone, inhabitants in Vienna spend 3.7 hours per day on their phone on average (see Mobile Communication Report, 2018). Also, mobile commerce keeps increasing: in 2018, people in Austria spent an estimated amount of 640 million euros when shopping via their smartphone, while it was 200 million euros in 2013 –less than a third was spent five years earlier (see Handelsverband Österreich, 2018a). This is an extreme increase companies and sellers have to cope with. However, it is also notable that mostly low-involvement products have been bought via this kind of device: people mostly bought textiles, electronic devices or books (see Handelsverband Österreich, 2018b).

Regarding those subdivisions of e-commerce, it is important to also distinguish between the different types of online shops that have emerged.

3.4. Distribution Channels

Bricks and Clicks

Bricks and Clicks retailers are also sometimes called “brick and mortar retailers”. These retailers used to have their businesses exclusively “offline” – they used to be generic businesses such as shops or stores. They decide to open up an online presence (for several reasons: in order to not lose customers to other online shops, inability to pay all store employees, wanting to be more digital…), but still want to keep their stores as well, so the regular business activities are not replaced, but supplemented (see Turban et al., 2018). An example for a bricks and clicks development is the fashion manufacturer H&M.

Clicks to Bricks

This is the contrary development. Businesses that used to offer their goods or services exclusively online tend to open physical stores these days. The reasons behind that are versatile: Sometimes to increase customer engagement like Amazon or Apple try to achieve by opening stores (see Turban et al., 2018). This strategy can be seen as a multichannel business model, which is not a new phenomenon but has been implemented for several years already. It is not a surprise that online sellers try to boost customer contacts by enlarging the number of possible touchpoints.

Pure players

A so-called pure player is a company that exclusively sells their goods or services online. No physical store does exist, the company also doesn’t have distribution partners. The only way to buy products is online. Alibaba, AboutYou or Wish are examples for general-purpose sellers. An example for a pure player that just sells specific articles is dogtoys.com. (see Turban, 2018). These shops gather high amounts of various kinds of products and deliver them basically anywhere for sometimes disproportionate low price. This seems to affect the stationary commerce in a negative way. not only because of the prices but also because it raises expectations from buyers towards (online) sellers: free shipping, free returning, extensive returning deadlines are only some of the services customers are are taken

for granted. Therefore the users start expecting the same from other, maybe non-pure player, online shops as well which makes it more difficult and challenging for them.

Direct manufacturers

Manufacturers often skip distribution channels to reduce organizational and financial costs. Instead, they introduce the possibility for the consumer to directly manufacture their own products online. Dell and LEGO have started doing this, which is also a benefit for the customer because this way they have the opportunity to design their very own products (see Turban et al., 2018). This is also a well-known method for selling products that require high involvement and have higher price points. The customer is free to customize their products to a high degree to make it be the way they like it most. This leads to the result the customer will find most satisfying. Car configurators are also an example for that.

There are several methods for manufacturing goods that are sold online. E-Commerce differs from conventional commerce in a sense that the methods differ compared to manufactured goods which are sold in stores. In the following, the most important methods will be explained briefly.

- Engineer to order (ETO): Customers predetermine their wishes and preferences regarding the product. It is then customized directly according to these preferences. It is the most common approach in customized products.
- Make to order ('build to order): Low-demand products are only built after the customer actually buys the product. They are manufactured to customer specifications.
- Assemble to order (ATO): The components of the final product already exist. A molecular product architecture is needed for this kind of product that the customer assembles and customizes depending on his/her wishes and preferences (see ibid).

3.5. Progress and status quo of e-commerce in Austria

E-commerce has been an important part in Austria's commerce. For a start, Austrian traders and sellers have been digitalizing their own businesses, by building online shops. On the other side there also have been international developments that

influenced the buying behavior of Austrian customers that will be examined. The following chapter will take a look at e-commerce numbers and developments regarding the Austrian market.

Consumers have been switching their habits to shop online for quite some time now, because of several reasons. This argument can also be supported by following statistics:

The revenue of e-commerce in Austria keeps rising: while it has been 0.6 billion € in 2006, the number has increased to 3.8 billion in 2018. The number of buyers has risen as well from 4 million buyers in 2010 to 5 million buyers in 2018. People have been buying books and magazines mostly, followed by toys, sport articles and electrical appliances. Fewest purchases have been made in the food and furniture sector. Nevertheless, most of the money that is spent online is for clothes, namely over five billion euros. The most popular online in Austria shops are amazon.at, ottoversand.at, and quelle.at (see Handelsverband/KMU Forschung Austria (2017). People mostly buy books, computers and electronics and clothes online, which is a mixture of high involvement and low involvement products. Contrary to cars, which are preferably bought offline from 94% of customers in 2016 (see ibid).

While people aged from 25 to 34 represented the majority of online shoppers in 2004, in 2018 the majority is defined by people aged from 18 to 24, followed by people from 25 to 34, 35 to 44, 45 to 54, 55 to 65 and 65 to 74-year-old people (25% of the last group are told to shop online, while it was barely 1% in 2004). This shows a generational shift (online shoppers are getting older) as well as a general growth. Due to the fact that today users of almost every age group shop online, possibilities for sellers open up.

A recently published study also shows the switch of people's shopping behavior: The amount of people shopping online keeps increasing, also regarding high involvement products. The OGM (Austrian Association of Marketing) interviewed 1000 Austrians about their shopping and information procurement behavior, in relation to buying cars. Results showed that almost 100% of people gather information online while being in the first phase of the purchase. For further and more detailed information, many people still visit car dealers. Especially young people consider buying cars online, while going to car dealers keeps getting more important for services. For elderly people, it is still important to visit car dealers to

get information, consulting and advice while younger prospects prefer getting these kinds of information online. When asked about their motives of buying cars from car dealers, people mostly named their trust in the car dealers, possibility of test drives and being able to talk a human person (avoidance of anonymity). Men tend to retrieve more information online than women, while they prefer to inform themselves at car dealers. which also explains why personal consultation is more important to them while men tell women inform themselves online exclusively and also buy the car online. (see OGM, 2019).

This study gives insights for the current situation of people's mindset in Austria regarding buying new cars. Other papers have explained already that car dealers do not have exceedingly important roles anymore when it comes to choosing and customizing the car, but rather when it comes to service and deals. The switch to buying online undoubtedly justifies the importance of providing as much as information online as possible for car brands. Especially, the configurators are an important part of that. This significance justifies the importance of the usability of configurators as their usage constantly increases.

4. Personalization and Customization

We live in a world where we can personalize or customize almost everything, from the background picture of our phone to the sofa you might be sitting on right now. Since and the web has been made publicly available, many things have changed. Personalization should ease the usability for the user, by collecting his data and changing the website based on this information (see Karat, Karat and Brodie, 2004: p. 7). It has been used to personalize sites, forums and actually also e-commerce sites, so it is useful for vendors as well. There are many possible ways for personalization, such as the use click streams to estimate the goals of the user, or collaborative filtering to learn more about users' interests. Recommender systems are used often, especially in e-commerce. Next to personalization there has also been a progress when it comes to customization during the recent years. The difference between personalization and customization is basically that when a website is personalized, it is system-tailored, and when a website is customized, it is user-tailored (see Sundar, Marathe (2010: p. 298). Customization may also be seen as a kind of "gatekeeper" because the user decides what kind of things or options he/she wants to see or not, so he/she actively includes or excludes information. This is also a big issue when it comes to seeking information online on social media sites (see ibid: p. 299).

4.1. Personalized Web

The web and its content keep on becoming more and more adaptive and personalized, due to the ongoing collection of all kinds of user data. Generally, Adomavicius and Tuzhilin split up personalization online as a five-stage process:
1. customer data collection, 2. creation of customer profiles, 3. matchmaking, to determine the personalized products, services, and content most suited for each customer, 4. delivery of personalized products, services and content in the most suited channel, and 5. measuring customer response to personalized offerings (Adomavicius/Tuzhilin 2002, p. 1). The following subchapter examines and rate other researchers' insights to deliver an overview how personalized web looks like and how it is created.

4.1.1. Personalization

Personalization is widely used in e-commerce. It is defined as "*The act of specifically selecting content, in the sense of Web page or other digital content, for individual customers based on properties of the customer with the goal of increasing business outcomes for an e-commerce platform." (*Kaptein/Parvinen, 2015: p. 8)

There are important aspects for the designs of online shops, regardless of personalization: Friendliness, courtesy and understanding (see Lee/Park, 2009).

Online shops are missing out on the personal consulting possibilities salespeople may deliver in local shops, thus they have to rely on personalization. Apparel online shops for example try to figure out in advance if the user is male or female, then asking them to fill out some information about the size of clothes, preferred color, etc. (see ibid). Lee and Park state in their study that there are several elements that influence the attitude of the users towards personalization of online shopping websites in general, e.g. the online shopping history (frequency, amount, number of websites). This suggests, that the better and more expansive your online shopping experience is, the higher is the purchase intention in general. As Smith also states it:

"*With e-commerce, the better a firm can tailor and focus this information to the customer, the more effective their communication will be. As customers receive a greater degree of relevant and useful information from a company, they will be more apt to use that company's services and purchase that company's products. Loyalty will grow hand in hand with the company's revenue provide that the company acts appropriately with regards to the use of private, personal information*." (Smith, 2009: p. 101).

Caldini's taxonomy from 2001 which consists of six influence strategies was tested for online marketing strategies as well. Scarcity ("Only 5 pieces left!"), authority (use of academic titles to sell things) and consensus ("best seller") strategies seem to be successfully implemented in online marketing already (see Kaptein/Parvinen, 2015). The authors tested various methods on potential customers on an e-commerce website and found out that depending on the customers personality, there are large, yet heterogenous effects on their purchase behavior (see ibid), based on scarcity, authority and consensus and others. They as well clarify that people have different

personalities that require different types of content which why is it makes sense to combine technical solutions with psychological traits: Firstly, the consumers should be identified uniquely – this is easily possible nowadays based on cookies, social media logins and unified IDs (see ibid). Secondly, dynamically adaptable content needs to be put on the website, so that it is fluidly changeable for the different customers. Kaptein and Parvinen also suggest applying the 4 P's of marketing to the online shops (e.g. dynamic pricing, special discounts and more "to an individual based on his or her behavior." (Kaptein/Parvinen, 2015: p. 26.)

If reatailers want to personalize their homepage, e-commerce shop or, it is important for them to know their potential customers, as systems – not users – do the tailoring. The data can consist of several kinds. Karat, Karat and Brodie recommend defining a personalization feature space which consists of 3 categories: 1. The feature category (which consists of the characteristics of the techniques),2. the user category (which consists of the user's predisposition to trust the site, and the interaction goal) and 3. The business context (which consists of e.g. the business goals). Defining these three categories should help the provider and the user as well (see Karat, Karat and Brodie, 2004: p. 11f.). Still sometimes it is hard to decide what kind of information you want to gather and how it should be used. This is why Karat, Karat and Brodie designed the "Decision Support System" (ibid, p. 14) for IBM Watson which is a big player in the personalization and customization industry. It was designed to provide guidance on how to personalize applications or websites and it shows correlations of features and simulate what-if-situations (see ibid). The authors found out that it depends on the kind of website visited; retailers' goals are especially important. For example, in information technology, customers do not like collaborative filtering (a process telling what other similar users have bought). Still, personalization seems to be important to users in the e-commerce sector. Participants indicated that personalization is more important to them than usability (see Karat, Brodie, Karat, Vergo, and Alpert, 2003, p. 690). Personalization is also crucial for building trust in long-term relationships between the consumer and the online vendor (see Briggs, Simpson, de Angeli, 2004: p.39) which was tested in a Stanford study with 1400 participants. This thesis was that personalizing homepages **increased** credibility, therefore trust as well (ibid, p.45).

There are several kinds of personalization. The following model will just be reflecting possible kinds when it comes to e-commerce.

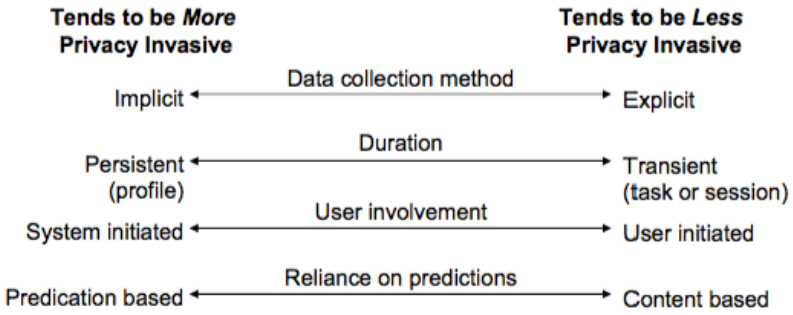


Figure 5: Four axes of personalization systems and their impacts on privacy. Referring to Cranor, 2004: p. 64.

Data collection method: Implicit data collection means that personalization is based on information about users, for example search queries or browsing behavior. Explicit data collection means that the personalization is based on data like demographics, ratings, or preferences (see Claypool et al., 2001: p. 49).

Duration: "task/session" places advertisements which fit to the user's current shopping situation. Persistent means that you create anonymous profiles about the users where retailers can add or delete information about them (see Cranor, 2004: p.65).

User involvement: when it is user-initiated, retailers can consider that the users have given some information which helps to personalize, such as giving the name of a city when looking up the weather forecast. When it is system-initiated, the system tries to find this kind of information, for example via the IP address (ibid, p.66).

Reliance on predictions: when the personalization is prediction-based you can compare users' profiles can be compared. This can lead to the exploration of similar preferences which leads to similar recommendations. This is also called "recommendation system" which will be discussed more in-depth in the following. When used a content-based personalization, the system will suggest products based on products that consumers have already bought, like Amazon does (and is regularly ridiculed for) (ibid p.66f.).

Recommender Systems

Recommender or recommendation systems are widely used especially in the e-commerce sector. The objective of a recommender system is – as the name suggests – to recommend something to the user, anticipating that it might fit his/her

taste, which they haven't discovered or known yet (see Chandrashekhar/Bhasker, 2011). They can be divided into three approaches:

Collaborative Filtering

The collaborative filtering approach argues that how products are recommended is based on other people's interests, tastes and preferences. It therefore on social information filtering/'Word of Mouth': If other people are similar to the current user, similar or same products are suggested (see Gregoriannis et al., 2013). There are two kinds of algorithms that are used for Collaborative Filtering: Memory-based and model-based algorithms. Memory-based algorithms try to predict ratings that base on heuristic models which work with formerly collected data. Model-based algorithms predict ratings using machine learning techniques or statistical data. This is why model-based algorithms are more complicated and take longer to be operational. Collaborative Filtering recommendations are often prefaced by phrases such as "People who bought this item also bought…" or "Other items you might be interested in" (see Smith, 2005).

Content-Based

This approach recommends products that are similar to already used or bought products from the identical user. This approach is useful for textual items such as documents, which is why it is generally used for online library systems. Here, user profiles are formed to be able to store their interests and preferences. User profiles are useful for helping customers make their buying decision when it comes to high involvement products.

Hybrid

A popular way to gather most information about a user and recommending them an ideal range of products is the mixture of the two just explained methods.

(see Gerogiannis et al., 2013)

There are also other categories of recommenders, based on demographic data, utility-based recommenders and knowledge-based recommenders (which requires data mining, so the systems have information about the user that can be applied purposefully).

Recommender systems are relying on psychological effects. It is important to always try to evoke positive emotions. "Initially, Psychological Customization includes modeling of individuals, groups, and communities to create psychological profiles

based on which customization may be conducted." (Saari, Turpeinen, 2004: p. 21). (The term *customization* may be understood synonymously to *personalization* in this context.). The goal of recommender systems is to persuade users to do or buy something specifically, still it is not always entirely clear what factors influence the persuasion. Several studies have been conducted on that topic. Bechwati and Xia found out in 2003 that the way how information is presented to the consumer can change their evaluations towards the recommendations. Subconscious processing of information is also an indispensable factor, especially regarding the design of the systems and perceived control (see Kruger et al., 2004). An interesting finding for high involvement products has been made by Tam and Ho in 2005, that if a recommendation matches positively, it has moderating influence on the elaboration and also on the acceptance of the recommendation. Based on these insights, Gretzel and Fesenmaier have conducted a study in 2006 researching how persuasion can be improved when using recommender systems are used. They focused on three factors: relevance, transparency and effort. Of course, it is important for recommender systems to design suggestions that are *relevant* to the user. Also, *transparency*, regarding the recommending process increases the perceived value, acceptance and even the users' confidence in the recommendation system. *Effort* is something consumers prefer to avoid or reduce while surfing the web (see Shugan, 1980). On the other hand, a study suggests that when it comes to decision-making, increased effort is followed by an increased likelihood of making a good decision (see Bechwati/Xia, 2003). Gretzel and Fesenmaier (2006) found out, that in this context high effort leads to a increased perceiving of value of the recommendation, but on the other side has a slight negative impact on the perceived match of the recommendation. This means, if a consumer puts more effort into the personalization, they have higher expectations for the results and therefore are unhappier if they do not fit. Also, the elicitation of preferences of each individual consumer is an intrinsic factor but still determines the users' evaluation of the recommendation, which is why preferences can be affected by the user's interaction with the system (see Gretzel/Fesemaier, 2006). Therefore, it is important to take notice of the relationship between user and technology as an almost-social one. User behavior in personalized web environments has also been researched by Ho and Bodoff in 2014. They found out that there are two kinds of user behavior: item

sampling (sampling different items and collecting them in cart) and item selection (collecting just the selected item in the cart). Confidence and attitude determine the effect of personalization, which is why it is important to ensure that personalization is done in a friendly and appealing way, so the user likes getting the personalized content and doesn't get overwhelmed or startled by the amount of personalization.
Nevertheless, recommender systems do have some limitations – one of them is called "cold start problem" – the lack of information about the user in the first place, which makes it difficult or sometimes impossible to tailor website fitting to users' preferences. Also, the lack of ratings can lead to this kind of problem (see Schafer/Fankowski/Herlocker/Sen, 2007).

Behavioral Targeting

Behavioral targeting is another possibility to target customers and give them personalized content based on their surf- and clickstream behavior. This kind of targeting can be extended to *predictive behavioral targeting*, which additionally includes personal user data, such as sociodemographic information that is gathered via online questionnaires or profiles (see Ho/Bodoff, 2014). Many web sites make use of this technology, such as *Facebook* or e-commerce site *aboutyou* which focuses on delivering personalized content and search results to the users.
Personalization, however, is not the only technique which enables users and customers to tailor their online shopping experience. With the growth of e-commerce, also another similar method has established in the last years: Mass customization. It is described in the following subchapter.

4.1.2. Mass Customization

Customization is a development which is similar to personalization in the first place, but the there are some notable differences. Customization – also often called Mass Customization is giving the end user the possibility to put together a product based on their wishes and preferences, so, customizing it. Especially in an online environment, this enables a way for making products that can be customized by a

single customer. Yet, it is possible to manufacture it the same way in which mass production products would be produced, which is why the term often is called *Mass* Customization. Customization therefore is also a part of industry 4.0 because mass customization allows automation techniques. With the increasing amount of customization techniques, mostly taking place online and is therefore accessible to all users, companies are also able to collect user data which then can be used to iteratively develop and enhance the systems which the customization technique are based on, e.g. online configurators for products or services, for example where do people spend most time? Where do they drop out and why, etc. (see Båkas et al., 2018).

Originally, the term was used by Joseph Pine in 1992: “developing, producing, marketing and delivering affordable goods and services with enough variety and customization that nearly everyone finds exactly what they want.” (Pine, 1992: p. 58). Therefore, the goal of mass customization is giving people the products they want explicitly, also at the time they want it.

Mass customization is a very wide and broad topic, accordingly the rest of this chapter focuses on giving information that is needed in context of the exact topic of the thesis.

Spierings et al. describe mass customization following: *“Mass customisation (sic!) aims to deliver personalised (sic!) products that answer real user needs, with the benefits of mass production for the provider of the goods or services.”* (Spierings et al., 2018: p. 4)

“Overall, the central idea behind mass customization has been to design custom-made products using the principles of modular product design and produce them via advanced manufacturing process technologies (e.g., flexible manufacturing cells, group technology)” (Thirumalai/Sinha, 2010: p.479) is another suiting explanation for the mass customization technique.

The question is, how mass customization can be applied to products and what products can or should be mass customized? There is already a high number of products that can be customized online, e.g. muesli, bike helmets or cars. The technical requirements, how a customization system can be built and what things need to be considered are explained in the following.

Salvador, de Holan and Piller developed a new approach in 2009 that showed three capabilities needed for mass customization:

1. "**Solution space development**: The product attributes that are customized must be identified, as well as the question what customer needs diverge.
    i. **Innovation tool kits**: Software that enables large pools of customers to translate their preferences into unique product variants, allowing each customer to highlight possibly unsatisfied needs.
    ii. **Virtual concept testing**: An approach for efficiently submitting scores of differentiated product concepts to prospective customers via virtual prototype creation and evaluation.
    iii. **Customer experience intelligence**: A tool for continuously collecting data on customer transactions, behaviors or experiences and analyzing that information to determine customer preferences.
2. **Robust Process Design**: Reuse or recombine existing organizational and value-chain resources to fulfill a stream of differentiated customers' needs.
    i. **Flexible Automation:** Automation that is not fixed or rigid and can handle the customization of tangible or intangible goods.
    ii. **Process Modularity**: segmenting existing organizational and value-chain resources into modules that can be reused or recombined to fulfill differentiated customers' needs.
    iii. **Adaptive Human Capital:** Employing managers and workers who can deal with new and ambiguous tasks.
3. **Choice Navigation:** Support customers in identifying their own solutions while minimizing complexity and the burden of choice.
    i. **Assortment matching:** Software that matches the characteristics of an existing solutions space (that is, a set of options) with a model of the customer's needs and then makes product recommendations.
    ii. **Fast-cycle, trial-and-error learning**: An approach that empowers customers to build models of their needs and

interactively test the match between those models and the available solutions.

iii. **Embedded configuration**: Products that "understand" how they should adapt to the customer and then reconfigure themselves accordingly."

(Salavdor/de Holan/Piller, 2009: p.73)

These steps show that mass customization can be used and implemented by basically any kind of product or service. Mass customization shows its advantage when the system is implemented, and the customers use it. The first step shows the beginning of the development, e.g. assuring that the software can be accessed and is working sufficiently. This includes the software's capacity to collect and mine huge amounts of customer data. The second step consists of slowly integrating the technique, already including human capital and automation and modularity features. The third step is the implementation of the system on which the mass customization process is based and that is actually visible for the customer. Because this thesis mainly focuses on online configurators, which are a part of mass customization techniques, the focus will be set on the third part, the choice navigation. There are three approaches for developing choice navigation. The first method, assortment matching is, for example, used by Amazon. This means, that also customization products can or should make use of recommender systems, which are part of personalization techniques, as already mentioned before. The other two methods suggest the opportunity of machine learning techniques. This gives the users the power of decision, but also helps and guides them. Those methods can be applied for customizing interactively, e.g. NIKEiD custom shoes, while the third part relies on information about the customer to adapt the configuration (e.g. Tesla is adapting to different drivers) (see ibid).

Online Configurators

According to the Configurator Database, there are currently more than 1000 of web-based product configurators (see Blazek/Partl/Streichsbier, 2016). This showcases the trend of building configurators letting consumers decide, what kind of products they want to have.

The user should not experience difficulties, misunderstandings or frustrations when using a configurator that is built to customize products. Walcher and Willer therefore analyzed 500 SME companies that offered customization methods. Based on these results, three criteria were established to analyze process satisfaction:

1. Usability
2. Creativity
3. Enjoyment

Additional criteria consisted of:

4. Uniqueness
5. Choice options
6. Visualization (see Walcher/Willer, 2012).

Interestingly, usability is the first criteria to be mentioned, followed by creativity and enjoyment. This shows that on the one hand, people need to be able to *use* the system properly and need to understand it, but also a creative, fun aspect is important when designing configurators in order to satisfy customers.

These aspects therefore need to be taken into consideration when setting up a configurator. Bakås et al. suggest that in the state of choice navigation, two kinds of decisions need to be made: The product *selection*, and the following product *configuration*. According to them, configurators should offer both aspects. Yet, they also mention the so-called “paradox of choice” which can lead to confusion and overwhelm on the customer’s perspective and should therefore be avoided because otherwise, the decision-making process is not a positive but a stressful experience, which may postpone or even hinder a buying decision (see Bakås et al., 2018)

The process of creating a product configurator can be visualized like follows:

Step 1	Step 2	Step 3	Step 4	Step 5
Preliminary analysis: do we really need it?	**Macro-analysis: to what extent do we need it?**	**Micro-analysis: implementation alternatives and costs**	**System design and implementation planning**	**System implementation and launch**
Customization strategy Quantify loss of not having a configurator	Map of configuration process Evaluate advantages	Define configuration requirements Demonstrate feasibility	Freeze configurator process	Product models for non-rep. product families Debugging and adjust

Understand value of configuration	Identify representative product family	Cost/benefit analysis	Select software - contract with vendor Implementation plan	Launch

Table 6: Implementation process of a configurator, referring to Forza and Salvador, 2007: p. 86)

These steps break down the important parts and considerations that need to be made if there is no configurator yet. It is important to set up a certain strategy at the beginning, with goals and achievements. Afterwards, the possible process of the configurator should be mapped. The third step shows the micro-analysis, going more into detail by defining requirements and analyzing the costs and benefits. The next step shuts down the process for the selection of the software and setting up an implementation plan. The last step consists of the actual implementation and the launch of the product, including debugging and adjusting activities. Now given the technical standards and features, Friedman gives an extensive and informative overview on what to consider when *designing* a responsive configurator. These insights are as well important, because not only the technical aspects like the implementation or the launch are crucial, but also how the configurator is designed, what kind of information is given and how well it can be perceived by the users. The most important findings are summarized in the following table:

Design	Interaction	Performance	Accessibility
How does the entry point look like?	Should the user automatically move to the next step when finished with the current one?	Is visual feedback of the product preview instant on mobile?	Are all critical elements (“previous/next” buttons, summary, visuals) focusable?
How are recommendations presented?	For every step, do we show the effect of a selected feature on the price immediately?	Do we store choices automatically? What happens upon page refresh?	Are all UI controls labeled for screen reader users?
How are presets selected?	Is it possible to save or label the current snapshot of the configuration?		Are icons intuitive to all users, or do they include visible text labels for usability?

Do we ask for preferences?			For every step, is the summary of all changes always accessible?
Is the product always visible, on mobile and desktop?			Is color contrast bright enough to make text stand out on top of backgrounds?
Do we always display the current price?			Is color contrast bright enough to make text stand out on top of backgrounds?
How are navigation buttons design			
Is it possible to jump back- and forwards to sites?			
Is it clear how to undo something?			
Do we use animations and transitions for rotation, a change in price or a re-rendering of components?			
How do we design the addition or removal of a choice (color, icon, overlay)?			
For every step, do we display the effect of a selected feature on the price?			
Do we provide extra details (for example, financing, leasing, reservations, sharing)?			
Do we use a 3D view/thumbnail of the product?			
Do we integrate a chat bot or conversational UI?			

Table 7: Important Configurator features.

(see Friedman, 2018: unpaged).

The list comprises points and features which should be considered. For example, it is important to include alternate texts for people who need screen readers. The list also features other topics which need to be taken into consideration, e.g. if the price should be shown all the time. All of these decisions need to be made carefully and eventually tested with users before they are implemented and and published.

After implementing an attractive and well-built configurator, people enjoy using it. A study found out five different kinds of perceived benefits people express when customizing products:

1. Utilitarian Value: the individual preferences match with the product characteristics
2. Uniqueness Value: the value that comes with the uniqueness of the product and the fact that it's "self-made"
3. Self-expressiveness value: the product reflects the own personality
4. Hedonic value (during process): the capacity of experiencing fun, joy or pleasure during the process
5. Creative achievement value (during process): creative task of codesigning leads to a feeling of accomplishment.
   (see Merle et al, 2010)

Many people indeed feel joy and pride when customizing own objects or products, as this means that they "made" it (I-designed-it-myself-effect, see Franke/Schreier/Kaiser, 2010), also because it perfectly fits their needs (see ibid). The feeling of positive emotions or descendance into a certain kind of task, it is also called flow (the concept will be defined and analyzed in detail later). Companies or technicians who design and implement configuration systems therefore should take this state into consideration, as the most desirable state a user can enter during a customization process. A user experience free of interferences or malfunctions sparks users' joy, curiosity and innovation. (see Ceribeli/da Silva Tamashiro/Merlo, 2016).

Linking back to car online configurators, they have some special characteristic. Starting with the fact that car configurators cannot really be put into the e-commerce sector as you (in exception of Tesla) can't order a car online, you can just customize and assemble it, but the buying process still takes place physically at a car dealership.

Also, car configurators are classified as "hard customization" (in contrary to soft customization), which means that standardized parts are combined and put together individually, depending on the customer's choices (see Piller, 2000). Car configurators follow the assemble-to-order classification, which means, that product

components cannot always be chosen independently because certain correlations have to be considered as well (e.g. ordering an a/c requires a strong motorization) (see ibid, 2000). Car configurators are ERP (enterprise resource planning) - configurators with CAD (Computer Assisted Design) automation. CAD automation means the collection of user data which is then used for gaining insights about user behavior, but as well as the visualization of e.g. 3D objects. Enterprise resource planning configurators are used when a product has many customizable features which however can interfere, as well as be combined. Some product features can only be chosen once, which shows an implicit restriction: if the car color is blue already, it cannot be black at the same time. An example for an explicit restriction would be two interfering features, such as a too weak motorization combined with an A/C (see Herlyn, 2012).

This shows the complexity of car configurators and the various factors that need to be taken into consideration when designing and implementing one. Yet, car configurators constantly are improved to ensure they keep being used by a growing range of customers.

4.1.3. Comparison of Mass Customization (MC) and Personalization

To finish this chapter, personalization and mass customization are compared. Clearly, personalization and MC look similar at the first glance, but their objectives and methods are definitely different. Personalization in e-commerce is useful and it has been around for a long period of time already – if it ceased existing, most people would react with shock, surprise, maybe even anger, because nowadays personalized advertisements, messages or content are such an ordinary phenomenon that web users are used to it already (and maybe enjoy it subconsciously as well because it sometimes can be advantageous). Yet, personalization methods are not always expedient. especially in an e-commerce environment for high involvement products, they often appear to be unrewarding and rather useless. In this environment, mass customization methods have a bigger advantage or can be used more productively. Contrary to personalization systems, the user chooses and customizes the product themself and therefore cannot get a

"wrong" or unfitting recommendation as all the information that is used are given by the user during the process. Bleier, de Keyser and Verleye come to the same conclusion and summarize:

> *"While both approaches hold great potential to achieve customer engagement goals (…), we delineate (sic!) that the level of autonomy for customization strategies and the level of granularity for personalization strategies need to be aligned with customer characteristics as well as characteristics of the customer-company relationship."*
> (Bleier/de Keyser/Verleye, 2017, p. 89).

They also suggest tailoring customization and personalization strategies accordingly to the customer lifecycle (see ibid). A mixture between both techniques can make sense and is often already used. The Volkswagen Konfigurator already included a recommendation system into the online configurator, e.g. displaying recommendations such as "users who bought this also bought", or star rating systems. No information can be found about what kind of recommender system is used by the Volkswagen configurator. Due to the fact that it is a recommender system for high involvement products that also includes and shows rating systems, it is possible that a hybrid collaborative filtering system just like Jiang et al. introduced in 2015 was used (see chapter 2).

Another possible approach is the information about the user, and especially the user's behavior during the configuration process, mining this data and then using it for automated adaptive selling (see Kaptein/McFarland/Parvinen, 2018). Customized persuasive messages for each customer when they enter or finish the configurator could be a possible outcome of that.

There are some ways that can enhance and simplify personalization. Data collection is needed in any way, which is why "newer" methods such as big data technologies can also be used in this context. The next chapter gives an overview about this.

5. Artificial Intelligence and Big Data

AI and Big data have been widely discussed topics for some years. This chapter investigates if AI/big data technologies can be used to enhance technical developments that are connected with usability in e-commerce regarding customizable products or as well the personalization of e-commerce web sites.

While big data is a field where huge amounts of data are collected and processed, artificial intelligence often takes this data to learn rules and solve problems (see Hammer/Kostroch/Quiros, 2017.). Making use of big data enables setting up rules, storing and visualizing data, and also analyzing user behavior and consequently predict user behavior.

Big data is often described with five key concepts, also called the five Vs:

1. Volume (the amount of gathered data)
2. Velocity (the speed at the data is generated and gathered)
3. Variety (the different kinds of data that are generated and used)
4. Veracity (the trustworthiness/reliability of the data)
5. Value (what is the value of the data and how you can make use of it)

(see Marr, 2015).

The Data collected can be various: Personal behavior of people on social media sites, such as likes, comments, uploaded pictures, as well as using patient data which can help predicting sicknesses. For the e-ecommerce sector, user behavior data is most interesting and important, which is why the main part of this chapter deals with big data and AI in the e-commerce branch.

Often, the usage of big data is criticized for the misuse of personal data. This is discussed in a subsequent part of this chapter.

Using the collected data, machines that are capable of artificial intelligence then learn how to mimic human behavior, including cognitive functions like learning things, or solving problems (see Hammer/Kostroch/Quiros, 2017). Artificial intelligence therefore also can automatically change interfaces or website designs based on what kind of person is using them (see Gentsch, 2019), while not being influenced by subjective points of views umformulieren. Still, AI takes all factors in consideration and is faster and more efficient than humans. Artificial intelligence is also present in e-commerce, even in the omnichannel business (verweisen):

companies like AT&T use artificial intelligence methods like machine learning to predict human behavior or the emotional states of customers. This is used for being able to act more proactively towards the customer (see Solomon, 2015*).: "With this new technology and a big data approach to customer problems, we can process data quickly. From there, we can make accurate predictions. It allows us to not only identify what happened, but to know why it happened and what the best approach is to solve it the first time."* (Solomon, 2015: unpaged).

5.1. Data Mining

Data mining "seeks to reveal a picture of the customer through an iterative collection and manipulation of data surrounding their online activities. For e-personalization, data mining supports the profiling of consumers and consumer groups." (Smith, 2005: p. 93). According to this, data mining itself is not a new technique, but has been used for already more than 15 years ago, e.g. to gather and then mine data from consumers (see ibid, 2005). This data was used for recommender systems and collaborative filtering. Recommender systems/collaborative filtering have been used in online shops for several years now. They have also been included in configurator systems to help people orientate themselves by offering recommendations like "people with this configuration also chose…", as well as offering rating systems (5-star-system) (see Volkswagen, 2019).

Data mining allows predictive analytics which means that based on the collected data, predictions about the future can be made. These assumptions are based on user behavior. Clickstream data is often used for marketing purposes as it not only provides customer data about purchases and product configuration. This is very valuable, especially in the customizing sector as it delivers information regarding the customers' behavior and demands over several periods (see Schuh/Riesener/Jank, 2018).

Thus, data mining has been crucial for building recommender systems. With the huge amount of the available data and their process, it gets even more important, e.g. by offering real-time analysis for retailing products by reinforcement learning (see Gentsch, 2019). This is why qualitative data is important for companies that are present in the e-commerce sector.

Companies which offer customizable products can benefit from this development: Sohrabi, Mahmoudian and Raeesi have developed a framework in 2010 that increases the usability of e-commerce website by using a hybrid algorithm and a neural network system. The researchers made use of data mining technologies and conducted a new framework that makes use of collaborative filtering (which is the main function and then uses a newly made, artificial neural network and a reactive algorithm) in order to make the framework flexible (immediate reacting to new data) and highly functional. Results showed that the use of the framework lowered the average number of clicks and increased the conversion rate, which proves its functionality and reliability (see Sohrabi/Mahmoudian/Raeesi, 2010).

5.2. AI, Big data and Automatization in e-commerce

Artificial intelligence and machine learning can help companies with automatizing their processes. In the e-commerce sector, this phenomenon is also called “intelligent e-commerce” (Turban et al., 2018: p. 251) or “smart e-commerce” (ibid, 2018: p.251). Artificial technologies often lead to automation processes in e-commerce activities, such as machine translation of languages. Recommender systems which are also called knowledge-based systems or expert systems in this context keep on coming up (see Turban et al, 2018). There are several (digital) big companies that invest in AI technologies:

- Apple, introducing Siri
- Google, working on Google brain, a project that includes machine learning
- Facebook, working on AI technologies for advertising and customer service
- IBM, delivering technologies for companies and manufacturers that enable the use of AI-powered systems, such as IBM Watson
- Amazon, using predictive analysis and machine learning to generate demand for products (see ibid, 2018)
- Spotify, collecting data from their listeners and using it for predictive analysis (see Russel, 2014)
- Netflix, collecting data from their viewers and using it for predictive analysis (see Marr, 2017)

There are several tasks in the e-commerce sector that can be improved with the help of AI, e.g. sales volume prediction. It also helps e-commerce shops and websites to reach customers on a more personal level. The following subchapter explains which functions can be used to personalize the online shopping experience.

5.2.1. Personalization and Customization

Algorithms and Machine learning allow websites to use data for enhancing the customer experience in a personalized way: *personalized* can be defined versatile. On the one hand, there are e.g. bots which the user can talk to (it is debateable if this is a personalized or a customized experience), so the user personalizes the content themself. there are also functions such as predictive analyses that do not involve the customer's actions directly but mainly make use of that data that was gathered about them. The most interesting functions are:

- Predictive analysis anticipates customers's preferences (see Charlton, 2016)
- Customized and automated e-mail-marketing (users get newsletters or marketing mails that are tailored to their needs and interests) (see Charlton, 2016)
- Customer experience enhancement (concierge service on Facebook, Siri, Cortana) allow customers to get information, make reservations and more functions via one tool (see Charlton, 2016)
- Product Launches (BMW used an AI technology to promote their new electronic car which enabled interested people to answer questions directly in the ad campaign) (see Charlton, 2016)
- Programmatic advertising (advertising content is not planned, bought and implemented by humans anymore, but by technology. Specific audiences and demographics can be targeted. It can be used for online ads but as well for TV and print ads and works in an automatized way.) (see Charlton, 2016)
- Chatbots (chatbots are used commonly on e-commerce sites as well as other service sites such as bank websites. They are answering basic questions and can give information and recommendations and can serve as personal

assistance to shoppers). Chatbots are a part of automated customer service (see Mah, 2016).

- Product and content recommendation (similar to the first bullet point, AI can also be used to recommend products but also content -such as newspaper articles – to web users, basing on information about him/her and behavior data. Machine learning is used to enable recommender sytems suggest products, services, etc. based on self-identified profile information or purchased/gathered data) (see Gentsch, 2019; Earley, 2015)
- Dynamic Pricing (depending what kind of customer is looking at the product, what kind of device is used and what region the user is from, prices can vary. They also are dependent on supply and demand. The prices therefore are not fixed but can fluctuate. (see Turban et al., 2018).)

AI seems to have various functions when it comes to e-commerce and digital businesses. Generally, it is important to know the customer, and also to use the data collected about them in a useful and working way. In digital business presentation of the content is crucial, especially in a user experience point of view. Not only delivering personalized content to the user but also presenting it as easy, appealing and attractive as possible is key (see Earley, 2015). Especially regarding the e-commerce sector and online shops, the use of AI finally always comes down to one main function/state:

> *"E-commerce sites want to sell more merchandise, and customers want to purchase things that they need or will enjoy having. (…) They make the purchase when they're getting what they need when they need it. The algorithm is predicting their need and making the offer in anticipation of it."* (Earley, 2015: p. 17).

5.2.2. Cars and AI

With cars as high involvement products being the main topic of the empirical part of the thesis, AI developments in the car industry regarding personalization or customization is the next point of focus.

The development of self-driving cars is ongoing. Several companies, such as Tesla or Google have worked on self-driving cars for several years. This subchapter, however, will focus on personalization and customization methods for AI

technologies in the automotive sector only. There are three interesting examples that show the current state of development.

- Jaguar Land Rover are currently working on a technique with the help of AI that helps reading facial expressions of drivers in their car. It uses a driver-facing camera to detect the mood of the driver, including personalization settings that change, depending on the driver's state of mind, like starting personal favorite playlists, setting ambient lights to calming colors. The same technology is planned for rear passengers, dimming the lights and raising the temperature if signs of tiredness are detected, so the rear passenger can fall asleep more easily (see Jaguar Land Rover, 2019).
- Also, other car brands have invested in Artificial intelligence, e.g. Toyota, with the goal of making driving experiences more secure and fun (see Markoff, 2015).
- Mavridou et al. published a study on the improvement of car configurators. It has been already mentioned in the current scientific knowledge chapter, so this should be seen as a reminder. They criticize that customers are often overwhelmed by the huge amount of choices online car customization programs are offering. Along with this phenomenon, affective needs were missing when it comes to customizing a car. Their solution was to develop a new kind of recommender system where also affective needs are incorporated. This would enable an emotional approach for customers as well, expanding possibilities for customizing a car online, because design parameters were included extensively. The article and the approach show an interesting point of view for car configurators, as here a more creative and playful point is used, getting some distance from the "building" and manufacturing character – which can be positive or negative, depending on the individual user.

5.3. Best Practices

When researching high involvement products that are sold online, there are two cases which be described as best practices. The first best practice is a recommender system which is based on artificial intelligence technology made by

Watson IBM. IBM delivered this technology to The North Face, a company that manufactures and sells premium outdoor wear (which can be defined as high involvement products). With IBM's technology, The North Face was able to set up a new online shop which allowed the customer to let the AI system look for suitable outerwear. Users are "talking" to the AI, which is asking questions e.g. what region the jacket is used for, what outdoor activity is planned etc. The questions asked are resemble those of a conversation with a salesman in a store. The "conversation" enables the customer to refine their needs which is the difference to normal recommender systems (see IBM, 2015). The website is not available anymore since at the beginning of 2019. There is no official statement of The North Face, an e-mail asking for reasons has been remained unanswered.

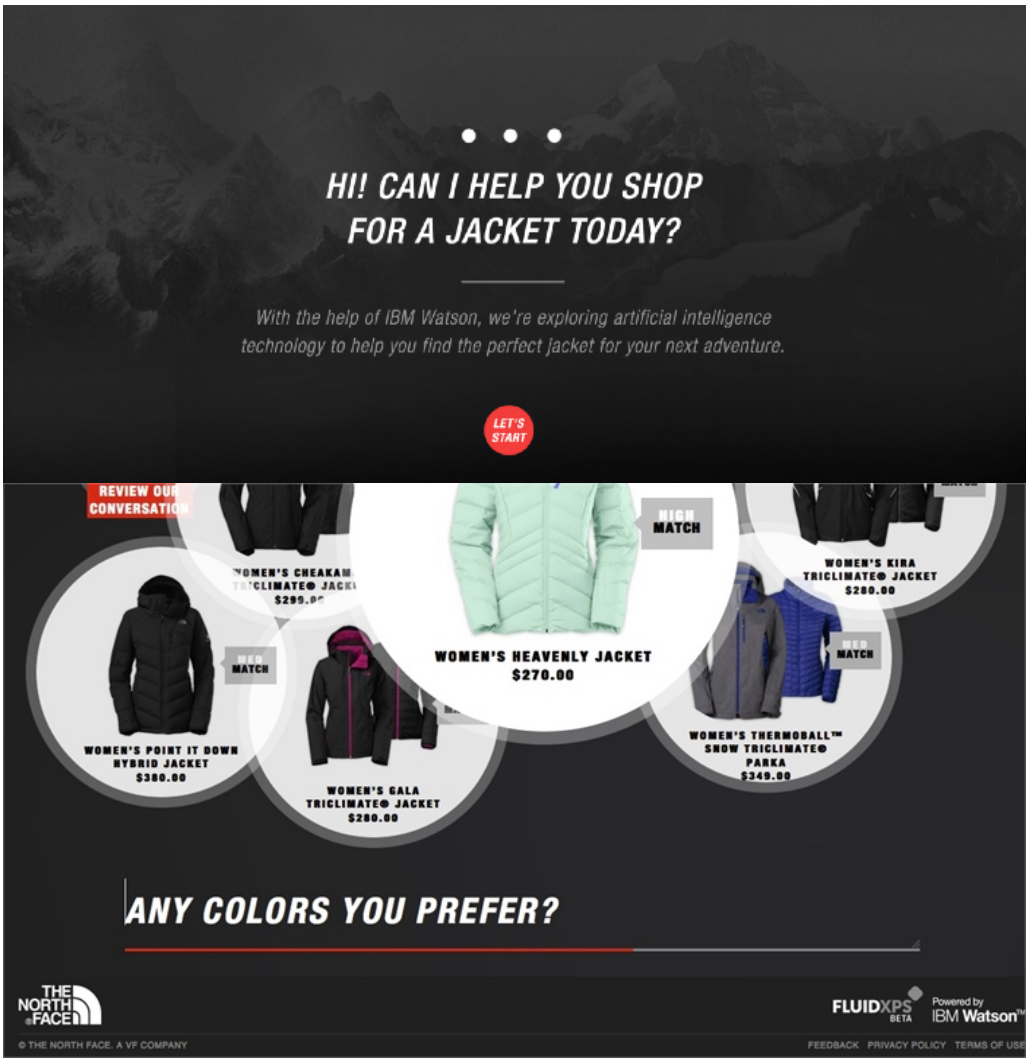


Figure 6: The North Face, AI-powered recommender system. Image: Personal Screenshots

The technical realization for the second example for best practice is also technically realized by IBM. IBM partnered with Jaguar Land Rover to demonstrate a new kind of customer experience regarding cars. (after) Recognizing the problem of too many existing possible choices versus the limited number of actual cars that can be shown in car dealerships, Jaguar Land Rover created the Jaguar Land Rover Virtual Experience. It is a 3D application that allows customers to customize their car and see it live in a 3D rendered visualization. The results of the customization process are instantly shown in a dealer showroom. This is a mixture between digital and physical customer experience, especially since this technology makes use of motion sensors. Thus, the prospect could open the driver's door to examine the interior or push a button to hear the engine. This customization method will also generate big amounts of data about customer preferences, enabling data mining and further development of this kind of customer experience. (see Vizard, 2013). This is a new and innovative strategy for the automotive sector, allowing interactivity and more emotional perspective of the transaction (playfulness, feeling of experimenting) for the consumer.

Figure 7: Jaguar Land Rover Virtual Experience. Image: CIO Insight

5.4. Legal and ethical issues

Processing and saving huge amounts of data from individuals, AI technology is often criticized for various reasons. Often, concerns about privacy are often expressed, as well as misuse and mismanagement of data or manipulation of opinions are heavily debated.

Dynamic pricing can be criticized, as it can be seen as unfair towards the customers to set different prices for different people, a phenomenon “price discrimination” (see Shpanya, 2014).

Data collection and mining theoretically takes place anonymously, but if there is enough data, it can be traced back to the individual behind the data, which was already the case almost 15 years ago (see Martin, 2006).

Recently, several scandals, like Cambridge Analytica (see Osborne/Parkinson, 2018), mass surveillance in China, leading to the social credit system which rates inhabitants (see Botsman, 2017), or the use of data to keep gamblers of online games hooked on the game (see Busby, 2018) have made headlines. Big data does not only provide chances and opportunities, but also risks and can be misused fast and easily. It is important to keep in mind that data and artificial intelligence do not have conscience, which is why people who design and implement the techniques need to be aware of ethical topics and problematics. Earley therefore points it down following:

> “There is no magic at the core of these tools and approaches—they still require creative human input, judgement, and expertise to produce results.” (Earley, 2017: p. 18)

Microsoft has published a book about the future of AI where one chapter is about ethical issues and principles. Being aware of this topic, Microsoft says:

> “Designing AI to be trustworthy requires creating solutions that respect ethical
> principles that are deeply rooted in important and timeless values.”
> (Microsoft, 2018: p 58)

Six principles were worked out to take care of societal impacts that AI can have. These principles are Fairness, Reliability and Safety, Inclusiveness, Accountability, Transparency and Privacy and Security. Especially the last two principles are important for a safe and respectful handling with data.

Although AI has come a long way and carries promising functions of which algorithms e-commerce can benefit of, there are still some problems to be solved. Especially regarding the fact that recommender systems seem to be improved by AI, but not all e-commerce sellers necessarily *need* the improvement of

recommender systems (such as online shops that offer product customization systems). AI seems to be a helpful aid when it comes to replacing “personal” features, such as the recommending service from a salesperson (→recommender systems), or the answering of questions by salespersons (→chatbots). Functions regarding customization sites, or more generally, regarding the enhancement of the usability of websites, seem to be missing (or exist rarely).

Another question is, how people actually behave when they shop online and if that kind of behavior can be influenced, depending on what they buy. It definitely depends on what product they are buying and how important that product is for them – generally on their *involvement*. Involvement is a big topic in the marketing and communication sector, and it is also important in this thesis to understand the difference between high and low involvement – especially in the online environment. The next chapter therefore gives information about this topic.

6. High Involvement Products

Products can be classified as high or low involvement products and low involvement products. As already mentioned, low-involvement products are more likely to be bought online (see Handelsverband Österreich, 2018c). It is important to distinguish between low and high involvement products because the market of low involvement products in e-commerce is reaching a saturation level (see CBRE, 2017). This is the reason why e-commerce should be focusing more on high involvement products. Yet, there are some differences that occur with the online purchase of high involvement products. This chapter treats the most famous theoretical model about high and low involvement, the Elaboration Likelihood Model by Petty and Cacioppo and then goes on to extend and alter the definition of high involvement products to fit for the e-ecommerce sector.

6.1. Elaboration Likelihood Model (ELM)

Marketing wants to persuade people to buy products or make decisions. When people shop online, they are confronted with a high number of stimuli. As this thesis is written about High Involvement Products, the Elaboration Likelihood Model is introduced in the following. The emphasis lies on the high involvement parts. The Elaboration Likelihood Model was introduced by Petty and Cacioppo in 1986. Originating from the social psychology sector, this model analyzes the process of persuasion in two different kinds of ways. The ELM also consists of the following premises:

1. Humans have the motivation to have the right attitude. Attitudes are not static as they are dependent on the social circle which is why they need to be altered or corrected from time to time.
2. Messages which are causing the change of attitude are not always processed in the same amount/speed.
3. There are different variables which can influence the amount of change of attitude.
4. If arguments are examined more or less intensively, motivation for impartial processing can in-/decrease.

5. Variables that already exist can have a negative or positive aspect on the processing of information.
6. Importance of periphery stimuli increases when the motivation is high.
7. Attitudes which are altered on the central route appear to be more resistant to changes. (see Petty/Cacioppo, 1986).

According to Petty and Cacioppo, there are two different kinds of routes to process impressions, which are also true for buying decision processes: the peripheral and the central routes.

Motivation is an important part concerning both routes. The higher the motivation, the more precisely the information is processed. Given a high level of motivation, the recipient processes information precisely and with mental carefulness. This way, the information is processed via the central route.

Information that is processed via the peripheral route also relies more on emotional cues and messages, as the recipients do not think that much and that intensively about the received message or information.

Possible changes of opinions or attitudes are more consistent, because the impressions are connected with attitudes and values if they are elaborated on the central route. For the central as well as for the periphery route, Petty and Cacioppo state that repetition of messages can be beneficial. They also assumed that both routes are separated clearly. Current research findings actually show, that both routes are alternating with each other and sometimes are mixed up (see Petty/ Briñol, 2014).

Applying these findings on high involvement products, especially in a digital, e-commerce context, this poses several questions. How can “high involvement” be defined in a digital setting/environment? Is it still the same experience when it comes to looking at products that are defined as high involvement products online in comparison to looking at them offline and what role does personalization of online shops in it? And is high involvement the same kind of condition when people plan on buying products online (compared to buying products offline), with the possibilities of customizing them?

6.2. High involvement products and high involvement behavior in e-commerce

Generally, high involvement products are defined as “durable, experience goods which are usually expensive” (Mitchell, V.W., 1999, p. 175), that have a higher value (see ibid, 1999). This is a rather broad definition which can be applied to a versatile number of products. Typical high involvement products are cars, jewelry, furniture or electronic articles such as TVs or gaming systems. High involvement services are journeys or insurances.

Looking at the e-commerce sector, there are two things to consider:

1. The personal involvement of the user when it comes to shopping online for high involvement products.
2. The reliability of the term “high involvement products” relating to e-commerce

Regarding the first point, it is difficult to decide where the user’s involvement is high or low when they areshopping online. As already mentioned, the peripheral and the central routes are alternating and therefore it is not always clear, which route is taken when processing information. Due to the big amount of advertising and the different consumer behavior online, involvement cannot be defined in the same way for physical media reception (see: *authorless*/Emerald Gems, 2015. Generally, the user behavior is different in an online environment compared to offline environment. Due to the fact that users are more online, and while being online, being engaged into multiple tasks simultaneously, a state of permanent cognitive load is created. Being online constantly and doing several tasks at one time, the users’ span of attention is constantly parted: Imagine a user checking Facebook first, chatting with a friend and listening to music on Spotify simultaneously while she is also looking for a new red dress. Given these numbers of activity, it is difficult to believe that the user consistently performs just one task, it is more likely to believe that all tasks are performed alternately. This kind of behavior leads to a general lower involvement, because the information receptiveness is partial (see Guadagno/Okdie/Muscanell, 2013). It fosters automatic and heuristic processing of information, which lowers the chance of high involvement. Information more likely is processed via the peripheral route (see Fennis/Stroebe, 2016). This may not have a big influence of the sale of low involvement products: they are bought more easily and without much doubt online (see Handelsverband Österreich, 2018c). But what does that kind of behavior

mean for the online purchase of high involvement products? When buying high involvement products, a higher span of attention is needed, optimally with information being processed in the central route. Fennis and Stroebe suggest that despite the parted span of attention, also high involvement can be given in certain situations:

> *"Online persuasion will feature both conscious, systematic, central as well as more unconscious, heuristic, peripheral processes. The former will probably be more important when consumers are highly involved or 'engaged' or have a salient promotion or prevention focus as in the examples discussed above. Under these conditions, and regardless of whether consumers' motivation is to acquire something desirable or to prevent the occurrence of something undesirable, they will actively browse the web in search of product information. They will therefore be motivated to process online advertising (and other content) in a mindful, conscious manner." (Fennis/Stroebe, 2016: p. 341)*

It therefore depends on what content or products the user is looking for. There is a phenomenon called "online heuristics", which means that people tend to believe information (which is perceived from online sources) more easily than information that is perceived physically (see Guadagno et al., 2013). Guadagno et al. therefore conducted a study where people (novices and experts) were asked to rate nonexistent football players based on an ostensible report and afterwards had to predict their future performance. Everyone received the same information, but in different formats (typed report, chart and graphed report, and on a computer screen). The information which was computer-based yielded the highest ratings from both novices and experts. It is questionable if this heuristic "computer = true" can be applied generally on information processing online, however, regarding high involvement products where product information is especially important, such an effect is easy to imagine. This can also be seen in the study about buying cars online that was conducted by Molesworth and Suortti in 2002. In interviews, people praised evaluation and information methods that were offered online, also because the information is given neutrally and there is no salesperson which is pressuring the prospect or giving out misrepresented information (see Molesworth/Suortti, 2002). This is different to how people make decisions for high involvement products offline. There, they more often get influenced by their families and friends (see Deshmukh/Das, 2012), celebrities and salespeople (see Santandreu/Shurden, 2017). Molesworth and Suortti also found out that the web is seen as a source of

information for high involvement goods, yet the conversion to actual purchases has remained low at least for cars which has been explained with price disadvantages, no test driving or missing service (see ibid, 2002). Generally, the internet is rated as useful and practical for searching for information about high involvement goods (see Santandreu/Shurden, 2017). The internet is helpful for finding information quickly, reliably and also offers various comparison possibilities, which makes it easier to decide for high involvement purchases.
When users are interested in a product or a brand, they are willing to take time to inform themselves more detailed and also are willing to invest in more time and concentration for it.

