

THE INFLUENCE OF NEED FOR CLOSURE AND DECISION AIDS ON ONLINE PURCHASE BEHAVIOR

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Abstract

The overall purpose of this study is twofold. On the one hand, an experiment has been carried out in order to investigate the influence of the need for closure [NFC] and product category experience on online decision-making and information processing, in general, and on online decision aids, search effort and the consideration set size, in particular. On the other hand, the analysis of the online behavior using video screen recordings in a simulated online purchase situation, will additionally function as a basis to develop a behavior analysis' coding scheme for online consumer decision-making and information processing and searching in the e-commerce context.

A total of 60 German subjects participated in this study. The manipulated decision aids were the consumer reviews and the recommendation system of the German Amazon website. The chosen product category in which participants had to search a suitable product was leisure backpacks. The data resulting from questionnaires during the experiment and the behavior analysis have been analyzed by carrying out Poisson loglinear and Gamma loglink regression analysis using generalized linear models.

The results indicated that the influence of NFC and the experience in the product category as well as the interaction between the two predictor variables on the product choice, confidence in the product choice, search effort, and usage of recommendation system was generally not relevant. However, an increase of the product category experience also led to an increase of the number of used search attempts of the participants, thus different approaches such as different search terms or categories and product sorting. Additionally, the usage and reliance on the consumer reviews increased significantly with an increase of the NFC of the participants. Furthermore, a marginal significant influence of the NFC was found, showing that with an increase of the NFC of the participants the consideration set size of the product category as a predictor to indicate whether high NFC participants reside in the *seizing* or *freezing* state did not show the expected effect. However, the results showed a tendency with marginal statistical significance that low NFC participants consideration set size increased with increasing product category experience.

Due to the lack of significant results, future studies should search for other latent variables or predictors such as the interplay between the NFC and the need for cognition for example. Additional implications and future research directions have been discussed.

Samenvatting

Het thema van deze afstudeeropdracht hoort globaal bij de categorieën e-commerce en online keuzegedrag (ofwel decision-making) thuis. Specifieker gaat het erom de invloed van zowel de gedragsdeterminant en persoonlijkheidsvariabele "need for closure" [NFC] en de ervaring met een product categorie op zogenoemde *decision aids* (klantenrecensies en aanbevelingssystem) van Amazon en op het keuzegedrag en onderliggende strategieën te onderzoeken. Eerdere onderzoeken hebben aangetoond dat de NFC een geschikte voorspeller en determinant van keuzegedrag, en uiteindelijk ook koopgedrag, is. Op basis hiervan werd voor een ander aanpak gekozen, door naast een gesimuleerde aankoopsituatie op Amazon ook een gedragsanalyse aan de hand van tijdens de studie opgenomen video's uit te voeren. Voor de gedragsanalyse werd een nieuw codeerschema opgesteld en toegepast, om het gedrag te standaardiseren en te operationaliseren, waardoor proefpersonen met elkaar vergeleken kunnen worden.

In totaal hebben 60 Duitse proefpersonen deelgenomen aan het experiment. De vergaarde data van vragenlijsten tijdens de studie en data van de gedragsanalyse werd vervolgens onderzocht door *Poisson loglinear* en *Gamma loglink* regressie analyses met *generalized linear models* toe te passen.

De resultaten laten zien dat er zowel geen hoofdeffecten door de NFC en de ervaring met de product categorie als interactie-effecten tussen de twee voorspeller waren op zowel de productkeuze, tevredenheid met hun keuze, erin gestoken moeite om te zoeken (search effort), als gebruik van de aanbevelingssysteem. Echter, een toename aan ervaring met de product categorie liet een toename in de hoeveelheid van verschillende aanpakken om te zoeken zien, zoals het gebruik van nieuwe zoektermen of zoeken binnen categorieën. Verder werd een significant effect gevonden dat een toename van de NFC ook in een toename van het gebruik van de klantenrecensies resulteerde. Bovendien werd een marginale significante invloed van de NFC gevonden betreffend de hoeveelheid van overwogen producten (consideration set size), die relatief toenaam naar mate de NFC ook toenam. De idee dat de product ervaring als een voorspeller gebruikt zou kunnen worden om aan te tonen of de proefpersonen met een

hoge NFC nog steeds in een toestand van *seizing* of *freezing* zijn, kon helaas niet helemaal bevestigt worden. Toch lieten de resultaten een tendens zien van marginale statistische significantie. De hoeveelheid van overwogen producten van proefpersonen met een lage NFC nam toe naarmate de productervaring ook toe nam. Voor proefpersonen met een hoge NFC was het echter precies tegenovergesteld, want de hoeveelheid van overwogen product nam juist af naarmate de productervaring toe nam.

Aangezien het ontbreken van statistisch significante resultaten wordt aanbevolen in de toekomst naar ander veelbelovende en latente factoren te kijken. Een mogelijke manier zou de verbinding van NFC en de behoefte aan cognitie (need for cognition) zijn, zoals besproken in de discussie. Verder aanbevelingen en conclusies zijn bediscussieert.

Introduction

The competitive character and still ongoing growth of e-commerce and online retailing (Ivanova, Scholz, & Dorner, 2013) increases also the need for a deeper understanding of consumer behavior, in general, and individual differences regarding decision making and its factors, in particular (Hargittai, 2004; van der Merwe & Bekker, 2003; Vermeir, van Kenhove, & Hendrickx, 2002). The relationship between decision-making and information processing, on the one side, and psychological traits, such as motivation, on the other side, is of particular interest here. Especially within the online context, where e-vendors try to help the costumers to reach a decision by providing them with decision-aids, such as the commonly used consumer reviews and recommendation systems (Kumar & Benbasat, 2006). However, decision aids have to be noticed, used, and adopted by the costumer in order to be effective (Ivanova et al., 2013; Mudambi & Schuff, 2010; Wang & Benbasat, 2005). Therefore, it remains very interesting whether and to which extent individual characteristics, in this particular case an individual's need for closure, play a key role regarding the effectiveness of decision aids and ultimately decision-making (Kruglanski, 1990; Vermeir et al., 2002; Vermeir & Van Kenhove, 2005).

The overall purpose of this study is twofold. On the one hand, an experiment has been carried out in order to investigate the influence of the need for closure on online decision-making and information processing, in general, and on online decision aids and the number of considered products, in particular. On the other hand, the analysis of the online behavior using video screen recordings in a simulated online purchase situation, will additionally function as a basis to develop a behavior analysis' coding scheme for online consumer decision-making and information processing and searching in the e-commerce context.

Theoretical Background

From a consumer perspective, having numerous alternatives from which to choose in an electronic shopping environment may seem desirable at first, however, limited cognitive resources and processing of its vast amounts of information may influence the decision making process negatively (Brown, Pope, & Voges, 2003; Häubl & Trifts, 2000). According to Vermeir et al. (2002), the decision-making process consists of different stages: the first stage consists of information search, the second regards the applying of a specific decision rule to the gained results, and the third stage refers to the use of information cues in order to make the actual product choice. Also, the traditional funnel analogy, which suggest that the

initial size of the considered products, usually called the consideration set, will decrease systematically until a purchase or choice has been made, resembles generally the stages of Vermeir et al. (2002). However, there has been critique that the consumer decision journey is more complicated than the parsimonious funnel metaphor describes and that it fails to capture the complexity of the product consideration process and its various factors (Haven, 2007). Furthermore, contrary to the original metaphor, Court, Elzinga, Mulder, and Vetvik (2009) proposed that the process of consumer decision-making can be rather compared to a circular journey than to a funnel. Hence, they state that the constant narrowing of the funnel does not describe the process adequately. Moreover, Court et al. (2009) distinguish between the initial considerations set, which indicates the general brand preferences, and the active consideration set, thus the accumulation of the initial brand preferences and the given products at hand. Therefore, they stress that the number of brands within the consideration set may actually increase from the initial consideration set to the active consideration set rather than decrease. Furthermore, in order to reach closure, as Court et al. (2009) describe the purchase action, consumer-driven marketing plays an increasingly important role from which consumers actively acquire helpful information. The earlier described decision aids can be also assigned to the consumer-driven marketing content among word-of-mouth recommendations, online research and reviews, but also past experiences. Earlier research also confirmed that, generally, prior knowledge and experience with a product category can have an affect on the kind of evaluative processing carried out in decision-making situations (Bettman, Johnson, & Payne, 1991). However, the active acquisition and processing of the given information in order to come up with a decision depends on the motivation of the consumer (Vermeir et al., 2002).