6.3. Flow

If users really focus on a task, this activity can also be indicated as “flow”. Flow is a useful approach in this context, as it can be applied on situations or behavior where a user is focusing deeply to absorb information.
Flow has been defined several ways in academic literature. Fitting definitions for online behavior are as follows:

- *“(…) the holistic sensation that people feel when they act with total involvement” (Csikszentmihalyi, 1977: p. 72).*
- *“(…) flow characterizes the perceived interaction (…) playful and exploratory. Flow theory suggests that involvement in a playful, exploratory experience (…) is self-motivation because (sic!) it is pleasurable and encourages repetition.” (Trevino/Webster, 1992: p. 542)*
- *“(…) the flow state is characterized by four dimensions (…) (a) the user perceives a sense of control over the computer interaction, (b) the user perceives that his or her attention is focused on the interaction, (c) the user’s curiosity is aroused during the interaction, and (d) the user finds the interaction intrinsically interesting.” (Webster/Trevino/Ryan, 1993: p. 413).*

These findings suggest that online users are able to get into this “flow” situation, which allows them to completely descend into their activity and furthermore even experiences of joy and playfulness. Yet, enough sense of control over the computer, sufficient grade of focus, curiosity and interest must be given to reach this state. Referring to high involvement products, this requires enough interest

and willingness on the customer's side to inform themself about the product for the user. Thus, when people are looking for high involvement products online, they enter the state of flow more easily than when they are looking for low involvement products.
A study by Ceribeli, da Silva Tamashiro and Merlo conducted in 2017 found out that there are some categories that influence the online flow situation of customers when asked to carry out high involvement purchases online. Main categories that promote the state of flow are *website aesthetics*, *website perceived innovation* and *prices*. This shows that if a website is perceived as aesthetic and also innovative, people are – given enough interest – keener to get into that flow state. Also, the higher the flow state is, the more satisfied users are with their choice of product and their experience. Other factors that as well influence the satisfaction as well are the *convenience of the website* and the *politics of switching and devolution* (see Ceribeli/da Silva Tamashiro/Merlo, 2017).

6.4. Implications for e-commerce with high involvement products

These definitions and especially the study from 2017 show how important entering a flow state can be for the purchase or the decision-making of high involvement products. This is especially true for an online environment where the attention span is often lower or at least divided. There already are advances when it comes to personalizing shops that sell (high involvement) products, like already mentioned, also when it comes to recommender systems. Yet, especially for online customization programs, the flow state is important and should be considered when offering customization methods for products online. The definition of high involvement products also needs to be extended for the online environment. On the one hand, the same products which are called high involvement products physically can be named high involvement products as well. Due to the high number of configurators online – which enable/foster the flow state – also other kinds of products need to be considered as high involvement products, as the user does have a high involvement while configurating them. In this situation and environment, it does not matter if that's

a pair of shoes, a biker's helmet or a surfboard – as long as the user descends into the process of customizing it and therefore has the chance of entering the flow state, all customizable products can be called high involvement products in this context. This is because firstly, the user already thinks of the product in the first place, therefore they don't usually *discover* it when browsing an ordinary online shop randomly or out of boredom, but purposefully goes on the website to customize it. Customizing the product, the user has to be acting actively themself, because things need to be configurated, colors have to be chosen, generally decisions have to be made (in contrary to online shops where the user just can look at a huge number of products without being actively engaged). Therefore, the user is engaged, highly involved and optimally enters the stage of flow during the customization process. But also, the users and their experiences have to be known well in order to actually be able to anticipate what the user want. It is crucial for accordingly setting up platforms, how to design them, and much more. The following chapter therefore informs about the customer journey and the consumer experience, whereas the chapter after that informs about the user in general.

7. Customer Journey and Consumer Experience

7.1. Customer Journey and Customer Decision Journey in e-commerce

In commerce and especially e-commerce, customer journey is a process which describes their way to buying or not buying a certain product or service. The consumer traverses certain points which are called “touchpoints” (the “points” they “touch” while looking for a product. The customer journey consists of five steps that the potential customer goes through ideally. The customer journey is important for marketers – especially in the e-commerce sector – because as already mentioned, it is crucial to know the customer and their needs and desires, optimally even before they know them. The five steps of the customer journey allow companies to track the customers’ behavior online and therefore to get to know them (better), which enables them to use better strategies and foresights. There are differences between an “ordinary” customer journey and the online customer journey because the steps can vary. In the following, important models and definitions of a typical customer journey are listed and explained. The customer decision journey and possibilities regarding omnichannel marketing is also presented.

7.2. Important parts of Customer Journeys

There are several models and definitions of a customer journey. The main model which most other models are based on, is presented now. Other terms and concepts base on this main model, derive on it or add more information or insights.

The main model consists of five stages that the consumer goes through while, ideally, being accompanied by a company ideally.

1. **Awareness**: The consumer gets aware of a certain brand or product by external information, such as advertisement.
2. **Consideration**: the brand or product are taken into consideration. This can happen when the consumer browses an online shop.
3. **Purchase**: A product is purchased if the consumer is persuaded.
4. **Retention/Service**: the consumer makes use of community forums, or uses call centers or chats in case of problems or information seeking.

5. **Advocacy/Loyalty**: In case of happiness or satisfaction with the brand or the product, the consumer subscribes to newsletters or starts following the brand on social media sites. This building of loyalty is crucial for the next costumer journey (brand gets taken into consideration in the awareness phase).

(see Kotler/Keller, 2006: p. 56).

The customer journey is a process which is why it can be visualized as:

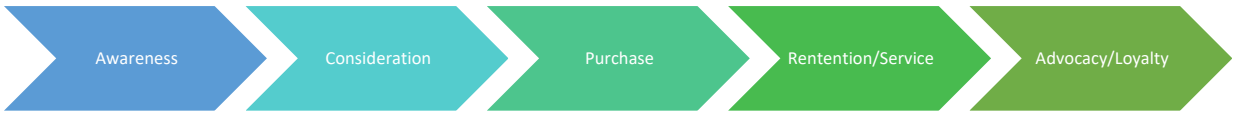


Figure 8: Customer Journey, referring to Kotler/Keller, 2006: p. 56.

7.2.1. Touchpoints

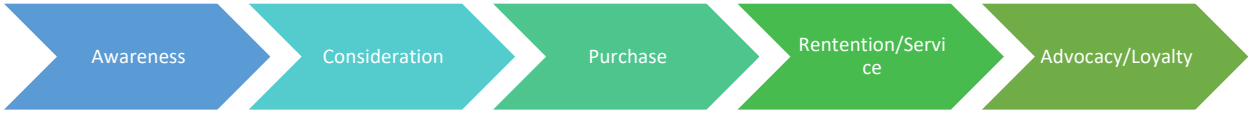
During all the five parts of the customer journey, a consumer gets in touch (purposely) with the company or the product. These happenings are called touchpoints and can occur at all five stages during the customer journey (see Kotler/Keller, 2006). Touchpoints can be divided into two levels: The customer *learns something* about the company, or the customer *perceives feelings* during the contact. These experiences lead to certain attitudes towards the brand. Touchpoints can happen online as well as offline.

Knowing and influencing touchpoints is relevant for the company, so that they can be designed and shaped ideally. Touchpoints can be analyzed and therefore, their success can be measured (although not every touchpoint can guarantee a positive influence on buying behavior – if they are not designed well enough they even can affect customers' behavior negatively) (see Puhlmann, 2008).

Although not every touchpoint can be influenced by companies or marketers, there are some which can be altered and influenced. Like this, benefits that improve the relationship between the customer and the brand can be created.

There are customer-initiated and brand-initiated touchpoints (see Sundar, 2018). Customer-initiated touchpoints happen when the customer is looking for information regarding a product or a brand proactively, while brand-initiated touchpoints are made by companies and already looking to target customers, for example advertisements on TV. Brand-initiated touchpoints are often paid for.

Touchpoints vary, depending on at what point they happen, if they happen consumer-initiated or brand-initiated and also if they happen digitally or physically. In the following, some explanatory touchpoints for the respective stages are named:



Digital	• Online Advertisement • Social Media • Web Search • Online Display • Blogs	• Web sites • Landing pages • Paid content • Product page • Search results • E-mail	• Web site (online shop) • App • Facebook Shopping • Cart/Thank you page/etc.	• FAQs • Community • Chat • Twitter • Facebook • Bots	• E-mail • Loyalty programs • Surveys • Ratings
Physical	• Advertisement (TV, radio, print, DOOH) • WOM	• Direct mailings	• Store • Salespeople	• Store • Call Center • Packaging	• Direct Mailings • Vouchers • Invoices • Loyalty card

Figure 9: Possible Touchpoints in certain situations. Own depiction.

There are some important touchpoints on both sides, yet it is visible that more touchpoints are being generated digitally. It is easier, and in most cases cheaper, for customers and also for brands to look for/deliver information online.

When thinking of the consideration of buying a new car, or customizing it online, the first two steps of the customer journey are especially important. People need to become aware of the brand first – and then consider the brand as a possible car manufacturer for their next car. Apart from one website (Tesla) cars cannot be *bought* online, just customized, nevertheless people who do this get a code and can show this code to salespeople who then place the order, so that the car actually gets produced adhering to the customer's individual wishes. The last three steps are, therefore, more important in the physical sector, because after having customized the car, the customer is obliged to visit a car dealership.

Summarizing, it is not enough for a car brand, to just cover one part of the customer journey – both parts need to be taken into consideration. Also, it is not comparable to ordinary online shops as the process as well as the contents are not the same. A

possible customer journey for buying a car that was customized online could look like this:

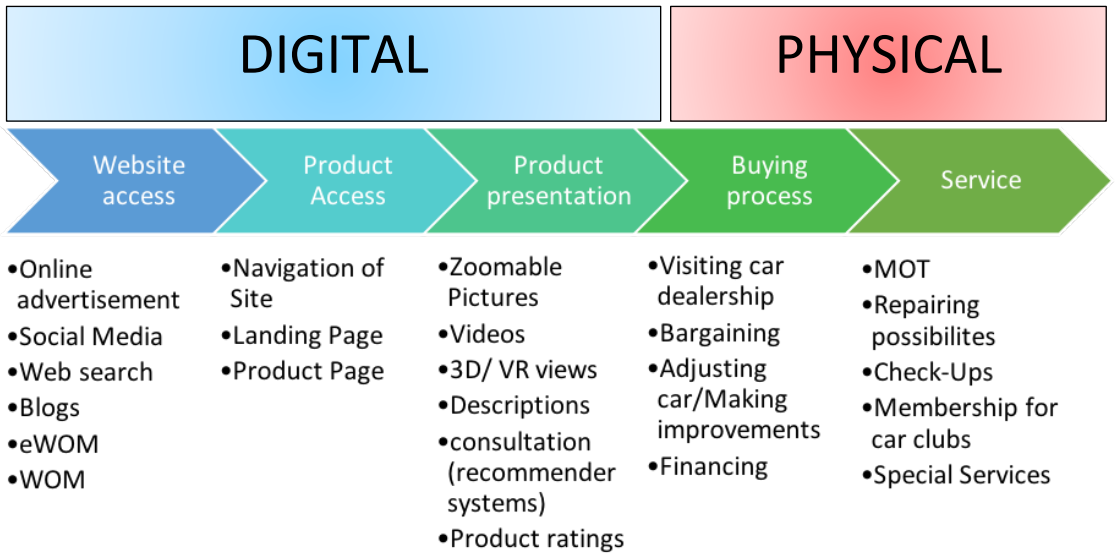


Figure 10:Possible customer journey in the car buying process. Own depiction.

7.2.2. Moments of Truth

During the buying process, there are as well several “moments of truth” which are explained shortly. A moment of truth is similar to touchpoints, as they also describe situations where customers get in touch with companies/brands in versatile ways. Moments of truth differ from touchpoints as they are not at all exorable by companies. A moment of truth could happen if a customer reads an article about the company which was not controlled by it. The four moments of truth and their importance in the customer experience sector are explained below.

1. Zero Moment of Truth. The term was invented by Google in 2011 and therefore is exclusive to online retailing: Potential customers realized that there is a need (for a service or a product) and go online to do some research regarding a potential purchase (see Cohen, 2013). When looking for a car, people used 18.2 sources on average to gather information. 97% of these shoppers were influenced at their Zero Moment of Truth (see Google, 2011). This high rate of influence apparently is typical for high involvement products

as the numbers for other high involvement products and services are similar: Banking with 91% and 10.8 used sources and technology with 92% and 14.8 used sources show numbers on the same scale. Meanwhile do low-involvement products such as groceries stand on the other side of the spectrum with 61% influence rate and 7.3 used sources (see ibid, 2011). The high importance of realizing and using such a zero moment of truth for marketeers and manufacturers becomes obvious. Google has four advices for marketeers regarding the ZMOT:

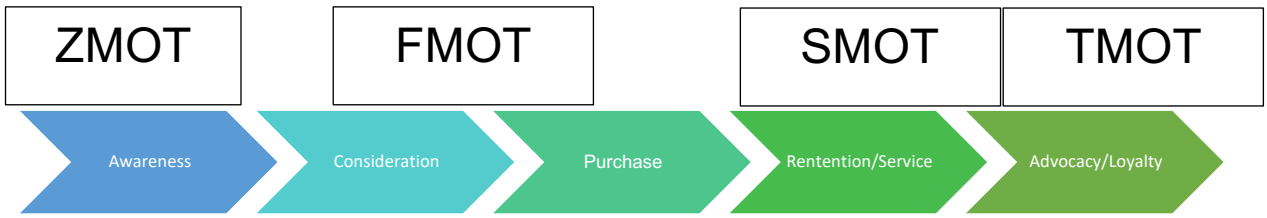
1. "Use search to uncover and understand the moments that matter.
2. Be present in the moments that matter.
3. Have something interesting, relevant and/or engaging to say.
4. Measure the impact."

(Lecinski, 2014: unpaged).

It is therefore not only important for sellers to design their websites as attractive as possible but also to be shown at the top of search results – in order to be seen by prospects (and considered the obvious choice).

2. First Moment of Truth. This term was coined by the company Procter and Gamble (P&G). This moment describes the buying decision which was made by the customer. P&G describe this moment as "the moment a consumer chooses a product over the other competitors' offerings". (Procter and Gamble, 2006, p. 29). This moment of truth is crucial as here the consumer makes theirdecision to buy or not buy a product or a service from a specific.
3. Second Moment of Truth. This term, too, was coined by P&G and describes the situations where the customer has purchased a product or a service and now experiences it. The quality of the product/service influences the experience, hence the attitude towards the product/the brand and to buy it again in the future or not (see Cohen, 2013).
4. Third Moment of Truth. This moment of truth can be listed for the situation after the purchase process and describes the consumers' feedback towards the brand/products. It can be negative, if the experience has been bad (via negative WOM, public complaints, not buying the brand again) or positive (sharing positive WOM, giving positive reviews, buying the product or the brand again and recommending it offline/online) (see ibid, 2013).

Combining the general Customer Journey, touchpoints and moments of truth, the following visualization can be created:



Digital	• Online Advertisement • Social Media • Web Search • Online Display • Blogs	• Web sites • Landing pages • Paid content • Product page • Search results • E-mail	• Web site (online shop) • App • Facebook Shopping • Cart/Thank you page/etc.	• FAQs • Community • Chat • Twitter • Facebook • Bots	• E-mail • Loyalty programs • Surveys • Ratings
Physical	• Advertisement (TV, radio, print, DOOH) • WOM	• Direct mailings	• Store • Salespeople	• Store • Call Center • Packaging	• Direct Mailings • Vouchers • Invoices • Loyalty card

Figure 11: Combination of touchpoints, moments of truths in physical and digital environments. Own depiction.

Due to the many touchpoints, users' experience when looking for a product or a brand, it is important for manufacturers to keep in mind how also little or short moments can influence a consumer's decision. *especially in the first moments.* This needs to be taken into consideration when setting up marketing strategies.

7.2.3. Consumer Decision Journey in e-Commerce

The consumer decision journey is another aspect of the customer journey. It mainly focuses on the point where the consumer actually decides to (not) buy a product or service, so other touchpoints are left out. The management consulting firm McKinsey has developed four steps in 2009, that show the process of a Consumer Decision Journey:

1. **Initial Consideration**: the consumer considers an initial set of brands (based on touch points).
2. **Active Evaluation**: Consumers add or subtract brands by evaluating what they want. They now start searching actively for information.
3. **Closure/Moment of Purchase**: Consumers select a brand at their moment of purchase. This is the moment where they actually buy brands.
4. **Post-purchase**: After purchasing a product or service, the consumer builds expectations based on the experience, so this is an ongoing exposure of the brand and the product. This is also called post-purchase experience and a crucial factor when it comes to the next consumer decision journey as these experiences influence the buying behavior (see Court/Elzinga/Mulder/Vertvik, 2009).

These steps are visualized in a circular model as the process repeats itself constantly. Therefore, a trigger is being set at the first point after a repetition, which ideally leads to a loyalty loop, building up loyalty towards the brand which is based on the positive post-purchase experience which in turn triggers the consumer to take the brand into the initial consideration set again:

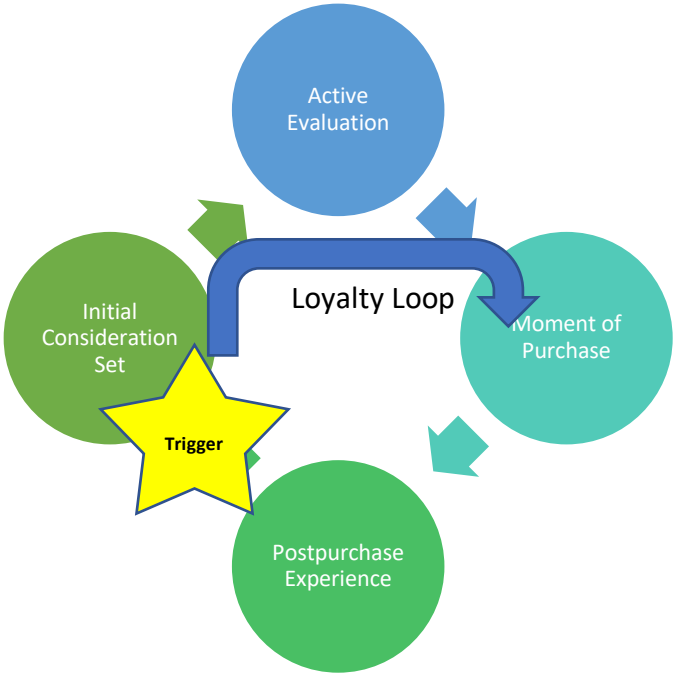


Figure 12: Decision-making process, referring to Court/Elzinga/Mulder/Vertvik, 2009: unpaged.

Especially regarding a car buying process, McKinsey did some research, finding out that the "fragmentation of media and the proliferation of products" (ibid, 2009:

unpaged) made consumers reduce the number of brands that are considered at the outset. The overwhelming number of choices and advertisements makes consumers fall back to the limited set of brands that remains in their minds. This is why brand awareness is essential. Brands in the initial consideration set can be "up to three times more likely to be purchased eventually than brands that aren't in it" (ibid, 2009: unpaged). Still, brands can interrupt the decision-making process by coming into consideration later, maybe even by forcing the exit of rivals. It depends on the industry and the kind of products how consumers behave. According to the McKinsey consumer decision survey conducted in 2008, the share of purchased brands is the highest at the first step (initial consideration set) with 63%. 30% remain in the second step, active evaluation, while only 7% make it to the loyalty loop. When it comes to the average number of brands, the number is 3.8 at the initial consideration set, while 2.2 are additionally added in the active consideration (see McKinsey, 2008). This means that the consideration of car brands is not only formed by previous experiences with car brands but can also be changed by external factors.

A high-number effectiveness of touch points happens during consumer-driven activities such as internet reviews or word-of-mouth recommendations. This gets even more important with the number of steps (21% for the first step, 37% for the second and 31% for the third). Former experience plays the biggest role in the first step (28%) and loses importance at the second (10%) and the third (5%) steps. Although company-driven marketing and store interactions remain important (store interaction has the highest importance in the third step while company-driven marketing has the highest importance in the first step), not all car brands take former experience and consumer-driven marketing into consideration. There are two different outcomes concerning the choice of a marketing strategy:

> *"The experience of US automobile manufacturers shows why marketers must master these new touch points. Companies like Chrysler and GM have long focused on using strong sales incentives and in-dealer programs to win during the active-evaluation and moment-of-purchase phases. These companies have been fighting the wrong battle: the real challenges for them are the initial-consideration and postpurchase phases, which Asian brands such as Toyota Motor and Honda dominate with their brand strength and product quality. Positive experiences with Asian vehicles have made purchasers loyal to them, and that in turn generates positive word-of-mouth that increases the likelihood of their making it into the initial-consideration set."* (Court/Elzinga/Mulder/Vertvik, 2009).

These insights show the significant role that consumers play nowadays when it comes to deciding for products and that marketers and manufacturers need to be aware of this development.

In 2015, Edelmann and Singer published an updated article for McKinsey, especially focusing on digital challenges concerning the consumer decision journey. They now suggest to exclusively use the “Consider” and “Evaluation” points for the first round of the journey, leading the “Advocate” point instantly to “Bond”, which then in the second round directly goes to the “Buy” point, leaving out “Consider” and “Evaluation. They call this the “Accelerated Loyalty Journey”. The elimination of these two points enables a quicker and more effective way of building loyalty instead of leaving it simultaneously next to the “Evaluate” point.

The authors also suggest steps for the future, just like Court et al. did. The two sets of steps are presented below to showcase how implications for the future changed within six years.

Steps	Court et al. (2009)	Edelmann/Singer (2015)
1	**Prioritize objectives and spending** (not only the right points have to be chosen but also the right customers need to be targeted)	**Automation** (the help of technical innovations eases the provision of enabling simple, useful and engaging experiences)
2	**Tailor messaging** (weaknesses need to be addressed at specific points. Hyundai allowed their customers to return their vehicles if they lost their jobs which helped Hyundai to get into the initial-consideration set)	**Proactive personalization** (enable the customer to spontaneously customize or personalize his/her experience)
3	**Invest in consumer-driven marketing** (the consumer needs to be more focused on, often with the help of CMS and online targeting engines)	**Contextual interaction** (using knowledge where a consumer is in a journey to be able to deliver follow-up sets of interactions)
4	**Win the in-store battle** (consumers want to look at products and therefore like re-checking them in stores which makes merchandising and packaging important)	**Journey innovation** (being open-minded for technologies such as data mining, omnichannel approaches, or collaborations with other companies)

Table 8: Implications for future customer decision journey. Own depiction.

Looking at the steps from 2009, there were already some interesting thoughts, such as consumer-driven marketing which is nowadays as (or even more) relevant as then. Yet, the implications from 2015 are clearer and enable a more structured plan on how to optimize the customer decision journey. Big data and automation as well as personalized messages and possibilities are viewed as crucial now.

7.3. Omnichannel opportunities for customer journeys

The previous chapters show the versatile circumstances that have to be considered by companies when it comes to advertising a product. The omnichannel approach delivers a promising opportunity to do so. Developed from multichannel marketing which describes the connection of multiple channels for marketing prospects, an omnichannel approach has derived (see Wassermann, 2015). Omni, originating from the Latin word “omnus”, means “everything” which explains the term – **all** possible channels of a company are connected for a seamless and easy customer experience. A 360° brand experience is the goal of this strategy. Possible connected channels are:

- Online Shop
- Mobile Use (e.g. Apps, via Smartphones, Tablets, other devices with internet connection)
- Social Media Sites
- Stores
- Mailings
- Leaflets

Combining these channels and also making them available to the customer simplifies the customer journey for the consumers as well as for the companies, delivering a seamless experience which overcomes digital and physical boundaries. Especially given the huge number of touchpoints, moments of truth and versatile ways of customer experience, this is a promising strategy for low-involvement as well as for high involvement products (see Salomon, 2015). Taking the car buying process as an example, it could be assumed that the prospect gathers information online as well as offline – whereas a connection between the different touchpoints already is possible. Afterwards, when the consumer customizes a car and then

decides to finally go to the car dealership, the salesman already knows the car which was designed previously.

The chapter seeks to explain why the customer journey is such an important topic, especially when it comes to high involvement products. Customers' behaviors and ways of getting information are versatile, so it is necessary to know them as well as possible. Through analyzing the consumers behavior and their preferences along with enhancing touchpoints according to the given insights, marketing advantages can be gained and used to influence customer journeys.

8. Consumer Behavior

Consumer behavior is a very important – if not the most important – factor when it comes to choosing how to implement and design an e-commerce platform. It has been widely researched and tested during the last few decades, and the results are briefly summarized in the following. However, since this study is focusing on online consumer behavior, more recent research will be shown and discussed.

Walter sees consumer behavior as *"the process whereby individuals decide whether, what, when, where how and from whom to purchase goods and services."* (Walter, 1974).

Based on this definition, you can say that everybody is a consumer. Not every kind of behavior can be defined, but consumer behavior itself nowadays is defined as follows:

"Consumer behavior is the activities people undertake when obtaining, consuming and disposing of products and services." (Blackwell et al. 2001: p. 12.)

Consumer behavior is therefore seen as an activity people constantly carry out. Still, the definition is not entirely fulfilling everything that is to know about consumer behavior. There is another definition which regards consumer behavior as dynamic, which is important considering that a consumer today has lots of choices and lots of different situations where they are in a position where there is something to buy:

"The dynamic interaction of affect and cognition, behavior, and environmental events by which human beings conduct the exchange aspects of their lives." (Bennett, 1995: p. 45). The dynamism of the interaction has been considered, as well as the fact that consumer behavior can change over the time and situation.

Solomon defines consumer behavior very wide-ranged:

"It is the study of the processes involved when individuals or groups select, purchase, use or dispose of products, services, ideas or experiences to satisfy needs and desires." (Solomon, 2015: p.28)

Blythe has created a dynamic model of consumer behavior that includes the most important parts:

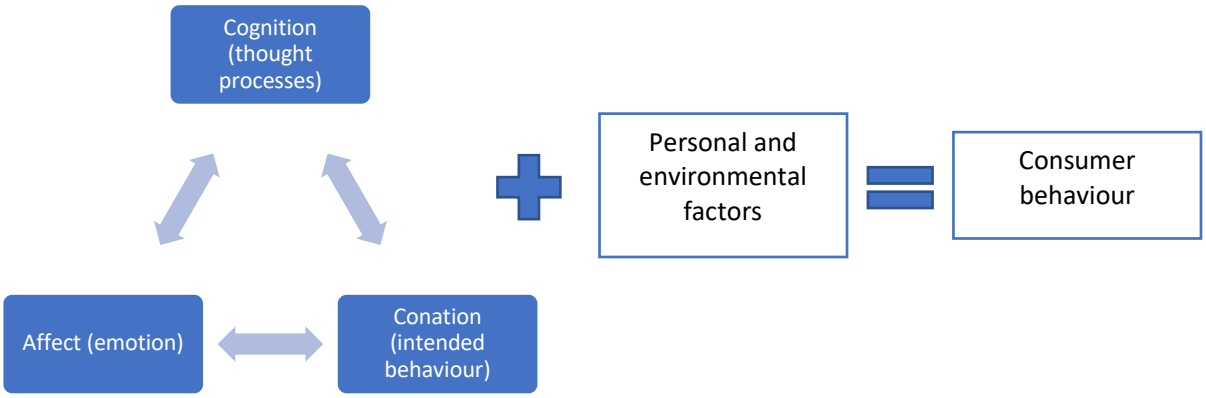


Figure 13: Consumer Behavior dynamics, referring to Blythe, 2013: p.7.

This means, a consumer is always influenced by three internal conditions: Cognition, Affect and Conation. These three stages are important as they can sometimes interfere, too. The other day you think of buying a product (conation) and end up buying something completely different (affect). The next stage is the influence from a consumer's personality on one hand, and from their environment on the other hand. Personal and environmental factors are discussed later. The model itself therefore means that marketers are able to influence certain processes at several points – such as thought processes if they give relevant or interesting information at the right time. Emotion, too, can be influenced and is therefore a very important factor when it comes to designing advertising campaigns (see Blythe 2013: p. 7).

Online buying behavior is also different from "regular" offline buying behavior. There are some theories that people behave differently when they shop online than when they shop offline, which seems logical in the first place. Humans generally act differently when they are alone and maybe with more time on their hands. This also applies to online shopping. But there are more in-depth insights: gender, age and income seem to have big influences on online buying behavior.

Gender: Sun and Zhang (2006, p. 64f.) claim, that men are more pragmatic, women feel greater feelings of anxiety when they have to do new activities and that they are also more influenced by their environment than men. The study suggests that it may be therefore easier for men to shop online. Another study, however, shows no significant differences between males and females using the internet (see Shin,

2009, p.1348) Still there are some differences between men and women while using a computer, therefore shopping online as well (ibid).

Age is also seen as a moderating factor: Computer skills are more easily learned by young users. Especially people who grew up with technology do not experience difficulties with learning new functions or skills. Because of this, younger people do have more and better experiences with the internet. Meanwhile, older people do experience difficulties while using a computer or using the internet, because they discern bigger risks, do not get used to applying complex commands and do not learn that fast (see Trocchia and Janda, 2000: p. 607f.). Trocchia and Janda therefore state that older people face the following obstacles, especially regarding e-commerce: lack of IT experience, resistance to change and the desire to try out the product before the purchase. This is especially important for this thesis as it focuses on people over 30, because of these specific reason: Are people who are not “digital natives” still not as motivated to use e-commerce or has this perception changed already during the last years?

Income can be seen as a moderating effect as well: Shin (2009, p. 1350) figured out that people/households with higher income tend to set lower risk thresholds when it comes to purchasing goods online. Low income discourages online transactions, nevertheless this social group has started buying more and began acting more recklessly as products are sold cheaper in online than in physical stores. On the other hand, Al-Somali et al. suggest that there are no big differences between people with lower or higher incomes when it comes to online shopping behavior as long as they are experienced in using IT systems. Hernández, Jiménez and Martín did a study about gender, age and income influencing online shopping behavior. The study was published in 2011, so it has more relevance than the studies shown above. The results showed that these three characteristics hardly have any significance when it comes to explaining the behavior of e-shoppers (Hernández, Jiménez and Martín 2011: p. 16f.). The differences which are discussed by the other studies decreased, maybe also because the internet has become a bigger part of people’s lives. An interesting finding of this study is that older adults are very active participants in e-commerce, a finding that might not have been anticipated (ibid, p. 18).

8.1. User Experience and Usability

As this study focuses on the experience with consumer goods, the terms user experience and consumer experience are used synonymously. User experience shapes and heavily influences how the user perceives an online shop, the brand, and the products that are sold. User experience is defined as follows by the International Organization of Standardization:

“A person's perceptions and responses that result from the use or anticipated use of a product, system or service.” (International Organization for Standardization, 2009: ISO 9241-210). Of course, user experience happens in physical environments as well. This chapter nevertheless focuses on online environments.

Morville (2004) has researched user experience design and states there are three principles that need to be considered: content, context and users. These three parts influence the information architecture and are the basis for the following seven features that need to be fulfilled when guaranteeing a satisfying user experience:

1. Useful (the products and systems need to fulfil their purpose)
2. Useable (methods must be interface-centered, plain usability is not sufficient for a good user experience)
3. Desirable (emotional design must be considered, such as attractiveness or value of image)
4. Findable (navigation must be clear, objects need to be locatable)
5. Accessible (websites should also be accessible to people with disabilities)
6. Credible (the credibility of a website is influenced by design elements)
7. Valuable (customer satisfaction needs to be improved the content needs to be significant). (see Morville, 2004).

These principles show that user experience design not only takes visual aspects into account, but goes more into details, especially regarding the content.

An e-commerce platform has multiple goals when it comes to designing the homepage: the overall goal is to increase sales. But marketing, branding, visual design and usability became important as well. Studies show that concerning e-commerce platforms, it is more efficient to go after the KISS principle (keep it simple, short and stupid) as people tend to be not that somnolently when it comes to

processing information online and therefore prefer to have a very easy and simple experience (see Krug, 2014). Krug states, if you could explain usability with one sentence, it would be “don’t make me think.” (see ibid) (However, not only is user experiencing the “online experience” that is made while potential customers surf the web and see the homepage, but also the experience they make with the purchased product.) When it comes to the online experience, the definition is divided into three parts: System, user and context of use. Context of use suggests a connection with *usability.* It often is equaled with user experience, which is wrong.

Usability is a part of user experience and is a general term which also appears in the “offline world”. Generally, usability is defined by ISO: “The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use.” (Ergonomic Requirements for Office Work with Visual Display Terminals, 1998: ISO 9241-11). Five attributes are defined to see what is important for usability:

1. Learnability: How easy is it for users to accomplish basic tasks the first time they encounter the design?
2. Efficiency: Once users have learned the design, how quickly can they perform tasks?
3. Memorability: When users return to the design after a period of not using it, how easily can they reestablish proficiency?
4. Errors: How many errors do users make, how severe are these errors, and how easily can they recover from the errors?
5. Satisfaction: How pleasant is it to use the design?” (Nielsen, 2012: unpaged).

Usability is therefore a crucial part in ensuring the best possible user experience. In comparison to user experience, usability has higher importance when it comes to using systems or sites – while user experience is more important when it comes to products and their outcomes (e.g. if the product is bought in the end). Nielsen also defines usability as: “how easy & pleasant these features are to use” (ibid, 2012: unpaged).

This means, usability tests how the website of e.g. an online configurator is built, how the information architecture is put together, how content is presented, et cetera. This is a useful approach as you can’t *buy* e.g. the car at the end of the process,

you can just customize it – so while the customizing process is happening, usability is the most important aspect.

Companies keep on enhancing their online presence to make sure potential customers or even just people who are interested stay as long on the site as possible and have a navigation/experience as easy and positive as possible. Especially online shops that sell high involvement products have to take care of their usability and the best possible user experience to ensure that the customers enjoy their visit on the website (or at least do not feel bothered by it). Ensuring a good, self-explaining usability brings joy and feeling of control towards the user. On the other side, if the usability of websites is bad or insufficient, people often feel overwhelmed or overchallenged, which makes them leave the website (see Nielsen, 2012).

Most important is the web interface and the information architecture that lies beneath it. The web interface defines how we see and perceives a website. The information architecture is how the given information is sorted and listed. These two factors also determine how a website is seen and if it is easy for the user to find the information they are looking for or, if it is understandable to find his/her way on the homepage (see Krug, 2014). Website design, according to Krug, also is an important factor, because it saves the user time and reduces frustration (e.g. designing important elements bigger and in brighter colors, connecting logically aspects visually, menu navigation is designed intuitively). Studies also show that visual design of websites, such as fonts, colors, text alignment and images are expected to not only create a usable experience but also to communicate brand values, such as innovation, reliability or friendliness (see Whitenton, 2018).

When it comes to website design, Nielsen also published ten usability heuristics for user interface design:

1. Visibility of system status (via feedback or reports)
2. Match between system and the real world (systems should speak the users' language, no phrasing that is too technical)
3. User control and freedom (give the user power at an immediate state)
4. Consistency and standards (words and actions on the site should always mean the same)

5. Error prevention (design the website so as little errors as possible appear)
6. Recognition rather than recall (user should not have to remember too much information. Objects, actions and options should be visible)
7. Flexibility and efficiency of use (allow users to tailor frequent actions)
8. Aesthetic and minimalist design (dialogues should only contain relevant information)
9. Help users recognize, diagnose and recover from errors (express error message in language, not in codes)
10. Help and documentation (offer information if needed) (see Nielsen, 1994).

These guidelines are important for user interface design and contain many useful thoughts. Yet, seeing that those heuristics are for interface design, heuristics for the optical design of the homepage are missing. This seems to be a general phenomenon in usability research - there is still a gap between information experience and graphic design of websites, which also can be seen as the most famous usability researches mostly leave out visual paradigms and rules. Most researchers give reasons that visual rules and paradigms are part of the user experience, while usability just ensures how people are experiencing the *use* of the service or the website. For example, Nielsen is known for saying that optical design is not part of usability (see Olsen, 2002), which is why also other considerations about usability are taken into account in this thesis. The author also does not share this opinion, as she shares Robier's opinion that can be found below. This is why the book "Visual Usability" by Schlatter and Levinson (2013) is used for explaining aesthetic and visual guidelines for usability. It is also used for the conduction of the questionnaires in the empirical and methodical part.

Schlatter and Levinson state that three meta principles are important for visual usability: Consistency, hierarchy and personality. These principles resemble some principles that were conducted by Nielsen as well.

For this thesis, the most important visual usability tools are: Layout, color and imagery.

Layout means that the design of the web site should be consistent, understandable and logically aligned. Visual hierarchies should be kept consistent and the content of the website is organized and structured well (see Schlatter/Levinson, 2013).

Color is called a “powerful tool to attract the eye” (ibid, p.171), therefore it is important that it is used in a way that is perceived pleasant by the users: it can highlight or accent, but also affect other emotions like drawing attention or be calming, depending on what message should be sent. This is why colors also play a high role when setting up a web site or a generally visible object, such as a leaflet (see ibid).

Imagery means the use of pictures, icons, illustrations and more. For usability, imagery is essential, concerning the depiction of products or explanations in a easy and quick way. It is important that images are appealing, don’t set the user off and have a good quality, because they draw attention and are also a form of communication on the part of the company (see ibid).

A study that was published in 2012 also found out that for the best possible online customer experience, it is important to give the customer a feeling of control and empowerment. Speed is no longer such an important factor. Visual design, graphical features and technical functionality are still important, yet not as relevant as control and empowerment – which is why customization possibilities are becoming more effective and indispensable (see Rose/Clark/Samouel/Hair, 2012). Also, complex navigation and information overload makes the consumer feel uncomfortable and therefore reduces the possibility of a repurchase, while the possibility of customization can give the consumer a sensation of personal control.

Usability can be analyzed with the aid of certain variables, such as time on the task, success rate, navigation, information architecture. Also, the design, the interaction rate, the performance and the accessibility can be considered (see ibid, 2012; Robier, 2016; Nielsen, 2012; Krug, 2004).

Robier also takes the following standpoints on user experience and usability:

Usability focuses on objectivity, instrumental quality, the optimization of work process design for the service/system/product, user tasks, the reduction of stress and the removal of barriers. He also talks about **effectivity**, which is defined when a certain goal can be reached with the help of a product or a process. (E.g. car customization program: if the car can be fully customized or if there are some

problems or errors during the process of customizing.) **Efficiency** means, how bad or how well that goal is achieved, e.g. if the user is undergoing lots of different stages, or the stages are too long). **Happiness** is also important for usability, because the user should be happy, or at least, contented with the system (talking about "joy of use" or "playfulness" in the Technology Acceptance Model). Also, these three variables are considered in the empirical part of the thesis.

Robier finally summarizes that usability consists of reaching a goal (effectivity) fast (efficiency) with a smile (happiness) (see Robier, 2016).

Contrary to that, **user experience** focuses on the improvement of a product's subjective experience (which can include joy and fun), subjective quality, developments, challenges and as well the optimization of work process design for the service/system/product (see Robier, 2016). Usability, therefore, is defined as a part ("research and optimization" (ibid, 2016: p. 14)) of the overall user experience. He therefore suggests the following classification:

Figure 14: Definition of Usability and User Experience. Referring to Robier, 2016: p. 13

According to this, usability lies within the process of user experience, taking place at the exact time while the consumer uses the product.

The definitions and distinctions of usability and user experience are various, but all authors seem to agree on the fact that usability is a part of the user experience. Researchers also found out that a higher perceived usability has positive impact on user preferences and task completion times (Lee/Koubek, 2010).

8.2. Consumer Buying Decision Process

While shopping online, consumers have many choices when it comes to the kind of shop, the kind of product, the price and so on. It has been researched that more 'window shopping' is done than actual online shopping – just like in the "offline world" (see Molesworth/Suortti, 2001). Therefore, retailers need to find out what makes a customer actually *buy* the product – or keeps them from buying it. Clearly you can

say that often people shop online because of various reasons – sometimes boredom, sometimes because they have seen a nice-looking red dress on somebody else, or maybe even if they want to buy certain products. Not everybody who browses for products online buys them in the end. Buying behavior is influence by sociodemographic data, such as gender, income, age and education. These factors are discussed in greater detail in a following chapter. Generally, there are five stages in the buying process: *problem recognition, information search, evaluation of alternatives, decision to purchase and post-purchase behavior* (see Stydrom, 2014). These five stages are, however, criticized as they cannot always be applied to every buying process. One point of criticism is that customers are unable to make their way through all the offers in the internet and therefore proceed a two-way stage (see Dabrowski, 2010): The first stage is the customer who examines lots of offers and then chooses the most promising products. In stage two, they compare the products (price, delivery, options) and make a buying decision in the end. There are, however, two differences to offline buying decision behavior: the shopping environment (which consists of the smell, the design of the store, the employees) and the promotion (perception of advertising during the online shopping process). Seeing the promotion and being interested in what is advertised, shoppers seek more information about the product, where alongside to general information often product reviews by other consumers are an important auxiliary (see Katawetawaraks/Wang, 2011). Post-purchase behavior, too, must not be underestimated, peculiarly if a customer wants to return a product (see Liang/Lai, 2001). Online customers often are perceived as more powerful and utilitarian in their shopping behavior because they have full control over the situation and 'pull' the information they have, unlike getting it pushed towards them as it is often the case in offline shopping environments (see Koufaris, 2003). Concerning the increased power that the online shopper obtains, it is important for online shops to keep ensuring the quality of their homepages. There has been extensive research what customers value, which is shown in the following:

Authors	Factors	Publication year
Alam/Yasin	• Website Design • Reliability • Product Variety • Delivery Performance	2010
Guo/Ling/Liu	• Website Design • Security • Information Quality • Payment Method • E-Service Quality • Product Quality • Product Variety • Delivery Service	2012
Schaupp/Belanger	• Privacy • Merchandising • Convenience • Trust • Delivery • Usability • Product Customization • Product Quality • Security	2005
Sen	• Cost • Convenience • Product • Seller Related Factors	2014

Table 9: Customer Value Factors. Own depiction.

Some of these factors are overlapping, yet it is surprising that “cost” was only named two times, especially when considering that lots of people like online shopping because they can get products cheaper than buying them offline in stores. Also “customization” is only named once, but a study was conducted back in 2005. This shows customization of products is not a new phenomenon but was already of importance almost 15 years ago. Other factors are named more often, such as convenience or delivery service. This may be especially meaningful for high involvement products where it is important to have a safe delivery, convenience when looking for them and also reliability, security, etc., as you may have a safe payment process, have the possibility to return the product if customers do not like it (they may be more likely to keep a 5€ book they don’t like than to keep a 500€ TV), which underlines the importance of a lean website on the one hand, advantages/security for the user on the other hand.

Hafner, Walker and Verplanken have developed a model in 2017 that shows a sequence of variables that influence buying behavior for cars:

1. “Reduce Choice set based on practical and financial needs…
    a. Previous experience
    b. Gathering information from trusted sources
2. Emotional Considerations
3. Influence of Image
4. Color
5. Influence of Sales Experience

Firstly, the choice set is reduced by practical implications, such as financial needs, connected with previous experience and information from friends or family. Interestingly, after that, two emotional variables play a big role, after technical implications and experiences are considered. This demonstrates the high importance of the image of the brand, as well as emotional considerations and experiences that people associate with brands/cars.

For cars, there also has been developed a special circle of buying decision process which will be explained now.

9. **“Phase of unstructured, passive information intake**: awaking of needs, buying impulse (first impulses are given by friends, acquaintances, family, media).
10. **Phase of structured and focused information research** (buying interest is built up by getting information consciously), purchase intention gets more concrete (offer differentiation by price, service, etc. first contacts with salespeople, first conversations with opinion leaders)
11. **Phase of decision making and rating of alternatives** (salespeople contact intensifies, negotiating)

The first three steps can take up to two years!

12. **Transaction is complete**
13. **Phase of waiting for delivery**: personal and medial communication, lookout for information that confirm the purchase
14. **Phase of product experience (post purchase phase):** motoring experience, product experience, lookout for self-affirmation in the product, sharing of gained insights and experiences with family and friends

15. **Phase of product use in daily life:** usefulness in daily use, service experiences, subconscious rating of strengths and weaknesses. Conversations about the car with family and friends. Decision about brand loyalty.
    The last four steps can take up two five years! After completing step 7, the circle starts again at step 1".
    (Unger, 1998: p. 66)

The steps show the difference between a general buying decision process and a car buying decision process. The first main difference is the time that passes – it can be up to seven years, or even longer, to go through this circle. It is also important to mention that the buying process is *not* completed after the transaction is done. Because a car is a utility object and is used frequently, this also plays a role in the buying decision process for the next car: experiences are made during driving, during service appointments, and much more. Concerning car configurators, they can play a role at any phase of the process, but they definitely are most important in steps one to three, especially two and three. It is still possible to change the customer's mind because they are open for information or even already actively looking for it, so the involvement is already given from their side. This gives the opportunity for car brands to be present and give the prospect already a first (positive) experience by offering a nicely designed and informative leaflet or impressing by offering a technologically advanced and easy-to-used online configurator.

8.3. Involvement

consumer's attention spans are not always at their highest level. Especially when buying fast moving consumer goods, most people rely on already existing experiences or patterns which lead to a satisfying outcome for them (e.g. well tasting drinks or chocolate bars). The term *involvement* is an essential term when it comes to analyzing the user experience and user behavior. There is an interesting example from Solomon referring to purchasing cars:

"Consumer #1: "I want the one I read about in the latest issue of *Car and Driver* magazine: it has a six-cylinder turbo engine, a double clutch transmission, a 90 strokebore and a 10:1 compression ratio.

Consumer #2: I want a red one" (Solomon, 2015: p. 61)

So even for cars, which are classified as high involvement products, there can be certain kinds of involvement. Involvement "*reflects our level of motivation to process information about a product or service we believe will help us to solve a problem or reach a goal."* (ibid, p. 61f.) Not everybody is excited or motivated about products the same way. Thus, it is important to know for companies to know their customers. Involvement is defined as "a person's perceived relevance of the object based on their inherent needs, values, and interests." (see Zaichkowsky, 1985: p. 343)

Different factors can lead to different kinds of involvement. For example, the factors from a person – the personal state, the needs, the importance of the product or the interest in it. But also, the source of communication or the occasion for buying of the product can play a role. Watching TV tiredly after a long day will not bring the same level of involvement as reading a special interest magazine about a niche topic you're interested in. Solomon defines three types of involvement: product involvement, message involvement and situational involvement. For this study, only product involvement is relevant.

Involvement can be classified in many different ways. Starting from the Elaboration Likelihood Model from Petty and Cacioppo from 1986 where high and low involvement and their central and peripher routes were distinguished. There is another model from Laurent and Karpferer from 1985 which splits up involvement into five factors. This is notable as it is another approach but can be applied on online behavior as well. The dimensions are as follows:

1. Personal interest: how a person is interested in the product and what it means to them personally
2. The perceived importance regarding potential negative consequences associated with a poor choice of the bought product (risk importance)
3. The probability of making a bad purchase
4. Pleasure value
5. Sign value (how closely it mirrors the customer and his/her personality and relates to him/herself). (Laurent/Karpferer, 1985: p.42ff.)

Products such as cars score highly on the second dimension, as you are likely to have a car over many years. It also can score highly on the pleasure and sign value, but it is not possible to make a general statement as it depends on the consumer's personality in the end. Still, especially regarding the first car, they often get

personalized with stickers, names, and many people even talk to their cars (see Bauer/Sauer/Becker, 2006). Cars therefore definitely can be seen as a product where high involvement is given and where brands, as well as emotions play a big role.

There have been doubts if involvement has to be defined differently when browsing the web. Is somebody fully involved the whole time when they surf the web (therefore perceives ads or shops online)? These questions are answered in another chapter of the thesis.

8.4. Attitudes

Attitudes depend on what product or what brand is concerned. For this study, attitudes about products that are bought based on a high thinking effort will be analyzed as it fits best to cars. Cars cannot only be seen as form of locomotion but also a status or even luxury object, depending on the brand. The formation of attitudes is divided into three parts, the cognitive function which guides the thoughts, the conative function that affects the behavior and the affective function that influences the feelings (see Hoyers/MacInnis/Pieters, 2018). Therefore, attitude is not static but dynamic and can change, based on external or internal factors. Attitudes about cars, for example, are framed by personal experiences with the brand, but also by the image the brand pursues (BMW shows their cars in a different way than Hyundai.) Here, ambivalences regarding the different perspectives can occur. When a high effort attitude is built, it is usually more difficult to change afterwards, which is called attitude resistance. Hoyers, MacInnis and Pieters distinguish between high effort and low effort peripheral routes when it comes to processing information. It is based on the consumers' motivation, ability and opportunity (short: MAO) (see ibid). If MAO is high, consumers devote high effort to forming their attitudes, which then seem to last longer and are more difficult to change (see ibid). Emotional appeals can affect the attitude/the processing of information, if it is relevant to the offer (see ibid). Therefore, emotions can play a role but aren't necessarily relevant.

The theory of reasoned action proposes how beliefs influence attitude and norms, which affect behavior (see ibid). It states that attitudes towards an act and subjective norms influence behavioral intentions and therefore behavior. However, a study

found that regarding the purchase of cars, there is a gap between behavioral intentions and the actual buying behavior when it comes to environmental aspects: “Positive attitudes toward the environment result in making a car more attractive to the consumer. However, with respect to purchase intention, environmental aspects are outweighed by other car attributes such as vehicle quality, financial aspects and experiential aspects.” (Mairesse/Macharis/Lebeau/Turcksin, 2012: p.566). This shows that people for example do say that environmental aspects are important to them (maybe because of social desirability), but when it comes to the actual buying process, other things that concern ‘egoistic’ (and not societal) aspects are more important. This may not be the only gap between intentions and actual behavior when it comes to buying high involvement products, regarding situational factors, emotional attachments or attitude-behavior relationships (see Hoyers/MacInnis/Pieters, 2018).

8.5. Personal Values

Buying behavior and general attitudes towards brands or articles are as well determined by people’s values. Values are described as “abstract beliefs that guide what people regard as important or good.” (Hoyers/MacInnis/Pieters, 2018: p. 48). Customers feel more appealed by advertisements or placements of products that fit to their own personal values. Values are largely influenced by the personality of each consumer. Personalities consists of the pattern of behavior and personal dispositions, also in what time people grew up and what values and morals were common at this time. This is why values depend on age and also social classes. For example, people who grew up during WWII or the Great Depression will prefer value and security over hedonism, while people from Generation X will have their preferences the other way around. Thinking about the age of the participants of the thesis, it will be a mixture between hedonism, but also safety – depending on personal traits and as well the social situation – if the person has children, is in a relationship, etc. Values concerning social class are as well important: if status and external acceptance are important to a consumer, their will prefer a Bentley over a Ford (see ibid)

Values that characterize cultures in the western world are: materialism, home, work and play, individualism, family and children, health, hedonism, youth, authenticity,

environment and technology (see ibid). When selling high involvement products, it is important to segment the target group also based on their values, as far as you are able to know them. A 45-year old man with a wife and two children will most likely have different priorities than a 23 year-old young woman who is about to buy her first car and therefore the values are different (for example will the woman most likely put more emphasis on individualism, while the man looks out for safety). Lifestyles are closely connected with personal values – naturally people adjust their lifestyles on their values. Lifestyles are defined as "manifestations or actual patterns of behavior" (ibid, p. 391). Therefore, lifestyle research can help companies reaching and understanding their potential target groups even better. If a person is more sportive, they will more likely buy a bigger car with all-wheel drive than a person who lives in the city.

8.6. Environmental Factors

Buying products does not always only include considerations if the buyer's needs will be fulfilled. Sometimes, it is important for people what other people think about it: can they brag with the new product? Is it showable or at least acceptable to show? This is why also environmental factors play a big role when it comes to consumer buying processes. Blythe introduces a model based on macro-environmental and micro-environmental factors that influence the consumer. Micro-environmental factors will not be discussed as it focuses only on the situation in a store and does not take e-commerce situations into consideration.

Macro-environmental factors are political issues, economic factors, geographical conditions, climate and 'green factors' (see Blythe, 2013: p. 185). When thinking about high involvement products – especially cars, you can see that these are very sensitive factor. It is important that the (potential) customer thinks in a positive way about these factors. Due to the high involvement characteristics of cars, attitudes take longer to be built and formed, but are also more difficult to alter and are more resistant to change. Another important essential part is the social environment. Social environment can also be classified into macro- and micro-environmental factors. Macro-environmental factors consist of culture (religion, language, food…), subculture (geographic, age, ethnicity, gender) and class (upper middle class,

middle class, lower middle class, skilled working class, working class, lowest level of subsistence), while micro-environmental factors consist of relationships with people like work colleagues, family and friends (see Blythe, 2013). Regarding the virtual environment there is also an online environment which influences the consumer behavior increasingly. Blythe breaks it down into three types: interactive websites that provide information for the customers, social networks such as Facebook or Instagram where people can interact with each other and virtual reality sites where people can adapt a new identity and live in a virtual world (see ibid). Although the third type is not very common anymore, it is still significant to be aware of all these types nowadays.

8.7. Sociodemographic Data

Consumers are versatile. This is why it is important to segment them into different groups to be able to address them as effective as possible.
There are more possibilities to divide sociodemographic data than the following ones, yet these are important for the thesis which is why the irrelevant ones are left out.

Age: Differently aged people have different needs and wants. Obviously, values and cultural experiences tend to stay the same in a lifetime, still people of the same age are going through similar life experiences and share the same trends (see Solomon, 2015; Hoyer/MacInnis/Pieters, 2018). Age also plays an important role when it comes to brand loyalty as research shows that consumers can access internal information that was learned about brand names earlier in life more easily than information about brand names that was learned later (Hoyer/MacInnis/Pieters, 2018). Mostly, age is split up in groups such as “Generation X”, “Baby Boomers” and “Seniors” (see ibid, p.324). Seniors are becoming a more interesting target group as “Generation Silver” because they are changing their lifestyles concerning the desire to enjoy the rest of their lives, tend to have less responsibilities than in the last years, etc. Fact is, that different age groups need different divisions, as they have different media usage behavior (see ibid). Furthermore, it is especially important to distinguish between age groups especially when it comes to online buying behavior and internet literacy/expertise. This was also a reason why in the

empirical section only results from people aged 30 to 60 are analyzed, in order to only measure behavior of non-digital natives. Age is crucial when it comes to building brand loyalty as research shows that consumers are more easily able to recall brand information when it is named early in life (see Ellis/Holmes/Wright, 2010).

Family structure: Divorce rates are increasing, people nowadays live longer, so more (flexible) forms of families emerge while the "classical" family with heterosexual parents formed by a working father and a stay at home-mother are not as common anymore as they used to be (see Solomon/Bamossy/Askegaard/Hogg, 2013). Accordingly, it becomes more difficult to actually define the term "family". Families are also formed later in life (people marry later and also get children at a later time than 50 years ago), and family size is decreasing as most women want fewer children/smaller families than a decade ago (see ibid). While most people used to have at least one sibling, now the fertility rate in Germany is at 1.4 child(ren) per household. With gender equality becoming a more and more significant topic, one consequence is that household decisions are shared more equally between men and women. Factors determining household decisions are interpersonal needs, product involvement and utility, responsibility and power. This means, with the woman being more empowered and autonomous, she will now have bigger decision-making powers (see ibid). Yet, there is still a main decision maker in the family which still seems to be male most of the time. Nevertheless, women keep on gaining more power when it comes to decision making and sharing participation within the family.

All in all, you can say, family forms are more versatile than ever, childbirth rate is decreasing and decisions in the household tend to be shared more equally. Regarding high involvement products, this seems interesting as the big and important purchases are discussed more equally and therefore you need to consider all important family members, subsequently know the family form as best as you can.

Income: Income, too, influences the consumer. Depending on what they earn and how much money is left after overhead living costs it shows how much money people have left to spend for bigger purchases. A distinction between people who actually want to spend money and people who prefer saving it for various reasons

needs to be made. People used to seek quality for their money during the last decades (see ibid), nowadays status and value are becoming more important. There is another important development that is called social mobility. It means that people can move within social classes - which are defined based on the income of people. During one's life, one can become poorer but also richer, which enables (or forces) people (or forces them) to make different choices concerning products than they were used to (see ibid). This increased flexibility also makes it more difficult for sellers to focus on certain income stages or social classes consumers can move rapidly within social classes. There are many characteristics and factors that influence customer behavior and the buying processes. To summarize the most important factors and contents, an electronic commerce model is shown. Factors that are dealt with in the thesis in detail are colored blue.

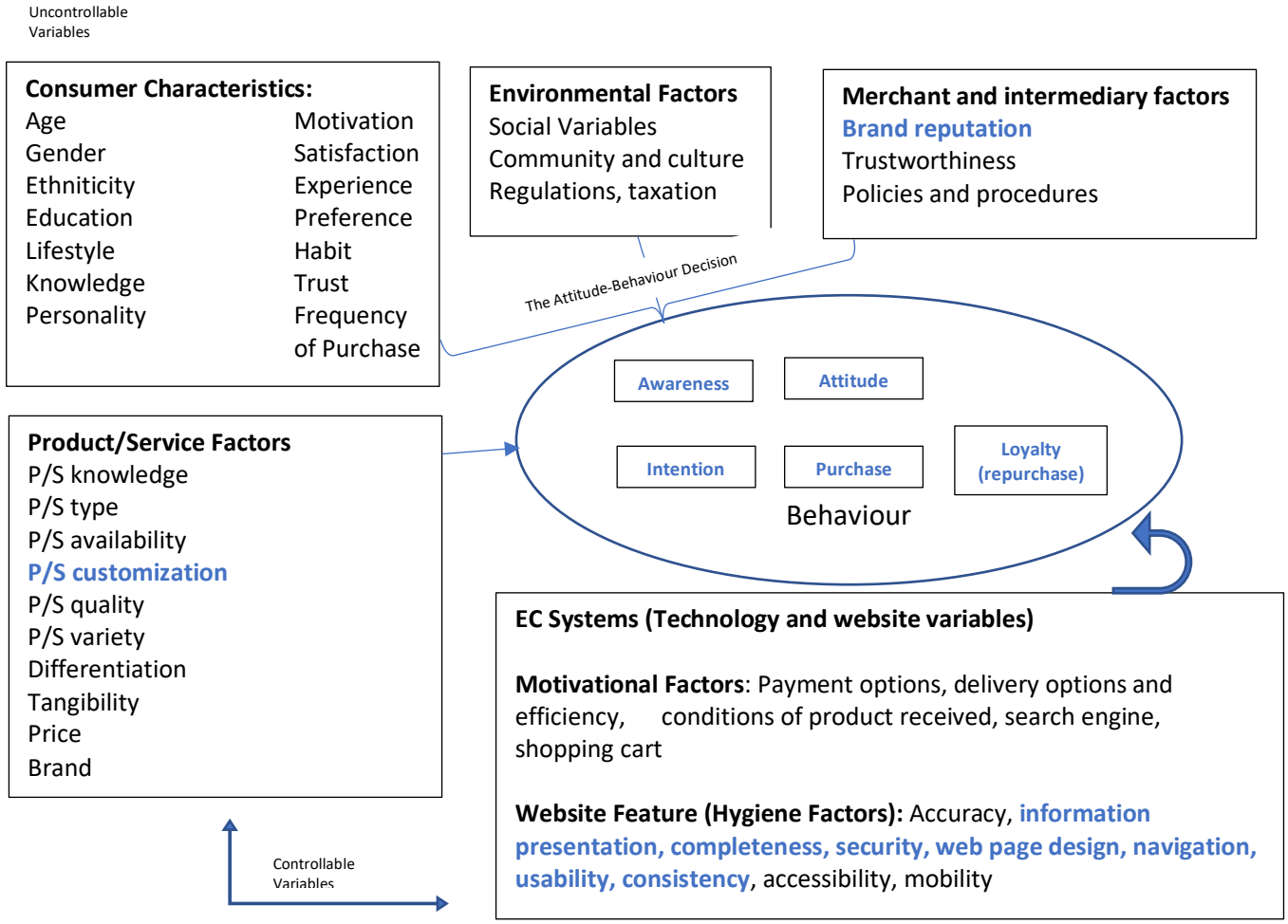


Figure 15: EC behaviour model. Referring to Turban et al., 2018: p. 363.

8.8. Consumer Loyalty and Trust

Loyalty is especially important for high involvement products (or for the companies selling them). The less often you buy a certain product, the more you rely on previous experiences with already known brands (see Blythe, 2013). For example, cars are not bought as often as cereals or a TV which is why car vendors often try to build a long-lasting relationship with their customer to keep them coming back for service or a new car (see Molesworth/ Suortti, 2001).

As already discussed before, consumer loyalty depends on various factors. Especially now that online consumers have options where to buy what kind of articles to what price, consumer loyalty is gaining in significance. Trust is an important factor when it comes to loyalty because to build a long-term relationship with a brand, a consumer must be able to trust the company. An already mentioned study analyzing personalization shows this effect when sites are personalized, because the results showed personalized homepages lead to increased credibility, therefore to more trust (see Briggs/Simpson, de Angeli, 2004). Studies also show that brand loyalty can be passed on for generations within a family (see Mandrik et al., 2004). It of course depends on the involvement for the product and the brand as well. Peter and Olsen categorized consumers according to their involvement and applied their behavior to brands. There are

1. Brand switchers, which have low brand loyalty and low personal involvement. The brand of the product doesn't matter to them. Sales promotions or other environmental factors affect them easily.
2. Information seekers have positive means-end information, still they don't really have a favorite brand, still some categories are important to them.
3. Routine brand buyers still have low involvement, but they do have a favorite brand. They are not looking for the best brand because they are already satisfied with their favorite brand.
4. Brand loyalists have very strong relationships and links to their favorite brand. The product category is important for them but still they stay loyal to their chosen brand. (see Peter/Olsen, 1996: p. 400f.)

Brand loyalists have the highest involvement when it comes to the products, the brand switchers the lowest one. Regarding high involvement products, it will be

difficult to attract brand switchers or information seekers when they just lack interest or involvement of the product.

A study conducted in 2011 examines the impact of E-Service quality, customer perceived value and customer satisfaction on customer loyalty in an online shopping environment (see Chang/Wang, 2011). E-Service quality hereby is defined as the level of service, with special focus on design on e-service quality in the eCommerce sector: website design, reliability, responsiveness, trust and personalization (see ibid). The study suggests that the better the quality, the bigger is the customer satisfaction and the more likely (and more easily reachable) is customer loyalty. It also found that when consumers purchase a product, the emotional assessment is more important than the rational assessment when it comes to choosing the product (see ibid). This is also why the e-service is especially important because it affects the emotional and implicit perception of the consumer. This is crucial for the pre-purchase and the purchase stage. Regarding the post-purchase stage, rational factors play a higher role for consumer loyalty: loyalty can be strengthened by offering a biggest possible value from the online retailer, such as functional benefits or lower prices or simple transaction processes (see ibid).

A study conducted in 1999 exposed that, concerning high involvement products, customers' emotional stages play a bigger role than expected: The role of positive emotions during services was researched. When the costumer was in a positive mood or positive emotions were induced, they showed a higher loyalty level for the service provider. This was particularly applicable for high involvement services which shows that positive emotions are highly relevant for high involvement services or products than you might think (see Bloemer/de Ruyter, 1999). Regarding the relationship between the customer and the seller, the study suggests "The stronger the positive emotions experienced in this case, the stronger the relationship between satisfaction and loyalty." (Bloemer/de Ruyter, 1999: p. 326). As already mentioned, depending on the kind of product and brand, it takes some time to form a loyalty to a brand. Car brand loyalty is a phenomenon that can not only be influenced by personal experience, but also by family and friends (see ibid; Unger, 1999)

McKinsey states that there are two different kinds of brand loyalists:

> *„ Of consumers who profess loyalty to a brand, some are active loyalists, who not only stick with it but also recommend it. Others are passive loyalists who, whether from laziness or confusion caused by the dizzying array of choices, stay with a brand without being committed to it. Despite their claims of allegiance, passive consumers are open to messages from competitors who give them a reason to switch. “*
> (Court/Elzinga/Vetvik, 2009: unpaged).

This also applies to car brands. If there is a person who absolutely adores BMW, they will recommend it to people when talking about cars or related topics. If the person they are talking to, does not have a preferred car brand out of various reasons (not interested enough, overwhelmed with choice…), they are more likely to be persuaded by the BMW lover.

Looking at all these components which determine behavior, it is obvious that people are different, regarding their personalities, life situations, etc. This is also why it is essential for sellers of high involvement products to know their customers and – even better – to be able to personalize their choice of products based on these preferences and different life situations. It would be even better if potential customers could customize their products themselves because even if recommender systems have improved efficiently during the last years and online shops can now personalize their pages and their offers more detailed than ever. Still sometimes mistakes occur or the user is startled or feeling insecure about the high amount of information the seller knows about them. It would maybe be more efficient if this choice was left to the customer, which is why customization – especially concerning high involvement products – can be considered as more effective and/or accepted by consumers.

When asking car buyers, a study with 300 participants gives insights about nine factors that are important when buying a car: safety and comfort, luxury, economy, reliability, fuel efficiency, easy of finance, variety, color, spaciousness and **brand image** (Kaur/Sandhu, 2004). Another study about the same topic where 400 participants were asked found five factors: safety and security, operational convenience, economy, quality and **esteem** (See Kaushal, 2013).

A qualitative study that was published in 2017 also shows that people who indicated that environmental and other factors are important to them, actually attach value to

emotional aspects and the car's image – this can be seen as a case of social desirability and also uncovers what a big role the brand image still plays when choosing a car (Hafner/Walken/Verplanken, 2017).

These findings pose the question of what role trust plays in an e-ecommerce environment, especially regarding high involvement products. Nissenbaum has identified four factors that create trust online: **1. Publicity**: good *and* bad actions are made public. Not only good things are published, but also bad things. (e.g. bad ratings on booking.com). **2. Reward and Punishment**: can the website be punished if it betrays the customers and lies? If the site shows vulnerability and the customer is rewarded for trust, this also increases trust levels. **3. Promulgations of norms**, moral and cultural. When a website comes from your own cultural environment, you automatically trust it more as you assume you share the same moral and attitude. **4. Public policies** that avoid betrayal – or at least show a possibility to whom you can address if you get betrayed makes you also feel more secure, especially in the internet where you have a global environment. This is especially important for financial services.

Now it is obvious that not only technical characteristics play a significant role, but also the image of the brand and trust. Volkswagen, however, does have to face problems regarding brand image and trust. The diesel emission scandal that came up in 2015 continues to cast its shadow. Yet, there are versatile results when examining the brand image of Volkswagen. Although the brand image definitely was damaged by the scandal (see Schultz, 2015), Volkswagen is still the most trusted car brand in 2019 (see Reader's Digest, 2019): 43% rated Volkswagen as the most trustable brand (question was asked openly), with 19% gap between the next brands BMW and Mercedes Benz. Volkswagen has been most trusted car brand continuously since 2004. (see ibid) This shows that once trust in a (high involvement brand) is built, it lasts long and also appears to resistant to crises.

The following and last chapter defines and explains the most relevant theory on which the empirical part of the thesis is based on. Also, explanations of the latest insights of the theory will be given (moderating and influencing variables).

9. Technology Acceptance Model

The Technology Acceptance Model was introduced by Davis in 1989. This theoretical model is the framework of the empirical part of this thesis, which is why it is explained in the following. The thesis makes use of the third version of the TAM, which was published in 2008.

The TAM tries to find out and explain how users accept and use technology. There are several factors which measure that, such as the perceived usefulness or the perceived ease-of-use (see Davis, 1989.). The model is often used to find out how people – especially people who did not grow up using digital technology – act with it and understand it. This enables the testing of the usability of websites, which is as well a part of the thesis. Some variables can (and will) be applied for the testing of the usability of physical information additionally (such as information printed on leaflet).

The framework of the TAM 3 and the most relevant/used variables for this study is shown and explained.

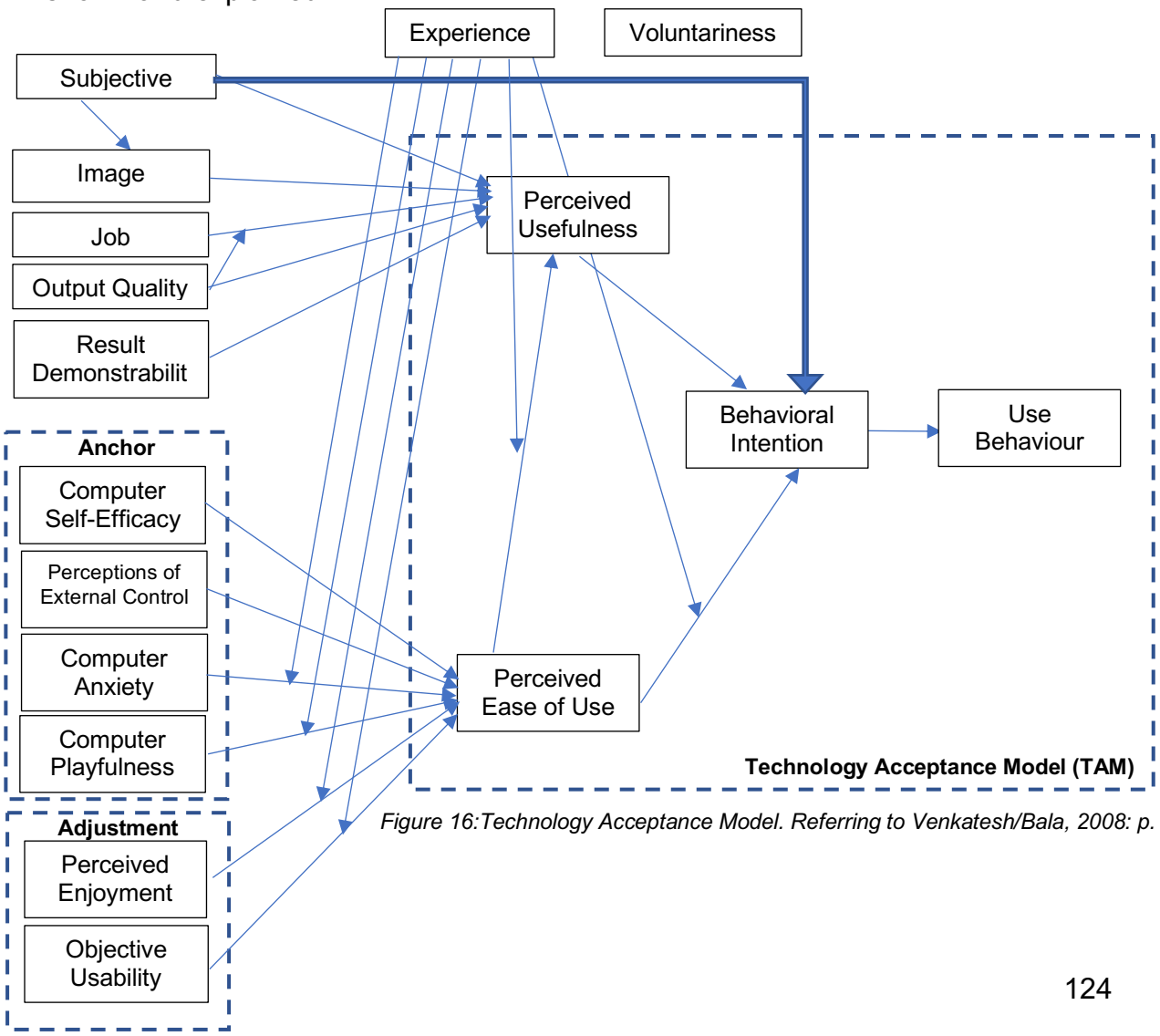


Figure 16:Technology Acceptance Model. Referring to Venkatesh/Bala, 2008: p. 280

Important variables:

- **Perceived Ease of Use:** The degree to which a person believes that using an IT will be free of effort (Davis et al., 1989).
    - Objective Usability: A “comparison of systems based on the actual level (rather than perceptions) of effort required to completing specific tasks” (Venkatesh, 2000, p. 350–351).
    - Perceived Enjoyment: The extent to which “the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use” (Venkatesh, 2000, p. 351).
    - Computer Playfulness: “… the degree of cognitive spontaneity in microcomputer interactions” (Webster & Martocchio, 1992, p. 204).
    - Computer Anxiety: The degree of “an individual’s apprehension, or even fear, when she/he is faced with the possibility of using computers” (Venkatesh, 2000, p. 349).
    - Perceptions of External Control: if user thinks there are resources that organizationally or technically support the use of the system. (Venkatesh et al., 2003).
    - Computer Self-efficacy: The efficacy a user has, regarding he/she has the ability to perform specific tasks while using a digital device. (Compeau & Higgins, 1995a, 1995b).
- **Perceived Usefulness:** how useful a system is to the user and if they get benefits and/or profits from using it (see Davis, 1989).
    - Result Demonstrability: if the results the user has created while using the system are tangible, observable, and communicable (Moore & Benbasat, 1991).
    - Image: The degree to which a user thinks that using an innovative technology will make him/her impress his/her social environment (ibid, 1991).

Following insights are new in the TAM 3 and therefore are considered in the empirical part, too:

- “Experience” is moderating computer anxiety, which will lead to perceived ease of use (see Venkatesh et al., 2008): system-specific objective usability and perceived enjoyment are going to be more important determinants over time, while computer anxiety will decrease due to increasing experience (see Venkatesh, 2000). Also, users will be able to complete tasks better and more easily (objective usability) and discover aspects of systems that either lead to enjoyment or lack of enjoyment.

- “Experience” is moderating perceived ease of use, which will lead to behavioral intention (see Venkatesh et al., 2008). The effect is weaker with increasing experience. This means, that experience influences the “perceived ease of use”, while the effect on “perceived ease of use” on behavioral intention will decrease, which means that individuals will emphasize “perceived ease of use” less but form their behavioral intentions to use the system.

The use of this theory allows the analysis of the usability of car configuration methods. On the one hand, “perceived ease of use” and “perceived usefulness” and their subcategories are useful and practical methods to analyze usability, especially because computer-related categories are included, such as computer anxiety or computer playfulness, which for example come up at the Flow Theory which fits to the analysis of high involvement products. Also, other variables are useful. Still, “objective usability” is difficult to measure because the term is vague, and usability can be a subjective factor. This is why the empirical part also relies on other outcomes from usability research that allow a more detailed approach.
Before the empirical part of the thesis takes place, the methodology is introduced and explained in the following chapter. The methods are explained, and operationalized.

10. Methodical part:

The empirical part of the thesis consists of **three** kinds of methods: An eye-tracking study (qualitative), a combination of a questionnaire and a discussion (qualitative), and an online questionnaire (quantitative). While the first two methods are combined, the third method builds up on the findings of the two first ones. The methodology of eye-tracking and questionnaires is described in this chapter. The methodology of an interview is not described, because it was combined with the questionnaire that was given after the eye-tracking study and consisted just of one open question/asking participants about their impression and experience.

The following chapter addresses the empirical research of the topic of usability of car configurators and buying behavior for cars. Based on the insights that could be gained in the theoretical research, two empirical studies will be conducted to research the perceived usability of a car configurator and also to research the online car buying behavior. The theoretical frameworks of the thesis are **the Technology Acceptance Model III** (Venkatesh, 2000) (*see chapter 10)*. Also, other usability frameworks, such as **usability heuristics for user interface design** (e.g. by Jakob Nielsen, 1994) (see chapter 9.1.) were used, as well as **visual usability research** (e.g."Visual Usability" by Schlatter/Levinson, 2013) (see chapter 9.1.). Also, usability metrics by ISO/IEC 9126-4 metrics ("effectiveness/efficiency/satisfaction") were partly used.

This thesis therefore uses **triangulations** as an empirical approach, as well as in the use of theories/theoretical frameworks (see Olson, 2004; Flicker, 2008).

Although the impression may appear that the used theories and theoretical sources and models (e.g. SUMI, see down below) are too technical and don't fit to the leaflets, as they are an analogue and not a technical method, the author was always aware of that and only used variables and parts of those sources that fit for digital (online configurator) and physical (leaflet) methods.

Those frameworks were used for defining the variables if possible. Sometimes, other literature was used. Following two research questions with the fitting hypotheses are formulated.

11.1. Research Questions and Hypotheses

Research question 1 (RQ1): **How is the usability of online customizable high involvement products in comparison to conventional customization possibilities perceived by people at the age of 30-60?**

This research question is answered with the findings the eye-tracking study that was performed.

Following hypotheses for RQ1 were conducted based on literature review:

No.	Hypothesis	Variables
1	Technical information (e.g. measurements) and explanations were findable more easily at the online configurator than at the leaflet.	"perceived ease of use" (Venkatesh, 2000)

Nurkka and Pyykkö suggest in 2014 that people who use digital solutions for customizing high involvement objects benefit from their ease of use, especially compared towards analogue ways of customizing high involvement products. Also, Mavridou et al. state that technical information is a benefit that derives from using car configurators in 2010.

2	The car customization process is more linear and straightforward when using the online configurator than when using the leaflet.	"objective usability" (Venkatesh, 2000)/ "Consistency and standards" (Nielsen, 1994)

Lee and Koubek found out that usability affects the use of e-commerce websites, especially regarding layout and design. Because the layout of the online configurator is different to the layout of the leaflets, it is assumed that people who use the online configurator customize their car more linear then the participants who use the leaflet

3	The car customization process is more effective when using the online configurator than when using the leaflet.	"effectiveness" (ISO, undated), "objective usability" (Venkatesh, 2000)

Mavridou et al. did research on online car configurators regarding recommender systems. When mining affective needs, they also found out that this leads to a higher effectiveness because the configurator reacts to the users' needs. The leaflet is unable to do so, which is why this hypothesis was formulated.

4	The car customization process is more efficient when using the online configurator than when using the leaflet.	“Flexibility and efficiency of use” (Nielsen, 1994), “objective usability” (Venkatesh, 2000) “efficiency” (ISO, undated)

Lee and Koubek also found out that a higher usability leads to a higher efficiency when using e-commerce platforms. Assuming this also is applicable for online configurators, it can be assumed that the online configurator delivers a higher level of efficiency than the leaflets.

5	The online configurator is more time-saving and more informative than the leaflet for the younger age group.	“efficiency/effectiveness ” (ISO, undated), “perceived usefulness” (Venkatesh, 2000)

Molesworth and Suortti conducted a study in 2001 that asked car drivers about their car buying behavior, especially online. Especially younger people often stated they preferred buying cars online, because of various reasons. Saving time and getting more information was one of them, which is why this hypothesis was formulated.

6	The older age group needs a bigger amount of time for navigating and orientating themselves through the sites of the online configurator than the younger age group.	“User control and freedom” (Nielsen, 1994).

Bergstrom and Schall (2014) researched user behaviour in e-commerce/online environments. They found out that older people generally take a higher amount of time to understand how a website works and how they can operate it. They also tend to absorb less content than younger people. Subsequently the hypothesis states this phenomenon also occurs when using online configurators.

7	Participants that customize their car with a leaflet spend more time with looking at pictures than with the actual customization process.	“efficiency/effectiveness ” (ISO, undated), “objective usability” (Venkatesh, 2000)

Bergstrom and Schall also found out that if people are confronted with a high number of pictures and a relatively lower amount of text, they tend to prefer the pictures. Now that the leaflet mainly consists of pictures, this hypothesis is formulated.

8	Participants who customize their car with the online configurator spend more time with reading facts and information than participants that customize their car with a leaflet.	“efficiency/effectiveness ” (ISO, undated), “objective usability” (Venkatesh, 2000)

Manhartsberger and Zellhofer published a study in 2005 stating people would rather scan texts instead of reading them. Actually, when a high involvement product is bought (or considered), people show higher level of focus and attention which is why the hypothesis states a different opinion than the study.

9	Women observe pictures more intensively than men at both methods (online configurator and leaflet).	“perceived aesthetics”, “perceived usefulness” (Venkatesh, 2000)

10	Men observe texts more intensively than women at both methods (online configurator and leaflet).	“perceived usefulness” (Venkatesh, 2000)

Several eye tracking studies that there are differences between man and woman when it comes to eye gazing and cuing of attention (see Bayliss/Pellegrino/Tipper, 2005; Coutrot et al., 2016; Schiessl et al., no date given). Some of them sugges that women prefer looking at pictures while men prefer reading texts. The two hypotheses are conducted to research if this also applies in a high involvement configurator environment.

11	Customizing the car with the online configurator led to a higher rate of satisfaction with the outcome than customizing the car with the leaflet.	“result demonstrability”, “output quality” (Venkatesh, 2000), “satisfaction” (ISO, undated)

Tirumhalai and Sinha researched if a customization method of payment processes increases customer satisfaction in 2010. This was indeed the case, which is why the same case is assumed for an online configurator of high involvement products, especially compared to leaflets of the same products which are not responsive and therefore cannot react to customers’ needs and desires.

12	The usability was rated better by people who used the online configurator than by people who used the leaflet.	“objective usability” (Venkatesh, 2000)

Friedman (2018) praises the design and the usability of the online configurator of Volkswagen. Especially the responsive design and the navigation gets rated positively. The hypothesis seeks to find out if the participants also think that way, especially compared to the leaflet.

13	The navigation is perceived easier and more comfortable by people who use the online configurator than by people who used the leaflets.	“perceived ease of use” (Venkatesh, 2000), “consistency and standards” (Nielsen, 1994)

Just as stated in the last hypothesis, the navigation is rated positively by Friedman. Also, Båkas et al. underline the high importance of choice navigation when starting configurator projects. Having in mind that this is apparently a widely known factor when designing online configurators, the hypothesis was conducted to research if the participants share that opinion and if the navigation is perceived easier than when using the leaflets.

14	The leaflets evoke a higher number of (positive) feelings than the online configurator.	"perceived enjoyment"/ "joy of use" (Venkatesh, 2000), "satisfaction" (ISO, undated)

Images evoke feelings. Especially pictures of humans (see Fennis/Stroebe, 2016). Also, comparing the characteristic of leaflets and the online configurator, the leaflet bears a haptic experience as well, while the configurator is designed businesslike and without images that own informational content. The hypothesis therefore states that this is a reason for a higher number of feelings people who use the leaflets perceive.

15	Participants that customized their car with the leaflets, who have a partner, one or more child(ren) or both spend more time looking at pictures of people than participants who don't have a partner, one or more child(ren) or both.	"perceived aesthetics" (Venkatesh, 2000)

Table 10: Hypotheses for Research Question 1. Own depiction.

There are - as already mentioned – visible differences between women and men when it comes to gazing behavior. Based on these insights, the question arises if there are also other circumstances that influence gazing behavior, especially regarding the content of the pictures that are observed. This is why the last hypotheses seeks to research possible gaze differences between people who have a family/a partner/offspring and people who have none of all this and therefore don't have somebody to consider when buying a new car, which eventually influences the gaze unconsciously.

Based on the findings of the eye-tracking study and the topic, the second research question was formulated:

Research question 2 (RQ2): **How is the current attitude towards the online purchase of cars of Austrians aged 30-60 and how is it influenced?**

This research question is answered by the findings of the online questionnaire. The following hypotheses were formulated based on the insights that could be gained during the eye tracking study and also based on other studies that had a similar topic, such as the study by OGM (2019) that was already mentioned. Also, here, the variables are defined by the already mentioned research findings.

No.	Hypothesis	Variables	Description
16	The satisfaction of the last guidance situation at a car dealership influences the willingness to buy/customize a car online.	“satisfaction” (ISO, undated)	The study by OGM in 2019 states that people still like going to car dealerships, but don’t show reasons. The hypothesis was formulated because it seeks to find out if people have a higher willingness to purchase their car online if they have made bad experiences at car dealerships.
17	The personal value of owning a car for the individual influences the willingness to use an online configurator when buying the next car.	“subjective norm” (Venkatesh, 2000)	Participants of the eye-tracking study sometimes expressed feelings of carelessness towards cars, which was also their reason why they didn’t try out online configurators until that day or would not buy a car that way because it does not bring them joy. Therefore, it is interesting to research a possible coherence between the personal importance and value of owning a car and the willingness to use an online configurator for buying the next car.
18	Self-efficacy and self-assessed competence for e-commerce platforms influences the willingness to	“computer anxiety”/”computer playfulness”/”computer self-efficacy” (Venkatesh, 2000)	Participants of the eye-tracking study sometimes stated that they didn’t understand functionalities or the layout of the website. Some of them also expressed a lower self-efficacy for internet use,

	buy/customize a car online.		which is why this hypothesis is conducted.
19	The importance of various options when choosing a car (model, equipment) influences the willingness to buy/customize a car online.	“subjective norm”, “output quality” (Venkatesh, 2000)	People often told after the study that they would still prefer buying a car online although the configurator was not good because of practical reasons. This hypothesis seeks to answer if also personal interest in certain features and options influences this attitude.
20	Men and women show the same level of willingness to buy/customize a car online.	“perceived ease of use” (Venkatesh, 2000)	Although the study conducted by OGM states the contrary, the eye tracking study showed that there is not a big difference between the two genders regarding the willingness to buy a car online. The hypothesis was made to research this phenomenon in a bigger number of participants.
21	The participants rate the usability of the online car configurator lower than the usability of the leaflets.	“objective usability” (Venkatesh, 2000), “visual usability tools” (Schlatter/Levinson, 2013)	Because the online configurator was rated worse than the leaflets overall after the eye tracking study, this hypothesis is stated for the participants of the online questionnaire.

Table 11: Hypotheses for Research Question 2. Own depiction.

10.2. Quality criteria of empirical research

When conducting scientific research, it is important to follow scientific criteria. Both empirical methods that are used in social sciences, where three quality criteria are valid and need to be considered. They are needed to ensure that data collection, analysis and interpretation is as valid as possible. The criteria are following:

1. **Objectivity**: measures if the results and findings of the experiment are influenced by the person who conducted the experiment. Objectivity is given if two people who conduct the same experiment come to the same conclusion

independently of each other (see Berger, 2011; Lindlof/Tailor, 2018). Objectivity can also be divided into three subcategories:

- Objectivity of **application**: standardization of the questionnaire and the type of data collection is given
- Objectivity of **analysis:** is given if the experimenter delivers a detailed documentation about the experiment/survey. Fulfilling this type of objectivity requires the supply of hypotheses.
- Objectivity of **interpretation**: the experimenter interprets the results of the experiment/the survey the same way as other researchers would do. This kind of objectivity is given if there are predefined values and settings, such as statistical ways of interpreting data (see Berger, 2011).

Objectivity cannot be fully given in this thesis as there is just one person who conducts the experiments, collects the data, does the analysis and interprets the results. Yet, features are fulfilled are the use of hypotheses, the use of predefined measurements such as statistical analysis methods and the use of already predefined and proofed values and variables that fit to the topic.

2. **Reliability:** is given if the questionnaire/the experiment delivers the same or similar results if it is being repeated. This shows the creditableness of a study. If an experiment or the conduction of a questionnaire are documented, and the analysis as well, reliability can be ensured by repeating the experiment/questionnaire under the same circumstances (see Berger, 2011).

Reliability is given in this experiment as the procedures of both empirical methods are documented and can be repeated under the same circumstances. Yet, the participants of the quantitative study would be different as they filled out the questionnaire anonymously and therefore could not be found again to redo the questionnaire.

3. **Validity**: this criterion is given if the defined indicators only measure or research the things and questions they are supposed to research. To ensure validity, an experiment or a questionnaire needs an operationalization to define what the indicators are supposed to measure and how they measure

it (with what information) (see ibid)**.** This criterion can also be split up into two parts:

- **External** validity: Seeks to answer if the results of the empirical research is actually relevant for the users and if it can be used for future implications – or if they are just usable for theoretical insights and are not at all perceived by the user afterwards.
- **Internal** validity (also called evaluator effect): Seeks to answer if the results are dependent/independent of the experimenter. Sometimes, different experimenters research the same topic and come to different insights and conclusions, which is especially often a problem in usability research (see Jacobsen/Hertzum/John, 1998). Internal validity can be increased if the research is conducted in bigger groups of researchers.

Both methods are operationalized to ensure validity.

Yet, even under the best circumstances none of the three quality criteria can ever be given to 100% as the empirical research is conducted and performed by humans – where errors never can be eliminated at a 100% chance (see ibid).

10.3. Methodical approach

This subchapter explains the methodical approach of the thesis before going into detail by describing the methodical profile and the two empirical methods.

Firstly, the topic was researched theoretically. By the examination of books, journals and studies, the topic of the thesis was altered. The first research question was formulated based on the insights that were gained during the literature study. The first research question therefore only refers to the current scientific knowledge and is researched via the eye-tracking study. The eye-tracking study is the first part of the empirical research. By ensuring it is a qualitative research, already deducted hypotheses could be answered, as well as new hypotheses could be formulated based on the findings of the study. The second part of the empirical research is a quantitative approach, in form of an online questionnaire. The online questionnaire aims to answer the second research question that was also formulated based on the findings of the eye-tracking study as well as on a current study of the topic of the eye-tracking study (which it was taken into consideration as well). The

hypotheses of the second research question are then answered based on statistical and descriptive methods.

It is notable that both of the two methods are deductive ways of measuring usability, because two methods (online configurator and leaflet) are directly compared with each other, where also goals are set, and functionalities are controlled and measured. Choosing a deductive approach enables formulating design and improvement suggestions after the experiment (see Bergstrom/Schall, 2014; Sarodnick/Brau, 2011). These two possibilites are also goals of general usability research (see Sarodnick/Brau, 2011). A deductive study also enables analysis of weaknesses and evaluations of functionalities, quality and performance, which is also measured in the eye-tracking study and in the online questionnaire.

10.4. Methodical Profile

Profile		
Theoretical Research	Literature Research: Research and analysis of relevant and fitting literature of topics such as usability, personalization, customization, user behavior. The research period was from January 2019 until July 2019.	
Empirical Research	**Qualitative Research**	**Quantitative Research**
Research method	Eye-Tracking Study, questionnaires before and after the study	Online Questionnaire (CAWI) using an online research panel
Research Question	How is the usability of online customizable high involvement products in comparison to conventional customization possibilities perceived by people at the age of 30-60?	How is the current attitude towards the online purchase of cars of Austrians aged 30-60 and how is it influenced?
Hypotheses No.	1-15	16-21
Basic Population	Austrians/People who have a driver's license and live in Austria, aged 30-60	
Sample size	N = 32	N = 214
Usable samples	32	209
Sampling procedure	Quota sampling	
Pretest	5 participants	10 participants

	Pretest period: 22.-24.6.2019	Pretest period: 16.-17.7.2019
Research period	25.6.-6.7.2019	19.-25.7.2019
Research place	Austria, Germany	Online
Research analysis	Descriptive and graphical analysis (Scan Paths, Gaze Plots, AOIs)	Descriptive Analysis, comparison of means (t-test), correlation analysis (Spearman)
Research analysis tool	Descriptive/graphical Analysis via BeGaze	Statistical Analysis via SPSS

Table 12: Methodical Profile. Own depiction.

The empirical sector of the study consists of two parts: An eye-tracking study and a quantitative questionnaire. The two methods will be explained and discussed in the following.

10.5. Qualitative Research: Eye-Tracking Study

Eye-tracking is a method to track movements of people's eyes. These movements are then saved and can be visually processed and worked up afterwards. With eye tracking, you can detect where people look at when looking at ads, TV shows, internet sites or leaflets, only naming a few examples. You can also see how long they look at certain points, where they look at and in what order they "scan" their object of attention.

(see Bergstrom/Schall, 2014). There are several devices that enable eye-tracking for specific situations. Mainly, eye trackers rely on a method called "corneal reflection", which reflects the movement of the eye. This reflection is captured by cameras that identifies the reflections of the light source on the cornea and the pupils.

Eye movements can be divided in to fixations and saccades. A fixation is – as the name suggests – when the eye is fixating on a certain point, therefore resting on a specific area and not moving. Fixations are usually quite short, as the eye performs saccades most of the time (even unconsciously.). They usually last between 100 and 600 milliseconds. Fixations can show that the user *sees* something, yet it does not prove that he/she actually *registered* it cognitively. Saccades are the movements that happen between the fixations. They are rapid and show the way between two points of interest (the fixations). There are different kinds of devices that allow to

eye-track people. The two used devices for this thesis are a stationary eye-tracker that is mounted at that bottom of a laptop or a display to track eye movements of people using a computer and glasses which are connected to a computer that enable eye tracking of moving people, for example when looking around or reading a book.

The stationary device was used for testing people's behavior and impressions when customizing their car with the online configurator tool by VW. The glasses were used to track their eye movements when they were asked to customize a car based on information they could get by reading leaflets of the different car models by VW.

There are also different ways of analyzing, visualizing and evaluating the recorded eye movements.

- Heat maps: a heatmap visualizes the number of fixations that participants made during the reception. There is a color code: if the visualization is red, this shows a high number/durance of fixations. Yellow shows a smaller number, green and blue an even smaller number.
- Focus maps: Focus maps are the visual counterpart to heat maps: they color everything in black apart from the things that you've looked at. This gives an overview what kind of contents were actually seen and – sometimes even more important – what kind of contents were not seen.
- Gaze plots: Also called scan paths, gaze plots show the sequence of fixations and saccades in a particular time frame. Fixations are visualized by dots and saccades are visualized by lines that connect the dots. Fixations are usually numbered after the order they were made. The bigger the dot, the longer the fixation.
- AOIs: Areas of interest enable dividing the site or the gaze area in certain geometrical parts or components. This way, researchers can analyze certain parts of e.g. web sites more specifically.

With this technology and the mentioned methods, this enables a very detailed and specific way to examine user behavior, even beyond questionnaires and self-reported interviews because it also shows behavior people often are not aware of or/and perform unconsciously.

Reasons why:

The thesis wants to explore and investigate the usability of certain products and interfaces. This is why eye-tracking was chosen as an additional method to examine the behavior of the participants who were asked to customize a car themselves. Cars are defined as a high involvement product in this thesis. They are also known by everybody and lots of people use and own cars, so it is not a niche product. Cars are also customizable online which is why they were the destined object for the empirical investigation of the thesis. The participants filled out a questionnaire before and after the customization, yet the most interesting data is how they got along whilst configurating their cars which can and will be measured and interpreted with the eye-tracking data. Especially cars are a special product. It is expensive, buyers (hopefully) own it for quite some time, and yet people value cars in versatile ways (or not at all). It is a rational, yet also emotional decision what car to buy. Van de Sand tells in 2017 that people buy cars for emotional reasons such as the brand, the color, the design, but still justify their decision with rational arguments (fuel consumption, mileage, etc.). This shows that there are lots of emotional reasons and therefore subliminal behavior that influences the buying decision which also justifies the eye-tracking study. People look at things that they might not even always remember that they looked – despite remembering why they did that. Now, that the thesis is not only about cars but more about the perceived usability, there are more reasons why eye-tracking should be used. It measures movements of the eye and therefore gives possibilities to examine the participants' behavior in a more subliminal kind of way. Information is not always perceived actively – lots of information that is perceived by the eye is perceived unintentionally and almost automatic. This also plays a role when usability is researched because eye movements show how participants orientate themselves when entering a website or looking at a leaflet. Measurements like how long they observed what kind of content, or how long they took for finding certain buttons is another reason why an eye-tracking study is a good way for examining the usability.

Limitations:

Eye-tracking technology also shows disadvantages. Eye tracking only shows data of gazes – so fixation and saccades. It does not show reasons about if the information there is perceived at all – or processed. Because a user looks at something does not necessarily mean he/she perceived or even understood it. A fixation can therefore stand for a higher level of interest – but also for incomprehension (see Holmquist et al, 2011). This means that gazes can be recorded – but the reason why a person looks where and how long cannot. This is why it is important to talk with the people about the study afterwards and optimally hand them a questionnaire.

Also, technical limitations can occur, such as the malfunctioning of the eye-tracking method (e.g.) the glasses. This can happen especially easy if older people are examined because of their glasses and their changed shape of eyes (see Duchowski, 2017). These technical and content-related limitations have to be considered when doing an eye-tracking study.

10.5.1. Operationalization

The participants of the eye-tracking study were handed two questionnaires. One questionnaire was handed before the study. The reason was to set the participants' moods for what they will do in the study, and also to collect basic information about experiences regarding cars and customized products. The post questionnaire was handed after the study and sought to ask people about their experience with the online configurator/the leaflet. The questionnaires partly refer on usability questionnaires that were already built, such as QUIS (Questionnaire for User Interface Satisfaction) by Shneiderman (1987) that examines subjective user satisfaction, and SUMI (Software Usability Measurement Inventory) by Porteous et al., 1995, which also measures impressions and feelings of users regarding usability.

The operationalization is shown now. The variables partly are based on the Technology Acceptance Model III (Venkatesh, 2000). Also, other usability frameworks, such as usability heuristics for user interface design (e.g. by Jakob Nielsen, 1994) were used, as well as visual usability research (e.g."Visual Usability" by Schlatter/Levinson, 2013).

Also, usability metrics by ISO/IEC 9126-4 metrics such as “effectiveness / efficiency / satisfaction” were used. Those frameworks were used for defining the variables if possible. Sometimes, other literature was used.

Pre questionnaire:

No.	Variable	Questions	Items	Type of answer
1	Sociodemographics	Sex	Male	Polar question
			Female	
		How old are you?	30-45 years	Polar question
			46-60 years	
2	Attitude and experiences towards cars	Do you currently own a car?	Yes	Polar question
			No	
		Have you purchased a car already?	Yes	Polar question
			No	
		If yes: What kind of car was it?	New car	Polar question
			Pre-owned car	
			Both	
		If yes: What attributes did you consider when buying the car?	Brand	Polar question Hybrid question
			Price	
			Mileage	
			Personal guidance and advising by the salesperson	
			Other:	
		What brands do you consider when buying a car?	*Blank space*	Open question
		Do you plan on buying a car in the following years?	Yes	Polar question
			No	
3	Experiences with customization	Did you already customize a product online (assemble a product yourself like you wish it would be like)?	Yes	Polar question
			No	
		If yes: What kind of product was that?	*Blank space*	Open question

Table 13: Operationalization pre-questionnaire of eye-tracking study. Own depiction.

Study:

Variable	Task	Possible answers
Perceived usability of online configurator/leaflet	"Think of your current life situation and imagine you would have to buy a car now. Customize it based on this situation."	Individual procedures of participants

Table 14: Operationalization eye-tracking study. Own depiction.

Post questionnaire:

No.	Variable	Questions	Items	Type of answer
1	General 1st impression	How did you get by when customizing your car?	*Blank Space*	Open question
2	Perceived ease of use (see Venkatesh, 2001)	Did you experience difficulties when customizing your car?	Yes	Polar question Hybrid question
			No, …	
		Did you miss something, like personal guidance?	No, nothing was missing	Polar question Hybrid question
			Yes, I missed …	
		How was the navigation of the configurator for you?	Self-explaining/Confusing	4-point rating scale
			Intuitive/Complicated	
			Logical/Incomprehensible	
3	Perceived control (see Venkatesh, 2001), User control and freedom (see Nielsen, 1994)	Did you have the feeling of having full control over your configuration while customizing the car? (E.g.: one selection does not interfere or hinder another selection or choice concerning different categories)	Yes	Polar question
			No	
		How do you rate the customization possibilities (color of car, motorization…)?	Too many possibilities – I felt overwhelmed	Polar question
			Right amount of possibilities	
			To little amount – I'd like to have had more possibilities	
3	Perceived aesthetics (see Venkatesh, 2001), Visual Usability (see Schlatter/Levinson, 2013),	Rate the whole visual structure of the configurator	Clear/Unclear	4-point rating scale
			Logical structure/ Illogical structure	
			Appealing/Not appealing	

	Efficiency (see ISO, undated)		Intuitive/In need of explanation	
		The buttons and symbols were…	Too big	Polar question
			Too small	
			Alright	
		The buttons and symbols were…	Understandable	Polar question
			Incomprehensible	
		The amount of pictures and illustrations was…	Bothering to me	Polar question
			Pleasant to me	
			neutral	
4	Perceived enjoyment (see Venkatesh, 2001), Satisfaction (see ISO, undated)	What feelings did you perceive while configurating (multiple answers possible)?	Fun	Multiple answers
			Boredom	
			Incomprehension	
			Excitement	
			Frustration	
		Did you generally feel good while configurating?	Yes	Polar question
			No	
5	Perceived usefulness, result demonstrability (see Venkatesh, 2001)	Does the configurator have a useful structure for you?	Yes	Polar question
			No	
		How do you rate the configurator concerning your result (the completely customized car)?	Useful	Multiple answers
			Useless	
			Good as an addition when buying a car	
			Good for comparing cars	
		Would you show the customized car your friends and acquaintances?	Yes	Polar question
			No	
6	Personal involvement and previous experiences regarding cars	How much do the following statements apply to you?	My car is only a status symbol for me.	6-point rating scale. 1: Applies very much, 6: doesn't apply at all
			My car is only an article of daily use for me.	
			I just want to get from A to B with my car.	
			Driving experience is very important to me	
		How important are versatile choices (car color, wheel rims, amount of horsepower…) to you when buying a car?	Very important	Polar question
			Important	
			Rather important	
			I don't care	
		Think back to the purchase of your last car.	Private seller	Polar question

		Did you buy the car from a private seller of from a Salesperson?	Salesperson	
		If you bought it from a salesperson: Were you contented with the adivising situation?	Yes, because…	Polar question Hybrid question
			No, because…	
		Did you have the feeling that you could trust the salesperson with his/her assessment?	Yes	Polar question
			No	
		What attributes did you take most notice of?	Price	4-point ranking scale: 1 is most important, 4 or more is less important Hybrid question
			Accessory	
			Interior	
			Exterior	
			Other: …	
7	Attitude towards costumization program	Did you already know about the opportunity of customizing a car online?	Yes	Polar question
			No	
		Would you ever consider customizing your car online?	Yes	Polar question
			No	
		If yes: What would be the reasons for it (multiple answers possible)? *Variables of items: I designed it myself-effect (see Franke/Schreier/Kaiser, 2011), Computer Playfulness, Perceived usefulness (see Venkatesh, 2000)*	Personal and individual car only I and nobody else has	Multiple answers
			Full control over the form and design of my car	
			Try out something new and playing around	
			Immediate display of the car (seats, color, etc.)	
			Immediate price transparency	
			Avoiding contact with humans	
			Convenience	
		How do you rate the configurator itself in general?	1-6	Grading question, 1 is the best, 6 is the worst
8	Objective overall usability (see Venkatesh, 2001), Flexibility and efficiency of use (Nielsen, 1994),	Would you have preferred another order of the configurator?	Yes, …	Polar question Hybrid question
			No	

	Efficiency and Effectiveness (see ISO, undated)	How do you rate the general usability of the configurator?	1-6	Grading question, 1 is the best, 6 is the worst
		Would you recommend the configurator concerning usability/practicability?	Yes	Polar question
			No	
9	Computer self-efficacy/playfulness/anxiety (see Venkatesh, 2001)	How would you rate your personal skills regarding computers/internet/online shops?	Secure/Insecure	4-point rating scale
			Competent/Incompetent	
			Experienced/Unexperienced	
		With what kind of media do you use the internet (multiple answers possible)?	Desktop PC/Laptop	Multiple answers Hybrid question
			Tablet	
			Phone	
			Other:	
		Do you enjoy using the internet or do you use it under duress?	I extremely enjoy using it	Polar question
			I enjoy using it	
			I use it for convenience	
			I use it under duress	
10	Online buying behaviour	Do you shop in online stores on a regular basis? If yes, in which ones? (On a regular basis means at least once per month)	Clothes (e.g. H&M)	Multiple answers Hybrid question
			Generic articles (e.g. Amazon)	
			Other	
			Don't shop online (on a regular basis)	
11	E-Commcerce attitudes	What criteria is most important to you about online shops?	Usability	7-point ranking scale Hybrid question
			Appealing design	
			Quick loading times	
			Possibility of personalizing/customizing the product	
			Good product pictures and descriptions	
			Help (bots, etc.)	
			Other:	
12	Online buying behavior regarding high involvement products/services	Did you already purchase some of the following products/services online?	TV	Multiple answers
			Smartphone	
			Furniture	
			Vacation	

Table 15: Operationalization of post-questionnaire of eye-tracking study. Own depiction.

The questions were not asked in this very order, because a randomization of the different variables was considered as more useful.

10.5.2. Sample

The participants for the study were selected very carefully. The goal of the study is to examine and compare usability explicitly for people who are not necessarily digital natives, which is why the age of the target group was limited from 30 to 60 years. Regarding the fact that 30-year-old persons did grow up with using the web (nevertheless not being digital natives) while 60-year-old persons did not, do not necessarily have experiences with shopping online and also lack the natural and intuitive understanding of using the web concerning web navigation and information architecture, the age was split up into two groups, from 30 to 45 years and from 46 to 60 years. This enables the possibility of comparing the two groups regarding their age (if there is different behavior, different levels of understanding and getting along, etc.). It was also important to have an equal number of men and women to assure equality between the two genders to not distort the results afterwards. Regarding the kind of product that was examined – car – which is a big and important decision, it is also extremely important to take notice of the family situation as this can influence the buying/choosing behavior as well. This is why two more attributes were taken into consideration: If the participant has a child or more children in his/her household. Generally asking for children was not specific enough as it is possible especially for older participants to have children who are older and therefore already moved out, therefore don't belong to the household anymore and aren't (necessarily) taken into consideration when buying a new car. The other attribute was if the participant has a partner he/she shares the household with. Here as well, just asking for a spouse or a partner was not specific enough, because it is possible to be married or in a relationship and not live together with the partner.

The four attributes are therefore: Age/Gender/Partner/Child(ren). Using every combination once, this results in 16 different kinds of people. Regarding the fact that the online configurator **and** the brochures are tested and then compared, two persons of every combination were needed, which results in 32 people that had need to be found and tested. It was taken into consideration to let one participant test both ways (configurator and leaflet), but this didn't seem useful. If the first kind of test is done, the other kind of test will be influenced by the primary effect: The person already knows what kind of car he/she wants, therefore it is not the original and tabula-rasa situation from the first test, which makes the two tests

incomparable. This is why two persons of each combination were searched, assuming that regarding their similar/same personal situation the behavior would be comparable. In the following, a segmentation of the combinations can be seen.

Number	Sex	Age Group	Partner	Child(ren)
1	Female	30-45	Yes	Yes
2	Female	30-45	Yes	No
3	Female	30-45	No	Yes
4	Female	30-45	No	No
5	Female	46-60	Yes	Yes
6	Female	46-60	Yes	No
7	Female	46-60	No	Yes
8	Female	46-60	No	No
9	Male	30-45	Yes	Yes
10	Male	30-45	Yes	No
11	Male	30-45	No	Yes
12	Male	30-45	No	No
13	Male	46-60	Yes	Yes
14	Male	46-60	Yes	No
15	Male	46-60	No	Yes
16	Male	46-60	No	No

Table 16: Sample of eye-tracking study. Own depiction.

The participants were therefore chosen based on these criteria. Those were asked about verbally or via e-mail before to assure not to recruit people who didn't fit into the target group. The criteria also show consideration of the overall population as the criteria include some of the most important ways of demographic segmentation data. The filter question was also asked verbally and before the actual study and was if the person owns a driving license. People without driving licenses were not taken into consideration. People were also asked in the questionnaire if they plan on buying a car in the following years, but also those who answered "no" were considered because they own a driving license and therefore have made experiences with cars and driving. Also, the reasons for saying no were not necessarily reasons for never buying cars (such as "I just bought a new one and I hope I won't have to buy another one soon, but still I'm interested in cars", etc.).

The participants were versatile. Most of them are employees at FH St. Pölten, such as employees in the IT department, marketing department, lecturers, researchers. But, also other acquaintances were recruited, such as doctors, construction workers and teachers. This is a good variety of people, as there is not only one certain group (such as students or teachers), but also different levels of education, jobs and different interests and life situations.

10.5.3. Execution

Pretests

A pretest was performed with five people before conducting the actual study. Every pretest was performed with 3 males and 2 females (one of each age group, two males of the younger age group) to ensure the functionality and understandability of the test. The number was chosen because Nielsen recommends a number of 5 testers when testing usability in general (see Nielsen, 2000). This was taken as a usable number for a pretest. The pretests took place in the participants' homes to ensure a natural and unaffected environment and took place in calendar week 26. After the pretests, the study was altered, and the questionnaires were modified iteratively.

Procedure

The **locations** of the study were various. Most studys took part in FH St. Pölten, some of them in the Usability Labor where most eye tracking studys take place. Due to lack of space, the studys with leaflets were conducted in seminar rooms, as well as the studys with the online configurator as well sometimes. The rest of the studys took place in the participants' homes in Vienna, Kufstein (AT), Rosenheim (DE) and Übersee (DE). The reason for that was that the most natural and regular situation should have been ensured for the participants, so they don't have this "experimental situation", experience it as an ordinary situation and feel as comfortable as possible. The eye-tracking study was conducted in calendar weeks 27 and 28. Both of the eye-tracking devices were available at this time which made it comfortable and easy to plan the interviews within two weeks. Sometimes, two experiments were conducted parallelly, yet, mostly just single people made the configuration.