There are several theories, models, and classifications that deal with an individual's motivation and help to describe and predict its influence on decision-making and information processing. For example, earlier studies successfully tested the applicability of need for cognition (Cacioppo, Petty, Feinstein, & Jarvis, 1996; Levin, Huneke, & Jasper, 2000), maximizing versus satisficing (Polman, 2010; Schwartz et al., 2002) or the reflective-impulsive model (Strack, Werth, & Deutsch, 2006) in this context. However, earlier studies regarding the usage and adoption of decision aids suggested that an individual's need for closure might shed more light on this issue (Havinga, Schmettow, & Scholz, 2013). Also, the motivation to process information seems to be related to the need for closure (i.e., Kruglanski, 1990). Further, the study of Vermeir et al. (2002) successfully showed that the need for

closure is an appropriate indicator of the amount of sought and used information, the appliance of decision rules, and also the confidence in their decisions. Therefore, this study can be seen as a replication of the study of Vermeir et al. (2002) and as a justification for the choice of the need for closure as one of the predictors. Furthermore, the influence of the concept of need for closure on the ambiguity aversion effect of consumers in decision-making situations has been confirmed (Schlink & Walther, 2007), which might be also highly probable and therefore relevant in the online context. Additionally, the rationale behind the usage of decision aids in the online context could be partially due to the intention to resolve the ambiguity and uncertainty.

Hence, it can be argued that an individual's need for closure, past experiences, and decision aids can be seen as valuable potential determinants for and moderating variables of decision-making. Therefore, the focus of the present study lies on the deeper relationship between these determinants and their particular influence.

Decision-Making and Information Processing

On the basis of the above described decision-making stages of Vermeir et al. (2002) and Court et al. (2009), the following paragraphs will describe relevant constructs and their relation to each other in more detail. Furthermore, the research questions and hypotheses will be derived.

Need for Closure

As already stated above, individual differences regarding the motivation for information search and usage seem to be related to an individual's need for closure [NFC] (Kruglanski, 1990; Vermeir et al., 2002; Vermeir & Van Kenhove, 2005). According to Kruglanski and Webster (1996), "the need for cognitive closure refers to individuals' desire for a firm answer to a question and an aversion toward ambiguity" (p. 264). The validation of their need for closure scale by Schlink and Walther (2007) showed a high negative correlation with the tolerance of ambiguity (r = -.51), indicating the applicability for decision-making situations with high uncertainty. However, the need for closure is not a dichotomous concept, but varies along a motivational continuum anchored at one end with a high need for closure and at the other end with a low need for closure or avoidance of closure (Kruglanski & Webster, 1996). Therefore, the following description of the characteristics of individuals high and low in need for closure only gives a global indication about the two extreme ends of the continuum. As a modern personality construct, the need for closure takes also situational or

contextual influences and factors into account (Schlink & Walther, 2007). Thus, although the NFC of a person is a relatively stable individual characteristic, it can vary due to contextual or situational factors (Webster & Kruglanski, 1994). For example, both the accountability for one's actions (Webster, Richter, & Kruglanski, 1996) and an attractive or enjoyable cognitive task can decrease the NFC (Houghton & Grewal, 2000). Further, the actual need for closure depends on the perceived advantages and disadvantages of reaching closure in the particular situation (Schlink & Walther, 2007). Unfortunately, the literature lacks meta-analyses regarding the effect sizes of the need for closure as well as most literature lacks implications about the explained and unexplained variance.