The task for the participants (regarding both leaflet and configurator) was as follows: Participants were asked verbally to imagine they had to buy a new car, regarding their current life situation. This means, imagining maybe the current car broke down and they would have to buy a new one, or just buying a car in general in case they don't own one right now. Their life situation also should be included into the decision what car to buy (such financial status, buying a car just for the one person or maybe also for a partner and children). Participants of both groups were told to think aloud while configurating so that the experimenter would also be able to get a verbal overview about the participants' experiences and thoughts. Then there were two possible ways:

1. Online Configurator: The participants for the configurator were asked to customize their own car on the Volkswagen.at configurator homepage. Help was not offered purposely because the participants should figure out how to run and operate the configurator by themselves (without falsifying the study results by the help of the author). Nevertheless, it was clarified before if the participants understand the operations of computers and the internet, which was always the case.
2. Leaflet: Before the start of the study, all available leaflets VW currently offers in stores were gathered from a VW seller in Vienna. Those leaflets were presented on desks in the seminar rooms/the homes of the participants in order (the different versions of the models were put together, etc.). The participants were then asked to gaze around the different leaflets and then choose one or more leaflets of cars they would consider buying right now. They shall then flick trough them, while imagining they actually were in the situation of considering buying the car (therefore also reading important information and not only look at them superficially). They were also told that if there were things to choose, such as entertainment system, the color of the car or the wheel rim, they should mark their choice with sticky notes they were given at the beginning.

   Volkswagen was chosen as a car brand because it is not an expensive kind of brand such as BMW, and it also offers a high range of models, so a family car can be customized, as well as a limousine for a single living person.

The procedure of the study will be explained now. First, the participants were greeted and welcomed. Drinks and snacks were offered during and also after the study. They were then seated to the place where their kind of study (configurator/leaflet) took part in the room and asked to fill out the pre-questionnaire. After filling it out they were explained the study and their task, making sure the task was understood well and there are no further questions. Occurring questions during the study were answered if they weren't technical or content-related questions regarding the configurator or the leaflets. After configurating their cars and finishing, they were asked to briefly summarize their experience with the configurator/the leaflet and how they got along verbally. The author wrote down their impressions, talked with them about the feelings they had, what they had missed, if they liked configurating the car and then handed them the post questionnaire where the participants had to answer multiple questions about the usability and their personal perception of the configurator/the leaflet. The combination of an initial verbal question and then the questionnaire was conducted on purpose to first catch a first and honest impression of the participant directly after customizing the car, and also to enable a softer access to the questionnaire, which was quite long and demanding. After finishing the questionnaire, the participants were thanked for their time and commitment to the research.
Depending on the participants, the study took around 30 minutes, sometimes longer (e.g. when the participant was a passionate or interested driver).

10.6. Quantitative Research: Online Questionnaire

A questionnaire that is conducted only was chosen as the second method of empirical research. This online questionnaire was programmed via HTML5 and put on an online survey tool where it was accessible for everybody who got the hyperlink for it. For finding participants, the online panel of the Talk Online Panel was used. A filter question was inserted at the beginning of the questionnaire (if the participant owns a driver's license or plans on getting it), to eliminate irrelevant participants. (see Callegaro/Lozar Manfreda/Vehovar, 2015)

Reasons why:

This method was chosen because the thesis investigates online buying behavior, so it is useful to conduct the study online: this way, it can be ensured that only people who are relevant for the study (=internet users) actually fill out the questionnaire.

The first advantage that can be named is that a higher number of participants can be gathered quite easily when doing an online questionnaire: The field is big, there are many potential participants and filling out the questionnaire is way easier and more straightforward than filling out printed interviews, or even conducting verbal interviews. Interactivity is another advantage, so this survey contented pictures that could be seen and rated by the participants.

The interviewer is also not present, which allows a more natural environment which is not pressured by e.g. the feeling of giving socially desired answers like it would be in verbal interviews. (see ibid). Also, the anonymity of the single user can be seen as an advantage: people are more likely to answer delicate or embarrassing questions.

Online questionnaires are also less error-prone, firstly because people can't skip questions – so the questionnaire is always complete once it is finished, and secondly because the data preparation already happens automatically, which prevents mistakes that could be made by human data preparation. The data just needs to be downloaded when the questionnaire is finished (see ibid).

Limitations:

Although an online survey seems practical and fast, there are also some disadvantages to it that are now discussed. Firstly, an online questionnaire lacks the experimenter, as already mentioned. This could be problematic if the participant does not understand a question/picture/etc., and there is nobody that could be asked about it. Also, the given anonymity in the internet can become a disadvantage, because the inhibition level is lower when it comes to lying about the personality or opinions. People can pretend to be somebody else easily. This can lead to distortions of the outcome result of the questionnaire.

The non-binding nature of the internet could lead to a higher dropout rate: because nobody is supervising them, the participants can easily drop out of the questionnaire

once they don't feel like doing it anymore because it is too long or too boring, etc. (see ibid).

Looking at the nature of the questionnaire, it is also notable that this kind of procedure is very structured. The participant hardly has any possibilities to state his/her opinion (if, sometimes just via blank spaces). This kind of predefined way of asking for opinions leaves the user a small amount of freedom. This also leads to some kind of gate-keeping: because the experimenter has conducted the questions, they all focus on a specific topic or area. Certain other topics that may be interesting could be not be covered by accident or left out intentionally, which also leads to a predefined set of answers and opinions that are gathered (see ibid).

10.6.1. Operationalization

The questionnaire was formulated based on the insights that could be gained during the eye-tracking study and another study that researched car buying behavior in Austria and was published in May 2019.

This questionnaire was as well formulated referring to QUIS and SUMI.

No.	Variable	Questions	Items	Type of answer
0	Filter question	Do you have a driver's license, or do you plan on getting it?	Yes, I have a driver's license/ I plan on getting it.	Polar question
			No, I don't have a driver's license.	
1	Socio-demographics	Are you male or female?	Male	Polar question
			Female	
		How old are you?	30-45 years	Polar question
			46-60 years	
		What is your highest education level (specific education levels are not translated)?	Hauptschule, Unterstufe AHS, NMS, Sonderschule	Polar question
			Lehre, BMS	
			AHS/ (z.B. Gymnasium)	
			Letzte zwei Jahre der BHS (BHS-Abschluss) (z.B. HAK, HTL, HBLA)	

			Hochschule (Universität/FH)	
		In what state do you live?	Vienna	Polar question
			Upper Austria	
			Lower Austria	
			Vorarlberg	
			Burgenland	
			Carinthia	
			Tyrol	
			Styria	
			Salzburg	
2	Internet usage	How often do you use the internet?	Daily	Polar question
			Several times per week	
			Several times per month	
		Do you use the internet because you like to or because you have to?	Because I really like to	Polar question
			Because I like to	
			For convenience reasons	
		How would you rate your personal skills with e-commerce stores or platforms such as amazon.at or willhaben.at?	Secure/Insecure	4-point scale between the two possible answers
			Competent/Incompetent	
			Experienced/ Inexperienced	
		Do you inform yourself digitally or analogue (e.g. with leaflets) when it comes to bigger purchases?	Digitally	Polar question
			Analogue	
			Both	
3	Opinions, attitudes and experiences about cars.	Think of your car/the next car you'd like to buy. How do you rate yourself at following statements?	My car is an article of daily use for me / My car is a status symbol for me	6-point scale between the two possible answers
			The driving feeling is very important to me / I want to get from A to B with my car	
			I'm open to sharing my car with other drivers (Car Sharing) / It is important to me that the car is my personal property.	
		What does a car purchase mean to you?	Exhausting procedure. I don't like doing it and I would like to save more time while doing it.	Polar question
			It is a situation I don't perceive many feelings about. I handle it neutrally.	
			Fun procedure. I like taking much time for it, doing research and	

			take lots of advising by friends/experts/online.	
		Did you already customize a car with a car online configurator?	Yes, and then I bought it like that at a car dealership.	Multiple answers
			Yes, to inform/prepare for the car purchase.	
			Yes, because it's a fun thing to do/killing time.	
			Yes, I customized it together with the salesperson.	
			No, but the salesperson customized it for me based on my wishes.	
			No, I don't have any experiences with online configurators.	
		Imagine you would customize a car. Put together a sequence of the following features that makes most sense for you.	Fuel	Rating scale from 1 to 7
			Model	
			Variation	
			Design (Color, tire rims, seats, etc.)	
			Price	
			Equipment	
			Accessory	
4	Car dealership experiences	Did you already purchase a car at a car dealership?	Yes	Polar question
			No	
		If yes: How satisfied were you with the following points at your last purchase at a car dealership?	Price	4-point scale ranging from Very dissatisfied to Very satisfied
			Number of models and features	
			Competence of salesperson	
			Credibility of salesperson	
			Trustworthiness of salesperson	
			Patience of salesperson	
			Friendliness of salesperson	
5	Future car purchase intentions	Would you buy a used or a new car next time?	New car	Polar question
			Used car	
		How important are following choosing options when purchasing a car? *(cursive items were only available for*	Brand	4-point scale ranging from Totally unimportant to Very important
			Interior (A/C, heating, navigation system…)	
			Exterior (Color, tire rims…)	

		people who chose "used car" in the previous question)	Number of seats/doors	
			Motorization	
			Fuel	
			First registration	
			Mileage	
		Would you prefer looking for your car online or offline?	Online	Polar question
			Offline	
		Why would you look for it online? *(cursive items were only available for people who chose "new car" before and therefore refers to the online configurator)*	I hope for price reductions	Multiple answers Hybrid question
			I did not decide for a car yet/It is easier to compare several car models and brands	
			I can avoid contact with humans	
			It is more comfortable for me	
			It means less stress for me	
			It's a personal and individual car nobody else but me has	
			I have full control over how my car is designed	
			I like trying out new things and experimenting	
			The immediate depiction of the car (seats, color, etc.) is an advantage for me	
			I can immediately see how much my car costs with what equipment	
			Other:	
		Why would you look for it offline? (cursive items were only available for people who chose "new car" before)	I hope for price reductions	Multiple answers Hybrid question
			I want to look at the car personally	
			It is more comfortable for me	
			It means less stress for me	
			I prefer the personal contact to humans	
			I want to support local car dealerships	
			I did not decide for a car yet, so I'm seeking personal guidance	
			I always bought my car at a car dealership and made good experiences with it	

			Other:	
6	Perceived usability	Observe following pairs of pictures. One picture comes from the online configurator by Volkswagen and the other comes from a leaflet by Volkswagen. Then tick the picture where the following attributes fit more in your opinion.	More attractive More expressive Clearer More informative Better comprehensible	Polar question. The online configurator and the leaflet were the choosing options. The question was posed for 5 pairs.
7	Method preference	Which method to customize your car would you prefer after seeing these pictures?	Online configurator Leaflet	Polar question

Table 17: Operationalization of quantitative online survey. Own depiction.

10.6.2. Sample

The sample of the quantitative study was selected based on the basic population of Austria. Women and men should be surveyed in equal numbers, representing the basic population. The chosen age group ranged from 30 to 60. It was reasoned because people had to be not too old to be using the internet on a regular basis – but also not too young to already be a digital native. The age definition of a digital native is various, in this thesis it is assumed that people from the age of 30 are not considered as digital natives (see Moran, 2016).

Th second characteristic that was considered when creating the sample was the states of Austria. To conduct a study that depicts the basic population, the sample must be consistent with the proportion of the inhabitants in the particular states.

There was not another characteristic regarding car use, or car buying behaviour because the whole basic population should be depicted, because the study is about high involvement products in general. It was, however, ensured that only people who have a driver's license take part in the study to only ask people who are familiar with the topic.

Considering these characteristics, following numbers show the basic population of Austria (see Statistik Austria, 2019):

	Männer 30-45	Männer 46-60	Frauen 30-45	Frauen 46-60
Basic Population Austria	946.390	1.007.971	936.142	1.009.551
Burgenland	29.112	36.018	29.982	35.760
Carinthia	55.051	67.212	54.849	68.770
Lower Austria	167.705	201.679	169.040	201.012
Upper Austria	155.573	171.998	149.760	169.637
Salzburg	58.824	61.676	58.841	64.261
Styria	130.794	145.318	126.309	143.128
Tyrol	80.667	85.638	80.566	85.839
Vorarlberg	42.790	44.280	42.597	43.661
Vienna	225.874	194.152	224.198	197.483

Table 18: Basic population of Austria. Own depiction.

Due to the nature and length of the thesis, a complete survey is not conductable. 200 participants were recruited to depict the basic population of Austria. The following grid shows the needed proportions for the respective states, which is the quota plan for the quantitative study:

	Männer 30-45	Männer 46-60	Frauen 30-45	Frauen 46-60
Basic Population Austria	49	52	48	51
Burgenland	2 (4%)	2 (4%)	2 (4%)	2 (4%)
Carinthia	2 (4%)	4 (8%)	3 (6%)	4 (8%)
Lower Austria	9 (18%)	10 (19%)	9 (18%)	11 (22%)
Upper Austria	8 (16%)	9 (17%)	8 (17%)	9 (18%)
Salzburg	3 (6%)	3 (6%)	3 (6%)	3 (6%)
Styria	7 (14%)	7 (13%)	6 (12%)	7 (14%)
Tyrol	4 (8%)	4 (8%)	4 (8%)	4 (8%)
Vorarlberg	2 (4%)	2 (4%)	2 (4%)	2 (4%)
Vienna	12 (24%)	11 (21%)	12 (24%)	10 (20%)

Table 19: Calculated sample from the basic population. Own depiction.

10.6.3. Execution

Pretests

A pretest was also performed with 10 people before the actual start of the online questionnaire. This enabled an elimination of errors and mistakes, also the participants could express things or questions they didn't understand or that weren't clear to them. The feedback that was given by the experts of the panel was also

used to improve the questionnaire iteratively. The pretest took place in calendar week 29.

Procedure

The questionnaire was built up at the online survey tool “soscisurvey.de”. After all the questions were placed, several walkthroughs were performed to test the questionnaire and its functionality, because there were also some questions that only had to be filled out by certain subgroups. After the pretest was finished, the annotations of the participants were included into the questionnaire.

It then went live from 19th of July until 28th of July 2019. 209 people filled out the questionnaire during that time frame. After that number was reached, the online panel closed the field. The data was downloaded from Soscisurvey and used for a descriptive and an interpretative analysis which both were performed using the statistic software SPSS. After formulating the descriptive analysis and the interpretation, the hypotheses are verified or falsified. Subsequently, both research questions are answered.

11. Empirical Part

11.1. Descriptive Analysis

11.1.1. Eye-Tracking and qualitative questionnaires

One exemplary walkthrough of the online configurator by a participant is shown in the following. More eye-tracking study data of the participants is not depicted descriptively here. The reason behind this is that the participants chose different ways to customize their cars, so almost no combined pictures can be given. Showing all pictures and screenshots of the participants (of e.g. gaze plots) would extend the length of the thesis and also not be useful.

There are, however, some more screenshots and pictures which can be found in the interpretation.

The following analysis depicts the two questionnaires that were filled out by the participants of the eye-tracking study. It does only contain whole numbers. Percentages of sums of group numbers are given if mentionable. For the general overview, percentages of whole numbers are not assumed as necessary, as the

total number (32 participants) is not big enough for delivering meaningful percentages. This is also the reason, why no mean values were calculated in this part of the analysis. To enhance the readability, the analysis is always split up into the group that used the online configurator and the group that used the leaflet.

Pre-Questionnaire (before the experiment)

1. **Do you plan on buying a car in the following years?**

Leaflet Online Configurator

	Male		Female		∑ = 16	Male		Female		∑ = 16
	30-45	46-60	30-45	46-60		30-45	46-60	30-45	46-60	
Yes	3	2	4	3	12	2	3	1	3	9
No	1	2	0	1	4	2	1	3	1	7

Table 20: Pre questionnaire – Question 1

In total, 21 of 32 participants plan on buying a car in the following years.

2. **Do you currently own a car?**

Leaflet Online Configurator

	Male		Female		∑ = 16	Male		Female		∑ = 16
	30-45	46-60	30-45	46-60		30-45	46-60	30-45	46-60	
Yes	3	4	3	4	14	3	4	4	3	14
No	1	0	1	0	2	1	0	0	1	2

Table 21: Pre questionnaire – Question 2

28 of 32 people currently own a car. The two people who don't own cars said, it's because they don't need one as they live in big cities and only use public transport.

3. **Have you purchased a car already?**

Leaflet Online Configurator

	Male		Female		∑ = 16	Male		Female		∑ = 16
	30-45	46-60	30-45	46-60		30-45	46-60	30-45	46-60	
Yes	4	4	3	4	15	3	3	4	4	14
No	0	0	1	0	1	1	1	0	0	2

Table 22: Pre questionnaire – Question 3

29 of 32 (more than 90%) of the participants have already purchased a car. The other three participants either got their car as a present from their parents or generally don't own one.

3a. If yes: What kind of car was it?

Leaflet Online Configurator

	Male		Female		∑ = 15	Male		Female		∑ = 14
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
New Car	0	0	0	0	15	0	0	1	1	2
Used Car	2	2	2	3	1	3	1	1	1	6
Both	2	2	1	1		0	2	2	2	6

Table 23: Pre questionnaire – Question 3a

93 % of participants (27 of 29) already purchased a used car. 48% of participants (14 of 29%) have purchased a new car.

3b. If yes: What attributes did you consider when buying the car (multiple answers possible)?

Leaflet Online configurator

	Male		Female		∑ = 15	Male		Female		∑ = 14
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Brand	2	3	1	4	10	1	3	3	2	9
Price	3	4	3	4	14	2	4	4	3	13
Mileage	2	4	2	4	12	2	4	2	2	10
Personal guidance by salespeople	0	0	1	1	2	0	2	0	3	5
Other:	0	0	0	0	0	0	0	0	0	0

Table 24: Pre questionnaire – Question 3b

"Price", "mileage" and "brand" were considered as the three most important attributes when it comes to choosing a car. Price is playing the highest role with 27 of 29 participants choosing this attribute. Mileage also is an important part (for buyers of used cars, so 24 of 27 participants). "Brand" was chosen by 19 of 29 participants. "Personal guidance" was considered as less important with 7 votes in total.

4. What brands do you consider when buying a car (multiple answers possible)?

Leaflet Online Configurator

	Male		Female		∑ = 16	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	

Ford	0	0	1	0	1	0	0	1	0	1
VW	3	2	4	2	11	3	4	3	2	12
Audi	0	0	1	1	2	1	1	2	1	5
Skoda	1	0	2	0	3	1	1	0	1	3
Volvo	1	0	2	0	3	1	1	0	1	2
Citroën	0	1	1	0	2	2	0	1	0	3
Hyundai	0	0	0	1	1	1	0	0	0	1

Table 25: Pre questionnaire – Question 4

This was an open question, so people had to write down the car brands that came into their minds. “Volkswagen” was mentioned by far most often (23 times). Also, “Audi”, “Skoda”, “Citroën” and “Volvo” were mentioned several times.

5. Did you already customize a product online (assemble a product yourself like you wish it would be like)?

Leaflet Online Configurator

	Male		**Female**		**∑ = 16**	**Male**		**Female**		**∑ = 16**
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Yes	3	3	2	1	9	3	2	4	1	10
No	1	1	2	3	7	2	2	0	2	6

Table 26: Pre questionnaire – Question 5

19 of 32 participants already customized a product online. More men than women customized a product online, as well as more younger people than older people.

5a. If yes: What kind of product was that?

Leaflet Online Configurator

	Male		**Female**		**∑ = 9**	**Male**		**Female**		**∑ = 10**
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Car	3	3	0	1	7	2	3	2	1	8
Muesli	1	0	0	0	1	1	0	0	1	2
Biker’s Helmet	0	0	1	0	1	0	0	0	0	0
Furniture	0	0	1	0	1	0	0	0	0	0

Table 27: Pre questionnaire – Question 5a

The kinds of customized products are various. Most participants actually customized cars online (15 of 19 participants), other participants customized muesli, a biker’s

helmet or furniture. Especially men are keen to customizing cars online (11 of 15 participants.

The following pictures show an exemplary walkthrough of the online configurator, with the eye tracking data of a female participant of the younger age group. The pictures are sometimes cropped where the gaze ends to not extend the thesis.

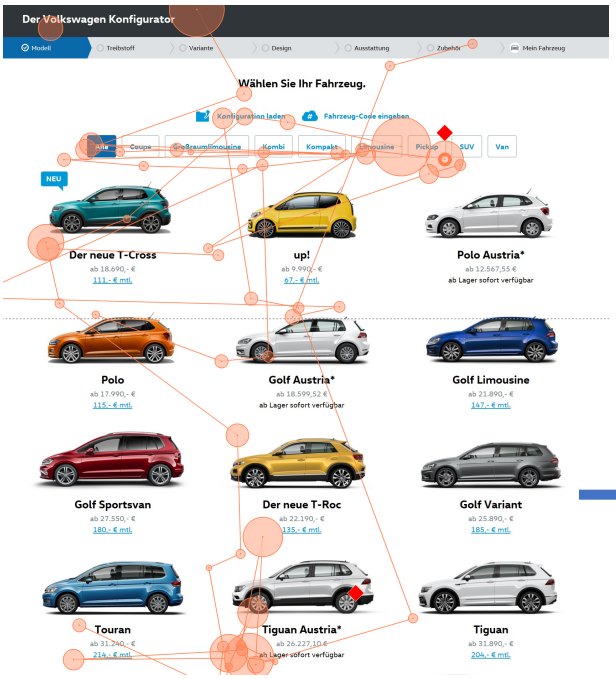


Figure 17: Choice of Model

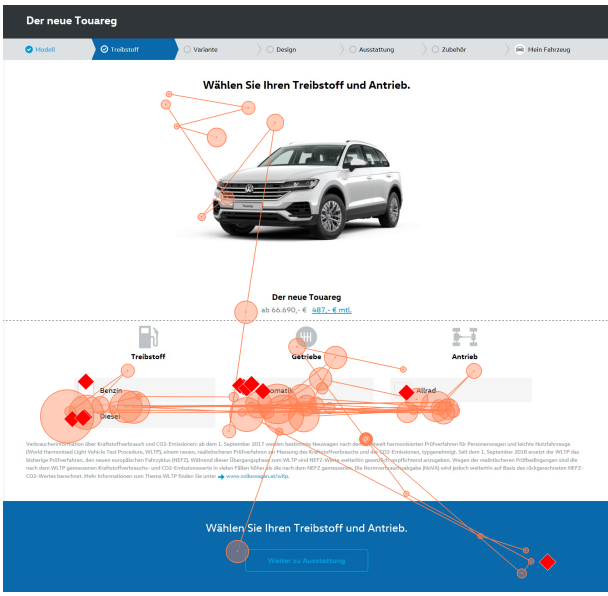


Figure 18: Choice of Fuel

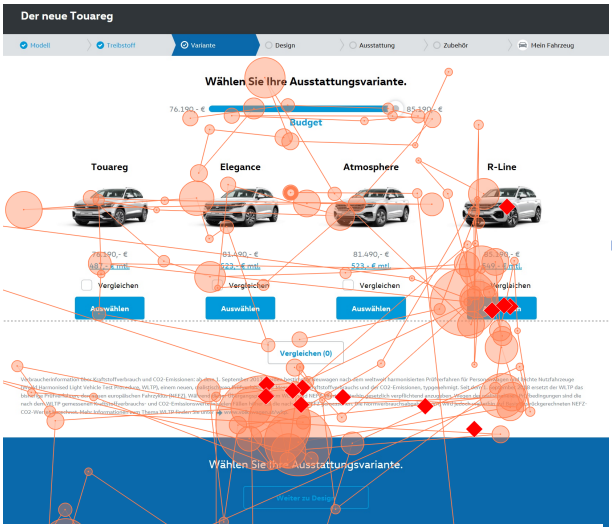


Figure 19: Choice of Variation

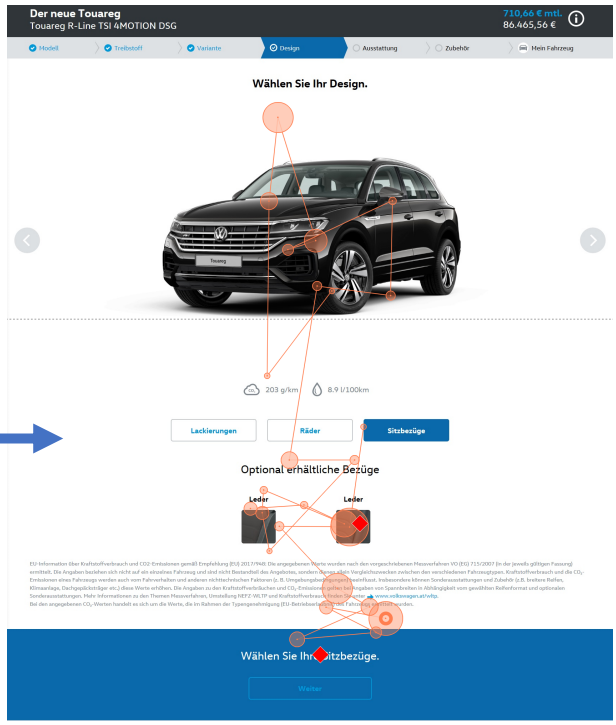


Figure 20: Choice of Design (Seats)

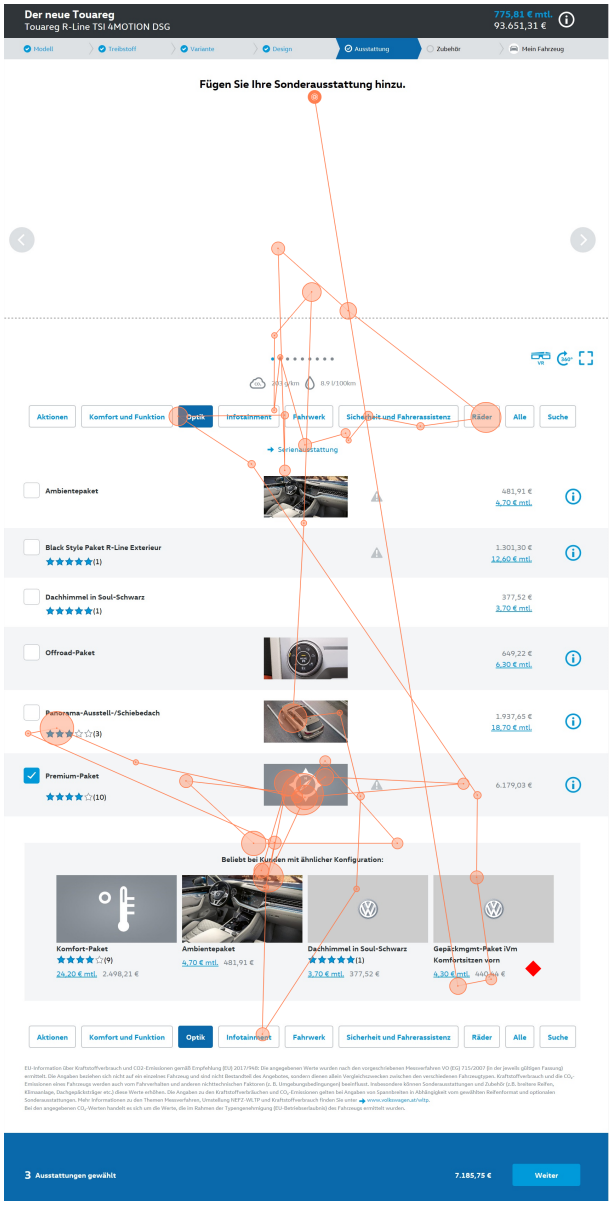


Figure 21: Choice of Equipment

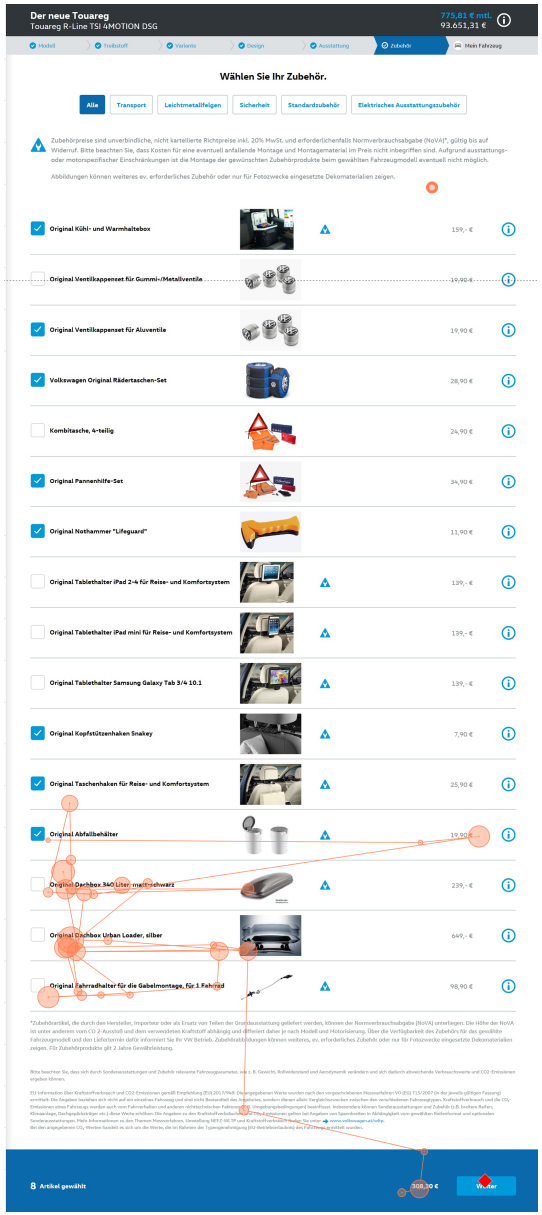


Figure 22: Choice of Accessories

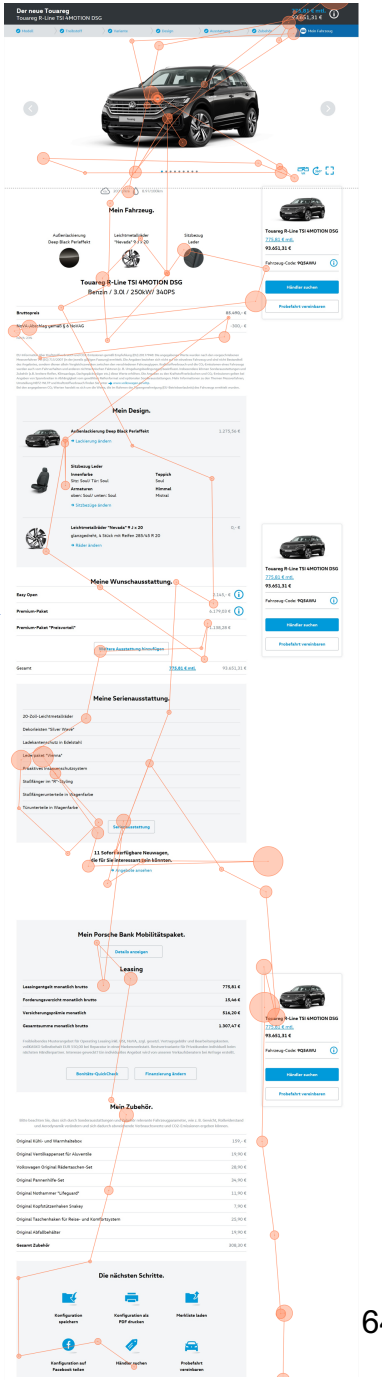


Figure 23: Total View of Customized Car

Post-questionnaire (after the study)

Some of the questions after the questionnaire were asked orally or they just had a blank space as an answering possibility. The answers of those questions will not be split up into a grid that separates the four groups (male/female/younger age group/older age group). If mentionable, the belonging group will be written behind the quotes/the open answers that were given.

The interpretative analysis of notable results can be seen in chapter 12.

1. **How did you get by when customizing your car?**

This question was asked verbally. This enabled to grasp the participants' impressions, feelings and how they perceived the experience in general. The quotes are written down in the following. Quotes which were similar or stated repeatedly are written in bold font.

Leaflet	Online Configurator
1. "I was missing information, such as the price or specific measurements." **2. "The content was not structured well."** 3. "Sometimes there was too much information, sometimes there were not enough choice options." **4. "I didn't find the information I was looking for."** **5. "It is very uncomfortable when I want to compare different car models."** 6. "A general overview for the car would be nice." 7. "For me it was very interesting and relaxing. I like taking time for getting information, so I enjoyed this." **8. "There are not enough choice options. And I didn't like the pictures, they were not good enough."** 9. "Sometimes the information is not presented well. I didn't understand it, or it was not clearly enough." **10. "The font was too small. Sometimes I couldn't read things properly, and I**	1. "I was missing functions." **2. "The operation was not intuitive."** **3. "The usability was low, I couldn't see everything and sometimes had to look for things."** 4. "There is no general overview." 5. "The mouse and the screen seem to be jumping around, maybe there are some loading problems?" **6. "I got confused about the menu navigation".** 7. "Some options were annoying. Overall, it was okay." **8. "I sometimes didn't have the feeling that I have the full control over the designed car. Decisions I made were just overruled."** 9. "The pop-up- windows were annoying me." 10. "For me, everything was fine. The menu navigation was good." **11. "Sometimes I couldn't make steps back. I didn't know what to do if I wanted to change something afterwards."** 12. "It's loading too slow."

also missed information, because it was not visible at the first glance."	

Table 28: Post questionnaire – collection of verbal impressions

Both methods were rated quite negatively by the participants. Only a few recalled it as a positive experience while most of the participants complained about missing functionalities, information or usability. Especially the online configurator has a high number of versatile complaints that seem to root in technical and informational reasons. People who used the leaflet often complained about missing information, such as prices or measurements. *(Authors note: often, the information the people were looking for was actually there – eye tracking data even shows that they glanced at it – but they apparently still didn't see it).*

2. How was the navigation of the configurator for you?

(The upper numbers in the box are from the younger age group, the lower numbers are from the older age group)

Leaflet

	m	w	m	w	m	w	m	w		Mean Values
Self-explaining	2 2	2 1	2 1	2 2	0 1	0 0	0 0	0 1	**Confusing**	**1,75**
Intuitive	2 1	1 1	1 2	2 3	1 1	0 0	0 0	1 0	**Complicated**	**1,81**
Logical	1 2	1 1	2 1	1 0	1 1	2 1	0 0	0 2	**Incomprehensible**	**2,25**
∑	**10**	**7**	**9**	**10**	**5**	**3**	**0**	**3**		

Online Configurator

	m	w	m	w	m	w	m	w		Mean Values
Self-explaining	1 1	0 1	1 0	2 0	1 2	1 2	1 2	0 1	**Confusing**	**2,75**
Intuitive	2 1	2 1	1 2	1 1	1 1	1 1	0 0	1 0	**Complicated**	**2,00**
Logical	0 1	1 1	1 2	1 0	1 1	2 1	2 0	0 2	**Incomprehensible**	**2,63**
∑	**6**	**6**	**7**	**5**	**7**	**8**	**5**	**3**		

Table 29: Post questionnaire – Question 2

The online configurator is rated worse by the participants, compared to the leaflets. People often perceive it as more confusing, complicated and especially incomprehensible. This is particularly the case for the older age group.

3. Would you have preferred another order of the configurator?

Leaflet Online Configurator

	Male		Female		∑ = 16	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Yes	0	2	1	0	3	0	0	1	1	2
No	4	2	3	4	13	4	4	3	3	14

Table 30: Post questionnaire – Question 3

If yes, which?

- "The colors should come first"
- "The colors should come in the end"
- **"I want to choose the fuel, *then* the model"**
- "First the packages, then the rest of the equipment"

Most people were satisfied with the given structure. Five of 32 people would have made changes.

4. Does the configurator have a useful structure for you?

Leaflet Online Configurator

	Male		Female		∑ = 16	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Yes	3	2	2	4	11	4	3	3	4	14
No	1	2	2	0	5	0	1	1	0	2

Table 31: Post questionnaire – Question 4

The structure of the online configurator is perceived better than the structure of the leaflets. Still, a majority of both groups says, the structure is useful to them.

5. Did you experience difficulties when customizing your car?

Leaflet Online Configurator

	Male		Female		∑ = 16	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Yes	0	2	1	0	3	2	2	4	3	11
No	4	2	3	4	13	2	2	0	1	5

Table 32: Post questionnaire – Question 5

If yes: Explain:

Leaflet	Online Configurator
1. "Information is printed too small" **2.** "Measurement information is missing" **3.** "The sequence of the content is confusing" **4.** **"There is too much, irrelevant information, while useful information is hard to find"** **5.** **"The pictures are annoying me."**	1. "The "comparing"-feature didn't work" **2.** **"When I chose things, other decisions were changed without me wanting that"** **3.** **"I couldn't undo things"** **4.** **"Orientation was bad"** **5.** **"Site is jumping"** 6. "Information is unclear" 7. "Sequence is not logical"

Table 33: Post questionnaire – Open answers to question 5

While the problems that occur with the leaflets are relatively similar (missing or unnecessary information, pictures are annoying) and can be traced back to the **content**, the reported problems about the online configurator are more versatile: technical problems occur, as well as problems with the structure and presentation with the content. More people using the online configurator reported problems.

6. **Did you have the feeling of having full control over your configuration while customizing the car?** (E.g.: one selection does not interfere or hinder another selection or choice concerning different categories)

Leaflet Online Configurator

	Male		Female		∑ = 16	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Yes	2	2	1	2	7	0	0	0	1	1
No	2	2	3	2	9	4	4	4	3	15

Table 34: Post questionnaire – Question 6

While the separation between "Yes" and "No" was almost equal at the leaflet group, only one of 16 participants told to have a feeling of full control during the customization process. This means that 15 of 16 people feel like they lack control over a process they should have control over. This can lead to dissatisfaction and frustration.

7. Did you miss something, like personal guidance?

Leaflet Online Configurator

	Male		Female		∑ = 16	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Yes	2	4	2	2	10	3	2	3	2	10
No	2	0	2	2	6	1	2	1	2	6

Table 35: Post questionnaire – Question 7

Yes, I missed...

Leaflet	Online Configurator
1. "The price" **2. "The motorization"** 3. "General Information" 4. "Technical information" **5. "Talking to a salesperson"**	**1. "A general overview"** **2. "Explanations for packages or accessories"** **3. "Talking to a salesperson"**

Table 36: Post questionnaire – Open answers to question 7

Both group's majority states they missed something during the customization process. The missing contact to a salesperson was mentioned several times by both group's participants.

8. How do you rate the customization possibilities (color of car, motorization…)?

Leaflet

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
Too many possibilities – I felt overwhelmed	0	1	0	0	1
Right amount of possibilities	2	3	2	3	10
Too small amount – I'd like to have had more possibilities	2	0	2	1	5

Online Configurator

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
Too many possibilities – I felt overwhelmed	1	1	1	0	3
Right amount of possibilities	1	2	1	2	6
Too small amount – I'd like to have had more possibilities	2	1	2	2	7

Table 37: Post questionnaire – Question 8

Both groups show a general satisfaction with the number of possibilities. However, the tendency towards a lack of amount is higher than the tendency to a too high number of possibilities

9. Rate the whole visual structure of the configurator

(The upper numbers in the box are from the younger age group, the lower numbers are from the older age group)

Leaflet

	m	w	m	w	m	w	m	w		Mean Values
Clear	2 1	1 2	2 1	2 1	1 1	1 1	0 1	0 0	**Unclear**	**1,89**
Logical structure	1 1	0 1	2 2	2 3	2 1	2 0	0 0	0 0	**Illogical structure**	**2,01**
Appealing	1 2	1 1	2 0	1 1	0 1	2 3	1 0	0 0	**Not appealing**	**2,12**
Intuitive	0 1	1 1	1 0	2 1	2 1	1 2	1 2	0 0	**In need of explanation**	**2,31**
∑	8	8	10	13	9	12	4	0		

Online Configurator

	m	w	m	w	m	w	m	w		Mean Values
Clear	1 1	0 0	0 0	2 1	1 2	2 1	1 2	1 1	**Unclear**	**2,88**
Logical structure	1 1	1 1	0 2	1 1	2 1	1 2	1 0	1 0	**Illogical structure**	**2,38**
Appealing	1 0	1 0	1 1	1 1	1 1	2 1	1 2	0 2	**Not appealing**	**2,81**
Intuitive	1 0	1 1	2 1	1 0	1 2	2 1	0 1	1 2	**In need of explanation**	**2,81**
∑	6	5	7	8	11	11	7	8		

Table 38: Post questionnaire – Question 9

As visible here, the online configurator gets worse ratings than the leaflet. Participants often state, that the structure is not clear and needs to be explained. this opinion is given by both age groups and both genders. The mean values show an especially low satisfaction with the clearness, appeal and the intuitiveness.

10. The buttons and symbols were…

Leaflet

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	

Online Configurator

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	

Too big	0	0	0	0	0	0	0	0	0	
Too small	2	3	2	3	8	0	2	0	0	2
Alright	2	1	2	1	8	4	2	4	4	14

Table 39: Post questionnaire – Question 10

10a. The buttons and symbols were…

Leaflet Online Configurator

	Male		**Female**		**∑ = 16**	**Male**		**Female**		**∑ = 16**
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Comprehensible	4	3	4	2	13	3	4	2	4	13
Incomprehensible	0	1	0	2	3	1	0	2	0	3

Table 40: Post questionnaire – Question 10a

Most people show satisfaction regarding the optical design of the buttons and symbols. Apart from the leaflet, where people often complain that the buttons and symbols were too small for them. Especially the older age group expressed dissatisfaction here.

11. The number of pictures and illustrations was…

Leaflet Online Configurator

	Male		**Female**		**∑ = 16**	**Male**		**Female**		**∑ = 16**
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Bothering to me	0	0	0	1	1	0	0	0	0	0
Pleasant to me	3	2	2	2	9	3	3	2	3	11
Neutral	1	2	2	1	6	1	1	2	1	5

Table 41: Post questionnaire – Question 11

People showed a slightly higher preference of pleasantness at the online configurator. This means, that the presented pictures and illustrations were depicted and perceived in a positive way.

12. What feelings did you perceive while configurating (multiple answers possible)?

Leaflet

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
Fun	4	2	2	3	12
Boredom	0	0	1	0	1
Incomprehension	0	2	1	0	3
Excitement	3	2	1	1	**7**
Frustration	0	1	2	0	3

Online Configurator

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
Fun	3	1	4	2	**10**
Boredom	0	0	0	0	0
Incomprehension	2	3	0	1	**7**
Excitement	2	1	2	1	6
Frustration	2	2	2	1	**7**

Table 42: Post questionnaire – Question 12

While participants of both groups often expressed “fun” when customizing their car, it is mentionable that the second most often expressed feelings were “incomprehension” and “frustration”. People also often verbally expressed, that the design and the structure of the online configurator was killing their joy and even sometimes making them want to abort the study.

13. Did you generally feel good while configurating?

Leaflet

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
I did feel good in general	3	4	3	4	14
I did not feel good in general	1	0	1	0	2

Online Configurator

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
I did feel good in general	3	2	3	3	11
I did not feel good in general	1	2	1	1	5

Table 43: Post questionnaire – Question 13

A slightly higher number of people feeling gut is visible at the leaflet group. Still, the majority of both groups claimed to have felt good in general.

14. How do you rate the configurator concerning your result (the completely customized car, multiple answers possible)?

Leaflet

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
Useful	2	1	1	2	6
Useless	1	0	0	0	1
Good as an addition when buying a car	2	2	2	3	9
Good for comparing cars	1	0	0	1	2

Online Configurator

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
Useful	1	0	1	1	3
Useless	0	0	0	0	0
Good as an addition when buying a car	4	3	4	2	13
Good for comparing cars	5	1	1	1	5

Table 44: Post questionnaire – Question 14

Although the leaflet is not responsive, and information is missing in there, still twice as much people (6) state it is “useful” compared to the number of people who assess the online configurator as useful (3). Both groups said, their method would be “good as an addition when buying a car”, also the online configurator was rated as “good for comparing cars” by five of 16 people.

15. How do you rate the general usability of the configurator? Grade: 1 is the best, 6 is the worst.

(The upper numbers in the box are from the younger age group, the lower numbers are from the older age group)

Leaflet

1		2		3		4		5		6	
m	**w**	**m**	**w**	**m**	**w**	**m**	**w**	**m**	**w**	**m**	**w**
1	0	2	1	1	1	0	2	0	0	0	0
0	1	2	1	2	1	1	0	0	0	0	0

Online Configurator

1		2		3		4		5		6	
m	**w**	**m**	**w**	**m**	**w**	**m**	**w**	**m**	**w**	**m**	**w**
0	1	0	2	3	1	1	0	0	0	0	0
0	0	1	1	1	2	1	0	1	1	0	0

Table 45: Post questionnaire – Question 15

16. **How do you rate the configurator itself in general? Grade: 1 is the best, 6 is the worst.**

(The upper numbers in the box are from the younger age group, the lower numbers are from the older age group)

Leaflet Online Configurator

1		2		3		4		5		6		1		2		3		4		5		6	
m	w	m	w	m	w	m	w	m	w	m	w	m	w	m	w	m	w	m	w	m	w	m	w
0 1	0 1	1 1	1 1	1 0	1 0	1 0	2 2	0 0	0 0	0 0	0 0	0 0	0 1	0 1	1 1	3 1	2 1	1 2	1 0	0 0	0 1	0 0	0 0

Table 46: Post questionnaire – Question 16

Both questions show a wider range of grades when looking at the online configurator. While the leaflet gets a bigger amount of good or fair grades, the grades of the online configurator spread almost on the whole scale and are therefore worse. Especially older people perceive the configurator not well.

17. **Would you show the customized car to your friends and acquaintances?**

Leaflet Online Configurator

	Male		Female		∑ = 16	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Yes	3	2	4	4	13	2	3	4	2	11
No	1	2	0	0	3	2	1	0	2	5

Table 47: Post questionnaire – Question 17

Most people would show their customized car to their friends, independently from their age and gender.

18. **Would you recommend the configurator concerning usability/practicability?**

Leaflet Online Configurator

	Male		Female		∑ = 16	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Yes	2	4	3	1	10	2	0	2	2	6
No	2	0	1	3	6	2	4	2	2	10

Table 48: Post questionnaire – Question 18

More people would recommend the leaflet than the online configurator. Especially older men show a strong tendency towards the leaflet.

19. **What attributes did you take most notice of? Rank them by using every number once: 1 is most important, 4 or more is less important.**

- Price
- Accessory
- Interior
- Exterior
- Other

For ensuring clarity and not showing too many details, the average rang per group is shown now.

Male, 30-45: Price → Accessory → Exterior → Interior
Male, 46-60: Price → Exterior → Accessory → Interior
Female, 30-45: Price → Interior → Exterior → Accessory
Female, 46-60: Price → Interior → Exterior → Accessory
All groups state that the price is most important to them, followed by exterior and interior.

20. **How much do the following statements apply to you? Tick the number (1: Applies very much, 6: doesn't apply at all).**

(The upper numbers in the box are from the younger age group, the lower numbers are from the older age group)

Leaflet

	1		2		3		4		5		6	
	m	w	m	w	m	w	m	w	m	w	m	w
My car is a status symbol for me.	1 1	0 0	2 0	0 1	0 2	1 0	1 0	2 1	1 1	1 1	0 0	0 1
My car is only an article of daily use for me.	2 0	1 1	0 0	1 2	1 1	2 0	1 2	0 0	0 0	0 1	0 1	0 0
I just want to get from A to B with my car.	0 0	1 1	0 0	0 0	1 2	0 1	2 0	1 0	1 1	0 0	0 0	1 1
Driving experience is very important to me.	2 1	2 1	2 2	1 1	0 0	1 2	0 1	0 0	0 0	0 0	0 0	0 0

Online Configurator

	1		2		3		4		5		6	
	m	w	m	w	m	w	m	w	m	w	m	w
My car is a status symbol for me.	0 1	0 1	0 0	1 0	2 1	0 0	1 1	0 1	1 0	2 1	0 1	0 1
My car is only an article of daily use for me.	0 0	1 1	0 1	0 1	1 1	1 0	2 0	0 0	1 1	1 0	0 1	0 1

I just want to get from A to B with my car.	11	12	01	00	00	10	12	10	10	01	10	11
Driving experience is very important to me.	12	21	11	12	11	11	00	00	00	00	00	00

Table 49: Post questionnaire – Question 20

Both groups show a similar result: most people don't see their cars as a "status symbol". They also don't see it just as an "article of daily use", yet. The "driving experience" is very important to most of the participants.

21. How important are versatile choices (car color, wheel rims, amount of horsepower…) to you when buying a car?

Leaflet Online Configurator

	Male		**Female**		**∑ = 16**	**Male**		**Female**		**∑ = 16**
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Very important	2	2	1	1	6	1	2	1	0	4
Important	2	0	1	0	4	0	2	0	2	4
Rather important	1	1	0	2	4	2	0	2	2	6
I don't care	0	1	0	1	2	1	0	1	0	2

Table 50: Post questionnaire – Question 21

Both groups show similar results, most people express a medium level of importance for choices regarding a car.

22. Did you already know about the possibility of customizing a car online?

Leaflet Online Configurator

	Male		**Female**		**∑ = 16**	**Male**		**Female**		**∑ = 16**
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Yes	4	4	4	2	14	4	2	3	3	12
No	0	0	0	2	2	0	2	1	1	4

Table 51: Post questionnaire – Question 22

The majority of people knew about the possibility of customizing a car online. Females and males of the older age groups are the biggest part of the minority who didn't know the online configurator.

23. Would you ever consider customizing your car online?

Leaflet

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
Yes	4	3	4	3	14
No	0	1	0	1	2

Online Configurator

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
Yes	4	3	3	3	13
No	0	1	1	1	3

Table 52: Post questionnaire – Question 23

No, because:

- "I'm only buying used cars"
- "I want to make a test drive"
- "I want guidance"

Most people consider customizing their car online. Older people, however, would consider it not that often.

23a. If yes, what would be the reasons for it (multiple answers possible)?

Leaflet

	Male		Female		∑ = 14
	30-45	**46-60**	**30-45**	**46-60**	
Personal and individual car only I and nobody else has	4	3	4	3	4
Full control over the form and design of my car	0	1	0	1	11
Try out something new and playing around	1	1	1	0	**3**
Immediate display of the car (seats, color, etc.)	4	2	3	3	12
Immediate price transparency	2	2	3	1	8
Avoiding conctact with humans	1	0	1	0	2
Convenience	2	2	3	2	9

Online Configurator

	Male		Female		∑ = 13
	30-45	**46-60**	**30-45**	**46-60**	
Personal and individual car only I and nobody else has	4	3	4	3	2
Full control over the form and design of my car	0	1	0	1	8
Try out something new and playing around	2	´1	3	1	**7**
Immediate display of the car (seats, color, etc.)	3	2	4	2	11

Immediate price transparency	2	3	3	2	10
Avoiding conctact with humans	0	0	1	0	1
Convenience	2	3	2	0	7

Table 53: Post questionnaire – Question 23a

These two grids give interesting insights. While both of the groups express practical reasons for customizing a car online, such as "immediate display of the car" (12/11 votes) or "immediate price transparency" (9/10 votes), people who actually used the online configurator before showed a higher tendency towards playfulness as 7 of 13 people of the configurator group voted for "try out something new and playing around", while only 3 out of 14 people of the leaflet group voted for this answer.

24. Think back to the purchase of your last car. Did you buy the car from a private seller of from a salesperson?

Leaflet Online Configurator

	Male		**Female**		**∑ = 15**	**Male**		**Female**		**∑ = 14**
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Private Seller	1	2	0	1	4	1	2	0	1	4
Salesperson	3	3	4	1	11	2	2	3	3	10

Table 54: Post questionnaire – Question 24

Both grids show a similar separation of the groups (gender and age) and in general.

24a. If you bought it from a salesperson: Were you satisfied with the advising situation?

Leaflet Online Configurator

	Male		**Female**		**∑ = 11**	**Male**		**Female**		**∑ = 10**
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Yes	3	3	3	1	10	2	2	3	3	10
No	0	0	1	0	1	0	0	0	0	0

Table 55: Post questionnaire – Question 24a

Yes, because:

- **“The salesperson was nice”**

- **“The salesperson was competent”**
- **“The salesperson was trustworthy”**
- **“The salesperson made lots of effort for me”**
- “I could do a test drive”
- **“I got some interesting information and explanations.”**

No, because:

- **“The salesperson was not obliging towards me”**
- “I felt like the salesperson just wanted to sell the most expensive model to me”

Both grids show a similar separation of the groups (gender and age) and in general. An interesting finding about this question is, that people did not seem to be happy with their experience because of the price or the test drive (at least just one of them), but because of the good experiences they made with salespeople. Either they were competent, trustworthy or nice – which doesn’t even necessarily affect the buying process but just is an *emotional* factor – yet it seems to be so important and mesmerizing for most of the people that this was the first memory that came to their minds. The same can be said for negative experience – all of them also are strongly connected to the (negative) contact with salespeople.

25. Did you have the feeling that you could trust the salesperson with his assessment?

Leaflet Online Configurator

	Male		Female		∑ = 11	Male		Female		∑ = 10
	30-45	**46-60**	**30-45**	**46-60**		**30-45**	**46-60**	**30-45**	**46-60**	
Yes	3	3	3	0	9	2	1	3	3	9
No	0	0	1	1	2	0	1	0	0	1

Table 56: Post questionnaire – Question 25

Both grids show a similar separation of the groups (gender and age) and in general. Almost 100% of the participants of both groups express that they trusted the salesperson.

26. How would you rate your personal handling with computers/internet/online shops?

(The upper numbers in the box are from the younger age group, the lower numbers are from the older age group)

Leaflet

	m	w	m	w	m	w	m	w	
Secure	2 1	1 1	2 1	2 2	0 0	1 1	0 0	0 0	**Insecure**
Competent	2 1	1 0	1 2	2 3	1 1	1 1	0 0	0 0	**Incompetent**
Experienced	1 2	1 1	2 0	1 2	0 1	2 2	1 0	0 0	**Inexperienced**
∑	9	4	6	12	3	8	1	0	

Online Configurator

	m	w	m	w	m	w	m	w	
Secure	2 1	1 2	2 1	2 1	0 1	1 1	0 1	0 0	**Insecure**
Competent	1 1	2 1	2 2	2 3	1 1	0 0	0 0	0 0	**Incompetent**
Experienced	1 2	1 2	2 2	1 1	0 0	2 0	1 0	0 1	**Inexperienced**
∑	8	9	11	10	3	6	2	1	

Table 57: Post questionnaire – Question 26

Both grids show a similar separation of the groups (gender and age) and in general. Participants have a generally high self-efficacy concerning their contact with computers, internet and e-commerce. Yet, older people, especially older women assess themselves as not that experienced, competent and secure as the younger age group.

27. With what kind of media do you use the internet (multiple answers possible)?

Leaflet

	Male		**Female**		**∑ = 16**
	30-45	**46-60**	**30-45**	**46-60**	
Desktop PC/Laptop	4	3	4	4	15

Online Configurator

	Male		**Female**		**∑ = 16**
	30-45	**46-60**	**30-45**	**46-60**	
Desktop PC/Laptop	4	3	3	4	14

Tablet	2	2	1	2	7	1	3	2	2	8
Phone	4	4	4	4	16	4	4	4	4	16

Table 58: Post questionnaire – Question 27

Both grids show a similar separation of the groups (gender and age) and in general. Most people use the internet on their phone and on a desktop pc or a laptop. Older people show a slightly higher tendency to use tablets.

28. Do you enjoy using the internet or do you use it because you have to?

Leaflet

	Male		**Female**		**∑ = 16**
	30-45	**46-60**	**30-45**	**46-60**	
I extremely enjoy using it	2	1	2	0	5
I enjoy using it	2	1	1	4	8
I use it for convenience	0	2	1	0	3
I use it because I have to	0	0	0	0	0

Online configurator

	Male		**Female**		**∑ = 16**
	30-45	**46-60**	**30-45**	**46-60**	
I extremely enjoy using it	3	2	3	1	9
I enjoy using it	1	1	1	1	4
I use it for convenience	0	1	0	2	3
I use it because I have to	0	0	0	0	0

Table 59: Post questionnaire – Question 28

The grid of the online configurator group shows a higher number of people who say they “(extremely) enjoy using the internet”. Both groups have nobody who says they use the internet because they “have to”. Still, the number of answers in the leaflet group has a wider range than the number of answers in the online configurator group. This is a similarly mentionable finding as in question 23a.

29. Did you already purchase some of the following products/services online?

Leaflet

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
TV	2	1	2	0	5
Digital camera	2	1	3	2	8
Smartphone	3	2	2	1	8
Furniture	2	2	2	3	9
Vacation	2	2	4	2	10

Online Configurator

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
TV	2	1	1	1	5
Digital camera	2	0	1	2	5
Smartphone	2	3	2	2	9
Furniture	2	2	3	3	10
Vacation	3	2	3	3	11

Table 60: Post questionnaire – Question 29

Both grids show a similar separation of the groups (gender and age) and in general. 21 of 32 people already booked a vacation online, which makes it the mostly purchased high involvement service in this group. Also, furniture and smartphones were already purchased online by more than 50% of the participants.

30. Do you shop in online stores on a regular basis? If yes, in which ones? (On a regular basis means at least once per month)

Leaflet

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
Clothes (e.g. H&M)	1	0	1	0	2
Generic articles (e.g. Amazon)	3	3	2	3	11
Other	0	0	0	0	0
Don't shop online (on a regular basis)	1	2	0	2	5

Online configurator

	Male		Female		∑ = 16
	30-45	**46-60**	**30-45**	**46-60**	
Clothes (e.g. H&M)	2	1	1	0	4
Generic articles (e.g. Amazon)	4	2	3	1	10
Other	0	0	0	0	0
Don't shop online (on a regular basis)	1	1	1	2	5

Table 61: Post questionnaire – Question 30

Both grids show a similar separation of the groups (gender and age) and in general. Most people buy generic articles from e-commerce platforms such as *amazon.com*. 10 of 32, which is almost one third, claim they don't shop online on a regular basis generally.

31. **What criteria is most important to you about online shops? Rank them by using every number once: 1 is most important, 7 or more is less important.**

- Usability
- Appealing design
- Quick loading times
- Possibility of personalizing/customizing the product
- Good product pictures and descriptions
- Interactivity of content
- Help (bots, etc.)
- Other

For ensuring clarity and not showing too many details, the average rang per group is shown now.

- **Male, 30-45:** Quick loading times → Usability → Appealing design → Good product pictures and descriptions → Interactivity of content → Possibility of personalizing/customizing the product → Help (bots, etc.)
- **Male, 46-60:** Usability → Appealing design → Good product pictures and descriptions → quick loading times → Interactivity of content → Possibility of personalizing/customizing the product → Help (bots, etc.)
- **Female, 30-45:** Appealing design → Usability → Quick loading times → Good product pictures and descriptions → Possibility of personalizing/customizing the product → Interactivity of content → Help (bots, etc.)
- **Female, 46-60:** Usability → Good product pictures and descriptions → Appealing design → Help (bots, etc.) → Quick loading times → Interactivity of content → Possibility of personalizing/customizing the product

A separation of gender and age group can be seen at these rankings. While older people value orientation characteristics, such as "usability" and "good product pictures and descriptions", younger people value "quick loading times" and "appealing design". "Good product pictures and descriptions" and "usability"

however are still important for all four groups. Females of the older age group also wish for “help (bots, etc.”), which is considered less important for the other three groups. “possibility of personalizing/customizing the product” is not considered as important for any of the four groups and therefore always come up at one of the last three ranking places.

11.1.2. Quantitative Online Questionnaire

The given percentage values always refer to the **percental division of the two age groups in the respective gender** (101 women and 108 men). This is why because there are more women than men, and the percental division allows a more detailed insight, e.g. when comparing men and women, which would not be possible without this division. This means, for example, that the sum of answers of male participants always sum up to 100%. The percentages were always rounded to one decimal place.

The **sums and mean values** (if given as an additional value) should provide an overview of the whole numbers in comparison to the overall numbers and sums. This is why there are no percentages, but only whole numbers. When giving these numbers, there also has been no division between the two genders, only between the age groups, depending on what was more useful. If there are mean values, the number was always rounded to two decimal places.

If useful, graphical depictions are given. Mostly, if the numbers don’t range much or preferences are visible at the first glance, graphical depictions are left out.

The following grid shows the sample division (combined answers from question 1 and question 2, asking about age and province):

Province	**Male**		**Female**	
Age group	**30-45**	**46-60**	**30-45**	**46-60**
Vienna	13 (12,0%)	12 (11,1%)	7 (6,9%)	15 (14,9%)
Upper Austria	8 (7,4%)	10 (9,3%)	8 (7,9%)	8 (7,9%)
Lower Austria	11 (10,2%)	10 (9,3%)	11 (10,9%)	11 (10,9%)
Vorarlberg	2 (1,9%)	1 (0,9%)	1 (1,0%)	3 (3,0%)
Burgenland	1 (0,9%)	1 (0,9%)	4 (4,0%)	1 (1,0%)
Carinthia	3 (2,8%)	4 (3,7%)	5 (5,0%)	4 (4,0%

Tyrol	1 (0,9%)	7 (6,5%)	4 (4,0%)	3 (3,0%)
Styria	8 (7,4%)	7 (6,5%)	9 (8,9%)	4 (4,0%
Salzburg	4 (3,7%)	5 (4,6%)	1 (1,0%)	2 (2,0%)
∑	**51**	**57**	**50**	**51**

Table 62: Sample division of online questionnaire

3. Do you inform yourself digitally or analogue (e.g. with leaflets) when it comes to bigger purchases?

Art der Informationsbeschaffung	**Male**		**Female**		**∑ = 209**
	30-45	**46-60**	**30-45**	**46-60**	
Digitally	29 (26,9%)	19 (17,6%)	13 (12,9%)	14 (13,9%)	75
Analogue	1 (0,9%)	1 (0,9%)	0 (0,0%)	3 (3,0%)	5
Both	21 (19,4%)	37 (34,3%)	37 (36,6%)	34 (33,7%)	129

Table 63: Online questionnaire – Question 3

The majority of people (129 of 209) gets their information from both sources, offline and online. 75 people claim to get their information from online sources only. Just five out of 209 people receive information offline exclusively.

4. Did you already customize a car with a car online configurator? (Multiple answers possible)

	Male		**Female**		**∑ = 209**
	30-45	**46-60**	**30-45**	**46-60**	
Yes, and then I bought it like that at a car dealership.	16 (14,8%)	8 (7,9%)	6 (5,9%)	12 (11,1%)	42
Yes, to inform/prepare for the car purchase.	**23 (21,3%)**	**24 (23,8%)**	**16 (15,8%)**	**33 (30,6%)**	**96**
Yes, because it's a fun thing to do/killing time.	20 (18,5%)	15 (14,9%)	6 (5,9%)	17 (15,7%)	**58**
Yes, I customized it together with the salesperson.	1 (0,9%)	2 (2,0%)	2 (2,0%)	5 (4,6%)	10
No, but the salesperson customized it for me based on my wishes.	3 (2,8%)	4 (4,0%)	4 (4,0%)	3 (2,8%)	14
No, I don't have any experiences with online configurators.	8 (7,4%)	15 (14,9%)	21 (20,8%)	11 (10,2%)	**55**

Table 64: Online questionnaire – Question 4

The following diagram shows the division of answers in total:

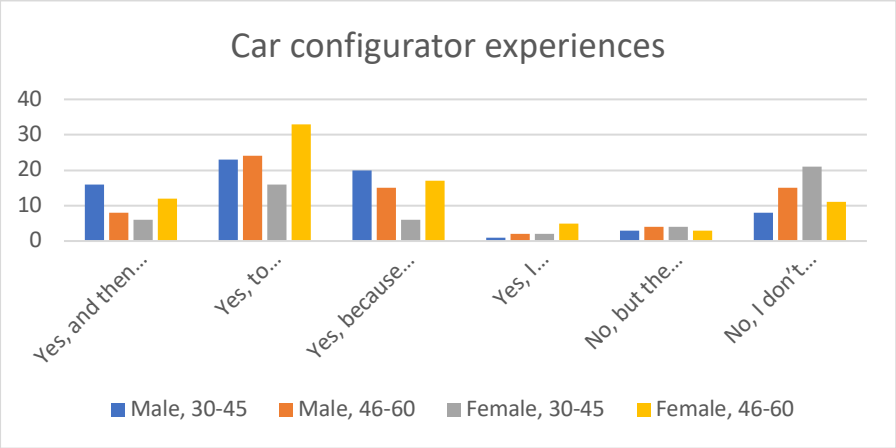


Figure 24: Graphic overview of car configurator experiences. Own depiction.

Almost 50% of the participants (96 of 209) say, they already customized a car online for information and as a preparation for the next car purchase, independently of the gender. 58 people claimed to do it for fun, especially men. Yet, almost 25% (55 people) do not have any experience with online configurators for cars at all. Especially younger males show a higher interest in customizing cars.

5. Think of your car/the next car you'd like to buy. How do you rate yourself at following statements?

(The first number in the respective box always refers to the younger age group. The lower one refers to the older one.)

	m	w	m	w	m	w	m	w	m	w	m	w	
My car is an article of daily use for me	11 (10,2%) **19 (17,6%)**	13 (12,9%) **20 (19,8%)**	**13 (12,0%)** 16 (14,8%)	**18 (17,8%)** 14 (13,9%)	12 (11,1%) 10 (9,3%)	9 (8,9%) 7 (6,9%)	10 (9,3%) 3 (2,8%)	7 (6,9%) 7 (6,9%)	5 (4,6%) 9 (8,3%)	2 (2,0%) 3 (3,0%)	0 (0%) 0 (0%)	1 (1,0%) 0 (0%)	**My car is a status symbol for me**
The driving feeling is very important to me	10 (9,3%) 9 (8,3%)	9 (8,9%) 10 (9,9%)	**12 (11,1%)** 13 (12,0%)	10 (9,9%) 5 (5,0%)	11 (10,2%) **14 (13,0%)**	**13 (12,9%)** 10 (9,9%)	7 (6,5%) 4 (3,7%)	9 (8,9%) **11 (10,9%)**	7 (6,5%) 4 (3,7%)	7 (6,9%) 5 (5,0%)	4 (3,7%) 7 (6,5%)	2 (2,0%) 10 (9,9%)	**I want to get from A to B with my car**
I'm open to sharing my car with other drivers (Car Sharing)	4 (3,7%) 3 (2,8%)	3 (3,0%) 6 (5,9%)	1 (0,9%) 5 (4,6%)	2 (2,0%) 2 (2,0%)	6 (5,6%) 4 (3,7%)	5 (5,0%) 3 (3,0%)	9 (8,3%) 9 (8,3%)	12 (11,9%) 7 (6,9%)	12 (11,1%) 11 (10,2%)	9 (8,9%) 10 (9,9%)	**19 (17,6%)** **25 (23,1%)**	**19 (18,8%)** **23 (22,8%)**	**It is important to me that the car is my personal property.**

Table 65: Online questionnaire – Question 5

Most people state that their car is just a basic consumer item for them, not a status symbol. Sharing their opinion about the feeling of the drive or just wanting to go places with their car, the average of the opinions is more separated and can be found in the middle.
Male participants, however, state that driving feeling is important to them, while more women state that they just want to get from A to B with their car. Also, more male participants state that their car is a status symbol for them.
Yet, there is a strong forming of opinions for the last statements: 86 of 209 people state that it is important to them that their car is only used by them, while only 16 of 209 people state that they would be eager to share their car with other drivers. It can be seen in following graphic:

6. Did you already purchase a car at a car dealership?

(The first number in the respective box always refers to the younger age group. The lower one refers to the older one.)

	Male	**Female**	∑
Yes	42 (38,9%)	42 (41,6%)	**84 (40,2%)**
	55 (50,9%)	49 (48,5%)	**104 (49,8%)**
No	9 (8,3%)	8 (7,9%)	17 (8,1%)
	2 (1,9%)	2 (2,0%)	4 (1,9%)

Table 66: Online questionnaire – Question 6

188 people bought a car at a car dealer. Those 188 people answered the next question:

7. How satisfied were you with the following points at your last purchase at a car dealership?

(The first number in the respective box always refers to the younger age group. The lower one refers to the older one.)

	Very dissatisfied (1)		**Dissatisfied (2)**		**Satisfied (3)**		**Very satisfied (4)**		**Ø**	
	m	**w**	**m**	**w**	**m**	**w**	**m**	**w**	**m**	**w**
Price	3 (3,1%)	0 (0,0%)	0 (0,0%)	2 (2,2%)	25 (25,8%)	34 (37,4%)	14 (14,4%)	6 (6,6%)	**3,2**	**3,1**
	1 (1,0%)	1 (1,1%)	5 (5,2%)	1 (1,1%)	37 (38,1%)	32 (35,2%)	12 (12,4%)	15 (16,5%)	**3,1**	**3,2**

Number of models and features	2 (2,1%) 0 (0,0%)	1 (1,1%) 0 (0,0%)	1 (1,0%) 5 (5,2%)	1 (1,1%) 2 (2,2%)	24 (24,7%) 34 (35,1%)	41 (34,1%) 34 (37,4%)	15 (15,5%) 16 (16,5%)	9 (9,9%) 13 (14,3%)	**3,2** **3,1**	**3,1** **3,2**
Competence of salesperson	2 (2,1%) 1 (1,0%)	0 (0,0%) 1 (1,1%)	4 (4,1%) 6 (6,2%)	3 (3,3%) 2 (2,2%)	19 (19,6%) 28 (28,9%)	22 (24,2%) 27 (29,7%)	17 (17,5%) 20 (20,6%)	17 (18,7%) 19 (20,9%)	**3,2** **3,2**	**3,3** **3,2**
Trustworthiness of salesperson	2 (2,1%) 1 (1,0%)	1 (1,1%) 1 (1,1%)	3 (3,1%) 7 (7,2%)	3 (3,3%) 2 (2,2%)	26 (26,8%) 28 (28,9%)	24 (26,4%) 28 (30,8%)	11 (11,3%) 19 (19,6%)	14 (15,4%) 18 (19,8%)	**3,1** **3,2**	**3,2** **3,3**
Patience of salesperson	2 (2,1%) 0 (0,0%)	0 (0,0%) 1 (1,1%)	1 (1,0%) 6 (6,2%)	6 (6,6%) 3 (3,3%)	19 (19,6%) 27 (27,8%)	19 (20,9%) 26 (28,6%)	20 (20,6%) 22 (22,7%)	17 (18,7%) 19 (20,9%)	**3,4** **3,2**	**3,2** **3,3**
Friendliness of salesperson	2 (2,1%) 1 (1,0%)	0 (0,0%) 1 (1,1%)	0 (0,0%) 5 (5,2%)	6 (6,6%) 2 (2,2%)	25 (25,8%) 27 (27,8%)	18 (19,8%) 23 (25,3%)	15 (15,5%) 22 (22,7%)	18 (19,8%) 23 (25,3%)	**3,3** **3,3**	**3,3** **3,4**

Table 67: Online questionnaire – Question 7

Altogether mean values: (1 = "Very dissatisfied"; 4 = "Very satisfied")

Male, 30-45: 3,1
Male, 46-60: 3,2
Female, 30-45: 3,3
Female, 46-60: 3,3

People express a mediate satisfaction level regarding their last experience at a car dealership. The satisfaction always ranges from 3,1 to 3,4 in every subsection, which leads to altogether mean values from 3,1 to 3,3.

8. Imagine you would customize a car. Put together a sequence of the following features that makes most sense for you.

To ensure visibility, only the highest percentages of the respective chosen ranks were chosen here.

	Female		**Male**	
	30-45	46-60	30-45	46-60
Fuel	Rank 3 (15/14,9%)	Rank 2 (12/11,9%)	Rank 3 (19/17,8%)	Rank 1 (12/11,2%)
Model	Rank 1 (29/28,7%)	Rank 1 (28/27,7%)	Rank 1 (28/26,2%)	Rank 1 (31/29,0%)
Variation	Rank 5 (17/13,9%)	Rank 3 (14/13,9)	Rank 2 (23/21,5%)	Rank 2 (23/21,5%)
Design (color, tire	Rank 6 (12/11,9%)	Rank 6 (12/11,9%)	Rank 4 (14/13,1%)	Rank 7 (16/15,0%)

rims, seats, etc.)				
Price	Rank 1 (10/9,9%)	Rank 1&2 (11/10,9%)	Rank 7 (18/16,8%)	Rank 1 (11/10,3%)
Equipment	Rank 4 (13/12,9%)	Rank 5 (19/18,8%)	Rank 5 (19/17,8%)	Rank 4 (21/19,6%)
Accessory	Rank 7 (22/21,8%)	Rank 7 (22/21,8%)	Rank 6 (24/22,4%)	Rank 7 (24/22,4%)

Table 68: Online questionnaire – Question 8

→ Some compilations showed the same percentages of several ranks. Then, the order is arranged based on the absolute numbers (because the rank is built within the subgroups).
Following combinations are shown:

Female, 30-45: Model → Price → Treibstoff → Equipment → Variation → Design → Accessory

Female, 46-60: Model → Treibstoff → Price → Variation → Equipment → Design →Accessory

Male, 30-45: Model → Variation →Treibstoff → Design → Equipment → Accessory → Price

Male, 46-60: Model → Treibstoff → Price → Variation → Equipment → Accessory → Design.

„Male, 30-45“ shows the biggest similarity with the actual order of car configurators. All groups, however, show that model, fuel and variation are chosen at the first and therefore most important places. Accessory is the last chosen feature mostly.

8. **Observe following pairs of pictures. One picture comes from the online configurator by Volkswagen and the other comes from a leaflet by Volkswagen. Then tick the picture where the following attributes fit more in your opinion.**

(The first number in the respective box always refers to the younger age group. The lower one refers to the older one.

	Subcategories	**Online Configurator**		**Leaflet**	
		Male	Female	Male	Female

Pair 1: Colors	attractiveness	34 (31,5%) 39 (36,1%)	31 (30,7%) 22 (21,8%)	17 (15,7%) 18 (16,7%)	19 (18,8%) 29 (28,7%)
	expressiveness	30 (27,8) 34 (31,5%)	28 (27,7%) 15 (14,9%)	21 (19,4%) 23 (21,3%)	22 (21,8%) 36 (35,6%)
	clarity	29 (26,9%) 32 (29,6%)	30 (29,7%) 22 (21,8%)	22 (20,4%) 25 (23,1%)	20 (19,8%) 29 (28,7%)
	informative content	33 (30,6%) 35 (32,4%)	35 (34,7%) 22 (21,8%)	18 (16,7%) 22 (20,4%)	15 (14,9%) 29 (28,7%)
	comprehensibility	30 (27,8%) 32 (29,6%)	29 (28,7%) 21 (20,8%)	21 (19,4%) 25 (23,1%)	21 (20,8%) 30 (29,7%)
Pair 2: Tire rims	attractiveness	36 (33,3%) 34 (31,5%)	41 (40,6%) 22 (21,8%)	15 (13,9%) 23 (21,3%)	9 (8,9%) 29 (28,7%)
	expressiveness	30 (27,8%) 33 (30,6%)	28 (27,7%) 17 (16,8%)	21 (19,4%) 24 (22,2%)	22 (21,8%) 34 (33,7%)
	clarity	31 (28,7%) 30 (27,8%)	34 (33,7%) 20 (19,8%)	20 (18,5%) 27 (25,0%	16 (15,8%) 31 (30,7%)
	informative content	35 (32,4%) 33 (30,6%)	37 (36,6%) 17 (16,8%)	16 (14,8%) 24 (22,2%)	13 (12,9%) 34 (33,7%)
	comprehensibility	33 (30,6%) 27 (25,0%)	36 (35,6%) 20 (19,8%)	18 (16,7%) 30 (27,8%)	14 (13,9% 31 (30,7%)
Pair 3: Seat covers	attractiveness	27 (25,0%) 15 (13,9%)	21 (20,8%) 18 (17,8%)	24 (22,2%) 42 (38,9%)	29 (28,7%) 33 (32,7%)
	expressiveness	21 (19,4%) 12 (11,1%)	18 (17,8%) 16 (15,8%)	30 (27,8%) 45 (41,7%)	32 (31,7%) 35 (34,7%)
	clarity	22 (20,4%) 20 (18,5%)	24 (23,8%) 15 (14,9%)	29 (26,9%) 37 (34,3%)	26 (25,7%) 36 (35,6%)
	informative content	26 (24,1%) 22 (20,4%)	21 (20,8%) 15 (14,9%)	25 (23,1%) 35 (32,4%)	29 (28,7%) 36 (35,6%)
	comprehensibility	27 (25,0%) 19 (17,6%)	21 (20,8%) 15 (15,8%)	24 (22,2%) 38 (35,2%)	39 (28,7%) 35 (34,7%)
Pair 4: Equipment	attractiveness	31 (28,7%) 34 (31,5%)	37 (36,6%) 27 (26,7%)	20 (18,5%) 23 (21,3%)	13 (12,9%) 24 (23,8%)
	expressiveness	36 (33,3%) 33 (30,6%)	35 (34,7%) 24 (23,8%)	15 (13,9%) 24 (22,2%)	15 (14,9%) 27 (26,7%)
	clarity	40 (37,0%)	38 (37,6%)	11 (10,2%)	12 (11,9%)

		37 (34,3%)	28 (27,7%)	20 (18,5%)	23 (22,8%)
	informative content	34 (31,5%) 36 (33,3%)	32 (31,7%) 26 (26,7%)	17 (15,7%) 21 (19,4%)	18 (17,8%) 24 (23,8%)
	comprehensibility	37 (34,3%) 31 (28,7%)	38 (37,6%) 24 (23,8%)	14 (13,0%) 24 (24,1%)	12 (11,9%) 27 (26,7%)
Pair 5: Accessories	attractiveness	22 (20,4%) 20 (18,5%)	23 (22,8%) 18 (17,8%)	29 (26,9%) 37 (34,3%)	27 (26,7%) 33 (32,7%)
	expressiveness	26 (24,1%) 19 (17,6%)	22 (21,8%) 23 (22,8%)	25 (23,1%) 38 (35,2%)	28 (27,7%) 28 (27,7%)
	clarity	32 (29,6%) 24 (22,2%)	31 (30,7%) 20 (19,8%)	19 (17,6%) 33 (30,6%)	19 (18,8%) 31 (30,7%)
	informative content	27 (25,0%) 26 (24,1%)	31 (30,7%) 20 (19,8%)	24 (22,2%) 31 (28,7%)	19 (18,8%) 31 (30,7%)
	comprehensibility	25 (23,1%) 20 (18,5%)	30 (29,7%) 19 (18,8%)	26 (24,1%) 37 (34,3%)	20 (19,8%) 32 (31,7%)
∑	attractiveness	30-45: 303 46-60: 249		30-45: 202 46-60: 291	
	expressiveness	30-45: 274 46-60: 226		30-45: 231 46-60: 314	
	clarity	30-45: 311 46-60: 236		30-45: 206 46-60: 292	
	informative content	30-45: 311 46-60: 253		30-45: 194 46-60: 287	
	comprehensibility	30-45: 306 46-60: 236		30-45: 199 46-60: 311	
∑∑		2705		2527	

Table 69: Online questionnaire – Question 9-13

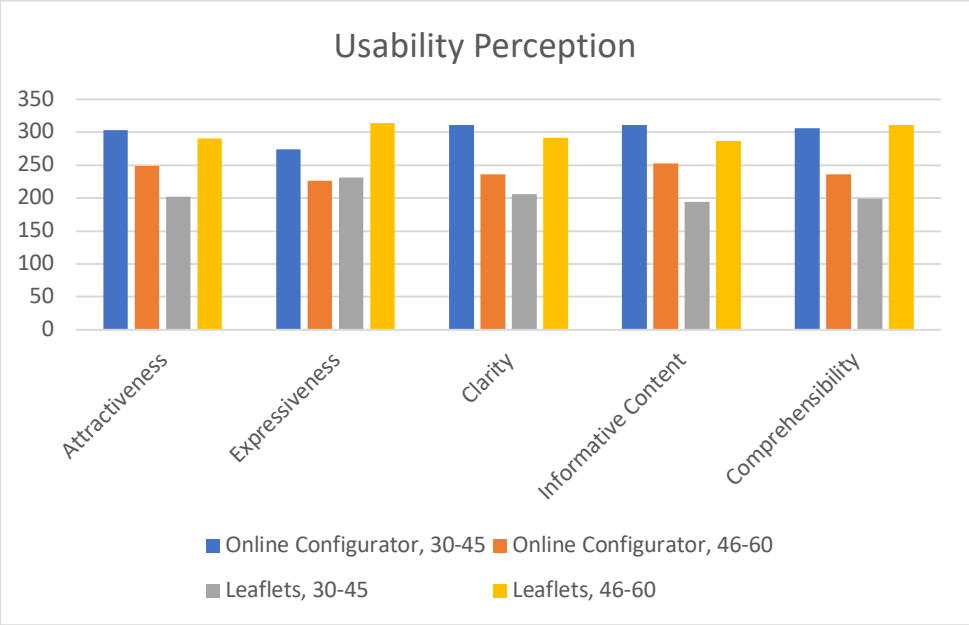


Figure 25: Graphic overview of perceived usability. Own depiction.

When being presented the two possible ways of customizing a car (leaflet/online configurator), people perceive information diversely, mainly depending on the age group. The older age group chooses the leaflets more often when they have to decide where the mentioned adjective fits better. Looking at the summarized numbers, this is the case at every adjective, although the differences between the numbers for the online configurator and the leaflets are not that big. The younger age group, however, always decides for the online configurator regarding every adjective as well. Furthermore, there are some mentionable insights regarding the two genders. Especially women aged from 46-60 often show a high preference for the leaflets, while women aged 30-45 clearly prefer the online configurator. When looking at the male participants, also a similar separation is visible, but it is not as strong as in the women's groups. Which means, that the separation (regarding preference of leaflets or online configurator) between the two age groups of male participants is more equal. The women's groups show a bigger discrepancy within the preference for the online configurator and the leaflet. Also, when looking at the numbers, it can be seen on the one hand that more women from the younger age group prefer the online configurator than men from the younger age group, which is a remarkable insight. On the other hand, due to the high number of women aged 46-60 who prefer the leaflets, the number of men aged 46-60 who prefer the online

configurator over the leaflets is higher than the number of women aged 46-60 who share the same preference.

Looking at the detailed subcategories, following insights can be given:

- “Attractiveness” is mostly chosen more often for the online configurator, for both age groups.
- There is no visible overall preference for “expressiveness”. Some pairs are rated in favor of the online configurator, some in favor of the leaflet.
- The same can be claimed for “clarity”. Yet, there is a visible difference between the age groups: The older age groups decides for the leaflets more often.
- The rating of “informative content” also varying within the pairs. Overall, the online configurator gets more votes here. Sometimes, a difference between the age groups is visible as well (older age group prefers leaflet, while younger age group prefers the online configurator). It is also visible, that women aged 46-60 almost constantly choose the leaflet when they have to decide which of the both methods give more informative content.
- “Comprehensibility” was mainly rated in favor of the online configurator. Although here are also some visible preferences of the older group towards the leaflets.

Also, the different pairs deliver different impressions:

- The online configurator is better rated in the “color” pair than the leaflet overall.
- Also, the online configurator is chosen more often in the “tire rims” pair, especially within the younger age group and the men.
- When rating the “seat covers” pair, people prefer the leaflet overall, even the younger age group (yet men aged 30-45 preferred the online configurator a little more often than the other groups).
- Looking at the “equipment” pair, there was a very clear preference for the online configurator for all groups (apart from women aged 46-60 who just

showed a very slight preference for the online configurator with just 4 more votes for the online configurator than for the leaflets in total)

- The rating of the “accessories” pair shows a very clear preference for the leaflet, especially within women of both age groups. Men give versatile ratings, but also tend to prefer the leaflet overall.

Overall, these insights cannot be explained, because these numbers can have various reasons: Either the online configurator is designed well or badly (depending on the rating), the same goes for the leaflet. People could decide for the leaflet and still could find both methods presented in an ugly and incomprehensible way, yet, the leaflet is the “lesser evil” for them. Also, both the online configurator and the leaflet don’t have the same design and conception for their different categories – which means that e.g. the colors are presented differently than the accessories. This can lead to a versatile rating as well. Therefore, it would be invalid to say e.g. “the configurator is better than the leaflet because its usability was rated higher when looking at the color pair”. These numbers just show the opinion/choices of the people, but not the reasons behind them.

14. Which method to customize your car would you prefer after seeing these pictures?

	Male		**Female**		**∑ = 209**
	30-45	46-60	30-45	46-60	
Online Configurator	44 (40,7%)	39 (36,1%)	40 (39,6%)	26 (25,7%)	149
Leaflet	7 (6,5%)	18 (16,7%)	10 (9,9%)	25 (24,8%)	60

Table 70: Online questionnaire – Question 14

The younger age group clearly prefers the online configurator. Also the older age group prefers it, independently of the gender. Especially men aged from 46-60 clearly prefer the online configurator. Women aged 46-60 rate both methods almost equally (26 prefer the online configurator, 25 prefer the leaflet). The previous question showed, that the online configurator gets more votes concerning usability and its subcategories than the leaflet. However, the difference of sums for the online configurator and the leaflet is not that high, thus the online configurator was preferred by the participants by a slight margin. Especially in comparison with these

numbers: 149 of 209 people would prefer customizing their car with the online configurator over the leaflet.

15: What does a car purchase mean to you?

	Male		**Female**	
	30-45	**46-60**	**30-45**	**46-60**
Exhausting procedure. I don't like doing it and I would like to save more time while doing it.	4 (3,7%)	7 (6,5%)	11 (10,9%)	10 (9,9%)
It is a situation I don't perceive many feelings about. I handle it neutrally.	**28 (25,9%)**	**28 (25,9%)**	**24 (23,8%)**	**23 (22,8%)**
Fun procedure. I like taking much time for it, doing research and take lots of advising by friends/experts/online.	18 (16,7%)	20 (18,5%)	15 (14,9%)	15 (14,9%)

Table 71: Online questionnaire – Question 1

This shows that the majority of the participants perceives buying a car neutrally. It does not evoke many positive or negative feelings and is seen as a task that needs to be fulfilled. Yet, more people rate it as a fun activity than an annoying activity.

16. Would you buy a used or a new car next time?

	Male		**Female**		**∑ = 209**
	30-45	**46-60**	**30-45**	**46-60**	
Neuwagen	30 (27,8%)	35 (32,4%)	18 (17,8%)	26 (25,7%)	**109**
Gebrauchtwagen	21 (19,4%)	22 (20,4%)	32 (31,7%)	25 (24,8%)	**100**

Table 72: Online questionnaire – Question 16

A difference between the two gender is visible here. More men tend to buy a new car than women, regardless of the both age groups, while more women prefer to buy a used car.

The group of participants is split up in two groups now.
People who chose the answer "Used Car" were asked following questions:

17. How important are following choosing options when purchasing a car?

(The first number in the respective box always refers to the younger age group. The lower one refers to the older one.)

		Brand	Interior (A/C, heating	Exterior (Color, tire rims)	Number of seats/doors	Motorization	Fuel	First registration	Mileage
Very important	**w**	6 (10,5%)	10 (17,5%)	3 (5,3%)	8 (14,0%)	3 (5,3%)	9 (15,8%)	5 (8,8%)	7 (12,3%)
		9 (15,8%)	5 (8,8%)	1 (1,8%)	6 (10,5%)	5 (8,8%)	**10 (17,5%)**	5 (8,8%)	8 (14,0%)
	m	4 (9,3%)	7 (16,3%)	3 (7,0%)	3 (7,0%)	4 (9,3%)	6 (14,0%)	4 (9,3%)	7 (16,3%)
		4 (9,3%)	6 (14,0%)	2 (4,7%)	3 (7,0%)	3 (7,0%)	**10 (23,3%)**	3 (7,0%)	2 (4,7%)
Important	**w**	**21 (36,8%)**	**20 (35,1%)**	11 (19,3%)	**20 (35,1%)**	**24 (42,1%)**	**16 (28,1%)**	**14 (24,6%)**	**21 (36,8%)**
		9 (15,8%)	**15 (26,3%)**	9 (15,8%)	**17 (29,8%)**	**16 (28,1%)**	9 (15,8%)	**10 (17,5%)**	**17 (29,8%)**
	m	**13 (30,2%)**	**10 (23,3%)**	**7 (16,3%)**	**14 (32,6%)**	**11 (25,6%)**	**11 (25,6%)**	**10 (23,3%)**	**13 (30,2%)**
		12 (27,9%)	**14 (32,6%)**	6 (14,0%)	**12 (27,9%)**	**13 (30,2%)**	8 (18,6%)	**10 (23,3%)**	**13 (30,2%)**
Unimportant	**w**	4 (7,0%)	2 (3,5%)	**15 (26,3%)**	4 (7,0%)	4 (7,0%)	7 (12,3%)	11 (19,3%)	4 (7,0%)
		7 (12,3%)	5 (8,8%)	**14 (24,6%)**	2 (3,5%)	3 (5,3%)	5 (8,8%)	8 (14,0%)	0 (0,0%)
	m	2 (4,7%)	2 (4,7%)	5 (11,6%)	2 (4,7%)	4 (9,3%)	3 (7,0%)	6 (14,0%)	1 (2,3%)
		5 (11,6%)	2 (4,7%)	**12 (27,9%)**	6 (14,0%)	4 (9,3%)	3 (7,0%)	6 (14,0%)	6 (14,0%)
Totally unimportant	**w**	1 (1,8%)	0 (0,0%)	3 (5,3%)	0 (0,0%)	1 (1,8%)	0 (0,0%)	2 (3,5%)	0 (0,0%)
		0 (0,0%)	0 (0,0%)	1 (1,8%)	0 (0,0%)	1 (1,8%)	1 (1,8%)	2 (3,5%)	0 (0,0%)
	m	2 (4,7%)	2 (4,7%)	6 (14,0%)	2 (4,7%)	2 (4,7%)	1 (2,3%)	1 (2,3%)	0 (0,0%)
		1 (2,3%)	0 (0,0%)	2 (4,7%)	1 (2,3%)	2 (4,7%)	1 (2,3%)	3 (7,0%)	1 (2,3%)

Table 73: Online questionnaire – Question 17

The majority of people rates all of the named choices as “important”. “Exterieur” is rated as “not important” by the majority of men of both age groups and women aged 46-60, and “fuel” is rated as “very important” by the majority of men and women aged 46-60.

18. Would you prefer looking for your car online or offline?

	Male		**Female**		**∑ = 100**
	30-45	**46-60**	**30-45**	**46-60**	
Online	16 (37,2%)	9 (20,9%)	22 (38,6%)	14 (24,6%)	61
Offline	5 (11,6%)	13 (30,2%)	10 (17,5%)	11 (19,3%)	39

Table 74: Online questionnaire – Question 18

The younger age group prefers looking for a car online (both genders), as well as women aged 46-60. Male participants aged 46-60 prefer looking for a car offline. Overall, a clear majority of people who prefer looking for their car online is visible.

People who chose “online” were asked following question:

19. Why online? (Multiple answers possible)

	Male		**Female**		**∑ = 61**
	30-45	**45-60**	**30-45**	**46-60**	
I hope for price reductions	9 (36,0%)	5 (20,0%)	4 (11,1%)	6 (16,7%)	**24**
I did not decide for a car yet	4 (16,0%)	1 (4,0%)	3 (8,3%)	2 (5,6%)	10
I can avoid contact with humans	3 (12,0%)	0 (0,0%)	2 (5,6%)	1 (2,8%)	6
It is more comfortable for me	16 (64,0%)	6 (24,0%)	17 (47,2%)	9 (25,0%)	**48**
It means less stress for me	9 (36,0%)	1 (4,0%)	11 (30,6%)	5 (13,9%)	**26**
It is easier to compare several car models and brands	3 (12,0%)	5 (20,0%)	3 (8,3%)	4 (11,1%)	15

Table 75: Online questionnaire – Question 19

*A blank space was offered to give the participants the possibility to write personal answers. They said, “**I can do that in the evening too**”, “**I can see the differences immediately**” and “**I also can read and compare the parameters with no rush***

and then go and see the car", "I can compare prices in the different regions of Austria".

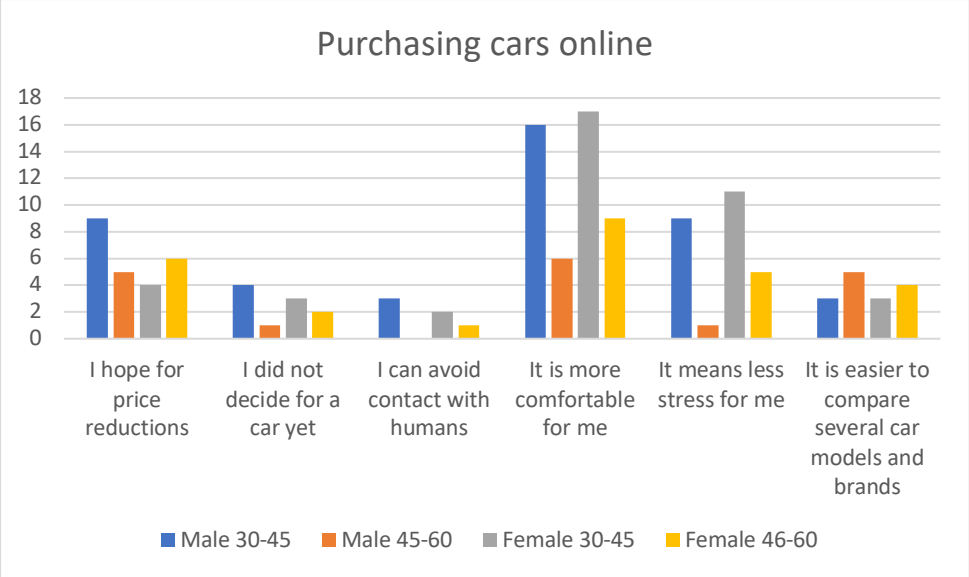


Figure 26: Graphic overview of reasons for purchasing cars online. Own depiction.

People most often chose "It's more comfortable for me" for answering this question (48 of 61). Also, 26 people stated, "It is less stressful for me". 24 (39%) people hope for price advantages.

People who chose "offline" were asked following question:

20. Why offline? (Multiple answers possible)

	Male		**Female**		**∑ = 39**
	30-45	**45-60**	**30-45**	**46-60**	
I hope for price reductions	1 (5,6%)	5 (27,8%)	5 (22,7%)	4 (18,2%)	**15**
I want to look at the car personally	4 (22,2%)	12 (66,7%)	8 (36,4%)	11 (50,0%)	**35**
It is more comfortable for me	0 (0,0%)	2 (11,1%)	1 (4,5%)	1 (4,5%)	4
It means less stress for me	0 (0,0%)	5 (27,8%)	1 (4,5%)	7 (31,8%)	13
I prefer the personal contact to humans	1 (5,6%)	9 (50,0%)	7 (31,8%)	11 (50,0%)	**27**

Table 76: Online questionnaire – Question 20

A blank space was offered to give the participants the possibility to write personal answers. Here, no personal answers were given.

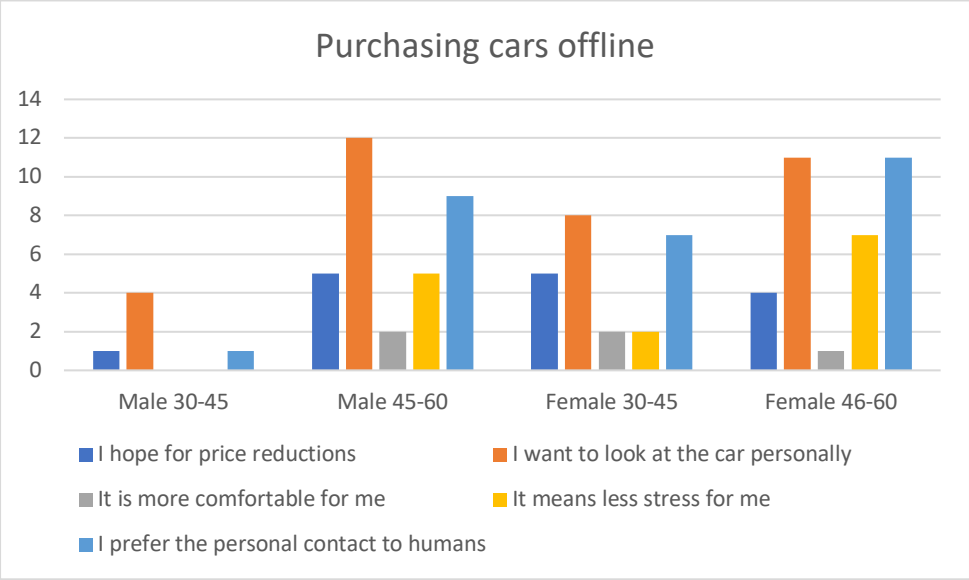


Figure 27: Graphic overview of reasons for purchasing cars offline. Own depiction.

Reasons for buying the car offline are mostly that people want to examine the car personally (35 of 39 say that). Also, 27 people state to prefer the personal contact with other people. As well as it can be seen in the “Why online?” question, the same percentage of people (15 people equals 39%) are hoping for price advantages.

People who chose the answer "New Car" were asked following questions:

21. How important are following choosing options when purchasing a car? (The first number in the respective box always refers to the younger age group. The lower one refers to the older one.)

		Brand	Interior (A/C, heating	Exterior (Color, tire size…)	Number of seats/doors	Motorization	Fuel
Sehr wichtig	**w**	5 (11,4%)	7 (15,9%)	1 (2,3%)	**10 (22,7%)**	5 (11,4%)	8 (18,2%)
		11 (25,0%)	8 (18,2%)	5 (11,4%)	6 (13,6%)	5 (11,4%)	8 (18,2%)
	m	8 (12,3%)	18 (27,7%)	6 (9,2%)	12 (18,5%)	11 (16,9%)	**15 (23,1%)**
		13 (20,0%)	16 (24,6%)	5 (7,7%)	12 (18,5%)	11 (16,9%)	13 (20,0%)
Wichtig	**w**	**10 (22,7%)**	**10 (22,7%)**	**11 (25,0%)**	7 (15,9%)	**10 (22,7%)**	**9 (20,5%)**
		10 (22,7%)	**14 (31,8%)**	**12 (27,3%)**	**19 (43,2%)**	**15 (34,1%)**	**14 (31,8%)**
	m	**16 (24,6%)**	**9 (13,8%)**	**14 (21,5%)**	**17 (26,2%)**	**14 (21,5%)**	14 (21,5%)
		16 (24,6%)	**17 (26,2%)**	**19 (29,2%)**	**18 (27,7%)**	**21 (32,3%)**	**18 (27,7%)**
Unwichtig	**w**	2 (4,5%)	1 (2,3%)	4 (9,1%)	1 (2,3%)	3 (6,8%)	1 (2,3%)
		3 (6,8%)	3 (6,8%)	7 (15,9%)	0 (0,0%)	5 (11,4%)	3 (6,8%)
	m	6 (9,2%)	3 (4,6%)	7 (10,8%)	1 (1,5%)	4 (6,2%)	1 (1,5%)
		4 (6,2%)	2 (3,1%)	11 (16,9%)	4 (6,2%)	3 (4,6%)	4 (6,2%)
Sehr unwichtig	**w**	1 (2,3%)	0 (0,0%)	2 (4,5%)	0 (0,0%)	0 (0,0%)	0 (0,0%)
		2 (4,5%)	1 (2,3%)	2 (4,5%)	1 (2,3%)	1 (2,3%)	1 (2,3%)
	m	0 (0,0%)	0 (0,0%)	3 (4,6%)	0 (0,0%)	1 (1,5%)	0 (0,0%)
		2 (3,1%)	0 (0,0%)	0 (0,0%)	1 (1,5%)	0 (0,0%)	0 (0,0%)

Table 77: Online questionnaire – Question 21

The majority of this group rates all of the named choices as "important", similar to the group of people who told they would buy a used car. Most women aged 30-45

state the “number of doors/seats” is “very important” to them, the majority of men aged 30-45 asses “fuel” as “very important”.

22. Would you prefer customizing/looking for your car online or offline?

	Male		**Female**		**∑ = 109**
	30-45	**46-60**	**30-45**	**46-60**	
Online	25 (38,5%)	26 (40,0%)	12 (27,3%)	13 (29,5%)	76
Offline	5 (7,7%)	9 (13,8%)	6 (13,6%)	13 (29,5%)	33

Table 78: Online questionnaire – Question 22

Like in the other group, the younger age group prefers looking for a car online (both genders). Also, the older age of men group shows a preference towards buying the next car online. Women of both age groups are separated equally for online and offline. Overall, a clear majority of people who prefer looking for their car online is visible.

People who chose “online” were asked following question:

23. Why online? (Multiple answers possible)

	Male		**Female**		**∑ = 76**
	30-45	**45-60**	**30-45**	**46-60**	
I hope for price reductions	5 (9,8%)	7 (13,7%)	1 (3,7%)	0 (0,0%)	13
It’s a personal and individual car nobody else but me has	17 (33,3%)	16 (31,4%)	6 (22,2%)	8 (29,6%)	47
I have full control over how my car is designed	3 (12,0%)	0 (0.0%)	2 (5,6%)	1 (2,8%)	6
I like trying out new things and experimenting	19 (19,6%)	12 (23,5%)	6 (22,2%)	5 (18,5%)	42
The immediate depiction of the car (seats, color, etc.) is an advantage for me	16 (31,4%)	16 (31,4%)	8 (29,6%)	10 (37,0%)	**50**
I can immediately see how much my car costs with what equipment	21 (41,2%)	18 (35,3%)	9 (33,3%)	11 (40,7%)	**59**
I can avoid contact with humans	1 (3,7%)	0 (0,0%)	1 (2,0%)	1 (2,0%)	3
It is more comfortable for me	14 (27,5%)	9 (17,6%)	6 (18,5%)	6 (22,2%)	35

It means less stress for me	7 (13,7%)	3 (5,9%)	5 (18,5%)	3 (11,1%)	18
It is easier to compare several car models and brands	15 (29,4%)	13 (25,5%)	14 (14,8%)	9 (33,3%)	**51**

Table 79: Online questionnaire – Question 23

*A blank space was offered to give the participants the possibility to write personal answers. They said, "**I can do it whenever I want – time is a big factor**."*

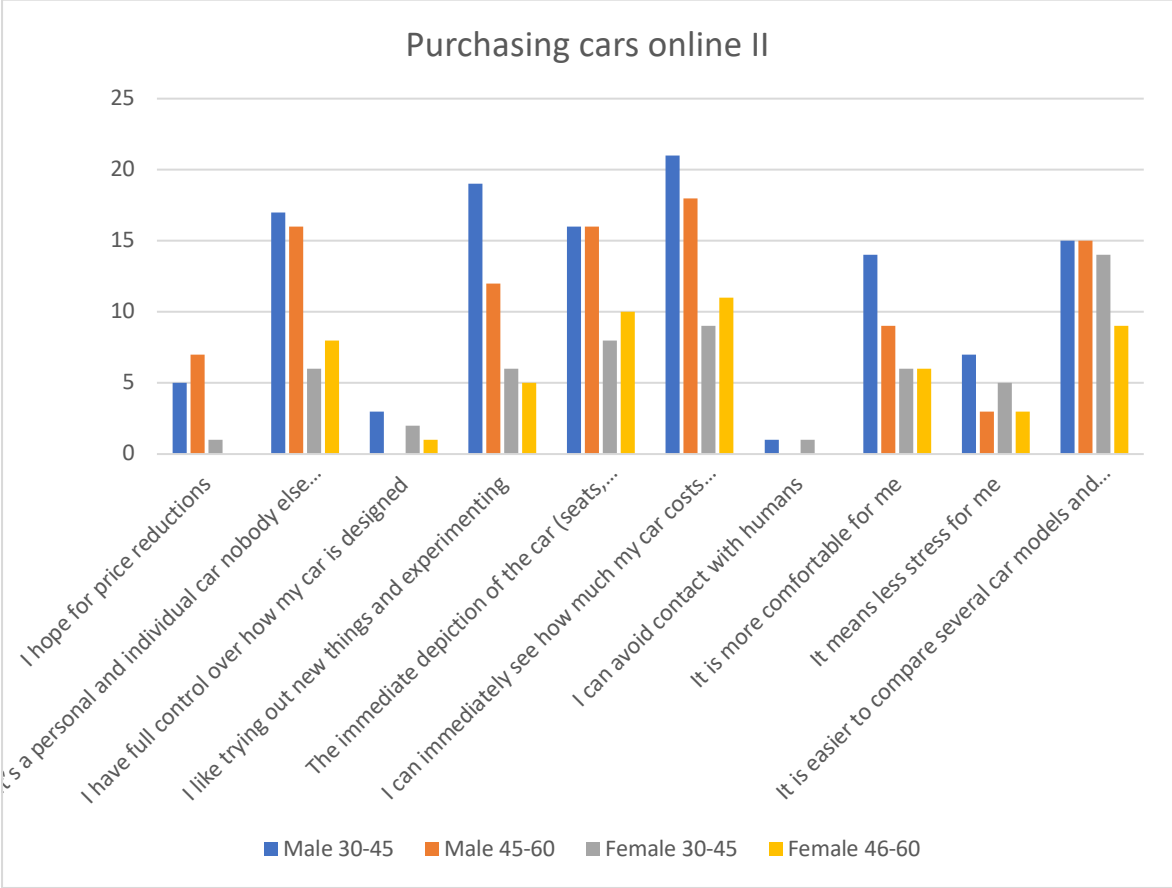


Figure 28: Graphic overview of reasons for purchasing cars online II. Own depiction.

This grid is especially important for car configurators. 59 of 76 people here praise the possibility to "immediately see how much the car costs, with what kind of equipment". 51 participants appreciate the possibility of "easily comparing different brands and models". Also, 50 people see it as an advantage if they can "immediately see the changes of e.g. colors or seats". Interesting insights are also, that more than 50% of people said that they like "experimenting and trying out new things" (47 people), so playfulness is an important factor as well. The participants also like the fact that it is "their very personal, own car, like nobody else has" (42 people). Those

two statements are personal, emotional statements that show that not only technical features and advantages play a role for online configurators.

24. Why offline? (Multiple answers possible)

	Male		**Female**		**∑ = 33**
	30-45	**45-60**	**30-45**	**46-60**	
I hope for price reductions	3 (21,4%)	4 (28,6%)	2 (10,5%)	4 (21,1%)	9
I want to look at the car personally	5 (35,7%)	6 (42,9%)	4 (21,1%)	12 (63,2%)	**27**
It is more comfortable for me	2 (14,3%)	2 (14,3%)	2 (10,5%)	1 (5,3%)	7
It means less stress for me	0 (0,0%)	5 (27,8%)	1 (4,5%)	7 (31,8%)	13
I want to support local car dealerships	3 (21,4%)	6 (42,9%)	2 (10,5%)	4 (21,1%)	15
I prefer the personal contact to humans	1 (5,6%)	3 (21,4%)	3 (15,8%)	11 (57,9%)	**18**
I did not decide for a car yet, so I'm seeking personal guidance	3 (21,4%)	5 (35,7%)	2 (10,5%)	9 (47,4%)	**19**
I always bought my car at a car dealership and made good experiences with it	2 (14,3%)	6 (42,9%)	2 (10,5%)	8 (42,1%)	16

Table 80: Online questionnaire – Question 24

*A blank space was offered to give the participants the possibility to write personal answers. They said, "**I want to look at the car model with the paint finished must be seen physically."***

27 of 33 people say, they want to "look at their new car personally" and therefore buy it offline. 19 people "require personal advice and consulting" when buying a new car and 18 people say, they "prefer the personal contact with other people". The last two reasons are similar to the reasons people stated who would buy used cars, especially the preference of personal contact. The contact with other humans therefore remains an important factor for people who prefer buying their car offline, regardless of a used or a new car.

The separation of groups finishes here – from now on all people were asked following questions:

25. Do you use the internet because you like to or because you have to?

	Male		Female		∑ = 209
	30-45	**46-60**	**30-45**	**46-60**	
Because I really like to	41 (38,0%)	33 (30,6%)	31 (30,7%)	24 (23,8%)	**129**
Because I like to	7 (6,5%)	19 (17,6%)	18 (17,8%)	21 (20,8%)	65
For convenience reasons	3 (2,8%)	5 (4,6%)	1 (1,0%)	6 (5,9%)	15

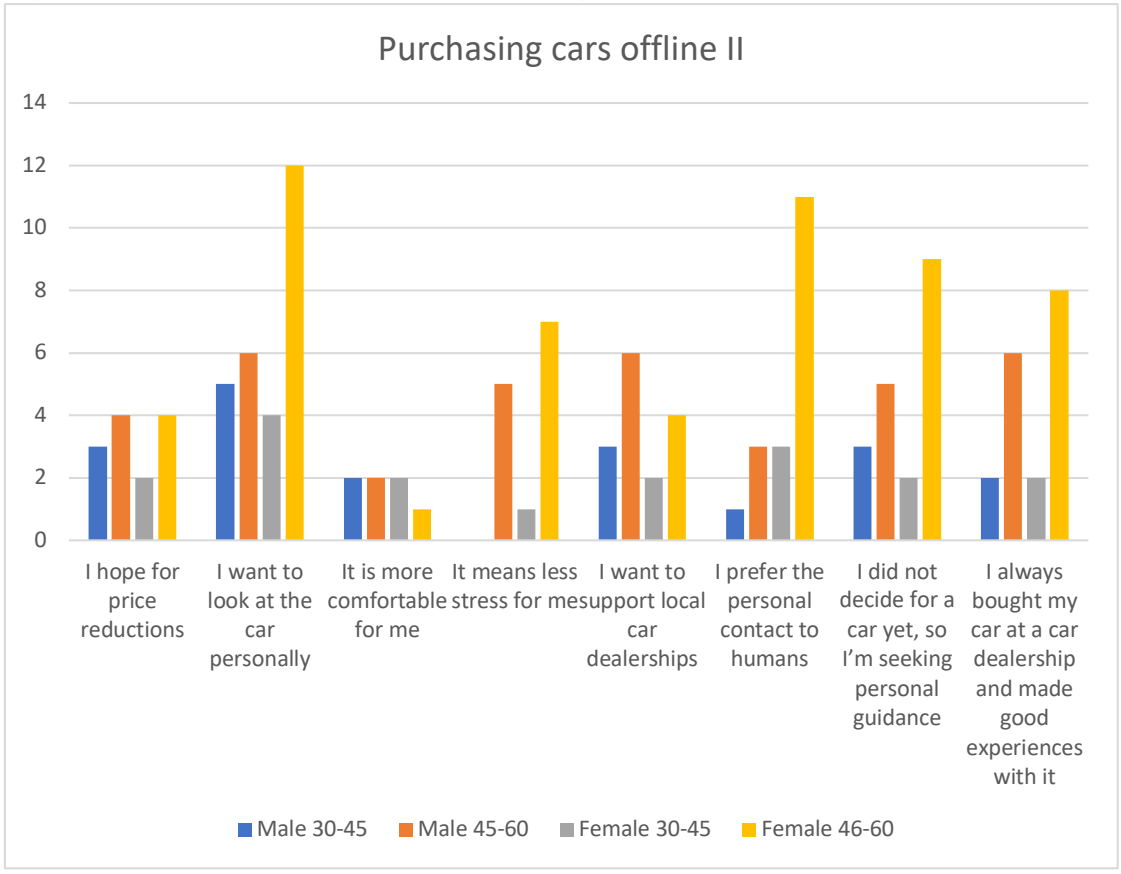
Table 81: Online questionnaire – Question 25

129 of 209 people use the internet “with big pleasure”, which makes them the majority. Especially the younger group is very present in this separation. 65 people say, they use the internet “with pleasure”. 15 people tell to use the internet “because it’s convenient”, 11 of them are aged 46-60.