Generally, individuals with a high NFC seem to be highly motivated to reach a conclusion or goal quickly and have a higher tendency to terminate cognitive processing related to the issue at hand (Webster & Kruglanski, 1994). Further, the disposition toward closure can also influence the decision-making patterns (Vermeir & Van Kenhove, 2005) or different aspects of the decision-making process (Vermeir et al., 2002). According to Kruglanski and Webster (1996), an individual with a high need for closure have a tendency to reside in either one of two oppositional states regarding relevant issues. These are called "seize" or the urgency tendency, and "freeze" or the permanency tendency. Thus, either the individual tries to reach closure regarding a specific topic or situation, thus "seizing" it as long as it takes to reach closure (urgency tendency); or the individual already reached a state of closure and "freezes" his/her attitude, knowledge, heuristics, and strategies regarding this topic, which were once suitable to succeed in reaching closure to remain in this state or reach it again as fast as possible (permanency tendency) (Kruglanski & Webster, 1996; Vermeir & Van Kenhove, 2005). Hence, the state of "freeze" is generally desired by individuals with a high need for closure for relevant situations and issues. Therefore, they usually refuse to accept new or differing evidence in order to remain in a state of closure and avoid uncertainty (Kruglanski & Webster, 1996). Concluding, the need for closure can give an indication about why people differ regarding their preference to use different types of information (Houghton & Grewal, 2000) and affects how they think, feel, and act (Vermeir & Van Kenhove, 2005). Furthermore, it will be tested whether the self-reported confidence of and satisfaction with a product choice increases with the need for closure as Vermeir et al. (2002) found in their study. This leads to the first hypotheses:

H1a: The chance of ultimately making a product choice increases relevantly with the need for closure of the participants.

H1b: Participants with a high need for closure will be relevantly more confident of their product choice than low need for closure participants.

Additionally, once individuals with a high or heightened NFC obtained closure, they seem to show reduced levels of information processing regarding the issue at hand (Mayseless & Kruglanski, 1987). Furthermore, the threatening or undermining of closure may induce negative feelings, as well as positive feelings are evoked when closure is facilitated or attained (Vermeir & Van Kenhove, 2005). Hence, individuals with a high NFC, who are residing in a state of freezing, seem to be less willing to engage in time and energy consuming processing of large amounts of information and seem to prefer widely applicable knowledge, such as heuristic decision cues (Vermeir et al., 2002; Vermeir & Van Kenhove, 2005) or in the consumer context already formed attitudes about brand (Houghton & Grewal, 2000). However, this does not seem to hold true for high NFC individuals, who are still seizing and trying to reach a state of closure (Vermeir et al., 2002). Thus, individuals with a high need for closure in the "seizing" state might engage in increased information seeking activities in order to resolve the ambiguity of the situation (Vermeir et al., 2002). Therefore, the experience with a subject or an issue at hand might give an indication of the search effort of high NFC individuals and their willingness to engage in time-consuming activities to come up with a decision. Hence, the crux or the decisive factor for search effort of high need for closure individuals might be their experience with a, for example, product category. By approaching this in a deductive manner, it can be expected that having no or little experience indicates that a person is still residing in the seizing state, whereas already existing experience indicates the freezing state. However, consumers with a low NFC seem to enjoy uncertainty and deliberately postpone judgment until they are either satisfied with the information uptake, which incorporates alternative views to their own, or (cognitive) resources are depleted (Vermeir & Van Kenhove, 2005; Webster & Kruglanski, 1994).