26. How would you rate your personal skills with e-commerce stores or platforms such as amazon.at or willhaben.at?

(The first number in the respective box always refers to the younger age group. The lower one refers to the older one.)

Figure 29: Graphic overview of reasons for purchasing cars offline II. Own depiction.



Secure						**Insecure**	
m	**w**	**m**	**w**	**m**	**w**	**m**	**w**
40 (37,0%)	**31 (30,7%)**	6 (5,6%)	15 (14,9%)	4 (3,7%)	4 (4,0%)	1 (1,0%)	0 (0,0%)
31 (28,7%)	**29 (28,7%)**	20 (18,5%)	20 (19,8%)	5 (4,6%)	1 (1,0%)	1 (1,0%)	1 (1,0%)
Competent						**Incompetent**	
m	**w**	**m**	**w**	**m**	**w**	**m**	**w**
33 (30,6%)	23 (22,8%)	15 (13,9%)	**23 (22,8%)**	2 (1,9%)	4 (4,0%)	1 (0,9%)	0 (0,0%)
26 (24,1%)	21 (20,8%)	24 (22,2%)	**28 (27,7%)**	6 (5,6%)	2 (2,0%)	1 (0,9%)	0 (0,0%)
Experienced						**Inexperienced**	
m	**w**	**m**	**w**	**m**	**w**	**m**	**w**
32 (29,6%)	**26 (25,7%)**	14 (13,0%)	20 (19,8%)	4 (3,7%)	4 (4,0%)	1 (0,9%)	0 (0,0%)
29 (26,9%)	18 (17,8%)	22 (20,4%)	**29 (28,7%)**	5 (4,6%)	4 (4,0%)	1 (0,9%)	0 (0,0%)
∑ = 209							
m	**w**	**m**	**w**	**m**	**w**	**m**	**w**
105	**80**	35	58	10	12	3	0
86	68	66	**77**	16	7	3	1

Table 82: Online questionnaire – Question 26

Most of the participants assess themselves "secure", "competent" and "experienced" when it comes to using e-commerce platforms. While both age groups of male participants and the younger age group of women have the highest number in the first separation (1 = "secure/competent/experienced", 4 = "insecure/incompetent/inexperienced"), women aged 46-60 have the highes numbers in separation number 2. Concluding, most of the participants rate themselves as secure, competent and experienced e-commerce users, whereas women tend to rate themselves worse than men.

28. What is your highest education level?

	Male		**Female**		**∑ = 209**
	30-45	**46-60**	**30-45**	**46-60**	
Main school, Undergrad AHS, NMS, Sonderschule	0 (0,0%)	1 (0,9%)	0 (0,0%)	1 (1,0%)	2
Lehre, BMS	0 (0,0%)	7 (6,5%)	1 (1,0%)	7 (6,9%)	15

AHS (e.g. Gymnasium)	7 (6,5%)	10 (9,3%)	5 (5,0%)	10 (9,9%)	32
Last two years of BHS (BHS-degree) (e.g. HAK, HTL, HBLA)	18 (16,7%)	10 (9,3%)	14 (13,9%)	14 (13,9%)	56
University (of applied sciences)	26 (24,1%)	29 (26,9%)	30 (29,7%)	19 (18,8%)	104

Table 83: Online questionnaire – Question 28

People with a university degree represent the majority with 104 of 209 people, which is almost 50%. 88 people have an a-level, while the rest is beneath this education level.

30. How often do you use the internet?

	Male		**Female**		**∑ = 209**
	30-45	**46-60**	**30-45**	**46-60**	
Daily	50 (46,3%)	55 (50,9%)	50 (49,5%)	47 (46,5%)	202
Several times per week	0 (0,0%)	2 (1,9%)	0 (0,0%)	4 (4,0%)	6
Several times per month	1 (0,9%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	1

Table 84: Online questionnaire – Question 30

202 of 209 people use the internet daily, which is almost 100% of the overall number of participants. 6 people aged 46-60 use it several times per week, while one male age 30-45 uses it several times per month.
This data was used to subsequently interpret it and answer the research questions. This will be done in the following chapter

11.2. Interpretation

This chapter consists of the examination of the hypotheses to be able to verify or falsify them.
The first set of hypotheses is based on the eye-tracking study and will be examined with the help of Areas of Interests (AOIs) that were defined when evaluating the eye-tracking data. Some hypotheses will also be answered based on the questionnaire that was given to the participants after the experiments.
For answering the hypotheses of the second research question, statistical procedures and descriptive measurements will be used to analyze and interpret the given data. Correlation analyses and T-tests will be performed to answer the hypotheses. The hypotheses always will be evaluated in three-rowed grids: the two age groups, to investigate possible differences between the younger and the older age group and the aggregated group, to deliver an evaluation of the collective.
Subsequently, the outcomes will be summarized.

11.2.1. Examination of the Hypotheses

Hypotheses Eye-Tracking

The hypotheses of the eye-tracking study are answered based on calculations and illustrations. The variables are defined by the information that is needed to answer the hypotheses. Sometimes, technical information and verbal expressions are combined. The hypotheses are answered by the measurements of the defined AOIs. The measurement numbers taken for the AOIs were taken from the KPI “Dwell Time”, which sums up all fixations and saccades within the AOI (see SMI, 2014). This KPI was considered as the most useful one. Also, the KPI “Average Fixation” was taken into consideration but was then not used because 1. It was not comparable with “Dwell Time” because of the duration ratio, also the measurement was not sufficient.
Additional pictures of gaze plots and heatmaps are used for a better overview and a graphical representation of the measured data. The reason why the grids are sometimes split up into the age group (and not e.g. into the two genders) is that the

possible differences between the two age groups should be made visible. Differences between the genders have been analyzed if needed but are mostly irrelevant.

When measuring where people looked at what objects with what amount of time, a graphic was used as a reference picture to measure the AOIs. The AOIs were following:

1. **"technical information"** (e.g. measurements or price)
2. **"textual explanations"** (informative text about e.g. different kinds of navigation systems)
3. **"textual presentation"** (non-informative text, about e.g. how good-looking the car is)
4. **"visual presentation"** (only measured for the leaflets: non-informative pictures, e.g. a picture of the car with a woman doing yoga on it. The online configurator only contains informative visual content, see AOI no. 5)
5. **"visual explanations"** (informative pictures, e.g. pictures of different navigation systems)
6. **"rest"** (where people looked at nothing specifically or the gaze was not measurable)
7. **"humans"** (only measured for the leaflets: when people looked at depictions of people in the leaflets)

Hypotheses

1. **Technical information (e.g. measurements) and explanations were findable more easily at the online configurator than at the leaflet.**

Variable: time passed until people read *informative content* for the first time. "Reading" is defined as when the fixation stays longer than 2 seconds in a defined area and the eye movement stays in the defined area ("*informative content" consists of AOIs 1,2,5).* The following grid shows the mean time values of all participants.

	male			**female**			∑
	30-45	**46-60**	∑	**30-45**	**46-60**	∑	
Online configurator	2,05 mins	2,48 mins	2,31 mins	1,23 mins	1,58 mins	1,49 mins	**2,06 mins**
Leaflet	1,56 mins	2, 33 mins	2,15 mins	2,43 mins	3,27 mins	2,52 mins	**2,34 mins**

Table 85: Hypothesis 1

The younger group generally found technical information/explanations faster than the older one. The overall mean numbers show, that technical information is found

faster (on average: ca. 30 seconds) when using the online configurator than when using the leaflets. Interestingly, the male participants find information faster when using the leaflet. Now that the hypothesis does not make a difference between genders, it can be **verified**.

Some quotes regarding the information finding process that were told by the participants after the interview are added. (Sentences in bold font were told more than once):

Online Configurator	Leaflet
1. **"I could find technical information quite well."** 2. **"The information was there, but not findable easily."** 3. "I could see the information, but I sometimes didn't understand it." 4. "The information was insufficient."	1. "The information I was looking for was missing." 2. "The informative content was written too small. I didn't see it properly." 3. "I didn't even realize that that information was there. I thought it wasn't given at all." 4. **"There was too little amount of technical information."**

Table 86: Hypothesis 1 II

This shows that on the one hand, the information was findable more easily when using the configurator. On the other hand, it was not always usable information at all. The leaflet indeed contained the information, but often it was just overseen or could not be read well. Many people (leaflet group: 12 of 16, so 75%) for example didn't understand that the used shortcut "SA" means "Sonderausstattung" because it was explained nowhere.

2. **The car customization process is more linear and straightforward when using the online configurator than when using the leaflet.**

Variable: amount of times when pages are turned/subsite is revisited. The hypothesis seeks to find out if the people using the online configurator stick to the suggested order of customizing the car or change things afterwards. The same applies to people who used the leaflet.

The number of participants show how many people turned pages/revisits. The number of turns shows the overall number of turns/revisits made by all participants in the respective grid.

Table 87: Hypothesis 2

	male			**female**			∑
	30-45	**46-60**	∑	**30-45**	**46-60**	∑	
Online configurator	1 participant 2 revisits	1 participant 1 revisit	2 participants 3 revisits	2 participants 2 revisits	3 participants 6 revisits	5 participants 8 revisits	**7 participants 11 revisits**
Leaflet	4 participants 6 turns	2 participants 6 turns	6 participants 12 turns	3 participants 6 turns	4 participants 6 turns	7 participants 12 turns	**13 participants 24 turns**

The summarized number of turns of the leaflet group is more than twice as big than the summarized number of revisits of the online configurator group. Also, almost two times more people at the leaflet group take turns at all, compared to the online configurator group. There are also no notable differences between the two genders or age groups (just one difference of the online configurator between younger and older women). This hypothesis can be also **verified**.

3. **The car customization process is more effective when using the online configurator than when using the leaflet.**

Variable: number of customized features. In usability research, "effectiveness" is mainly defined as the "accuracy and completeness with which users achieve specified goals" (see Mifsud, 2015: unpaged). The goal in this experiment was to customize a car, which was reached by every participant. To measure the effectiveness of the customization process, the number of customized features is counted and compared. This enables a comparison between the two methods. The number of the "twins" are directly compared in the following grid. "M/F" defines gender, "A" is age group 30-45, "B" is age group 46-60; "P/N" means partner/no partner, "+/-" means children/no children.

	Online Configurator	**Leaflet**
MAP+	4	8
MAP-	5	4
MAN+	5	5
MAN-	6	3
MBP+	4	4
MBP-	5	4
MBN+	6	3
MBN-	5	4
FAP+	7	7

FAP-	6	2
FAN+	4	7
FAN-	7	4
FBP+	4	3
FBP-	6	7
FBN+	8	5
FBN-	6	6
∑	**88**	**76**

Table 88: Hypothesis 3

The total number shows that the online configurator is (slightly) more effective than the leaflet. More features are customized when using the online configurator. Apart from a few exceptions, for every „twin pair", the participant who used the configurator customized a higher number of features. Therefore, this hypothesis can be **verified**. *(Yet, it must be mentioned that the leaflets have various contents. They sometimes offer more possibilities to customize a car (up to 8-10), whereas other car model leaflets offer only 3-5 possibilities. This should be taken into consideration regarding this hypothesis.)*

4. **The car customization process is more efficient when using the online configurator than when using the leaflet.**

Variable: "Efficiency" is defined by the time that was taken for completing several tasks in the usability sector (see ibid). For answering this hypothesis, the length (time passed) of customizing the single features was measured. Then, the mean time of all participants' lengths were calculated. The details of all times and participants would extend the volume of the thesis, which is why only the mean times are shown beneath.

Sometimes, not all participants (this applies especially to the participants that used the leaflet) did or could choose certain features. Then that feature was left out and the mean value was not calculated by dividing the numbers by all e.g. 16 participants, but by the remaining 14., so the outcome value would not get distorted.)

	Online Configurator	**Leaflet**
Car Model	Ø 0,46 mins	Ø 0,52 mins
Color	Ø 1,23 mins	Ø 0,41 mins
Tire Rims	Ø 0,38 mins	Ø 0,33 mins
Seats	Ø 0,54 mins	Ø 0,48 mins

Equipment	Ø 3,10 mins	Ø 1,32 mins
Accessories	Ø 0,47 mins	Ø 0,37 mins
Ø	Ø 1,16 mins per feature	Ø 0,51 mins per feature

Table 89: Hypothesis 4

The numbers show that people take longer for customizing most features when they use the online configurator. Especially the "equipment" feature takes especially longer on average for people who use the online configurator. People who use the leaflet generally take less time for customizing their features, which can also be seen in the overall average time. People who used the leaflets also seemed to decide more spontaneous and didn't alter their choice once they made it. The participants who used the online configurator however often altered their choices. People often "played around" with different choice options, e.g. when choosing a color or the tire rims. This could be reasoned because the online configurator offers a responsive design which shows the changes immediately, which may have led people to try out several designs because they instantly can see how the designs look on the car, while this possibility is not given when customizing the car with a leaflet. People also read information longer when using the configurator, which was also not the case for people who used the leaflet (see H1), which also is a reason why they took longer. They absorbed more information and tried out more possibilities, which is why the people who used the leaflet took less time for customizing their features. On the other hand, the time people spend customizing their car does not differ that much between the two methods (see H5). This shows, that the leaflet is more efficient, yet the remaining time must be spent differently (see e.g. H7). The hypothesis can be therefore **falsified**.

5. **The online configurator is more time-saving and more informative than the leaflet for the younger age group.**

Variables: overall length of the customization process and time people spend with looking at informative content (see H1.) To get the numbers of "time of looking at informative content", the AOIs 1, 2 and 5 are summarized for every participant at every step when they customize their car (e.g. color, seats). After summarizing the times, the mean time values are calculated. To provide an overview, only those

mean values are shown in the following grid, because presenting all the data would lead to confusion and extend the length of the thesis.

	Online configurator		**Leaflet**	
	30-45	46-60	30-45	46-60
Ø Time of looking at informative Content	4,01 mins	3,45 mins	1,53 mins	2,32 mins
Ø Overall length	12,00 mins	13,03 mins	10,18 mins	13,13 mins

Table 90: Hypothesis 5

The numbers show on the one hand, that people who used the online configurator did not save time on average compared to the people who used the leaflets. Au contraire, the younger group of people who used the leaflets took less time for customizing their car on average. The older group takes slightly more time on average. Apart from that, people who use the online configurator spend more time looking at informative content. This is the case for both age groups. The overall length is bigger when looking at the older age group of the configurator, but so is the time of looking at informative content. Yet, also the older age group spends more time looking at informative content when using the online configurator than when using the leaflet.

The hypothesis therefore can be **verified partly**.

6. **The older age group needs a bigger amount of time for navigating and orientating themselves through the sites of the online configurator than the younger age group.**

Variables: The amount of “time for navigating” is split up into the five main parts of the configuration process. Also, “time for finding out how to continue” is measured, which shall show how good the participants can find their ways through the configurator and how they find orientation. The “number of repeated clicks on one place” shows if participants had to repeat their clicks (e.g. on the “Weiter”-Button) because they didn’t click properly the first time. This measurement can also be used as a navigation variable (see Fernández-Caballero et al., 2018).

The following numbers and times show mean numbers that were calculated based on the 16 participants. The mean numbers base on one whole configuration process.

		30-45	46-60
Ø Time of navigation on sites	Fuel and motorization	0.43 mins	1.43 mins
	Color	0.45 mins	0.56 mins
	Tire rims	1.22 mins	1.04 mins
	Equipment	2.11 mins	2.58 mins
	Accessories	1.10 mins	0.51 mins
Ø Number of repeated clicks on one place/useless clicks		4	7
Ø Time passed for finding out how to continue (e.g. finding "Weiter"-Button) for all 5 subcategories		∑ 1,32 mins	∑ 2,24 mins

Table 91: Hypothesis 6

All three variables show that the older age group takes more time and also a bigger number of repeated clicks to continue their process (apart from "tire rims" and "accessories" which showed a slightly shorter amount of time). The older age group therefore takes more time and a bigger effort to navigate through the sites than the younger age group. This hypothesis can be **verified partly**.

To illustrate this hypothesis, combined gaze plots and heat maps are shown now.

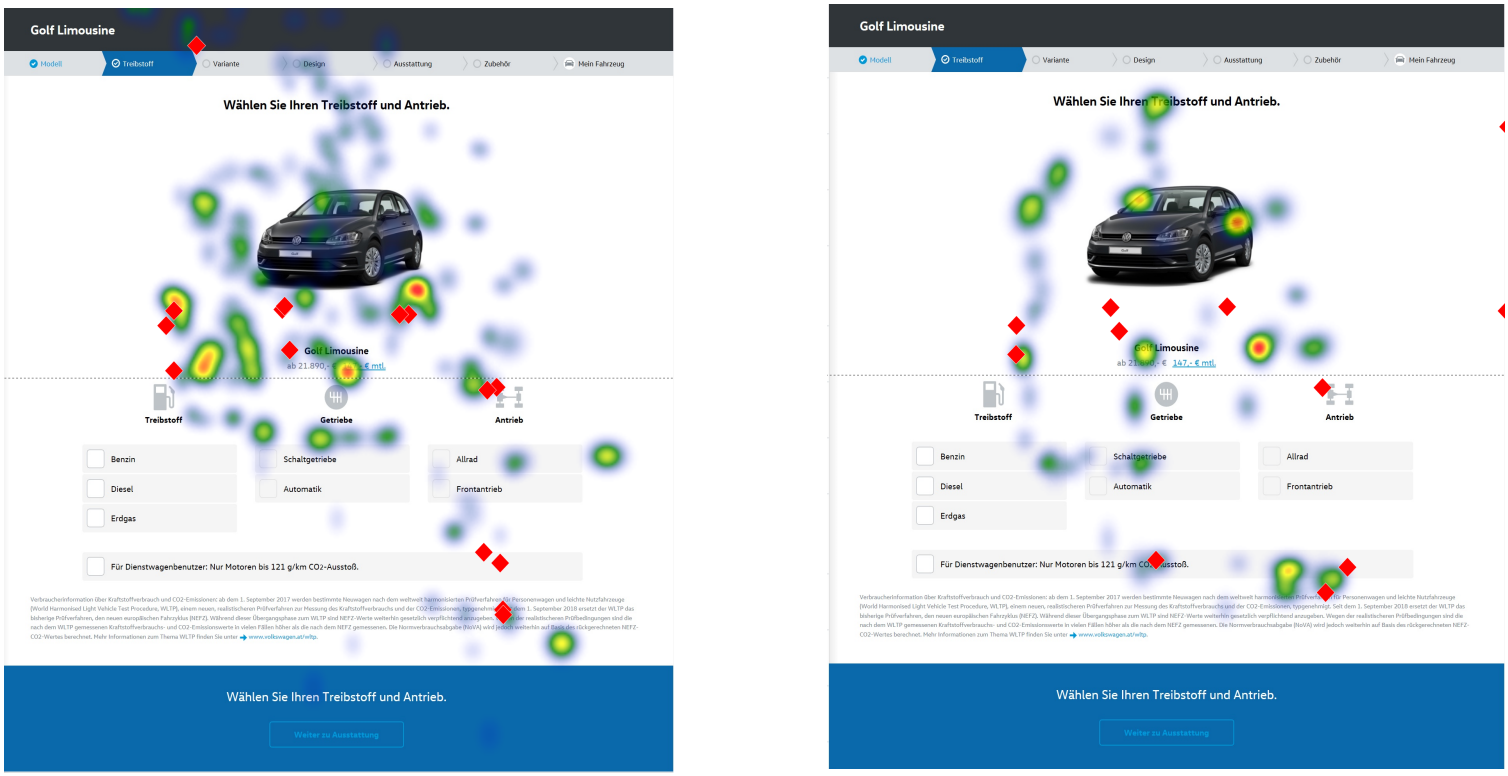


Figure 30: Combined heat maps of participants of old and young age group. The older age group can be seen on the left. More repetitive clicks (red rhombs) are visible here (several rhombs on the same place). © SMI, 2019.

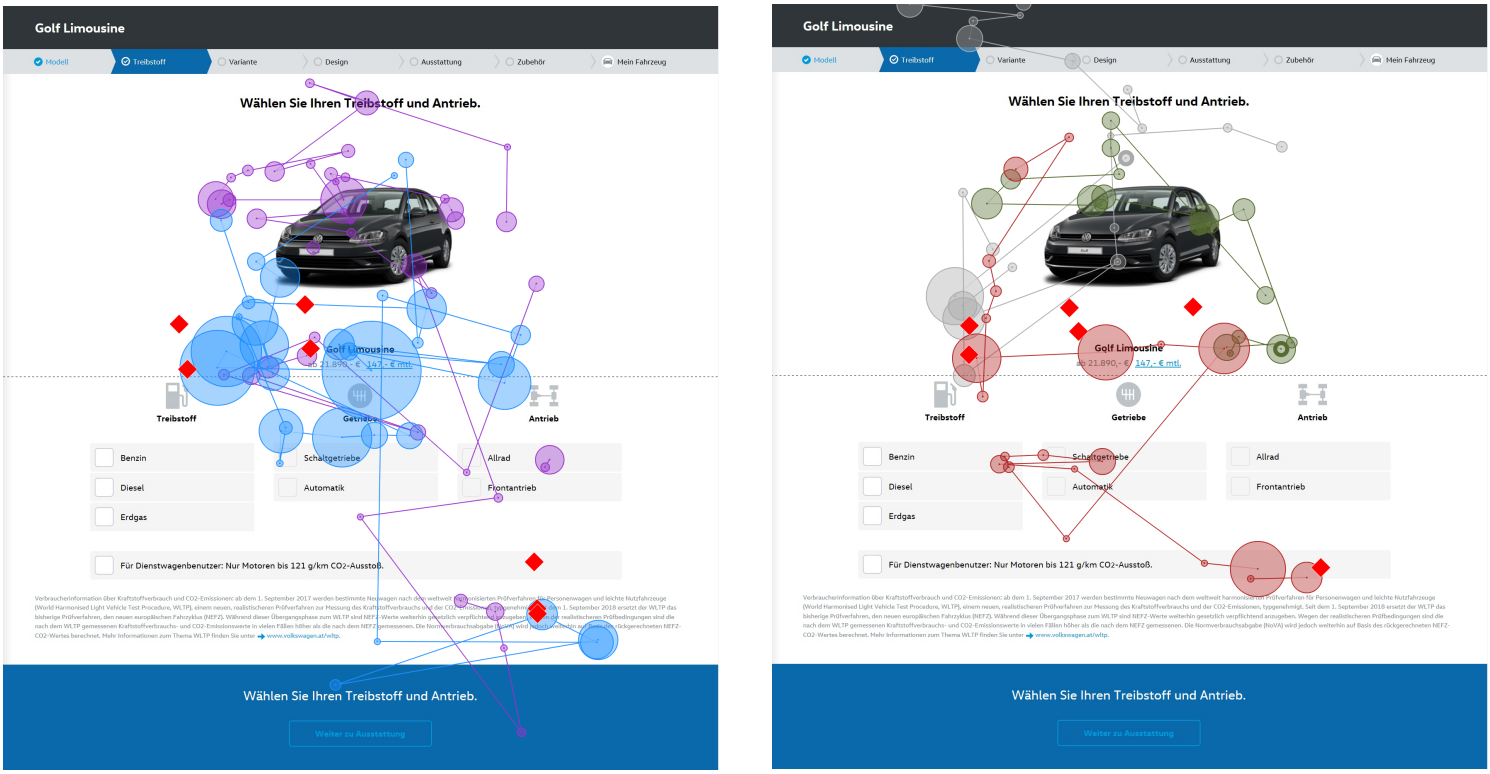


Figure 31: Combined gaze plots of participants of old and young age group. The older age group can be seen on the left. Longer fixations are visible, as well as smaller ranges of movement, which is typical for older age groups when browsing web sites. The younger age group shows derailed attention (see Bergstrom/Schall, 2014). © SMI, 2019.

7. **Participants that customize their car with a leaflet spend more time with looking at pictures than with the actual customization process.**

Variables: the "time looking at pictures" is measured via AOI 4,5 and 7. (visual information and presentation). „Length of customization process" is defined by AOI 1, 2 and 5 because participants looked at those AOIs before making their final customization decisions.

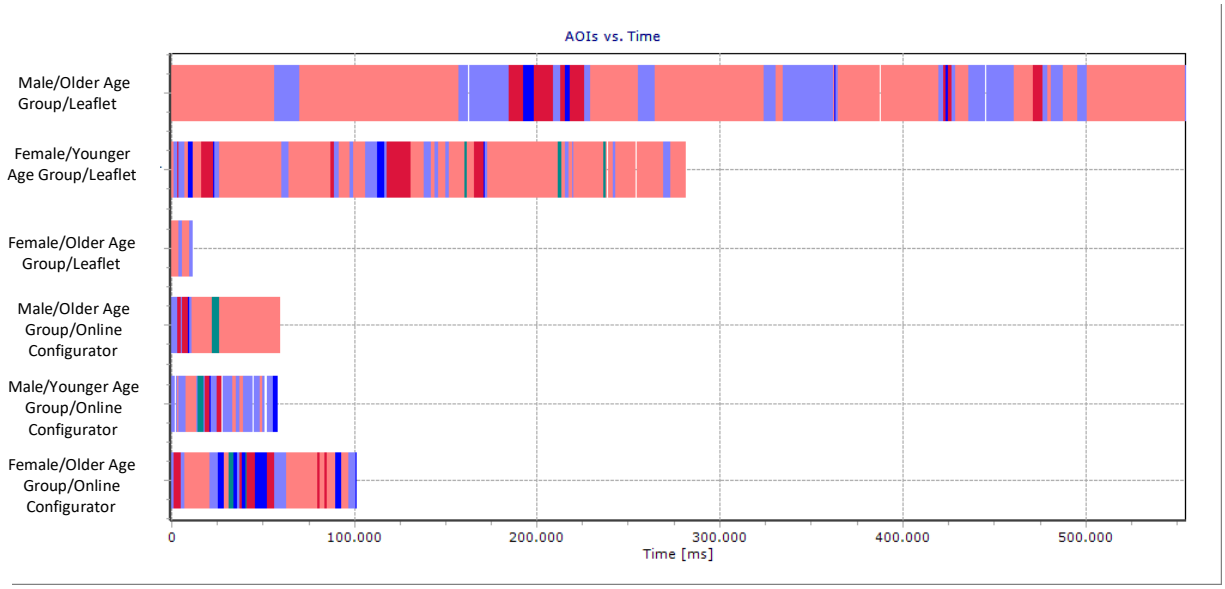
	30-45	46-60	∑
Ø Time of looking at pictures	3,44 mins	2,26 mins	3,05 mins
Ø Length of customization process	5,32 mins	8,26 mins	6,59 mins

Table 92: Hypothesis 7

Participants that belong to the younger age group don't show a preference for pictures. Their length of looking at pictures is not longer than their length of the actual customization process. Also, the other group spends more time with reading content. Looking at pictures generally seems to be also an important part of the customization process but reading informative texts and looking has a higher priority for customizing the car. The overall two average times also show that preference. This hypothesis is **falsified**.

To illustrate this hypothesis, the segmentation of pictures and text (AOIs) of six exemplary participants is now shown. Red colors show the observation of text, blue colors show the observation of pictures (green color stands for AOI no. 6 "rest"). The graphic shows that there are no obvious differences between men and women – the proportion between observed text and observed pictures depends on the single participant after all.

Figure 32: Division of texts and and pictures. © SMI, 2019.



8. **Participants who customize their car with the online configurator spend more time with reading facts and information than participants that customize their car with a leaflet.**

   Variable: the mean values of "length of reading facts and information" (AOI 1 and 2), will be compared between the online configurator and the leaflet.

	Online configurator		**Leaflet**	
	30-45	46-60	30-45	46-60
Ø Length of reading facts and information	4,01 mins	3,39 mins	1,53 mins	2,57 mins

Table 93: Hypothesis 8

The participants that customized their car with the online configurator needed a higher amount of time reading facts and information than the group of people who used the leaflets, independently of age. This can have various reasons, e.g. that there is the possibility that the online configurator basically *offers* more informative content than the leaflets while they are mainly permeated with site-filling pictures, presentative texts and therefore lack the amount of informative content the online configurator can offer. The participants spent more time reading informative content when using the online configurator than the participants who used the leaflet anyway, which is why this hypothesis is **verified**.

9. **Women observe pictures more intensively than men at both methods (online configurator and leaflet).**

   Variables: the average time of observing pictures (AOI 4, 5 and 7) is measured for men and women, independently of their age groups. This and the next hypothesis show the numbers in a different kind of grid to deliver a better overview.

			Ø Length of looking at pictures
Online Configurator	Men	30-45	2,45 mins
		46-60	2,55 mins
		∑	2,50 mins
	Women	30-45	2,40 mins
		46-60	3,21 mins
		∑	3,01 mins

Leaflet	Men	30-45	3,18 mins
		46-60	2,31 mins
		∑	2,55 mins
	Women	30-45	3,24 mins
		46-60	3,47 mins
		∑	3,41 mins

Table 94: Hypothesis 9

The numbers show that women show a slightly higher interest in pictures than women, independently of both age groups. They look at the pictures for a longer duration of time, while men apparently spend their time differently when customizing their car (e.g. reading texts, see H10). This can be seen especially obvious for the group who used the leaflet. This can have several reasons. Former eye-tracking studies already showed that women look at pictures more intensively than men for several reasons (pictures are more appealing, give more information in a shorter amount of time) (see Bayliss, 2005). Also, the leaflets show a high number of pictures of people, especially women put into favorable situations (such as a successful businesswoman in the city, a dreamy young woman going surfing, another woman doing yoga, so all nice situation which are actually not relevant when buying a car, and still, most of the times, women are depicted. This could be seen as a strategy by Volkswagen to raise interest and awareness on women's side for cars unconsciously by showing pictures of other women who seem to be happy and successful *while* they own such cars), families and also dogs, which also can trigger emotional responses or at least draw attention from female prospects (see Fennis/Stroebe, 2016). So, there could be various reasons why female participants look at pictures more intensely than male participants. This hypothesis can be **verified**.

10. Men observe texts more intensively than women at both methods (online configurator and leaflet).

Variables: "observed text" is put together by the AOIs 1, 2 and 3. All kinds of text are considered because this hypothesis wants to measure if men generally read more texts than women, independently of the kind of text (informative/presentative).

			Ø Length of observing texts
	Men	30-45	3,31 mins

Online Configurator		46-60	3,54 mins
		∑	3,43 mins
	Women	30-45	3,09 mins
		46-60	3,40 mins
		∑	3,25 mins
Leaflet	Men	30-45	2,40 mins
		46-60	3,29 mins
		∑	3,05 mins
	Women	30-45	2,53 mins
		46-60	3,09 mins
		∑	3,01 mins

Table 95: Hypothesis 10

The age groups show two different results. The younger age group shows a slight difference of times between men and women. Still, that difference is not big. When it comes to the older age group, it can be seen that male participants do observe texts more intensively than women, but also here, the difference is not notably big. This shows that these differences are not big enough to be recognized as significant. The hypothesis is **falsified**.

To illustrate this hypothesis, exemplary heat maps and gaze plots of single participants are shown now.

(*Note*: *the reason for always choosing the same content of features (mostly "equipment" is reasoned because participants have remained longer on these sites/pages, because there are more options and choices. This enables a more detailed depiction of the eye movements, in contrary to other sites (such as "tire rims", "color", etc.), where people made their choices quite quick and therefore don't remain on the sites/pages that long).*

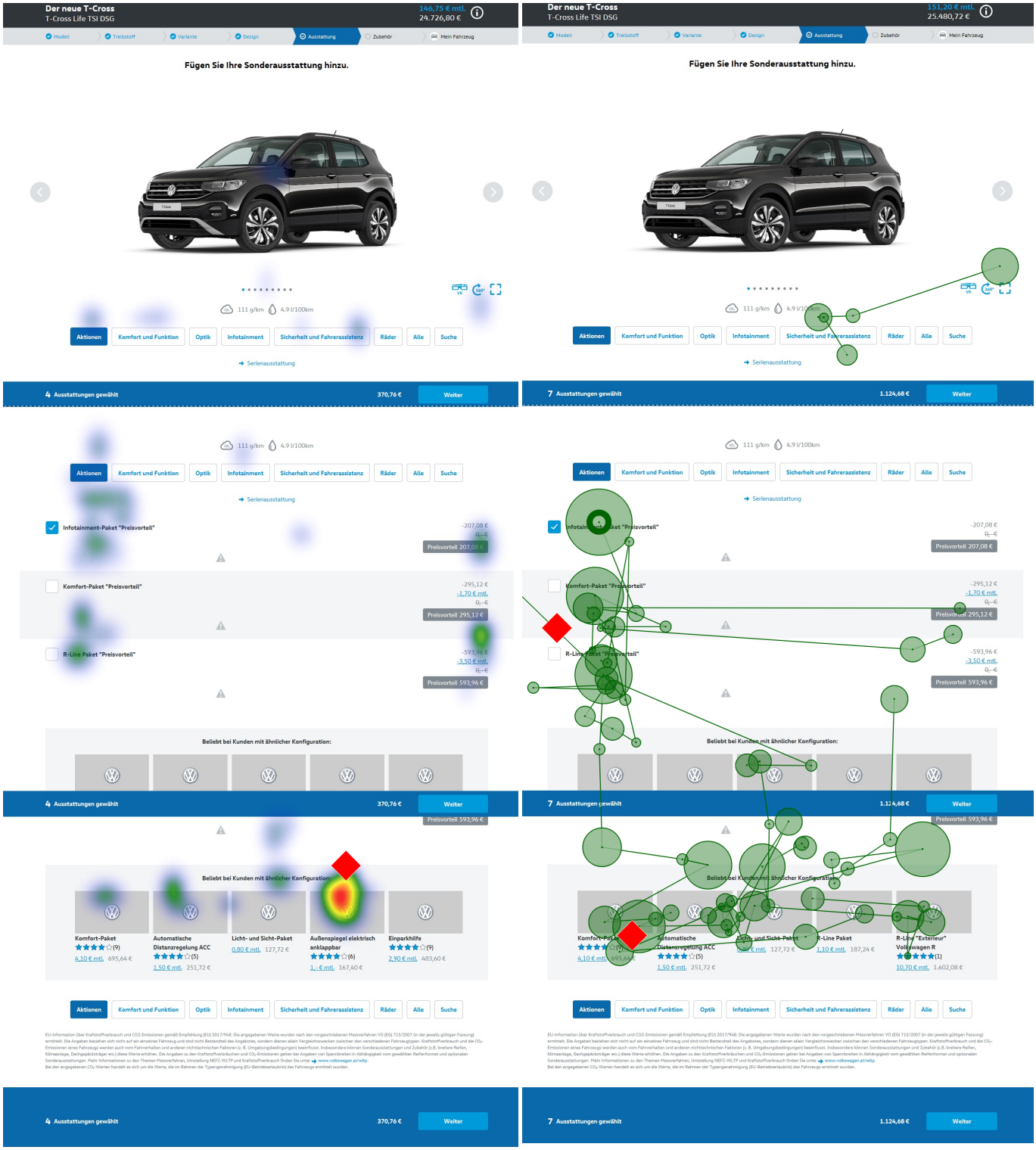


Figure 33: Heat map and gaze plot of a male participant of the younger age group. This participant has focused more on looking at pictures than reading texts: The heat maps as well as the gaze plots show a higher density on the pictures. However, the texts also have been observed. A notable event is that the participant gazed at the recommendations ("Beliebt bei Kunden mit ähnlicher Konfiguration") for quite some time and even chose one by clicking on it (see red rhomb at the right graphic). This participant is not the only one who made choices based on recommendations. © SMI, 2019.

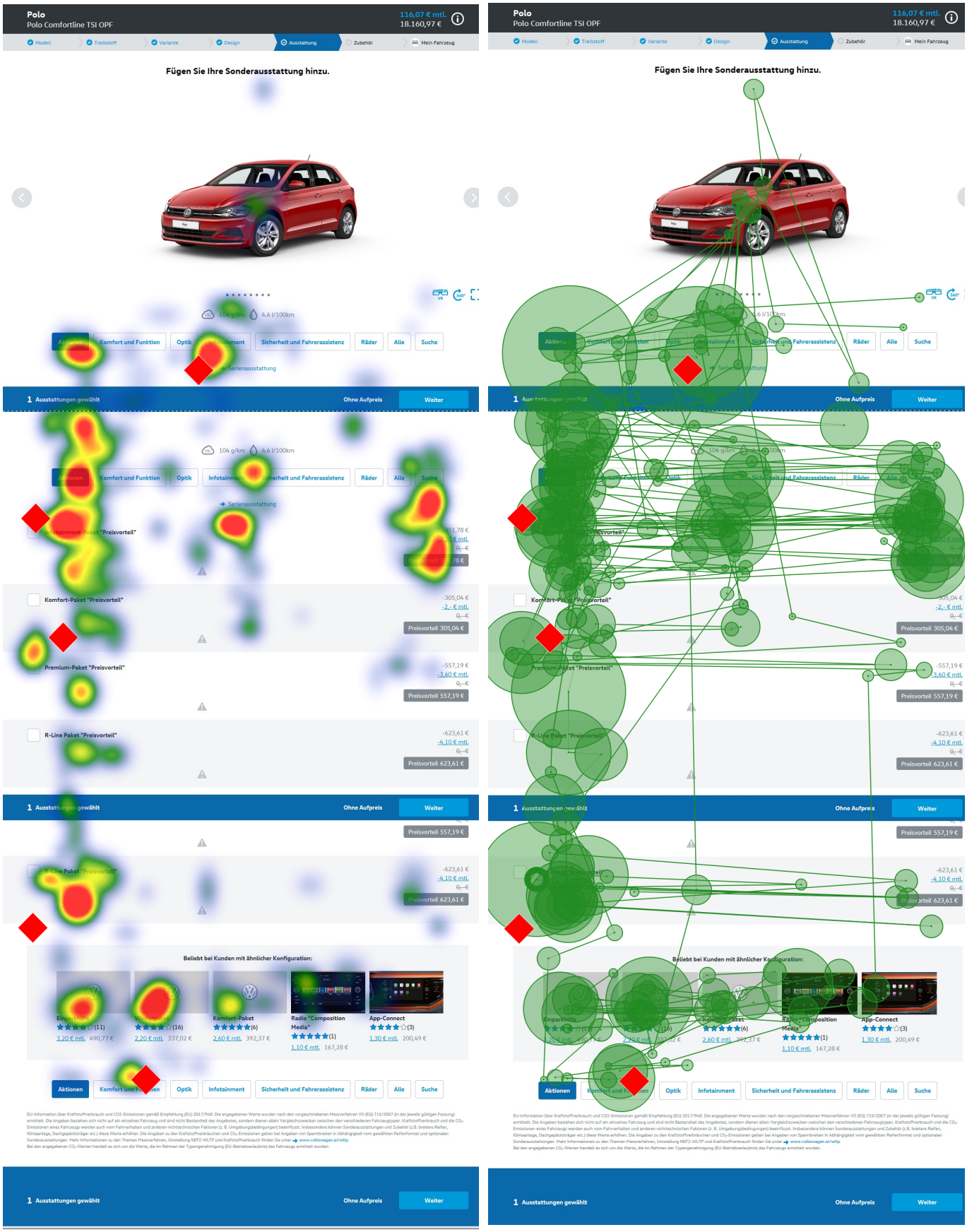


Figure 34: Heat map and gaze plot of a female participant of the older age group. This participant shows a very detailed examination of the various choice options. She looks at the texts most of the time and rests her gaze for some time (visible because of the red color of the heat maps and the size of the gaze plots at the texts). She, as well, shows interest in the recommendations ("Beliebt bei Kunden mit ähnlicher Konfiguration") and observes them (here pictures mostly) for quite some time. © SMI, 2019.

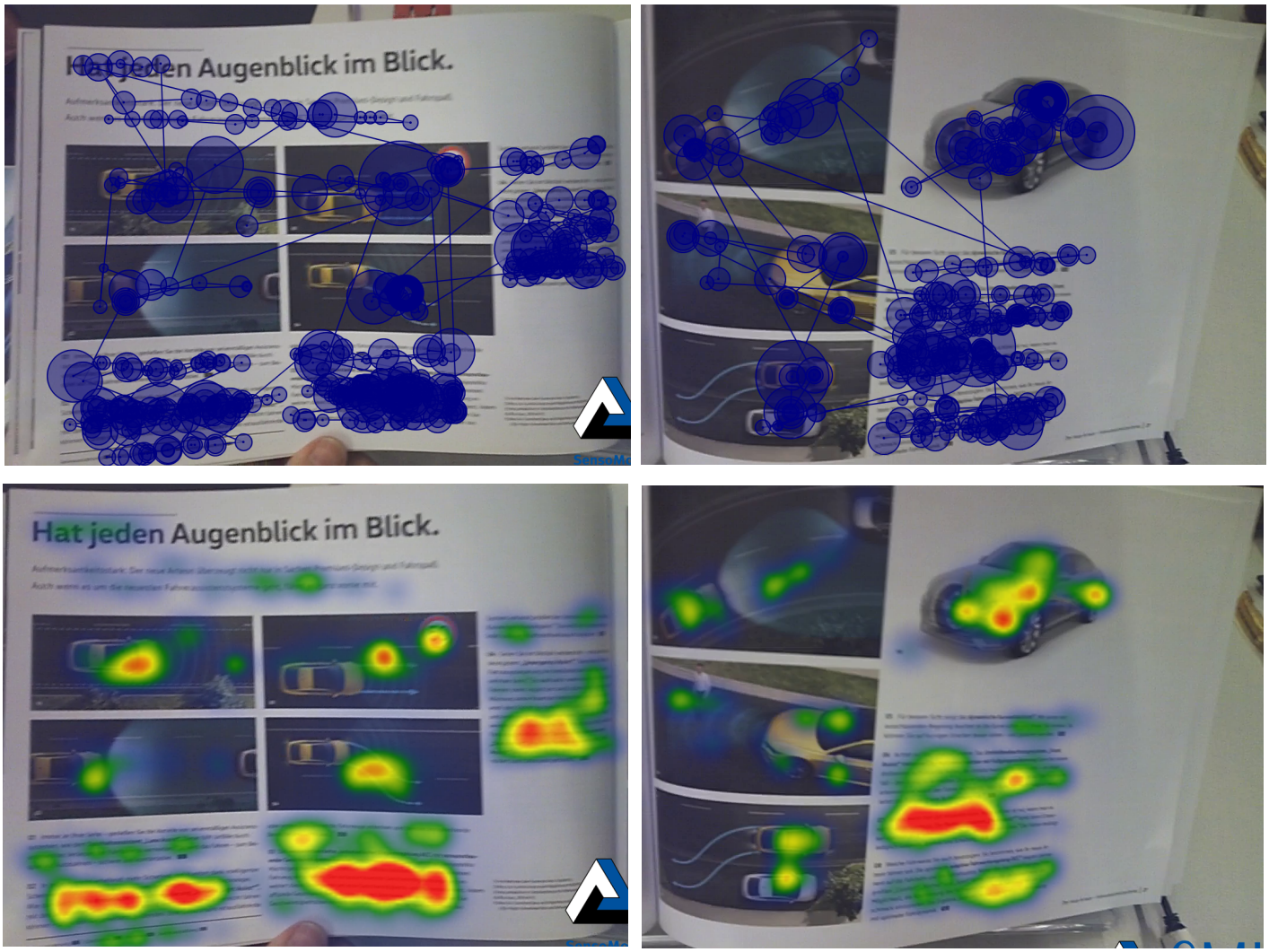


Figure 36: Heat maps and gaze plots of a male participant of the younger age group. This participant studied the leaflet very accurately and looked at almost every kind of content. The bigger focus, however, lies on reading texts, as it can be seen by comparing the density and size of heat maps (also the color here is notable: red color occurs in bigger areas when observing texts) and gaze plots at the texts and the pictures. © SMI, 2019.

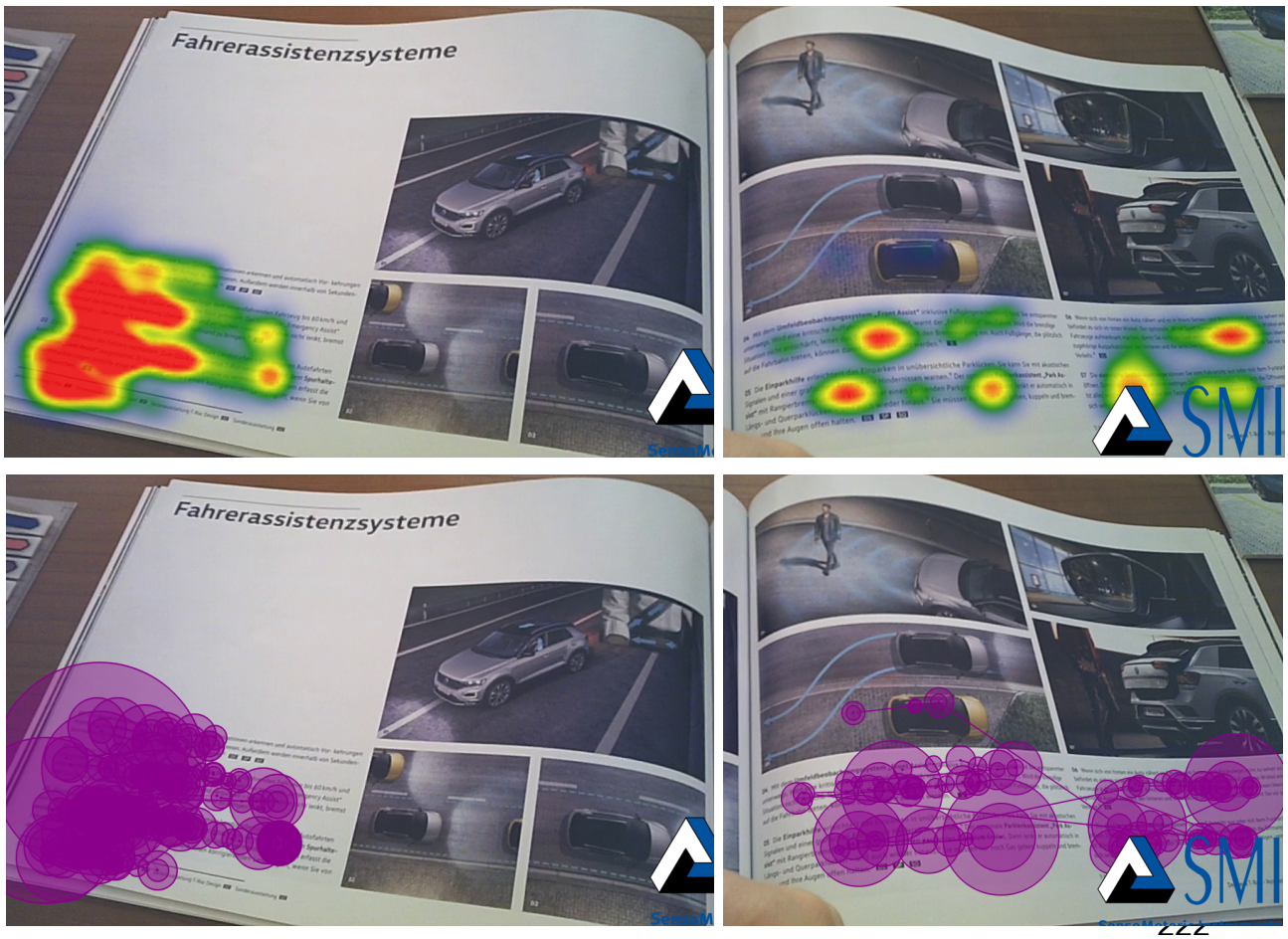


Figure 36: Heat maps and gaze plots of a female participant of the younger age group. This participant almost exclusively observed texts and just gazed at one picture for a very short amount of time, as visible on both graphics. The texts were observed very carefully, especially on the left page: Note that almost the whole area of the heat map is colored red. © SMI, 2019.

There is, however a difference, *how* women and men look at a site. An example can be seen here:

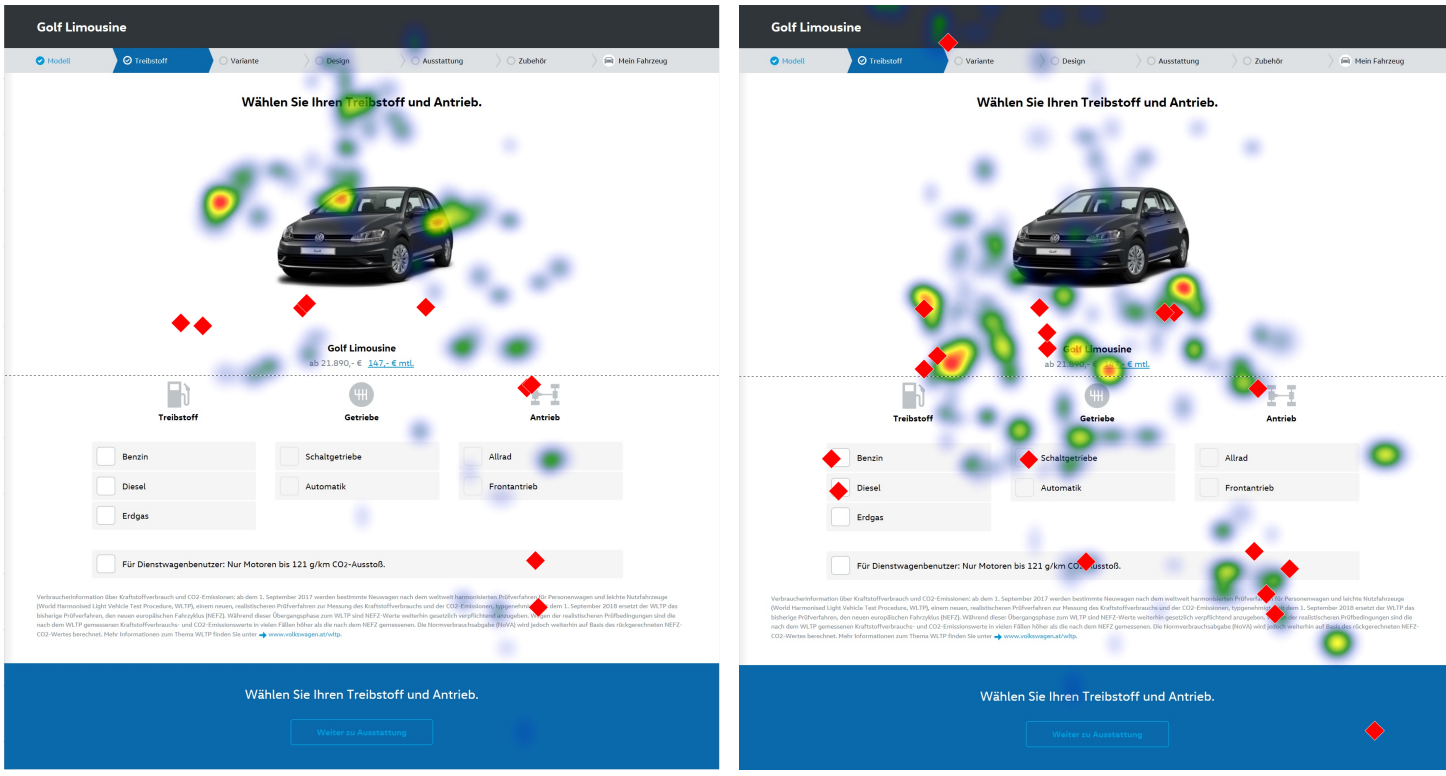


Figure 37: Combined heat maps of participants of male and female participants. The male participants can be seen on the left, the female participants are depicted on the right picture. While men don't show a very high density of heat maps, women show a higher density and also a higher number of clicks (red rhombs). Women also seem to look more closely at textual content while men look at pictures more intensively here. © SMI, 2019.

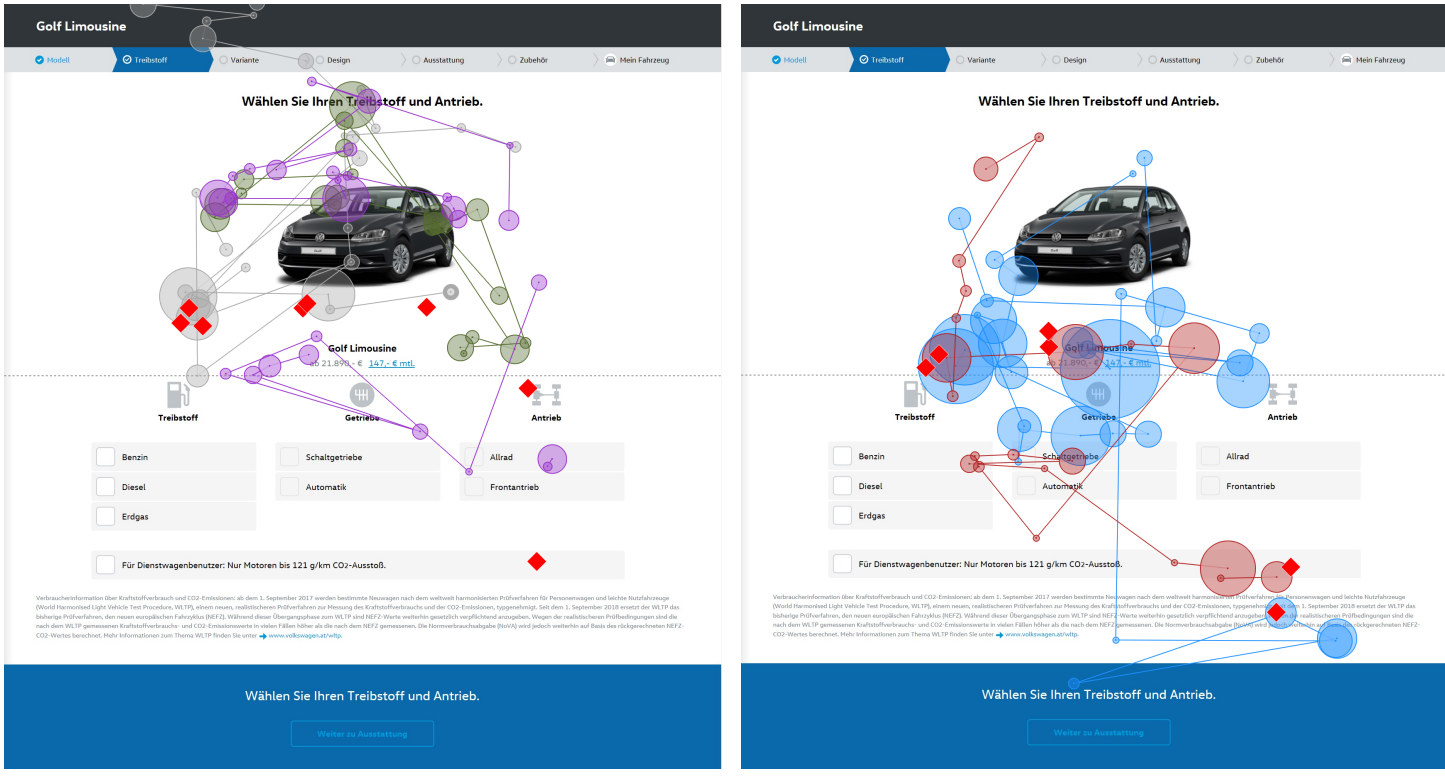


Figure 38: Combined gaze plots of participants of male and female participants. The male participants can be seen on the left, the female participants are depicted on the right picture. Men look at the content more shortly and hectic, while women take more time to observe content longer (size of the gaze plots increases with length of gaze). Also, men look around more intensively than women (gaze plots spread wider at the left depiction) © SMI, 2019.

11. Customizing the car with the online configurator led to a higher rate of satisfaction, also with the outcome than customizing the car with the leaflet.

Variables: This hypothesis is examined with the aid of the post questionnaire. Three questions are taken into consideration: No. 15: “Would you show the customized car to your friends and acquaintances?” and no. 16: “Would you recommend the configurator concerning usability/practicability?” Both questions were to be answered with yes or no. The third question is no. 12: “How do you rate the configurator concerning your result (the completely customized car)?”. Multiple answers were possible, three positive and one negative answer could be chosen.
Those questions are chosen because it shows the satisfaction of the participant with the result of their study. The variables are deduced from the Technology Acceptance Model III (TAM3).
The number of answers of “yes” and “no”/positive and negative answers is compared for both methods in the following grid. The method with the higher number of “yes”/positive answers shows the higher satisfaction rate.

		Online Configurator	**Leaflet**
12: “How do you rate the configurator concerning your result?”	**Positive answer**	21	17
	Negative answer	0	1
15. “Would you show the customized car to your friends and acquaintances?”	**Yes**	11	13
	No	5	3
16: “Would you recommend the configurator concerning usability/practicability?”	**Yes**	6	10
	No	10	6
∑		**38**	**40**

Table 95: Hypothesis 11

The grid shows a slightly higher number of answers on site of the leaflet. Interestingly, the participants almost only give positive answers at question no. 12. The uneven number of positive and negative answers should be taken into consideration, but all possible answers were taken into the analysis to not distort the outcome. The difference between the online configurator and the leaflet is most

obvious at question no. 16: only 6 of 16 people would recommend the online configurator, while at least 10 of 16 people would recommend the leaflets.
These numbers show a lower satisfaction rate for the online configurator. The hypothesis can be **falsified**.

12. The Usability was rated better by people who used the online configurator than by people who used the leaflets.

Variables: This hypothesis is examined with the aid of the post questionnaire. Four questions that examine perceived usability features are taken into consideration: No. 6: “Did you have the feeling of having full control over your configuration while customizing the car?”, No. 8: “How do you rate the customization possibilities (color of car, motorization…)?”, No. 9: “Rate the whole visual structure of the configurator” and no. 13: “How do you rate the general usability of the configurator?”
The variables are deduced by usability research by Nielsen, 2013, the TAM3 and visual usability research (e.g. Schlatter/Levinson, 2013).
All the questions have different types of answers (grades/”yes-no”/Likert scales). The following grid show mean values and sums of numbers of the given answers to provide an overview where people have decided in favor of the online configurator and when they decided in favor of the leaflets. To ease the readability, positive/better answers are colored in green.

	Type of answer	Online Configurator	Leaflet
6: “Did you have the feeling of having full control over your configuration while customizing the car?”	Yes	1	7
	No	15	9
8: “How do you rate the customization possibilities (color of car, motorization…)?”	Too many	3	1
	Right amount	6	10
	Not enough	7	5
9: “Rate the whole visual structure of	The visual structure was…	***Likert Scale Ranging from 1-4 → mean values***	
		1 Clear – 4 Unclear	2,88	1,89

the configurator”		1 Logical structure – 4 illogical structure	2,38	2,01
		1 appealing – 4 not appealing	2,81	2,12
		1 intuitive – 4 in need of explanation	2,81	2,31
	The buttons and symbols were…	Too big	0	0
		Too small	2	8
		Alright	14	8
	The buttons and symbols were…	Understandable	13	13
		Incomprehensible	3	3
	The number of pictures and illustrations were…	Bothering to me	0	1
		Pleasant to me	11	9
		Neutral	5	6
	13: “How do you rate the general usability of the configurator?”	*Grades from 1-6. 1 is best, 6 is worst → Mean value*	3,0	2,0

Table 97: Hypothesis 12

Question no. 6 was answered in favor of the leaflets. Only *one* of 16 participants that used the online configurator had the feeling that he/she had the control over the customization, while at least 7 of 16 people of the leaflet group had that feeling.

Also, question no 8 was answered in favor of the leaflets: The customization possibilities were perceived in an appropriate amount by 10 of 16 people of the leaflet group, but just by 6 people in the online configurator group. The majority of the remaining 10 complained about having not enough possibilities.

Question no. 9 consisted of four sub-questions. The first sub-question was how people perceived the visual structure of the configurator and had to be answered in a Likert scale. The mean values of every answer were calculated. Comparing the two mean values of every answer, all values are in favor of the leaflets. The second sub-question asked about the size of buttons and symbols. Here, the online configurator was rated better than the leaflets (8 people of the leaflet group complained that they were “too small”). The third sub-question asked about the understandability. Here, both methods were rated equally. The last sub-question asked about the number of pictures and illustrations. “Neutral” was also considered as a positive answer, because in a usability context, a neutral experience can be evaluated as positively because it’s not perceived negatively or bothering (see

Nielsen, 2013). The number of positive answers was almost equal for both methods (online configurator: 16, leaflet: 15).

Question no. 13 asked the participants to rate the usability of the methods with a grade ranging from 1 to 6. The leaflet was graded a whole grade better on average than the online configurator.

Summarizing this grid, 7 values are in favor of the leaflet, 2 values are in (slight) favor of the online configurator and 1 value is equal for both methods. The design of buttons and pictures at the online configurator is rated better than at the leaflets. Nevertheless, with an absolute majority of 70% of values in favor of the leaflet, the usability is definitely rated worse for the online configurator. Especially the visual structure rated much worse, as well as the feeling of control. This hypothesis can be **falsified**.

13. The navigation is perceived easier and more comfortable by people who use the online configurator than by people who used the leaflets.

Variables: This hypothesis is examined with the aid of the post questionnaire. Two questions that examine perceived usability features are taken into consideration: 2: "How was the navigation of the configurator for you?" and 5. "Did you experience difficulties when customizing your car?"

The questions have difficult types of answers (Likert scale/"yes-no"). The following grid show mean values and sums of numbers of the given answers to provide an overview where people have decided in favor of the online configurator and when they decided in favor of the leaflets.

Table 98: Hypothesis 13

	Type of answer	**Online Configurator**	**Leaflet**
2: "How was the navigation of the configurator for you?"	***Likert Scale Ranging from 1-4 → mean values***		
	1 self-explaining – 4 confusing	2,75	1,75
	1 intuitive – 4 complicated	2,00	1,81
	1 logical – 4 incomprehensible	2,63	2,25
5: "Did you experience difficulties when customizing your car?"	Yes	11	3
	No	5	13

Both questions show that the answers are in favor of the leaflet. Every mean value that was calculated from question no. 2 is in favor of the leaflet. Although both methods are not rated bad, the leaflet shows visibly better results than the online configurator, especially concerning the self-explanation. Also question no. 5 shows a preference for the leaflet with just 3 of 16 people stating that they had difficulties when customizing their car, while 11 of 5 – so almost 70% of the online configurator group stated they experienced difficulties. The number is almost three times as high as the number from the leaflet group. Seeing the results of both questions, this hypothesis can be **falsified.**

14. The leaflets evoke a higher number of (positive) feelings than the online configurator.

Variables: The perceived feelings were asked in the questionnaire that was handed out after the study. To answer this hypothesis, question no. 10 and 11 are used (10: "What feelings did you perceive while configurating?", 11: "Did you generally feel good while configurating?"). The questions already had predefined answers. 10 had 3 negative ("boredom", "incomprehension", "frustration") and 2 positive feelings as answers ("excitement", "fun") (multiple answers were possible), 11 had one negative and one positive feeling as answers ("felt good"/"didn't feel good").

The sum of all emotions that were perceived is calculated. Afterwards, the proportion between negative and positive emotions is calculated and the numbers of the leaflet and the online configurator are compared.

	Online configurator		**Leaflet**	
	Positive Emotions	Negative Emotions	Positive Emotions	Negative Emotions
Question No. 10	16	14	19	7
Question No. 11	11	5	14	2
∑	27	19	33	9
∑∑	46		42	

Table 99: Hypothesis 14

The numbers show that both of the methods evoke a high number of emotions. The group that used the leaflet generally showed a higher number of positive emotions (applies for both questions). Also, the proportion between positive and negative

emotions is lower at the leaflet group, as generally a lower number of negative emotions is evoked, compared to the online configurator group. The online configurator group also expressed a high number of feelings – even a slightly higher number in general – but the proportion between positive and negative emotions is more equal here. Question no. 10 shows an almost equal number of positive and negative emotions. Especially incomprehension and frustration score high numbers (see descriptive analysis), which shows that the people who used the online configurator experienced positive feelings on the one hand – such as excitement and fun, but also negative feelings were perceived when they didn't get along with the online configurator the way they wanted to. One participant even verbally expressed "feelings of hatred", while another participant stated she got aggressive while customizing her car with the online configurator. Negative feelings such as anger as a consequence of incomprehension are often experienced by users when using a computer application that doesn't work the way it is expected to (see Fernández-Caballero et al., 2018). This shows that the online configurator evokes a higher number of negative feelings, which also leads to a generally higher number of feelings. The leaflet group on the other hand shows a smaller number of negative feelings, which also could be the case because the participants didn't have to learn something new or involve themselves in a technical experiment. All they had to do is scroll through a leaflet – so they could perceive negative feelings about the content, but not that much about the technical implementation and functionality like people who used the online configurator could. The numbers therefore show that the leaflet does evoke a higher number of positive emotions – especially looking at the proportion to the number of negative feelings. However, the configurator evokes a higher number of general emotions. The hypotheses can be **verified partly**.

15. **Participants that customized their car with the leaflets, who have a partner, one or more child(ren) or both spend more time looking at pictures of people than participants who don't have a partner, one or more child(ren) or both.**

Variable: AOI 7 (pictures of humans) was used for the examination of this hypothesis. Participants that use the leaflet are split up into two groups: 1: "partner/child(ren)/both"

and 2. “single” (neither partner nor children). The gazes of the participants are examined and compared (where they look at first, and how they long they look on it). Due to the uneven number of the two groups (1 includes 12 participants, 2 includes 4 participants), the numbers of how long the participants looked at pictures were not summed up, but a mean value was calculated. The two mean values then will be compared.

	Leaflet	
	Group 1	Group 2
Ø Length of looking at pictures of humans	1,39 mins	1,03 mins

Table 100: Hypothesis 15

The mean numbers show that people of the first group do look at depictions of humans longer than people of the second group on average. There is more than 30 seconds difference, which shows that apparently people who do have a family/a partner/child(ren) are keener to look at pictures of people than people who live on their own. This can have various reasons, e.g. that people of group no. 1 don’t only think of themselves when they customized the car (people were instructed to imagine their current life situation and customize a car based on it), but also on their family members which caused them to look at the pictures of people more than people who customized the car just for themselves. It is also notable that especially women tend to look at pictures of people more often and also for a longer amount of time. Maybe people of group one looked at depictions of people who they connected with their own life situations, such as couples or families. The cause behind this phenomenon cannot be explained, but there is a various number of potential reasons. Also, the low number of group number 2 (four people) should be taken into consideration. The proportion between the two mean numbers could be coincidental, because the number is not very high at all. These facts should be taken into consideration at the answering of this hypothesis.

Still, the average time of group 1 is higher than the average time of group 2. The hypothesis is **verified**.

Hypotheses Questionnaire

The following hypotheses base on the second research question and will be answered based on analysis methods that were calculated in SPSS. Hypotheses 11 to 14 scrutinize a possible coherence between the willingness to buy a car online and four different potentially influencing factors. Hypothesis 15 rates the perceived usability of the online configurator and the leaflets. Hypothesis 16 examines possible differences between a male and the male subcategory.

The interpretation of the quantitative analysis contained some challenges. The potential influence of some variables on the willingness of customizing/looking for a car online were about to be researched. This required a correlation analysis. Normally, for correlation analysis, Spearman or Pearson analyses are required (see Field, 2017). The problem here was the wrong scaling of the variable "willingness to buy a car online" (question no. 18/22 in the quantitative questionnaire). Because the question was formulated "Would you customize/look for your car online or offline" and the answers were "online" and "offline". Spearman or Pearson does not allow analyses with nominal variables (see Field, 2017). Now, that only one answer "online" was needed, the variable was re-scaled to an ordinal variable, which enabled doing a Spearman correlation analysis. This kind of new variable is called *dummy variable*: The needed answer is rescaled with the value "1" ("online" in this case), while the redundant answer is rescaled with the value "0" ("offline" in this case). With this proceeding, SPSS leaves out all the answers with the value "0", and therefore only uses the needed ones ("online"). This method of rescaling values is common in statistics, see added links (although some[4][5][6][7]. With the dummy variable being rescaled *(being very strict, it is a metrically scaled variable, but metric variable also can be "down-graded" and seen as ordinal ones, see Field, 2017*) and the other variables being ordinally scaled anyway, the Spearman analysis could be used.

[4]https://www.researchgate.net/post/Can_one_calculate_Spearmans_rho_on_categorical_data_converted_to_dummy_variables

[5] https://www.methodenberatung.uzh.ch/de/datenanalyse_spss/zusammenhaenge.html

[6] https://marktforschung.fandom.com/wiki/Dummy-Variable

[7] https://www.statistik-tutorial.de/forum/viewtopic.php?f=2&t=10937&p=28263&hilit=metrisch+zu+nominal#p28263 (see „dutchie"'s answer

The testing always was split up into two variables, because people were able to choose if their next car should be a used car or a new car, which led to two variables that answer the same question (car online/offline), but one concerns prospects of new cars, the other one concerns prospects of used cars. The normal distribution was not tested because this is not necessary if one of the two tested variables is a dummy variable, which is the case in this analysis (see Kooyman, 1976; Janssen/Laatz, 2013).

H16: The satisfaction of the last guidance situation at a car dealership influences the willingness to buy/customize a car online.

The dependent variable ("willingness to buy a car online") is taken from questions no. 18 and 22 (used car/new car) "Would you prefer choosing your car online or offline?"/"Would you prefer configuring your car online or offline?". The two items "online" and "offline" were transformed into a new dummy variable, scaling the answer "offline" as "0", which enabled an ordinal scale. The new variable was also taken for testing H2, H3 and H4.
The independent variable ("satisfaction of last guidance situation at a car dealership") is taken from question no. 7 "How happy were you with the following points when buying a car at a car dealership?". The points consisted of: price, offered variety of models and equipment, salespersons competence, salesperson's credibility, salesperson's patience, salesperson's friendliness. The rating scale consisted of four points, ranging from "very happy" to "very unhappy".
The items were transformed into a new variable by using the mean values from the initial variable, classifying it as an ordinal scale.
Investigating a possible coherence between two ordinal variables requires conducting Spearman's correlation coefficient analysis (see Berger, 2011). The coefficient can range from -1 to 1, which means that the correlation increases with the coefficient's closeness to |1|. A significance is given if its value is 0.05 or lower (see ibid). The relevant calculation outcomes are shown in the following grid.

Age Group	**Kind of car**	**Values**
30-45	Used Car (N=53)	Coefficient: 0,206
		Significance: 0,197

	New Car (N=48)	Coefficient: 0,103
		Significance: 0,511
46-60	**Used Car (N=47)**	Coefficient: **0,299**
		Significance: **0,052**
	New Car (N=61)	Coefficient: 0,195
		Significance: 0,133
∑	**Used Car (N=100)**	Coefficient: 0,212
		Significance: **0,053**
	New Car (N=109)	Coefficient: 0,188
		Significance: **0,056**

Table 101: Hypothesis 16

The highest numbers can be seen at the analysis of the collective numbers (significance slightly more than 0.05 and for the older age group buying used cars (significance slightly more than 0.05 and low correlation). The numbers are, however, not significant enough.

Due to the lack of given significance for all the tested groups, H11 can be **falsified**: There is no influence of the satisfaction of the last guidance situation at a car dealership on the willingness to buy/customize a car online.

H17: The personal value of owning a car for the individual influences the willingness to use an online configurator when buying the next car.

The dependent variable ("willingness to buy a car online") is taken from question no. 22 (new car) "Would you prefer configuring your car online or offline?". (Same procedure as in H11, but just using the variable that is used for buying new cars).

The independent variable is taken from question no. 5 "Think of your car/the next car you'd like to buy. How would you rate yourself at following points?". Participants then had to rate themselves at a six-point Likert scale consisting of three variables that rated the personal value of cars. The Likert scale then was also transformed into a new ordinal variable by using the mean values of the three variables.

Again, because two ordinal variables are investigated, a Spearman's correlation coefficient analysis is conducted. The relevant calculation outcomes are shown in the following grid.

Age Group	Kind of car	Values
30-45	Used Car (N=53)	Coefficient: 0,062
		Significance: 0,657
	New Car (N=48)	Coefficient: 0,111
		Significance: 0,454
46-60	Used Car (N=47)	Coefficient: 0,165
		Significance: 0,268
	New Car (N=61)	Coefficient: 0,163
		Significance: 0,209
∑	Used Car (N=100)	Coefficient: 0,050
		Significance: 0,625
	New Car (N=109)	Coefficient: 0,065
		Significance: 0,503

Table 102: Hypothesis 17

None of the generated numbers is even close to a significance or a correlation. Therefore, H12 can be **falsified**: The personal value of owning a car does not influence the willingness to use an online configurator when buying the next car.

H18: Self-efficacy and self-assessed competence for e-commerce platforms influences the willingness to buy/customize a car online.

The dependent variable ("willingness to buy a car online") is taken from questions no. 18 and 22 (used car/new car) "Would you prefer choosing your car online or offline?"/"Would you prefer configuring your car online or offline?".

The independent variable is taken from question no. 26 "How would you rate your personal interaction with online shops such as amazon.at or online platforms such as willhaben.at?". Participants then had to rate themselves at a four-point Likert scale consisting of three variables that rated the self-assessed competence for e-commerce platforms. The Likert scale then was also transformed into a new ordinal variable by using the mean values of the three variables.

Again, because two ordinal variables are investigated, a Spearman's correlation coefficient analysis is conducted. The relevant calculation outcomes are shown in the following grid.

Age Group	Kind of car	Values
30-45	Used Car (N=53)	Coefficient: 0,170
		Significance: 0,223
	New Car (N=48)	Coefficient: 0,124
		Significance: 0,402
46-60	Used Car (N=47)	Coefficient: 0,179
		Significance: 0,229
	New Car (N=61)	Coefficient: 0,037
		Significance: 0,777
∑	**Used Car (N=100)**	Coefficient: **0,216**
		Significance: **0,031**
	New Car N=109)	Coefficient: 0,101
		Significance: 0,298

Table 103: Hypothesis 18

Most of the numbers are not sufficient to be called significant or close enough to |1|, to be rated as correlating. Yet, there is a significant number (0,031) at the collective of people who would buy their next used car online, next to a little correlation (0,216).
This means, H13 can be **verified partly**: The self-assessment competence for e-commerce platforms influences the willingness to **buy** the next car online (if it is a used car).

H19: the importance of various options when choosing a car (model, equipment) influences the willingness to buy/customize a car online.

The dependent variable ("willingness to buy a car online") is taken from questions no. 18 and 22 (used car/new car) "Would you prefer choosing your car online or offline?"/"Would you prefer configuring your car online or offline?".
The independent variable is taken from questions no. 17 and 21 (used car/new car) "How important are following choosing options when buying a car?" Participants then had to rate the importance of eight/six choosing options at a four-point Likert scale The Likert scale then was also transformed into a new ordinal variable by using the mean values of the eight/six variables.

Again, because two ordinal variables are investigated, a Spearman's correlation coefficient analysis is conducted. The relevant calculation outcomes are shown in the following grid.

Age Group	**Kind of car**	**Values**
30-45	Used Car (N=53)	Coefficient: 0,147
		Significance: 0,293
	New Car (N=48)	**Coefficient: -0,288**
		Significance: 0,047
46-60	Used Car (N=47)	Coefficient: 0,030
		Significance: 0,842
	New Car (N=61)	**Coefficient: -0,292**
		Significance: 0,023
∑	Used Car (N=100)	Coefficient: -0,095
		Significance: 0,350
	New Car N=109)	**Coefficient: -0,294**
		Significance: 0,002

Table 104: Hypothesis 19

The Spearman's correlation coefficient analysis shows the highest levels of significance here. Both age groups, as well as the collective show a significant correlation when it comes to buying a new car online. The collective even shows a high significance with 0,002. All of the coefficients are close to -0,3, which shows little correlation.

With the coefficients having negative numbers, this shows that the x values (choosing options) are higher, while the y values (willingness to buy car online) are lower when it comes to the coherence of the both variables.

This means, the hypothesis can be **verified partly**: the importance of a high number of choosing options influences the willingness to buy a new car online. Regarding the shape of the coefficients, you can even say that the willingness increases with the importance of choosing options.

This is an important insight regarding car configurators.

H20: Men and women show the same level of willingness to buy/customize a car online.

This hypothesis investigates a possible significant difference between the two genders regarding the preference to buy a used car online.

Again, the test was conducted in three groups, first the two age groups, then the collective. The hypothesis was investigated using a t-test for the mean values.

In the following, the t-tests are shown for the three groups.

Collective

		Levene Test		T-Test					Confidence interval 95%	
		F	Sig.	T	Df	Sig. (2sided)	Average difference	Standard deviation	Low	High
New Car	Matching Variance	17,414	0,000	2,457	107	0,016	0,216	0,088	0,042	0,391
	Not matching Variance			2,369	80,43	**0,020**	0,216	0,091	0,035	0,398
Used Car	Matching Variance	0,918	0,340	0,505	98	0,615	-0,050	0,099	-0,247	0,147
	Not matching Variance			0,503	89,36	0,616	-0,050	0,100	-0,248	0,148

Table 105: Hypothesis 20

Age group 30-45

		Levene Test		T-Test					Confidence interval 95%	
		F	Sig.	T	Df	Sig. (2sided)	Average difference	Standard deviation	Low	High
New Car	Matching Variance	6,260	0,016	1,327	46	0,191	0,167	0,126	-0,086	0,420
	Not matching Variance			1,247	29,42	0,022	0,67	0,4	-0,106	0,440

Used Car	Matching Variance	1,437	0,236	0,579	51	0,565	0,074	0,129	-0,184	0,332
	Not matching Variance			0,588	45,21	0,559	0,074	0,126	-0,180	0,329

Table 106: Hypothesis 20 II

Age group 46-60

		Levene Test		T-Test					Confidence interval 95%	
		F	Sig.	T	Df	Sig. (2sided	Average difference	Standard deviation	Low	High
New Car	Matching Variance	7,765	0,007	1,984	59	0,052	0,243	0,122	-0,002	0,488
	Not matching Variance			1,943	49,495	0,058	0,43	0,125	-0,008	0,494
Used Car	Matching Variance	0,173	0,679	-1,022	45	0,312	-0,151	0,148	-0,448	0,146
	Not matching Variance			-1,023	44,318	0,312	-0,151	0,148	-0,448	0,146

Table 107: Hypothesis 20 III

The yellow marked lines were taken. Due to the given significance from the Levene Test, the “matching variance” line was not usable at the “new car” subsection, so the “not matching variance” line had to be used.

the significance on every value was investigated. There was one significant value for the **collective group buying new cars**, showing a significant difference between men and women. This means that there are some significant differences between men and women regarding the willingness to buy/customize a new car online.

Another value which is almost significant can be found at the older age group, also buying new cars. Summarizing these grids, there are no significant numbers apart from the “new car” buying subsection for the collective group. The other values don’t show any kind of significance. This means, the hypotheses can be **verified partly**.

H21: The participants rate the usability of the online car configurator higher than the usability of the leaflets.

The participants had to look at 5 different pairs of pictures which always showed one picture of the online configurator and one picture of the printed leaflet with e.g. the selectable colors for the car. After every pair of pictures, they were asked to decide for the online configurator or the leaflet regarding following characteristics: attractiveness, expressiveness, clarity, informative content and comprehensibility.

The numbers of decisions for both information methods (configurator/leaflet) are counted. Every decision is weighted equally because it was considered that not all participants value the same decision possibilities equally (e.g. for some people, the color is more important than for others).

The chosen items are based on usability research and therefore are weighted equally, too.

The following grid shows the numbers of decision for each pair of pictures. The age groups are split up within the boxes.

	Items	**Online Configurator**	**Leaflet**
Pair 1: Colors	attractiveness	30-45: 65 (31,1%) 46-60: 61 (29,2)	30-45: 36 (17,2%) 46-60: 47 (22,5%)
	expressiveness	30-45: 58 (27,8%) 46-60: 49 (23,4%)	30-45: 43 (20,6%) 46-60: 59 (28,2%)
	clarity	30-45: 59 (28,2) 46-60: 42 (20,1%)	30-45: 54 (25,8%) 46-60: 54 (25,8%)
	informative content	30-45: 68 (32,5%) 46-60: 57 (27,3%)	30-45: 33 (15,8%) 46-60: 51 (24,4%)
	comprehensibility	30-45: 59 (28,2%) 46-60: 53 (25,4%)	30-45: 42 (20,1%) 46-60: 55 (26,3%)
Pair 2: Tire rims	attractiveness	**30-45: 77 (36,8%)** 46-60: 56 (26,8%)	30-45: 24 (11,5%) 46-60: 52 (24,9%)
	expressiveness	30-45: 58 (27,8%) 46-60: 50 (23,9%)	30-45: 43 (20,6%) 46-60: 58 (27,8%)
	clarity	30-45: 65 (31,1%) 46-60: 50 (23,9%)	30-45: 36 (17,2%) 46-60: 58 (27,8%)
	informative content	30-45: 72 (34,4%)	30-45: 29 (13,9%)

		46-60: 50 (23,9%)	46-60: 58 (27,8%)
	comprehensibility	30-45: 69 (33,0%) 46-60: 47 (22,5%)	30-45: 32 (15,3%) 46-60: 61 (29,2%)
Pair 3: Seat covers	attractiveness	30-45: 48 (23,0%) 46-60: 33 (15,8%)	30-45: 53 (25,4%) **46-60: 75 (35,9%**
	expressiveness	30-45: 39 (18,7%) 46-60: 28 (13,4%)	30-45: 62 (29,7%) **46-60: 80 (38,3%)**
	clarity	30-45: 46 (22,0%) 46-60: 35 (16,7%)	30-45: 55 (26,3%) **46-60: 73 (34,9%)**
	informative content	30-45: 47 (22,5%) 46-60: 37 (17,7%)	30-45: 54 (25,8%) 46-60: 71 (34,0%)
	comprehensibility	30-45: 48 (23,0%) 46-60: 35 (16,7%)	30-45: 53 (25,4%) **46-60: 73 (34,9%)**
Pair 4: Equipment	attractiveness	30-45: 68 (32,5%) 46-60: 61 (29,2%)	30-45: 33 (15,8%) 46-60: 47 (22,5%)
	expressiveness	30-45: 71 (34,0%) 46-60: 57 (27,3%)	30-45: 30 (14,4%) 46-60: 51 (24,4%)
	clarity	**30-45: 78 (37,3%)** 46-60: 65 (31,1%)	30-45: 23 (11,0%) 46-60: 43 (20,6%)
	informative content	30-45: 66 (31,6%) 46-60: 63 (30,1%)	30-45: 35 (16,7%) 46-60: 45 (21,5%)
	comprehensibility	**30-45: 75 (35,9%)** 46-60: 55 (26,3%)	30-45: 26 (12,4%) 46-60: 53 (25,4%)
Pair 5: Accessories	attractiveness	30-45: 45 (21,5%) 46-60: 38 (18,2%)	30-45: 56 (26,8%) 46-60: 70 (33,5%)
	expressiveness	30-45: 48 (23,5%) 46-60: 42 (20,1%)	30-45: 53 (25,4%) 46-60: 66 (31,6%)
	clarity	30-45: 63 (30,1%) 46-60: 44 (21,1%)	30-45: 38 (18,2%) 46-60: 64 (30,6%)
	informative content	30-45: 58 (27,8%) 46-60: 46 (22,0%)	30-45: 43 (20,6%) 46-60: 62 (29,7%)
	comprehensibility	30-45: 55 (26,3%)	30-45: 46 (22,0%)

		46-60: 39 (18,7%)	46-60: 69 (33,0%)
∑	attractiveness	30-45: 303 46-60: 249	30-45: 202 46-60: 291
	expressiveness	30-45: 274 46-60: 226	30-45: 231 46-60: 314
	clarity	30-45: 311 46-60: 236	30-45: 206 46-60: 292
	informative content	30-45: 311 46-60: 253	30-45: 194 46-60: 287
	comprehensibility	30-45: 306 46-60: 236	30-45: 199 46-60: 311
∑∑		2705	2527

Table 108: Hypothesis 21

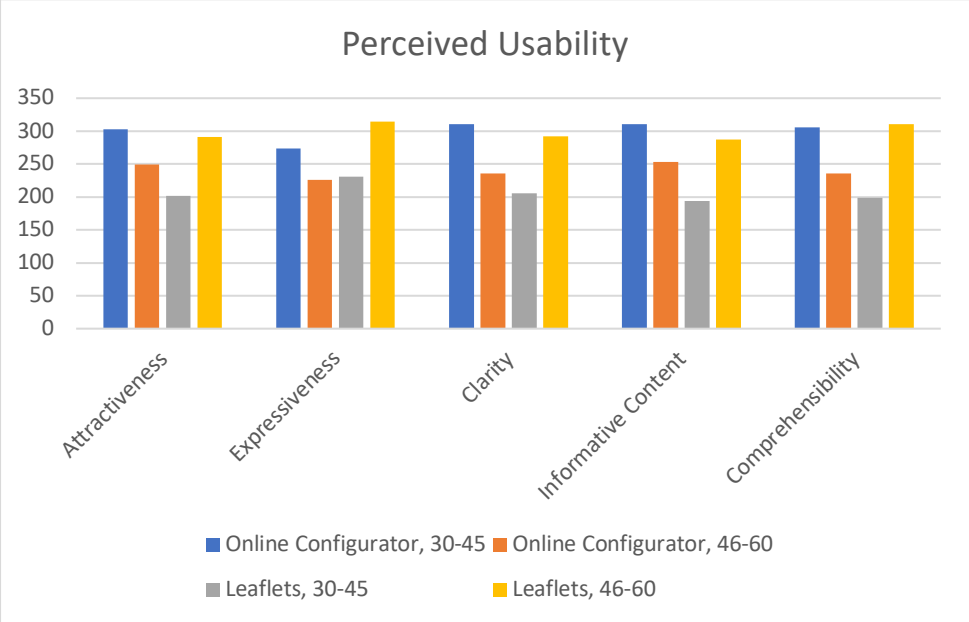


Figure 39: Hypothesis 21

The overall number shows that the online configurator was chosen 2705 times when parts of the usability had to be rated, while the leaflet was chosen 2027 times. The highest numbers of preferences were marked in bold font.

This means, that H16 can be **verified**.

Yet, there is a notable segmentation looking at the division of the ratings of the age groups. While the segmentation of the younger age group is mostly distinguished very clearly: most of the time, more than 50%, sometimes even up to 75% of the younger

group choose the online configurator, the older age group is divided more evenly, which means that the percentages of deciding for the online configurator/the leaflet do not differ that much. Also, the older age group decides for the leaflet more often and in a higher number, than the younger one. This can be seen well at the first summary subdivision: 303 people in the younger group decided for the configurator when it came to attractiveness, which leaves 202 people for the leaflet. This is a 60%/40% division. The older age group meanwhile is split up in 249 and 291 people, which shows firstly that more people decided for the leaflet and secondly, it is an almost even division with 46% and 53%. This phenomenon is visible for the other subdivisions of usability as well. This shows a notable segmentation between the two age groups and gives following insights:

1. The younger age group expressed a clear division and high level of preference for the online configurator in all of the five subdivisions of usability (apart from “expressiveness, where the preference for the online configurator is just at 54%). They subsequently prefer the online configurator in all parts of usability.
2. The older age group, however, does not express a clear division or high level of preference, but always prefers the leaflet at every subdivision of usability (especially “expressiveness”, where the preference for the leaflet is at 58%). The older age group therefore shows more homogenous preferences and is less convinced by the generator. The older age group evaluates the usability of the configurator worse than the younger age group.

11.2.2. Interim conclusion

Some interesting findings and insights are mentioned in the interim conclusion.

<u>Eye-tracking</u>

Data shows that useful information mostly is only scanned by people who used the leaflets, while people who used the online configurator read more information – and also for a longer time. This shows the difference between the configurator and the leaflet. The people who used the leaflet perceived the pictures as a primary element, whereas the texts were perceived as a secondary element and therefore did not get

that much attention. People who used the online configurator generally read the text longer and more intensively while the other group observed pictures more intensely. People of both method groups stated they didn't see things – but eye tracking data showed that they were gazing at it. They apparently didn't perceive it. Also, people said that they were looking for certain kinds of contents – that were there as well – but they didn't find it. The online configurator data shows, that certain things are not perceived by people, such as the price. People hardly gaze at it, although it is visible and not at a "hidden place" (upper right corner). The recommendation feature however is perceived and even used by many participants. Reason for those findings could be the five stars that are shown below the single recommendations, that could work as a cue, while people are not interested enough in the price because of the experiment situation. Gaze plots also show a wide and quick dispersion of the gaze, which can be interpreted as a need for orientation (see Bergstrom/Schall, 2014), while the dispersion of gaze of people using the leaflets is not that wide and big (especially the older age group showed this dispersion). This shows that people need to orientate them first before using the online configurator.
The online configurator gets rated worse than the leaflets in general. Especially navigation, layout and functionality are the worst rated parts regarding usability. Still, the online configurator is rated better when it comes to the visual design, such as the size and color of symbols, buttons and graphics.
Interestingly, people who rate their skills and use with computers/the internet lower (these are especially women of the older age group) rate the online configurator the best – they don't have that much complaints and state that they got along well without many problems. While other people who rated their skills and use with computers/the internet higher (especially males of both age groups) heavily complained about the usability and functionality of the program. Apparently, there is a connection of use of internet and own requirements regarding such programs, at least in this study.
Correspondingly, the leaflet is rated "bad" in a way that people couldn't find the information they were looking for – also that the order of contents didn't always make sense. So here as well, the usability of navigation and information could be improved. The font of certain texts is often perceived as too small – which may also be a reason why participants often just *oversaw* information. Also, people often

complained about the *number* of pictures (mostly: too many), the *content* of pictures (irrelevant pictures) and also sometimes about the design of the photos (e.g. the fact that the color of the car often was the same color as the background color of the picture was perceived negatively by 25% of the participants), which often distracted people which sometimes made them miss other contents that were there but were not perceived (e.g. certain kinds of information).
This shows that both methods own potential for improvement, in various kinds of ways.

Online questionnaire

The online questionnaire also gives valuable insights regarding the participants' perception of the online configurator and the leaflet and their attitudes towards purchasing cars online.
Most people state that their car is mainly an article of daily use for them which they own to get from A to B. They don't see their cars as status symbols. Still, almost 100% of the participants said that it is important to them that only they use their car, and are therefore not open towards car-sharing.
Around 50% of the participants would buy a new car while the rest would buy a used car at their next purchase. Both groups show a clear preference to purchasing cars online, for various reasons. Convenience and the bigger amount of various kinds of information definitely plays a big role. Some people also hope for savings. Interestingly, people who would prefer buying their next car offline also gave the same reason, next to the personal contact with salespeople and guidance. Yet, almost all of the participants would at least inform themselves online before buying a new car.
People perceive the usability of the online configurator and the leaflets in versatile ways. While one method would be preferred for customizing designing features, such as color, another method would be preferred for customizing other features. Likewise, the age and sometimes the gender play a role regarding these preferences. Generally, participants of the younger age group show a definitely higher preference for the online configurator than the older one. Still, the majority of all participants would prefer the online configurator over the leaflet.

A high number of participants already customized a car online, but there is also a high number that has never made experiences with customizing a car. People who used the online configurator stated that they did it for comparing cars or to prepare their next car purchase – but also some of them said they do it because it's fun for them – so the *joy of use* also plays a role here

The study also found out that a high number of the participants had bought a car at a car dealership and were fairly happy with their experiences there. The human contact therefore still plays a big role when making such a large purchase. Human contact or guidance also was often stated when the participants were given blank spaces for giving reasons why they would buy their car offline, or what they would miss when buying a car offline, just as in the questionnaire that was given out to the participants of the eye-tracking study.

Summary:

The combination of both studies shows that people are generally open-minded towards digital technologies when it comes to purchasing a high involvement product. The online configurator is a technology that most people would be using per-se, especially in comparison to the leaflets, so the conventional way to customize or at least inform oneself about a car. Both age groups and genders express various reasons for purchasing their next car online. Yet, the online configurator of Volkswagen still lacks usability, especially regarding the navigation, layout and the technical functionality of the site. This often makes participants feel frustrated or feel incomprehension and they therefore rate the usability of the leaflets higher. On the other site, some calculations (so results that don't base on self-assessment) show, that the online configurator is in fact more beneficial compared the leaflets (e.g. number of customized features). Since usability is a wide-spread concept that extends several features, both features have to be taken into consideration: perceived experience of the participants *and* the calculations that were performed after the experiment (based on former usability research). Generally, the usability of the leaflets gets rated better in the eye-tracking experiment while the online questionnaire shows the contrary. Of course, the two experiments have different natures: participants of the eye-tracking only used one of the both methods, but actually *used* it. Also, always "twin pairs" of participants were formed to enable the comparability of both methods. The participants of the

questionnaire however just got to *look* at the methods (screenshots were shown). Then again, they got to look at *both* of the methods, which enabled them to compare it directly, which was not the case at the eye-tracking experiment.
After all, people want to use the online configurator – but the implementation is bad, which leads to frustration and incomprehension. This was not the case when using the leaflets – but the leaflets on the other hand don't offer that high amount of information and practicability like the online configurator does.
Another interesting finding is that concerning the car purchase, human contact keeps remaining an important factor which can be seen at both studies: during the eye-tracking experiment, people kept gazing at depictions of humans (although some of them complained about them afterwards), the post questionnaire showed that many people enjoyed their experiences at car dealerships and extracted advantages from it, such as personal advising or just personal contact. Yet, not all people prefer this way – some also complained about negative experiences with car dealers, which is the reason why they switched to buying their cars online (because there is just the information – no "lying salespeople, just basic information without emotions") to avoid getting exploited again.

11.2.3. Answering of Research questions

The two research questions are answered based on the insights subsequently.

RQ1: How is the usability of online customizable high involvement products in comparison to conventional customization possibilities perceived by people at the age of 30-60?

The perceived usability was tested via an eye-tracking experiment to record subliminal movements and the participant's orientating behavior. The experiment was conducted on the online configurator of Volkswagen and printed leaflets of Volkswagen cars. People were asked to customize a car that fits their current life situation. The usability was tested by 32 participants aged 30 to 60. To distinguish the findings, the participants were split up into two age groups.

The participants often commented on perceived difficulties regarding the structure of both methods. Interesting insights that could be gained during the eye-tracking experiment:

The results of performed experiment and the questionnaire show, that the usability of the online configurator is rated worse, compared to the usability of the leaflet. Yet, both methods have advantages and drawbacks which makes it difficult to equally compare them. Participants who used the online configurator praised the visual style, such as the pictures and the buttons. The navigation and the layout however could be improved, as well as technical problems such as loading times and the "jumping" of the site or the mouse. Something that was also perceived negatively was that there admittedly was a high number of information - but it was incomprehensible because of various reasons. The participants are generally open-minded towards online configurators, but the lack of usability often leads to frustration – a phenomenon which was not visible at the leaflet group.

The leaflet also bears some problems regarding usability that were not perceived by people who used the online configurator: information was missing, there was a too high number of irrelevant pictures. But here as well, people experienced navigation problems.

The numbers that emerged by the calculations that were done in order to answer the research questions give different results – mainly in favor of the leaflet. Due to the different characters of the both methods, it is difficult to give a universal answer to the research question: the online configurator has a technical, pragmatic nature while the leaflets work with emotional cues (pictures) in big parts. The online configurator is a responsive program, while the leaflets are a static method where choice can just be marked but not immediately seen, also no (active) interaction with the method is needed, au contraire to the online configurator. People complain about usability problems at both methods.

Ultimately, the online configurator bears a high number of perceived problems which leads to a lower perceived usability compared to the leaflet.

RQ2: 2. How is the current attitude towards the online purchase of cars of Austrians aged 30-60 and how is it influenced?

The quantitative questionnaire shows a clear attitude towards buying or customizing cars online. Several attitudes, experiences opinions were asked to research if they influence the willingness to buy or customize a car online.

As a part of the quantitative analysis, correlations were researched to find out what influences the willingness to buy a car online. Here as well, depictions of the configurator and of the leaflet were used in order to let the participants compare both methods. They also had to rate the perceived usability.

The participants are shown five sets of collages that show one customization feature of the online configurator and the leaflet (e.g. “tires”). The usability of the online configurator gets rated better in total, but the difference of the both methods is not big. Also, the individual features are rated differently (e.g. the usability of the sites of tires and colors or the equipment are rated for the online configurator. Overall, the configurator gets good ratings when it comes to optics and buttons, but people often don’t like the navigation and the site layout.

Although the online configurator does not get exceptional ratings, most of the participants (and the majority of all four sub-groups) state in a follow-up question that they still would prefer the online configurator over the leaflet (71% overall). This shows that not usability is not the only characteristic that is perceived as important by the users. 79% of them also state that convenience is a reason why they would consider buying or customizing a car online.

When looking at possible coherences that may influence the willingness of purchasing a car online, the study shows that there is no coherence between the satisfaction with the last experience at the car dealer and the will to buy a car online. Also, there is no impact on the will to buy a car online by the gender. The self-efficacy regarding computer and internet use does influence the will of purchasing cars online for some groups. Also, people who consider a high number of choosing options necessary prefer to buy their car online.

Purchasing cars online is also preferred in a higher number by the younger age group, while the older age group mainly prefers it too, but there are more people who also still would prefer buying their car offline at a dealership. Experiences with

the car dealership are here mainly remembered positively and therefore play an important role when buying the next car, which shows that human contact (similar to the findings of the eye-tracking experiments) plays an important role when purchasing the next car.

People therefore are mainly willing to purchase a car online – new or used – for various reasons, mostly for convenience reasons, also because of the immediate depiction of the car, price information and because they can compare cars more easily this way.

11.3. Guidance

After the literature review and the two empirical studies that were conducted for this thesis, certain guidance can be given that concern the usability of high involvement configurators and general usability. Because the theoretical part of the thesis also deals with personalization methods as they are strongly connected with customization techniques, guidance for these methods will be given as well.

Guidance is given mostly for the online configurator because this was the main topic of the thesis. Obvious characteristics of the leaflets are however mentioned as well.

When comparing the online configurator of Volkswagen and the leaflet of their car models, especially older people complained about the lack of usability, especially regarding navigation and layout problems.

The first guidance therefore is fixing the technical problems which led to incomprehension and frustration and therefore discourage people (especially older people who are not that experienced with web applications anyway) from using the online configurator. The site should load quicker, contents should be seeable more easily and also people need to feel like they are more in control of their customized car – which most people in the experiment didn't not have.

People generally complained about the navigation and the layout – this applies on both methods, so also these features should be improved, also in terms of the leaflets: Apparently both don't show the overview well enough. Splitting down more specific problems, following advice can be given:

The online configurator should also respond better to people's needs, and maybe also offer more detailed information, or explanation about certain things and contexts that weren't understood immediately by the users.

The leaflets on the other hand could also be improved when it comes to usability: the number of pictures could be decreased, to not distract people's attention from reading facts and information they now tend to overlook. Abbreviations should be explained before using them. Also, certain sources of information could be printed in a bigger size, so people could read it more easily, especially older people.

Another idea of how older people could be introduced to this technology would be setting up displays, e.g. iPads or other kinds of tablets in car dealerships. The online

configurator could be used on these tables and would therefore have the following advantages:

1. People who go to the dealership and cannot talk to a salesperson immediately could bridge waiting time, especially if they already have a car in mind, they could customize it there.
2. People could learn playfully how to operate the online configurator without much pressure, especially older people.
3. If questions arise, the salesperson can help and guide the customer with the handling of the online configurator.
4. Tablets are not expensive, so dealerships could buy them without much financial drain and give people a possibility to cut their waiting time, which benefits the customer relationship.

This would also be another step towards an omnichannel customer relationship approach, so digital and physical world would get connected (which was mentioned in the theoretical part of the thesis). Another idea for an omnichannel approach would be personalized mailings: People who bought specific kinds of cars could be sent personalized mails: Replacement parts, special accessories, etc. that fits to their car model. Or also invitations to family parties (if the customer has a family), business get-togethers, etc. This however requires data about the customers but would be a way to connect the digital and the physical world, and also to strengthen the relationship between customers and car dealers – which is also desirable, as studies show that people do still visit car dealerships, but due to the shifting towards online shopping, they more likely visit them for service reasons.

Generally, a mixture between personalization and customization can be recommended. Both techniques have their strengths and weaknesses and can be combined well which each other – as it can be seen in the online configurator, offering product recommendations that also are a kind of personalization feature. Participants of the eye-tracking experiment perceived and sometimes even used it. With both techniques, a generally better customer experience can be guaranteed – assumed that usability is considered and improved constantly.

12. Discussion

12.1. Conclusion

The theoretical research gave many insights about personalization and customization which then could be used for conducting the two empirical studies. Personalization is a big part of successful e-commerce, and it will keep remaining important, especially now that data can be collected and used very easily with data mining techniques, artificial intelligence algorithms, etc. Especially high involvement products require a specifically careful presentation in e-commerce and require advanced technologies in comparison to low involvement products. The chapters about high involvement products and especially the current scientific knowledge show that there is a high amount of research about this very topic, but still there is also optimization potential. Customization is therefore another widely discussed topic, since people enjoy customizing their products, independently of high or low involvement products, and it is also a practical way for companies to sell more products online. Especially for high involvement products however, this seems to be an opportunity to sell them online. It also depends on the kind of product – how it is manufactured and what process steps need to be considered. A car is a high involvement product and actually always gets manufactured based on the customers' needs, which is why a car customization tool was chosen for the empirical research.
The theory chapters about customer journey and consumer behavior also show that there are many different kinds of users, and many kinds of different target groups. There is no *general* user. People are already so used to recommender systems and personalization techniques that data privacy is actually a topic which is discussed from time to time, still the convenience of personalized offers and content seem to outweigh it. Customizing a car therefore was seen as a useful method to test how people like customizing high involvement products, and also to compare the usability to a conventional customizing method.

Looking at the results of the eye-tracking experiment, many insights could be gained. Ultimately, it depends on what is customized. People act differently when they customize the color of their car than when they customize the number of

accessories: when customizing optical features such as the color or the tire rims, pictures were observed way more heavily than when customizing equipment features, where people focused more intensively on observing the texts. The same can be applied for accessories or the motorization.

Another observation of the eye-tracking was, that there were the differences between men and women. They actually do look differently when observing the content of a web site. But they perceive the same amount of texts, while women show a higher interest in pictures, especially pictures of humans and animals. Women also examine the rest of the given content more precisely, such as the scenery around the car, the environment or how the people in the leaflet interact with each other.

Generally, when evaluating the leaflets, it was notable that many people's initial gaze often goes to humans – independently of the gender. The face of the people always was the first thing the participants looked at, especially the eyes. This is an interesting finding, as the participants were told to *customize a car* – so their focus should be somewhere else. Still, the gaze is so fast people seem to look at people automatically, without even thinking if they actually want to. Depictions of people therefore have a big influence on the perception of content.

The leaflets also had a different impact on the participants than the configurator. Next to the number of evoked emotions, the leaflet also conveys a different kind of feeling – it is less technical, the participants have a haptic experience which also plays a role. A leaflet is flicked trough when people have time on their hands, or when they're bored, at least, when they are at the beginning of the car buying process. This is why the goal/focus of the leaflets is different to the goal/focus of the configurator. The leaflet contains such a high number of pictures – because the leaflet should evoke interest, therefore it works with emotional cues. Hence, many pictures of people are depicted – accordingly people that mirror the different target group of the different models of the cars: e.g. urban living women who stroll through the streets with their dogs, adventurous young women who drive around recklessly in a "T-Cross", but also pompous businessmen who drive through the city with their brand-new "Arteon". Also, some leaflets address various target group: the "Multivan" addresses and therefore depicts families, older and younger people and also single travelers – male and female ones. The leaflets therefore show an advantage when

it comes to psychological effects such as showing humans. Also, the leaflets show a general higher and denser amount of pictures than the online configurator, while the online configurator offers a higher number of texts and information compared to the leaflets.

Meanwhile, the online configurator offers a little to no amount of emotional content, but mainly factual content. It also owns a higher amount of informative contents that simply often are not inside the leaflets. Yet, some elements are not really observed, such as the price which is pictured in the upper right corner of the configurator and is also responsive towards the changes that are made. Meanwhile, the recommendations are observed extensively by many of the participants, which can have various reasons (price was not considered because it was a testing situation, recommendations were eye-catching because of the 5-star rating system...). The contents are more formal and clearly structured (or at least aim to be), while the leaflets transfer a higher number of emotions. This can also be reasoned because of the technical condition of the configurator. It is designed simply, without much distraction and offers the needed contents – on a responsive basis. People need to "interact" with the online configurator in order to get results, while they just need to flip through the leaflet and can get their information more passively.

The focus of the leaflets therefore is not the delivering of information, but the evoking of emotion and enthusiasm about the car model – or basically just generating interest, while the configurator aims to appear at another point of the customer journey – on a later one. The buying decision process of cars is long and extensive Nevertheless, usability is an important factor for both of the methods, which is why it is important to examine it. Strengths and weaknesses could be discovered in this eye- tracking experiment, especially regarding the usability of both methods. Although the online configurator doesn't get rated *that* bad and people are open-minded for customizing their next car online, the navigation, depiction of content and the general setup often lead to confusion and frustration. While the leaflet often lacks information or possibilities, such as responsive depiction of changes, people at least can't get confused by the task as they can get while using the online configurator for the same kind of task. People mostly rate themselves as computer literate, yet often are keen to having problems with the configurator (along with this comes having too short temper or losing it quickly). This can lead to an even higher level of

frustration if you generally know how to run a computer, use websites and then fail to customize a car (or having difficulties with it) because the configurator is not designed in a satisfying or working way, as it can be seen in the results of this experiment.

Ultimately, the leaflet and the configurator do have the same overall goal: selling cars. Yet, they appear to happen at different stages of the buying process of a car. Referring to the car buying process of Unger (1998), both methods can be classified in the second phase “Phase of structured and focused information research” (Unger, 1998: p. 66), which resembles the second step of the customer journey “consideration” (Kotler/Keller, 2006: p. 56). However (if both methods are used), two possible sequences are possible:

1. The prospect already considers the car brand and therefore looks at leaflets he /she downloaded online or got from a car dealership. The leaflet works with emotional cues. It evokes the prospect’s interest, whereupon he/she goes online at one point and starts using the online configurator to customize his/her very own personal car that has been observed before in a leaflet.
2. The prospect looks for information online and therefore stumbles upon the online configurator. He/she tries it out and likes the customized car. Because of the increased interest, the leaflet is also used, where the emotional cues can boost the desire to buy the car.

Of course, these two situations are just exemplary. It also needs to be considered that according to Unger (1998), the first three step of the process can take up to two years, so observing the leaflet or customizing the car can also happen several times, also in long intervals. Still, both methods are useful and used by prospects – they also could “support each other”, as their contents are various.

Customizing or generally purchasing a high involvement product online therefore is an accepted and positively seen by participants. The quantitative study also showed, that people would inform themselves online about a high involvement purchase anyway, although car dealerships play an important role as well.

Usability ultimatively has to be considered as people have to be able and to enjoy using the online configurator.

12.2. Limitations

The limitations of the thesis are adduced here.

Eye tracking:

The eye-tracking research was prepared and conducted very thoughtfully. However, due to numerous technical difficulties and problems that occurred during the experiment period, there are some limitations that need to be mentioned.

The stationary eye-tracking (that was conducted on the laptop) sometimes showed problems concerning the software. For two experiments, the browser window was sized differently (not fitting the screen), which resulted in the display of the mobile site of the configurator homepage. This, firstly, complicated the user experience for the two participants (as they verbally expressed). Secondly, this also complicated the full comparability of recordings of those two participants with the other 30.

The age of the recording program was another factor that exacerbated the experiment. The only browser that allowed a proper recording was Internet Explorer – a browser that is heavily outdated and therefore also not supported by many internet applications anymore. This was also the case with the online configurator – sometimes Internet Explorer just didn't work or display the content properly which is actually devastating when the display and the content (=usability) are being researched. In every case, the Volkswagen website showed a caution sign that the currently used browser is outdated and therefore content couldn't be displayed optimally. Also, loading times of the online configurator were long which sometimes led to impatience felt by the participants.

The eye-tracking technology based on the glasses was provided by the same company. Especially testing people of the older age group (46-60) bore some problems because many of the participants were wearing glasses. The participants' glasses often made it difficult to track their eye movements. The advanced age of the participants also sometimes led to sunk eyelids, which also impeded the finding of the pupils. The research results are therefore not as reliable as they could be.

Social desirability and a general could be a phenomenon that may have occurred during the experiment, because the experimenter was present the whole time. She also sometimes answered questions beforehand, which may have distorted some answers.

Missing involvement could be seen as another kind of limitation: Most of the participants finished the experiment quite quick, which probably would not have been the case if they were actually in the situation of customizing a car. Due to the experimental situation, the involvement was most likely not that high as it would be in the original situation.

The participants showed a certain homogeneity, which could lead to distortions as well: a high number of academics was among the participants, as well as a high number of people who work in the IT sector. Furthermore, the number of participants could be too small, too: Nielsen and Pernice (2009) suggests a number of 39 participants for a usability eye-tracking study, but just for one-set up, which would have required 78 participants for this study. Lesemann and Wilms (2007) also suggest a higher number of participants to ensure reliability, namely 50.

The configurator and the leaflets also did not have the same structure and content, which makes it difficult to compare the two methods. It is questionable if they are measurable the same way, because they are used for different purposes (see conclusion).

Another aspect is that just *one* kind of configurator/leaflet; just *one* brand and just *one* kind of product was researched. It would have been better to be able to at least compare two car brands, or two kind of high involvement products. This however would have extended the length of this thesis. It would also have required a higher number of participants and a more detailed framework.

Online Survey:

The online survey was conducted and sent out to a panel by TalkOnline Panel. 214 people finished the interview, 5 interviews couldn't be used. The quota was fulfilled for the most part. Yet, looking at the education levels, there is a high percentage of participants with a high education, which is not equal to the actual basic population. Furthermore, some of the questions could only be asked in an insufficient way: the comparison of the leaflet and the configurator could only be done via screenshots. Only giving screenshots of the leaflets leaves out the feeling of holding a leaflet in the hands (haptics), also only giving screenshots of the configurator leaves out its interactivity and the handling. The experience of both methods is therefore not fully

given and here, not the actual usability can be researched but just the estimation of the usability based on the visual perception of both of the methods.
Other limitations could occur, such as the distortion of data by incorrect answers given by participants. Since this kind of limitation can happen at any online questionnaire, more details about this and other possible limitations can be read in the methodical part of the thesis.

12.3. Prospect

People shop online. This phenomenon will not change, but it will strengthen in the following years – also more different kinds of products and services will be bought online. Therefore, technologies that enable a contemporary e-commerce customer experience will flourish as well – such as data mining and personalization. This is why also high involvement products will be bought online – even more than today, although the study that was examined by the author already showed that a high number of people already now bought high involvement products and services online. The number of people and products and services from this sector will increase as well.
Volkswagen and also other car brands have already started providing their leaflets online. There is, as the thesis shows, a difference between the online configurator and the leaflets – so there are for sure some people who do not want to use the online configurator at all, or are just not interested in it and who would prefer the leaflets and the other way around. Yet, companies start saving paper and distribute their information online – e.g. the leaflets. This may have various reasons, for example saving money, but also because people prefer looking for information online. Also, other providers of high involvement products have chosen a similar way: IKEA, whose catalogues and leaflets are famous and highly praised, now stopped delivering them to households (see standard.at, 2019). It can be downloaded on the official web site, though. Beyond that, IKEA also provides customization techniques for their furniture online (e.g. PAX planner[8]) and recently has started offering an audio book version of their catalogue on a Spotify playlist to

[8] https://www.ikea.com/ms/en_US/rooms_ideas/planner_pax3d/index.html

raise awareness for their digital content (see Neerman, 2019). This shows, that just as Volkswagen does, the analogue method is kept – but digitalized – next to offering a digital kind of customization technique.

Especially concerning the purchase of high involvement products, people show high open-mindedness because of various reasons, such as convenience but also the possibility to compare things and they can do it anywhere, anytime, without much pressure from e.g. salespeople or time scarcity. This means, there is also a high potential for e.g. the selling of cars online – both used cars and new cars, like the quantitative and the qualitative studies that were conducted show. Online configurators for cars therefore also play a big role, especially considering that also older people are "discovering" the internet and e-commerce, and younger people buy cars as well. Although car dealerships remain an important factor for people who plan on buying cars, they still require information about the car they want to buy online. Often, they use the online configurators for preparing for the purchase or just getting information. It is now important to implement the technique correctly and usable for the prospects. Otherwise, frustration and incomprehension can disperse people from using the online configurator – maybe even on such a high level that people generally turn away from the car brand and decide for another brand (another online car configurator) which should be avoided.

This is why it is important to keep the implementation in mind – and to make sure that such online applications are *usable* – the main thought should not be that *people should learn how to use it*, but to program and design the application in a way so *the application learns how it is supposed to be and act that people can use it* – because the technology has to adapt to people's needs, not the other way around – otherwise people will turn away from it if they don't necessarily need it – which is the case for online configurators. Artificial intelligence and data mining therefore could and should be used to increase the usability and the responsiveness of the configurator – based on data mining, personalization techniques (like they already exist – e.g. recommender systems), but maybe also even more – changing the size and color of fonts or the presentation of pictures and contents, depending on what user just customizes a car could be potential ideas to keep online configurators contemporary and pleasant to use – which is the actual sense of usability. Usability should always play a big role and therefore be warranted, which

is why it is especially important to constantly research and improve it – with the help of e.g. studies, collection and mining of data and *always putting the user first*.

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14. Attachments

- **Exposé**
- **Pre questionnaire**
- **Post questionnaire**
- **Online questionnaire**

Exposé Master These 2.Abgabe

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Arbeitstitel	**An Empirical Study Investigating the Usability of an Online Mass Customization Configurator and Attitudes for High Involvement Products in The Automotive Industry**
Fragestellung der Master-These	**Problemstellung:** High involvement products are sold online for a long time. Several personalization systems have been introduced to enable a better customer experience for potential buyers. Yet there is another important development in the e-commerce sector called mass customization. With the possibility to design and customize a very own and indivudal product, many people feel overwhelmed or lack experience, especially people who didn't grow up with digital technology. This is why this study investigates the usability of the interface of an online customization program for high involvement products. **Forschungsfragen:** 1. How is the usability of online customizable high involvement products in comparison to conventional customization possibilities perceived by people at the age of 30-60? 2. How is the current attitude towards the online purchase of cars of Austrians aged 30-60 and how is it influenced?
Wissenschaftliche und praktische Relevanz	**Wissenschaftliche Relevanz:** The usability is a part of customer experience which is a widely researched topic in marketing, yet this topic is not researched well enough to give implications. Based on the technology acceptance model, variables are derived that will research how users feel and act during the act of customization their own high involvement product. Eye-tracking will support the research with qualitative data. **Praktische Relevanz:** This topic researches important questions how to enhance usability when it comes to website interface design especially for high-involvement products which are still a difficult topic, when it comes to recommending them or customizing them because there is not sufficient research how people perceive and rate these sites. The customizing site (configurator) will be researched and investigated in this study.

Aufbau und Gliederung

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<tr><td>Methodenwahl</td><td>Empirische Methode:

Bei dieser Arbeit sollen zwei Methoden angewandt werden: zum einen eine Onlinebefragung, des Weiteren eine Eye-Tracking-Untersuchung. Zuerst wird die Eye-Tracking-Studie durchgeführt, bei der zwei Onlineshops präsentiert werden, einer mit Personalisierung, einer ohne. Danach werden die Probanden befragt, die Befragung wird die gleiche sein, die bei der Onlinebefragung verwendet werden wird und dient daher als Pretest. Ausgehend von den Informationen und Erkenntnissen der Befragung wird die Forschungsfrage beantwortet.

Begründung Methodenwahl:

Eyetracking:
Die Methode bietet eine optimale Beobachtungssituation und ist eine Messmöglichkeit für spontane und unwillkürliche Reize. Vor allem bei der Untersuchung von psychologischen und unbewussten Faktoren ist es von Vorteil, da man menschliche Reaktionen messen kann, die unüberlegt bzw. unbewusst geschehen. Beim Einsehen von einer Homepage orientiert man sich zuerst, sieht auf bestimmte Punkte oder Teile auf der Homepage, verweilt unterschiedlich lang und entscheidet oft spontan, wie der weitere Verlauf des Besuches aussieht, falls er die Seite nicht wieder verlässt. (Lapa, 2007). Mit Eyetracking können ebenfalls Probleme bei der Informationssuche oder der Orientierung auf Homepages optimiert werden (vgl ebd.). Weil in der Masterarbeit auch psychologische Vorgänge untersucht werden, die sich nicht immer rational erklären lassen, ist diese Methode deshalb geeignet und wird Erkenntnisse liefern. Des Weiteren ist die Befragung danach als Pretest für die Onlinebefragung verwertbar.

Quantitative Online-Befragung:
Quantitative Befragungen sollen gesellschaftlich relevante Aussaggen und Meinungen abbilden und idealerweise als Erkenntnis zur Beantwortung von wissenschaftlichen Fragen dienen ((Brosius, Haas, Koschel 2012, S.80). Die Befragung für die Masterarbeit soll online durchgeführt werden, was zwar immer wieder kritisch betrachtet wird, weil durch die Online-Komponente Leute ausgeschlossen werden, die keinen Internetanschluss besitzen oder nicht im Internet surfen, weshalb eine Online-Befragung auch nicht repräsentativ für die Gesamtbevölkerung eines Landes ist (vgl. ebd.). Dennoch ist die Wahl im Falle dieser Arbeit legitim, da sich die Befragung</td></tr>
</table>

generell nur an Leute richtet, die das Internet verwenden, da sie den Fragebogen schlichtweg nicht ausfüllen können, wenn sie nicht im Internet surfen, da sie dann auch nicht online shoppen. Die Befragung ist also legitim online durchzuführen, auch, weil sie zahlreiche Vorteile hat, wie beispielsweise eine vergleichsweise einfache und schnelle Durchführbarkeit und Ortsunabhängigkeit. Die Befragung wird unter anderem Videos und Bilder von Onlineshops bzw. Homepages beinhalten, die danach bewertet werden sollen- damit kann man Meinungen und Eindrücke untersuchen. Von Vorteil ist hier auch die mögliche Interaktivität. Die Befragung wird von dem Forschungsinstitut „MindTake“ durchgeführt, die Auswertung der Befragung erfolgt mittels der Statistik-Software SPSS.

Grundgesamtheit:

	Männer 30-45	Männer 46-60	Frauen 30-45	Frauen 46-60
Österreich gesamt	946.390	1.007.971	936.142	1.009.551
Burgenland	29.112	36.018	29.982	35.760
Kärnten	55.051	67.212	54.849	68.770
Niederösterreich	167.705	201.679	169.040	201.012
Oberösterreich	155.573	171.998	149.760	169.637
Salzburg	58.824	61.676	58.841	64.261
Steiermark	130.794	145.318	126.309	143.128
Tirol	80.667	85.638	80.566	85.839
Vorarlberg	42.790	44.280	42.597	43.661
Wien	225.874	194.152	224.198	197.483

Stichprobenziehung:
200 Leute bei der Befragung
Eyetracking: noch keine Anzahl sagbar
Alter: 30-60 → Zweiteilung der Altersgruppen in 30-45 und 45-60

Begründung: Die Altersgruppe wurde deshalb so gewählt, weil die Befragung an Leute richtet, die regelmäßig Produkte im Internet kaufen. Die Befragten müssen also definitiv internetaffin sein, daher wurde die Altersobergrenze mit 60 Jahren festgelegt. Auf der anderen Seite wurde die Altersuntergrenze mit 30 Jahren festgelegt, da es sich zum einen um High-Involvement-Produkte handelt, das heißt, die finanziellen Mittel müssen bei den Befragten gegeben sein. Die potentiell zu untersuchenden High-Involvement-Produkte werden oben zusammengefasst, können sich aber im Lauf der Recherche noch erweitern bzw. ändern. Des Weiteren haben Internetnutzer unter 30 Jahren eine gesteigerte Affinität zum Internet und deren Nutzung. Die Befragung soll sich aber nicht an sogenannte „digital natives“ richten, die mit an regelmäßige Internetnutzung gewohnt sind und auch schon routinierter online Produkte bestellen, sondern an eine Gruppe, die noch weniger Erfahrungen damit hat und somit auch nicht so routiniert ist.

	Männer 30-45	Männer 46-60	Frauen 30-45	Frauen 46-60
Österreich gesamt	49	52	48	51
Burgenland	2 (4%)	2 (4%)	2 (4%)	2 (4%)
Kärnten	2 (4%)	4 (8%)	3 (6%)	4 (8%)
Niederösterreich	9 (18%)	10 (19%)	9 (18%)	11 (22%)

	Oberösterreich	8 (16%)	9 (17%)	8 (17%)	9 (18%)
	Salzburg	3 (6%)	3 (6%)	3 (6%)	3 (6%)
	Steiermark	7 (14%)	7 (13%)	6 (12%)	7 (14%)
	Tirol	4 (8%)	4 (8%)	4 (8%)	4 (8%)
	Vorarlberg	2 (4%)	2 (4%)	2 (4%)	2 (4%)
	Wien	12 (24%)	11 (21%)	12 (24%)	10 (20%)

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Allfälliges (z.B. Firmenarbeit…)	

Bitte löschen Sie die grauen Erklärungen vor Abgabe des Exposés aus den Feldern und achten Sie darauf, dass Ihr Text in schwarzer Schrift erscheint.

Fragebogen NR:

1. **Geschlecht:**
   - ☐ männlich
   - ☐ weiblich

2. **Wie alt sind Sie?**
   - ☐ 30-45 Jahre
   - ☐ 46-60 Jahre

3. **Planen Sie, in den kommenden Jahren ein Auto zu erwerben?**
   - ☐ Ja
   - ☐ Nein

4. Sind Sie momentan im Besitz eines Autos?
   - ☐ Ja
   - ☐ Nein

5. Haben Sie schon mal ein Auto gekauft?
   - ☐ Ja
   - ☐ Nein

   a. Wenn ja: Welche Art von Wagen war dies (Mehrfachantworten möglich)?
      - ☐ Neuwagen
      - ☐ Gebrauchtwagen
      - ☐ Beides

   b. Wenn ja: Auf was haben Sie beim Autokauf geachtet (Mehrfachantworten möglich)?
      - ☐ Marke
      - ☐ Preis
      - ☐ Kilometerstand
      - ☐ Persönliche Betreuung/Beratung durch den Verkäufer
      - ☐ Sonstiges: _____

6. Welche Marken würden bei einem Autokauf für Sie infrage kommen?

_____

7. Haben Sie bereits online ein Produkt konfiguriert (sich selbst nach Ihren eigenen Wünschen zusammengestellt)?

- ☐ Ja
- ☐ Nein

a. Wenn ja: Um was für eine Art Produkt handelte es sich dabei?

_____

Fragebogen Nr:

1. Wie erging es Ihnen mit der Konfiguration des Autos?

2. Wie war die Navigation des Konfigurators für Sie?

Selbsterklärend	☐	☐	☐	☐	Verwirrend
Intuitiv	☐	☐	☐	☐	Kompliziert
Logisch	☐	☐	☐	☐	Nicht nachvollziehbar

3. Hätten Sie gerne eine andere Reihenfolge bei der Konfiguration gehabt?
   - ☐ Ja
   - ☐ Nein
   a. Wenn ja, welche?

4. Hat der Konfigurator für Sie einen sinnvollen Aufbau?
   - ☐ Ja
   - ☐ Nein

5. Hatten Sie Schwierigkeiten bei der Konfiguration?
   - ☐ Ja,
   - ☐ Nein
   a. Wenn ja, beschreiben Sie diese:

6. Hatten Sie während des Konfigurierens das Gefühl, sie hatten durchgehend die volle Kontrolle über Ihre Konfiguration? (z.B. eine Auswahl behindert/interveniert nicht eine andere Auswahl bei unterschiedlichen Kategorien)
   - ☐ Ja
   - ☐ Nein

7. Fehlte Ihnen etwas, wie beispielsweise die persönliche Beratung?

   □ Ja, mir fehlte: _____
   □ Nein

8. Wie beurteilen Sie die Auswahlmöglichkeiten bei der Konfiguration (Autofarbe, Motor...)
   □ Zu viele Möglichkeiten – fühlte mich überfordert
   □ Genau richtige Anzahl
   □ Zu wenig Möglichkeiten – hätte gerne mehr gehabt

9. Beurteilen Sie den gesamten **optischen** Aufbau des Konfigurators:

Übersichtlich	□	□	□	□	unüberschaubar
Logisch aufgebaut	□	□	□	□	unnachvollziehbar aufgebaut
Ansprechend	□	□	□	□	nicht ansprechend
Intuitiv	□	□	□	□	erklärungsbedürftig

   Die Buttons und Symbole waren...
   □ Zu groß
   □ Zu klein
   □ In Ordnung

   □ Verständlich
   □ Unnachvollziehbar

   Die Menge der Bilder und Darstellungen war...
   □ Zu gering
   □ Zu hoch
   □ In Ordnung

   Die verwendeten Farben waren für mich...
   □ Störend
   □ Angenehm
   □ Neutral

10. Welche Gefühle empfanden Sie bei der Konfiguration? (Mehrfachantworten möglich.)

□ Spaß
□ Langeweile
□ Unverständnis
□ Spannung
□ Frustration

11. Haben Sie sich bei der Konfiguration generell wohlgefühlt oder nicht?
- ☐ Habe mich wohlgefühlt
- ☐ Habe mich nicht wohlgefühlt

12. Wie beurteilen Sie den Konfigurator im Bezug auf das Ergebnis Ihrer Konfiguration?
- ☐ Nützlich
- ☐ Überflüssig
- ☐ Gut als Ergänzung beim Autokauf
- ☐ Gut zum Vergleichen

13. Wie beurteilen Sie die generelle Benutzerfreundlichkeit des Konfigurators? Vergeben Sie eine Schulnote.

1 2 3 4 5 6

14. Wie beurteilen Sie den Konfigurator insgesamt? Vergeben Sie eine Schulnote

1 2 3 4 5 6

15. Würden Sie Ihr konfiguriertes Auto Ihren Freunden/Bekannten zeigen?
- ☐ Ja
- ☐ Nein

16. Würden Sie den Konfigurator hinsichtlich seiner Benutzerfreundlichkeit/Praktikabilität weiterempfehlen?
- ☐ Ja
- ☐ Nein

17. Auf welche Attribute haben Sie am ehesten geachtet? Reihen Sie nach Wichtigkeit. 1 = „am wichtigsten“, 4 (oder mehr) = „am unwichtigsten“:

____ Preis
____ Zubehör
____ Interieur
____ Exterieur
____ Sonstiges: _____
____ Sonstiges: _____
____ Sonstiges: _____

18. Wie sehr treffen folgende Aussagen auf Sie zu? Kreuzen Sie die Zahl an. (1: Trifft sehr zu; 6: Trifft gar nicht zu):

Mein Auto ist für mich ein Statussymbol.	1	2	3	4	5	6
Mein Auto ist für mich nur ein Gebrauchsartikel.	1	2	3	4	5	6
Ich will mit dem Auto nur von A nach B kommen.	1	2	3	4	5	6
Das Fahrgefühl ist mir sehr wichtig.	1	2	3	4	5	6

19. Wie wichtig sind Ihnen diverse Auswahlmöglichkeiten (Farbe, Arten der Felgen, PS-Anzahl...) beim Autokauf?

□ Sehr wichtig □ Wichtig □ Relativ wichtig □ Ist mir egal

20. Wussten Sie bereits von der Möglichkeit, ein Auto online zu konfigurieren?
    - □ Ja
    - □ Nein

21. Würden Sie es in Betracht ziehen, ein Auto online zu konfigurieren?
    - □ Ja
    - □ Nein, weil: _____

    a. Wenn ja: Wieso würden Sie ein Auto online konfigurieren? (Mehrfachantworten möglich)

    - □ Persönliches, individuelles Auto wie nur ich es hab
    - □ Volle Kontrolle darüber, wie mein Auto gestaltet ist
    - □ Etwas Neues ausprobieren und herumexperimentieren
    - □ Sofortige Darstellung des Autos (Sitze, Außenfarbe, etc.)
    - □ Sofortige Kostentransparenz
    - □ Kein Kontakt mit Menschen
    - □ Bequemlichkeit

22. Denken Sie an Ihren letzten Autokauf zurück. Haben Sie dies von einem Privatverkäufer gekauft oder von einem Händler?

    - □ Privat
    - □ Händler

    a. Wenn Händler: Waren Sie mit der Beratungssituation zufrieden?

    - □ Ja, weil _____
    - □ Nein, weil _____

23. Hatten Sie bei der Beratungssituation das Gefühl, Sie könnten dem Händler mit seiner Einschätzung vertrauen?
    - □ Ja
    - □ Nein

24. Wie würden Sie Ihren eigenen Umgang mit Computern/dem Internet/Onlineshops einschätzen?

Sicher	☐	☐	☐	☐	Unsicher
Kompetent	☐	☐	☐	☐	Inkompetent
Erfahren	☐	☐	☐	☐	Unerfahren

25. Mit welchen Medien Nutzen Sie das Internet (Mehrfachantworten möglich)?
    - ☐ Desktop-PC
    - ☐ Tablet
    - ☐ Handy
    - ☐ Andere: _____

26. Nutzen Sie das Internet gerne oder eher gezwungenermaßen?
    - ☐ Sehr gerne
    - ☐ Gerne
    - ☐ Aus Bequemlichkeitszwecken
    - ☐ Gezwungenermaßen

27. Haben Sie bereits eines oder mehrere der folgenden Produkte/Dienstleistungen online erworben?
    - ☐ Fernseher
    - ☐ Digitalkamera
    - ☐ Smartphone
    - ☐ Möbel
    - ☐ Reisen

28. Wenn ja: waren Sie zufrieden damit?
    - ☐ Ja
    - ☐ Nein
        a. Wenn nein: würden Sie es das nächste Mal wieder im Geschäft kaufen? Begründen Sie ihre Antwort.

            ☐ Ja, weil _____

            ☐ Nein, weil _____

29. Kaufen Sie regelmäßig bei Onlineshops ein? Wenn ja, bei welchen? (*Regelmäßig steht hierbei für mindestens 1x pro Monat)*
    - ☐ Kleidung (H&M, Asos)
    - ☐ Generelle Artikel (Amazon)
    - ☐ Sonstige: _____
    - ☐ Kaufe nicht (regelmäßig) bei Onlineshops ein

30. Reihen Sie, welche Kriterien Ihnen bei einem Onlineshop am wichtigsten sind (1: am wichtigsten, 7(oder mehr): am unwichtigsten)

____ Benutzerfreundlichkeit
____ Ansprechendes Design
____ Schnelle Ladezeiten
____ Möglichkeit zum Personalisieren des Produkts
____ Gute Produktbilder/Produktbeschreibung
____ Interaktivität des Inhalts
____ Hilfestellung (In Form von Bot oÄ)
____ Sonstiges: _____

usabilityvolkswagen → sociodemographics 05.08.2019, 11:33

Seite 01

Seite 02

1. Haben Sie einen Führerschein, bzw. planen Sie, einen Führerschein zu machen?

- (•) Ja, ich habe einen Führerschein, bzw. ich plane, einen zu machen..
- ( ) Nein, ich habe keinen Führerschein.

2. Wie alt sind Sie?

- (•) 30-45
- ( ) 46-60

3. Informieren Sie sich bei geplanten größeren Anschaffungen lieber digital (online) oder analog (z.B. Prospekte)?

- (•) Digital.
- ( ) Analog.
- (•) Beides.

Seite 03

4. Haben Sie bereits selbst ein Auto mit einem Online-Konfigurator zusammengestellt? (Mehrfachantworten möglich)

- [•] Ja, und dann so beim Händler gekauft.
- [ ] Ja, als Information/Vorbereitung für den eigentlichen Autokauf.
- [•] Ja, weil es mir Spaß macht/aus Zeitvertreib.
- [ ] Ja, ich habe es mit dem Autohändler gemeinsam konfiguriert.
- [•] Nein, aber der Autohändler hat es für mich bei dem Konfigurator auf Basis meiner Wünsche konfiguriert.
- [ ] Nein, ich habe keine Erfahrung mit Online-Konfiguratoren.

5. Denken Sie an Ihr Auto/das nächste Auto, das Sie kaufen wollen. Wie ordnen Sie sich bei folgenden Aussagen ein?

Mein Auto ist für mich ein Gebrauchsartikel	( ) ( ) ( ) ( ) ( ) ( )	Mein Auto ist für mich ein Statussymbol
Das Fahrgefühl ist mir sehr wichtig	(•) (•) (•) (•) (•) (•)	Ich will mit dem Auto von A nach B kommen
Ich bin gerne bereit, mein Auto mit anderen Fahrern zu teilen (Car Sharing)	( ) ( ) ( ) ( ) ( ) ( )	Mir ist es wichtig, dass das Auto nur mein persönliches Eigentum ist

6. Haben Sie bereits ein Auto bei einem Autohändler gekauft?

- (•) Ja
- ( ) Nein

Seite 04

autohaendler

7. Wie zufrieden waren Sie bei Ihrem letzten Autokauf bei einem Autohändler mit folgenden Punkten?

Setzen Sie den Punkt bei der Aussage, die am meisten auf Ihre Erfahrung zutrifft.

	sehr unzufrieden	unzufrieden	zufrieden	sehr zufriede
Preis	(•)	(•)	(•)	(•)
Anzahl der der angebotenen Modell- und Ausstattungsmöglichkeiten	( )	( )	( )	( )
Kompetenz des Verkäufers/der Verkäuferin	(•)	(•)	(•)	(•)
Vertrauenswürdigkeit des Verkäufers/der Verkäuferin	( )	( )	( )	( )
Geduld des Verkäufers/der Verkäuferin	(•)	(•)	(•)	(•)
Entgegenkommen und Freundlichkeit des Verkäufers/der Verkäuferin	( )	( )	( )	( )

Seite 05

logikauto

8. Stellen Sie sich vor, Sie konfigurieren sich ein Auto. Stellen Sie sich einen Ablauf (aus den folgenden Kategorien) zusammen, der für Sie am meisten Sinn ergibt.

Mit welcher Kategorie würden Sie die Konfiguration gerne starten (=1), welche sollte am Schluss kommen(=7)?

Ziehen Sie alle Kategorien zu den für Sie passenden Zahlen.

Treibstoff	–
Modell	–
Variante	–
Design (Farbe, Felgen, Sitze, etc.)	–
Preis	–
Ausstattung	–
Zubehör	–

9. Betrachten Sie folgende Bilder, die aus dem Online-Konfigurator von Volkswagen und aus einem Prospekt von Volkswagen stammen.

Kreuzen Sie dann das Bild an, bei dem die angeführten Adjektive für Sie mehr zutreffen.

Bild 1:

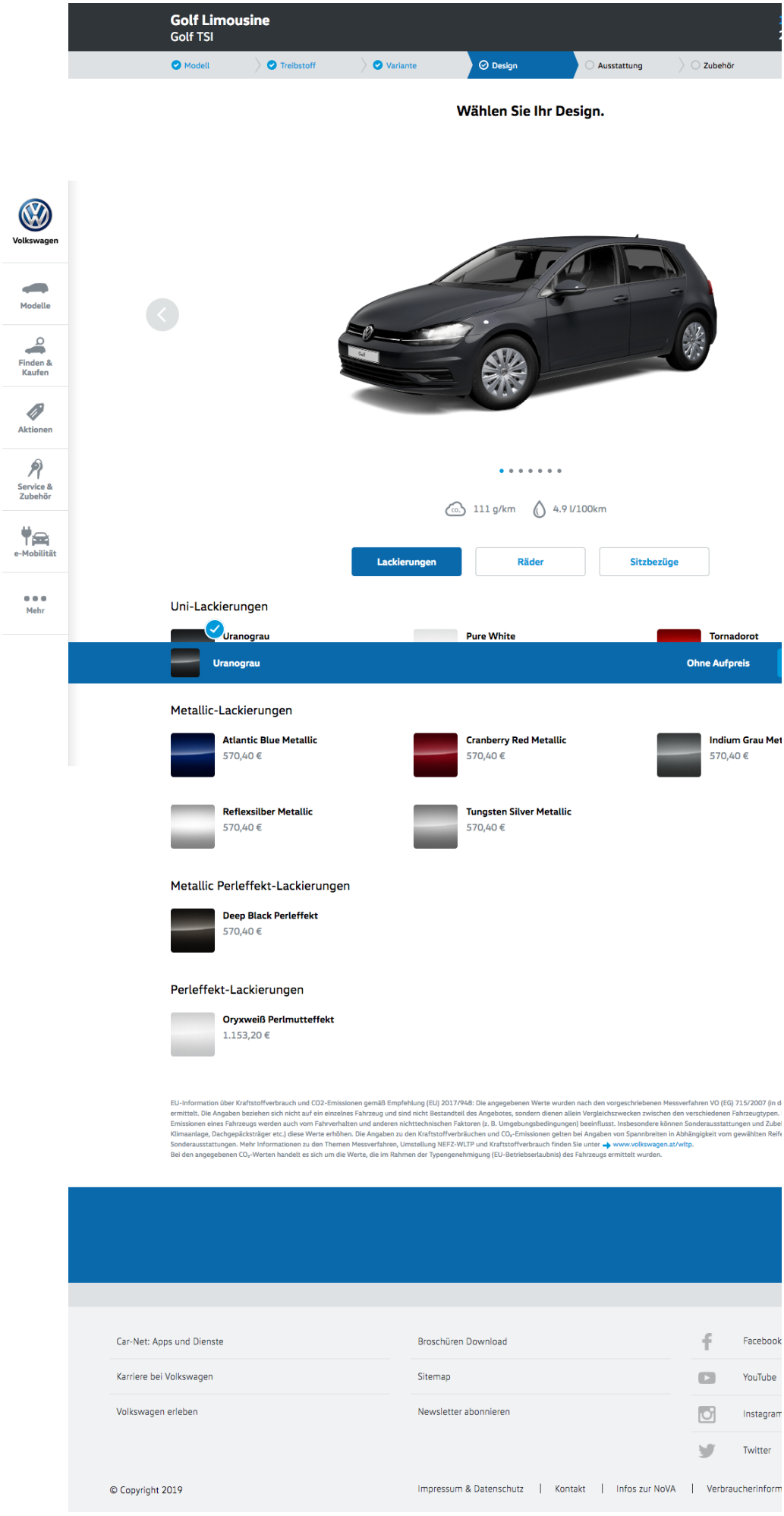
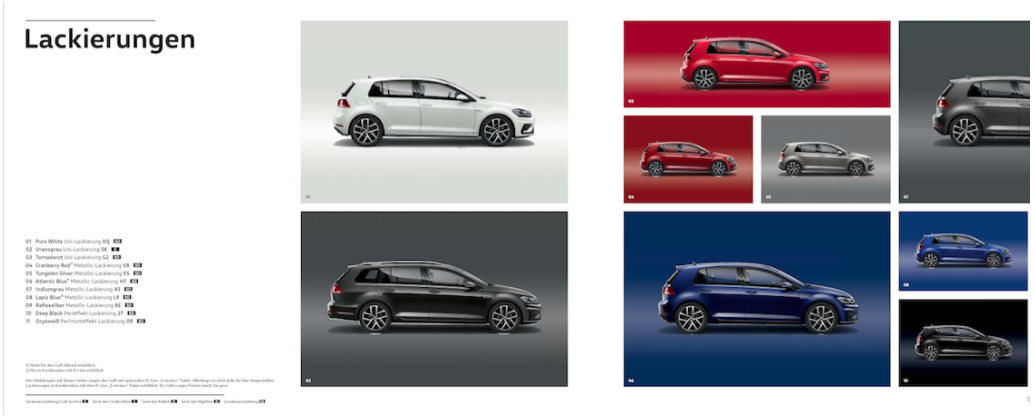

Golf Limousine
Golf TSI
Modell
Treibstoff
Variante
Design
Ausstattung
Zubehör
Wählen Sie Ihr Design.
Volkswagen
Modelle
Finden & Kaufen
Aktionen
Service & Zubehör
e-Mobilität
Mehr
111 g/km
4.9 l/100km
Lackierungen
Räder
Sitzbezüge
Uni-Lackierungen
Uranograu
Pure White
Tornadorot
Uranograu
Ohne Aufpreis
Metallic-Lackierungen
Atlantic Blue Metallic
570,40 €
Cranberry Red Metallic
570,40 €
Indium Grau Met
570,40 €
Reflexsilber Metallic
570,40 €
Tungsten Silver Metallic
570,40 €
Metallic Perleffekt-Lackierungen
Deep Black Perleffekt
570,40 €
Perleffekt-Lackierungen
Oryxweiß Perlmutteffekt
1.153,20 €
Car-Net: Apps und Dienste
Karriere bei Volkswagen
Volkswagen erleben
Broschüren Download
Sitemap
Newsletter abonnieren
Facebook
YouTube
Instagram
Twitter
© Copyright 2019
Impressum & Datenschutz
Kontakt
Infos zur NoVA
Verbraucherinform

Bild 2



	Konfigurator (Bild 1)	Prospekt (Bild 2)
Attraktiver	○	○
Aussagekräftiger	○	○
Übersichtlicher	○	○
Informativer	○	○
Leichter verständlich	○	○

Seite 07

10. Betrachten Sie folgende Bilder, die aus dem Online-Konfigurator von Volkswagen und aus einem Prospekt von Volkswagen stammen.

Kreuzen Sie dann das Bild an, bei dem die angeführten Adjektive für Sie mehr zutreffen.

Bild 1:

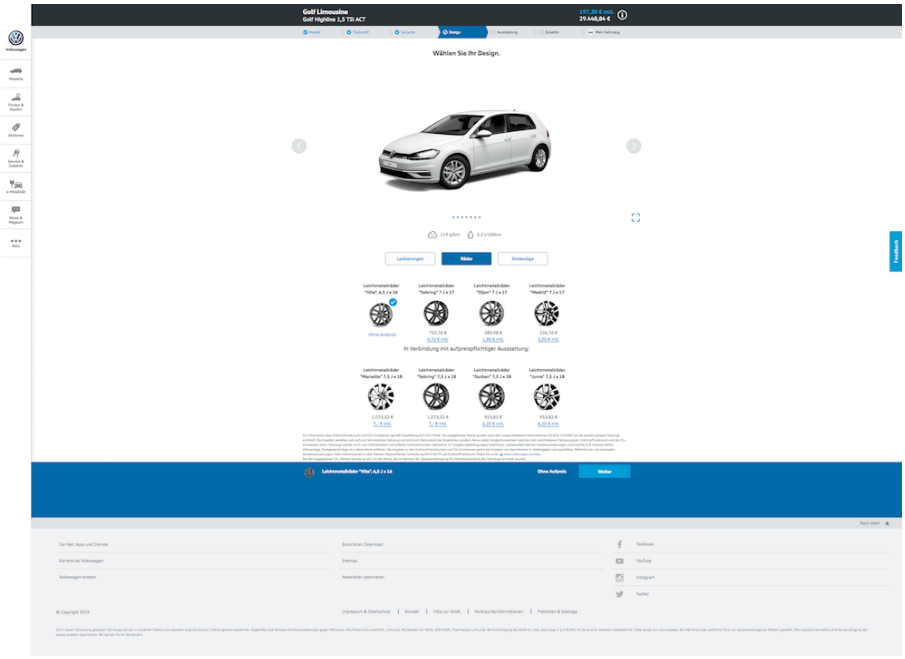


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Bild 2:

	Konfigurator (Bild 1)	Prospekt (Bild 2)
Attraktiver	○	○
Aussagekräftiger	○	○
Übersichtlicher	○	○
Informativer	○	○
Leichter verständlich	○	○

11. Betrachten Sie folgende Bilder, die aus dem Online-Konfigurator von Volkswagen und aus einem Prospekt von Volkswagen stammen.

Kreuzen Sie dann das Bild an, bei dem die angeführten Adjektive für Sie mehr zutreffen.zutreffen

Bild 1:

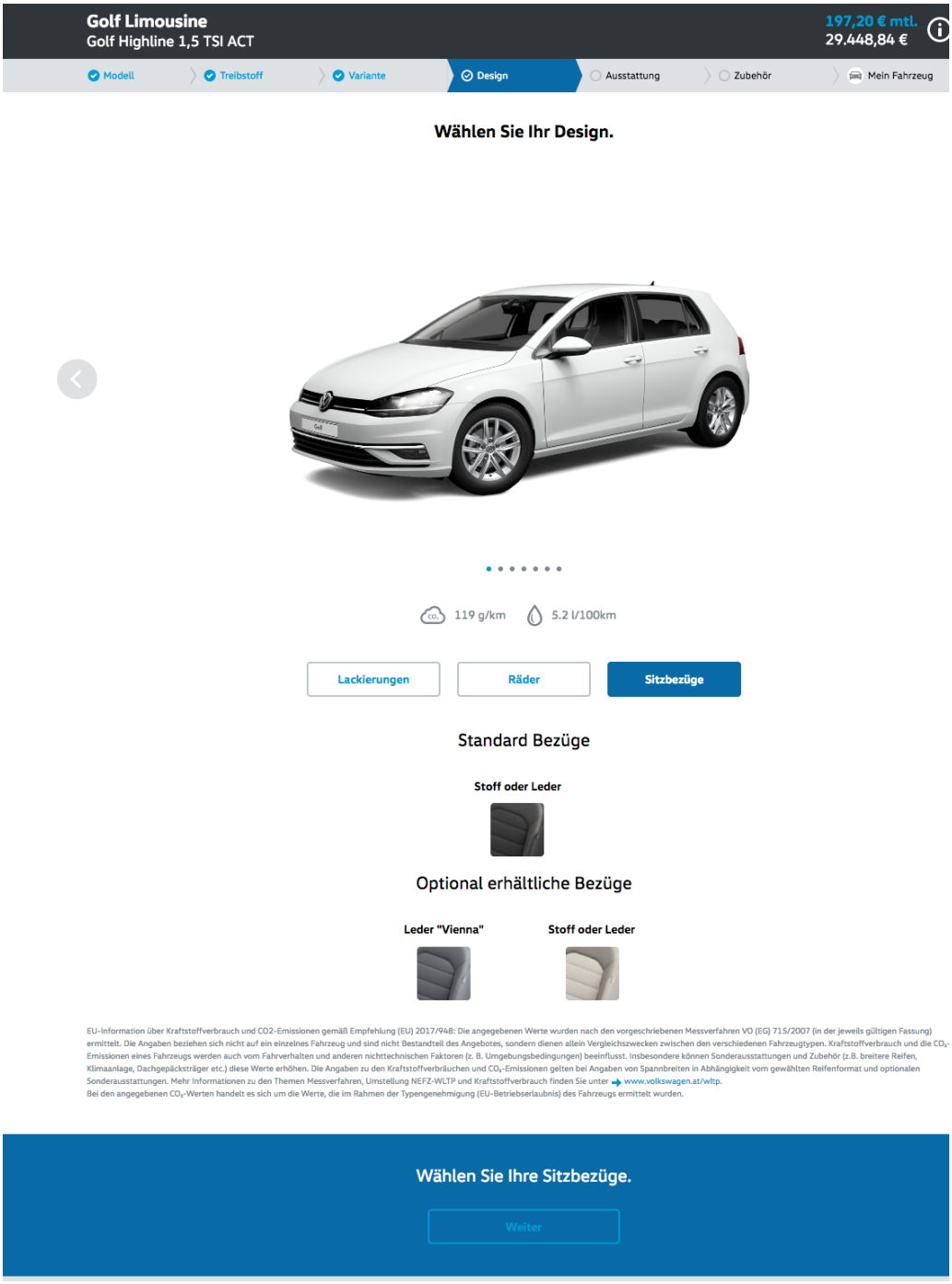

Bild 2:

	Konfigurator (Bild 1)	Prospekt (Bild 2)
Attraktiver	○	○
Aussagekräftiger	○	○
Übersichtlicher	○	○
Informativer	○	○
Leichter verständlich	○	○

12. Betrachten Sie folgende Bilder, die aus dem Online-Konfigurator von Volkswagen und aus einem Prospekt von Volkswagen stammen.

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Bild 1:

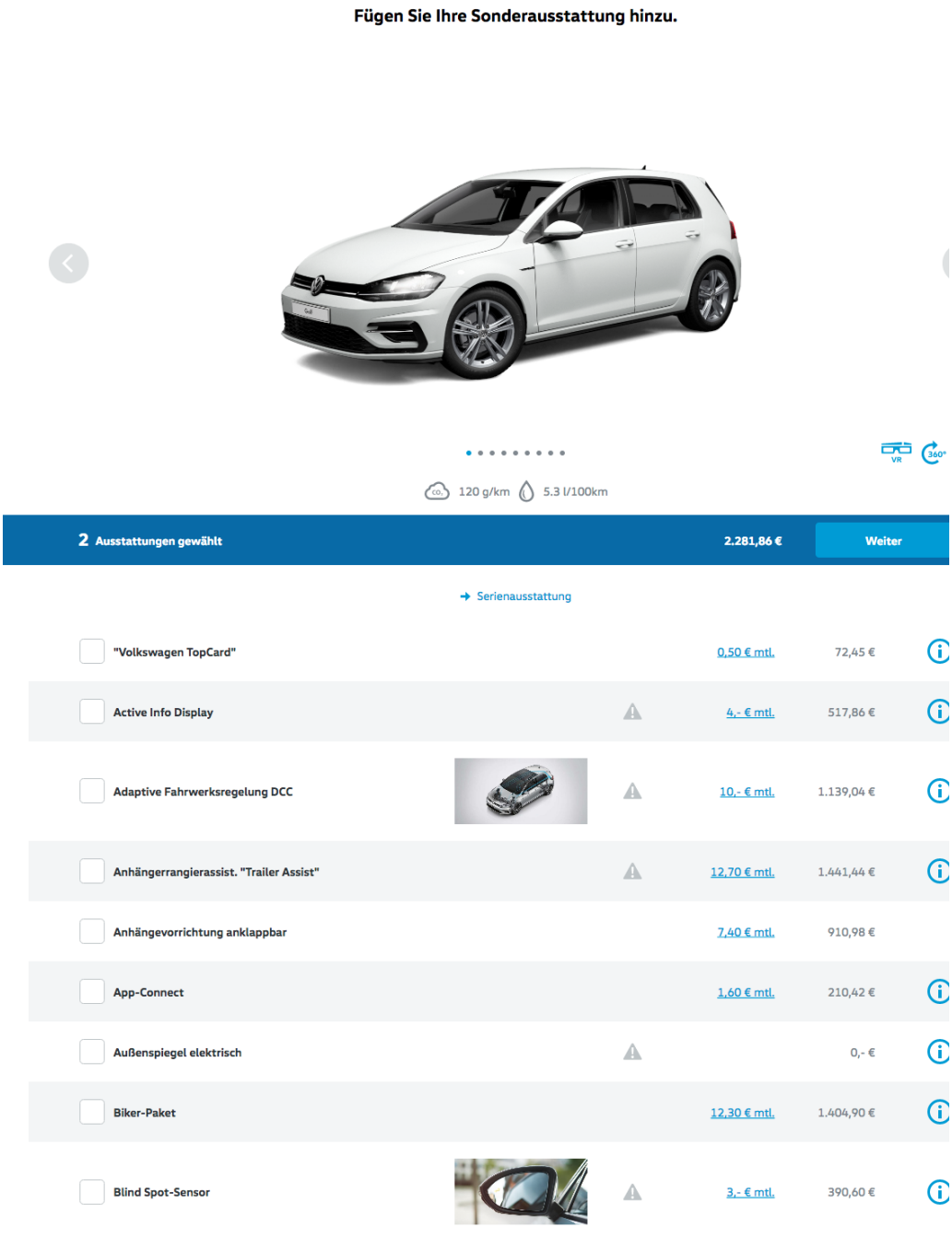
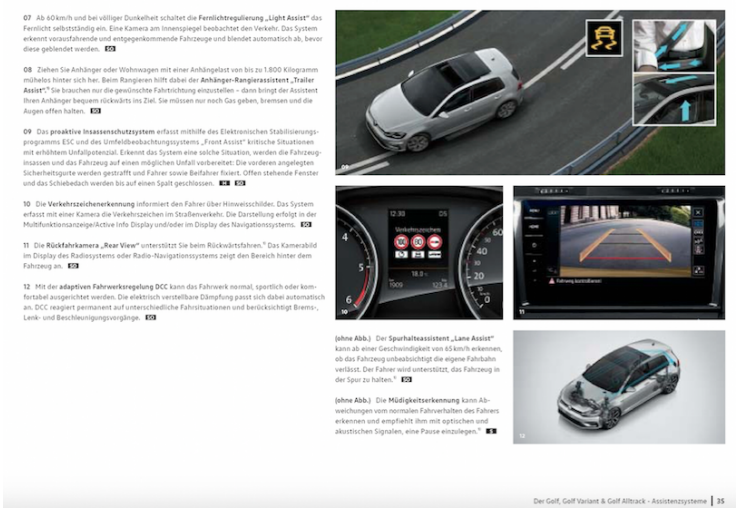


Bild 2:



07 Ab 60 km/h und bei völliger Dunkelheit schaltet die **Fernlichtregulierung „Light Assist"** das Fernlicht selbstständig ein. Eine Kamera am Innenspiegel beobachtet den Verkehr. Das System erkennt vorausfahrende und entgegenkommende Fahrzeuge und blendet automatisch ab, bevor diese geblendet werden. [SO]

08 Ziehen Sie Anhänger oder Wohnwagen mit einer Anhängelast von bis zu 1.800 Kilogramm mühelos hinter sich her. Beim Rangieren hilft dabei der **Anhänger-Rangierassistent „Trailer Assist"**.* Sie brauchen nur die gewünschte Fahrtrichtung einzustellen – dann bringt der Assistent Ihren Anhänger bequem rückwärts ins Ziel. Sie müssen nur noch Gas geben, bremsen und die Augen offen halten. [SO]

09 Das **proaktive Insassenschutzsystem** erfasst mithilfe des Elektronischen Stabilisierungsprogramms ESC und des Umfeldbeobachtungssystems „Front Assist" kritische Situationen mit erhöhtem Unfallpotenzial. Erkennt das System eine solche Situation, werden die Fahrzeuginsassen und das Fahrzeug auf einen möglichen Unfall vorbereitet: Die vorderen angelegten Sicherheitsgurte werden gestrafft und Fahrer sowie Beifahrer fixiert. Offen stehende Fenster und das Schiebedach werden bis auf einen Spalt geschlossen. [A] [SO]

10 Die **Verkehrszeichenerkennung** informiert den Fahrer über Hinweisschilder. Das System erfasst mit einer Kamera die Verkehrszeichen im Straßenverkehr. Die Darstellung erfolgt in der Multifunktionsanzeige/Active Info Display und/oder im Display des Navigationssystems. [SO]

11 Die **Rückfahrkamera „Rear View"** unterstützt Sie beim Rückwärtsfahren.* Das Kamerabild im Display des Radiosystems oder Radio-Navigationssystems zeigt den Bereich hinter dem Fahrzeug an. [SO]

12 Mit der **adaptiven Fahrwerksregelung DCC** kann das Fahrwerk normal, sportlich oder komfortabel ausgerichtet werden. Die elektrisch verstellbare Dämpfung passt sich dabei automatisch an. DCC reagiert permanent auf unterschiedliche Fahrsituationen und berücksichtigt Brems-, Lenk- und Beschleunigungsvorgänge. [SO]

(ohne Abb.) Der **Spurhalteassistent „Lane Assist"** kann ab einer Geschwindigkeit von 65 km/h erkennen, ob das Fahrzeug unbeabsichtigt die eigene Fahrbahn verlässt. Der Fahrer wird unterstützt, das Fahrzeug in der Spur zu halten.* [SO]

(ohne Abb.) Die **Müdigkeitserkennung** kann Abweichungen vom normalen Fahrverhalten des Fahrers erkennen und empfiehlt ihm mit optischen und akustischen Signalen, eine Pause einzulegen.* [A]

	Konfigurator (Bild 1)	Prospekt (Bild 2)
Attraktiver	○	○
Aussagekräftiger	○	○
Übersichtlicher	○	○
Informativer	○	○
Leichter verständlich	○	○

Seite 10

13. Betrachten Sie folgende Bilder, die aus dem Online-Konfigurator von Volkswagen und aus einem Prospekt von Volkswagen stammen.

Kreuzen Sie dann das Bild an, bei dem die angeführten Adjektive für Sie mehr zutreffen.

Bild 1:

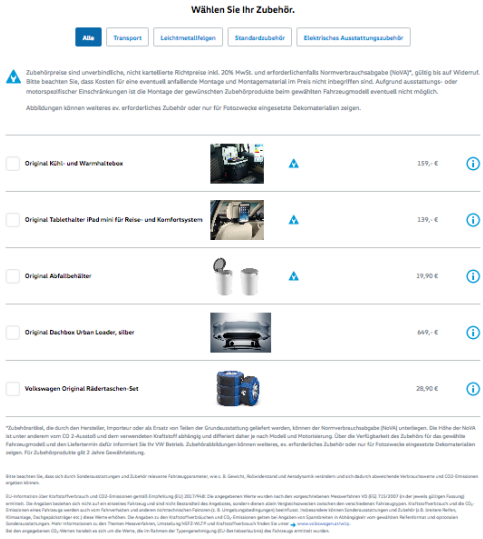


Bild 2:

	Konfigurator (Bild 1)	Prospekt (Bild 2)
Attraktiver	○	○
Aussagekräftiger	○	○
Übersichtlicher	○	○
Informativer	○	○
Leichter verständlich	○	○

Seite 11

14. Welche Art, Ihr Auto zusammenzustellen würden Sie nach diesen Bildern bevorzugen?

- ○ Den Online-Konfigurator
- ○ Das Prospekt

15. Was bedeutet ein Autokauf für Sie?

- ○ Mühevolle Prozedur, die ich ungern erledige bei der ich gerne mehr Zeit sparen würde.
- ○ Situation/Aufgabe, der ich neutral begegne und die ich ohne viele Emotionen abhandle.
- ○ Vergnügen, für das ich mir gern viel Zeit nehme, recherchiere und gerne Beratung beanspruche (online/von Freunden/vom Händler)
- ○ Sonstiges:

16. Tendieren Sie bei Ihrem nächsten Autokauf eher zu einem Neu- oder Gebrauchtwagen?

- ○ Neuwagen
- ○ Gebrauchtwagen

Seite 12

Gebrauchtwage

17. Wie wichtig sind Ihnen diverse Auswahlmöglichkeiten beim Autokauf?

	Sehr unwichtig	Unwichtig	Wichtig	Sehr wichtig
Markenauswahl	○	○	○	○
Innenausstattung (Klimaanlage, Sitzheizung, Bordcomputer...)	○	○	○	○
Außenausstattung (Felgen, Farben...)	○	○	○	○
Anzahl der Sitze/Türen	○	○	○	○
Motorleistung	○	○	○	○
Treibstoff	○	○	○	○
Erstzulassung	○	○	○	○
Kilometerstand	○	○	○	○

18. Würden Sie ihr Auto eher online oder offline heraussuchen wollen?

- ○ Online
- ○ Offline

Seite 13

Gebrauchtwagenonline

19. Warum online? (Mehrfachantworten möglich)

- ☐ Ich erhoffe mir preisliche Vorteile
- ☐ Ich habe mich noch nicht festgelegt
- ☐ Ich kann Kontakt mit Menschen vermeiden
- ☐ Es ist bequemer für mich
- ☐ Es bedeutet weniger Stress für mich
- ☐ Es ist einfacher, verschiedene Automarken/Modelle zu vergleichen
- ☐ Sonstiges:

Seite 14

Gebrauchtwagenoffline

20. Warum offline? (Mehrfachantworten möglich)

- ☐ Ich erhoffe mir preisliche Vorteile
- ☐ Ich möchte das Auto persönlich begutachten
- ☐ Es ist bequemer für mich
- ☐ Es bedeutet weniger Stress für mich
- ☐ Ich bevorzuge den persönlichen Kontakt mit Menschen
- ☐ Sonstiges:

Seite 15

Neuwagen

21. Wie wichtig sind Ihnen diverse Auswahlmöglichkeiten beim Autokauf?

	Sehr unwichtig	unwichtig	wichtig	Sehr wichtig
Markenauswahl	○	○	○	○
Innenausstattung (Klimaanlage, Sitzheizung, Bordcomputer...)	○	○	○	○
Außenausstattung (Felgen, Farben...)	○	○	○	○
Anzahl der Sitze/Türen	○	○	○	○
Motorleistung	○	○	○	○
Treibstoff	○	○	○	○

22. Würden Sie sich Ihr Auto eher online oder offline zusammenstellen wollen?

- ○ Online
- ○ Offline

Seite 16
Neuwagenonline

23. Warum online? (Mehrfachantworten möglich)

- [ ] Ich erhoffe mir preisliche Vorteile
- [ ] Es ist ein persönliches, individuelles Auto, wie nur ich es hab
- [ ] Ich habe die volle Kontrolle darüber, wie mein Auto gestaltet ist
- [ ] Ich mag es, Neues auszuprobieren und herumzuexperimentieren
- [ ] Die sofortige Darstellung des Autos (Sitze, Außenfarbe, etc.) ist ein Vorteil für mich
- [ ] Ich kann sofort sehen, wie viel mein Auto mit welcher Ausstattung kostet
- [ ] Ich kann Kontakt mit Menschen vermeiden
- [ ] Es ist bequemer für mich
- [ ] Es bedeutet weniger Stress für mich
- [ ] Es ist einfacher, verschiedene Automarken/Modelle zu vergleichen
- [ ] Sonstiges:

Seite 17
Neuwagenoffline

24. Warum offline? (Mehrfachantworten möglich

- [ ] Ich erhoffe mir preisliche Vorteile
- [ ] Ich möchte das Auto persönlich begutachten
- [ ] Es ist bequemer für mich
- [ ] Ich möchte den regionale Autohändler unterstützen
- [ ] Ich bevorzuge den persönlichen Kontakt mit Menschen
- [ ] Ich habe mich noch nicht auf ein Modell festgelegt und möchte mich persönlich beraten lassen
- [ ] Ich habe bisher mein Auto beim Händler gekauft und habe gute Erfahrungen damit gemacht
- [ ] Sonstiges:

Seite 18
jump1

25. Nutzen Sie das Internet gerne oder eher aus Notwendigkeit?

- ( ) Sehr gerne
- ( ) Gerne
- ( ) Aus Bequemlichkeitszwecken

26. Wie würden Sie Ihren eigenen Umgang mit Onlineshops wie amazon.at und Onlineplattformen wie z.B. willhaben.at einschätzen?

Sicher	( )	( )	( )	( )	( )	Unsicher
Kompetent	( )	( )	( )	( )	( )	Inkompetent
Erfahren	( )	( )	( )	( )	( )	Unerfahren

27. Sind Sie weiblich oder männlich?

- ( ) Weiblich
- ( ) Männlich

28. Was ist Ihr höchster abgeschlossener Bildungsgrad?

- ( ) Hauptschule, Unterstufe AHS, NMS, Sonderschule
- ( ) Lehre, BMS
- ( ) AHS/ (z.B. Gymnasium)
- ( ) Letzte zwei Jahre der BHS (BHS-Abschluss) (z.B. HAK, HTL, HBLA)
- ( ) Hochschule (Universität/FH)

29. In welchem Bundesland sind Sie wohnhaft?

- ( ) Wien
- ( ) Oberösterreich
- ( ) Niederösterreich
- ( ) Vorarlberg
- ( ) Burgenland
- ( ) Kärnten
- ( ) Tirol
- ( ) Steiermark
- ( ) Salzburg

30. Wie oft nutzen Sie das Internet?

- ( ) Täglich
- ( ) Mehrmals pro Woche
- ( ) Mehrmals pro Monat