Consideration Set

During the product information gathering and evaluation stage (Vermeir et al., 2002) are several more concepts, strategies, and personal characteristics of interest. The creation of the consideration set of the consumer takes place during this stage (Vermeir et al., 2002) and can be defined as the set of options that survive the product screening process (Häubl & Trifts, 2000). However, as Nedungadi (1990) and Court et al. (2009) pointed out, the creation of the consideration set is a continuous process, which incorporates the constant addition and subtraction as well as the evaluation of potential products. Furthermore, the consumer usually

starts with an initial consideration set, consisting of preferred brands and general preferences. The initial consideration set will be transformed into an active consideration set including the newly added products from the search to the general set from which the consumer goes on to evaluate and add and remove further products (Court et al., 2009). Thus, the experience of a consumer with a product category might lead to a general bigger initial consideration set. Generally, in order to construct a consideration set, consumers can either use an include- or exclude-strategy. In situations with large assortments of products at hand, the consideration set of the consumer serves as an important factor to determine decision-making strategies (Goodman, 2013). This is also in line with the observation of Court et al. (2009) regarding consideration set formation. In order to reduce the size of the consideration set and thereby the choice difficulty, Goodman, Broniarczyk, Griffin and McAlister (2013) tried to determine the possible effects of providing the consumer with recommendations. However, the consideration set and choice difficulty only increased rather than decreased.

In the literature, the term consideration set and choice set often have been used interchangeably and no clear definition or distinction has been given. Here, the difference between the consideration set and the choice set is that the former describes the complete number of products ever considered during the product search, whereas the latter describes the set of products from which the choice has been made. Therefore, this study will only use the consideration set of the participants, because the choice set size is rather difficult to determine objectively due to the described consumer decision journey, thus the continuous searching, adding, evaluating and removing of potential products (consistent with Court et al., 2009; Nedungadi, 1990).

The total search effort is used as an umbrella term for the several measured concepts indicating the search activity of the participants. According to Beatty and Smith (1987), measures of search effort often include the time spent on the decision, number of used information sources and types of information sought, as well as the number of considered alternatives. Furthermore, Moorthy, Ratchford, and Talukdar (1997) used the summation of obtained information as indicator for search effort and Häubl and Trifts (2000) used the number of product alternatives for which detailed information was obtained as indicator. Therefore, several measures resulting from the behavior analysis were used to give an indication of the total search effort. See table 1 for the different measurement concepts.

Table 1: Conceptualization of the Total Search Effort of the participants

Concept	Description	Abbreviation
Search Effort	Number of opened search result pages	ResuPage
	All Search Attempts	AllAtt
	Total time searching for products	TTS
	~	~~~
	Consideration Set Size	CSS

Based on the literature review and earlier described constructs, the following hypotheses have been proposed:

H2a: The higher the need for closure of the participants, the relevantly less search effort the participants will show.

H2b: The more experienced the participants are with the product category, the relevantly less search effort the participants will show.

H2c: Participants with a high NFC and experience with the product category do show significantly less search effort than high NFC participants without experience.

Decision Aids

In an attempt to help the consumer to make (purchase) decisions and effectively manage enormous amounts of information, e-vendors, such as Amazon, implemented various decision aids or decision support systems, such as consumer reviews [CR; see figure 1] and recommendation systems [RS; see figure 2], which were also used in this study (Häubl & Trifts, 2000; Vermeir et al., 2002). Ivanova and colleagues (2013) describe online consumer reviews as means of virtual knowledge transfer due to the given indication of product quality through the opinions and experiences of other consumers. In other words, online consumer reviews can be seen as a substitute for "first-hand product usage experience" (Ivanova et al., 2013, p. 2). The recommendation system provided by Amazon.de collects data from the browsing behavior of the consumer from various sources, such as Cookies and click-stream data for example, to detect patterns, make assumptions, and give future consumers recommendations based on their own or comparable past behaviors (Kumar & Benbasat, 2006). However, the product recommendations for consumers based on the visited product pages are for this context of special interest, because of the manipulated and artificially created product search and purchase situation. These product recommendations are based on

both the similarity to the visited product and specific assumptions made by Amazon about the consumer and his/her recent browsing history (Kumar & Benbasat, 2006). Furthermore, they are arranged according to their relational proximity to the visited product and again are derived from using implicit click-stream data (Kumar & Benbasat, 2006).



Figure 1: Screenshot from the experiment of a participant with consumer reviews

Decision aids can be considered effective, when they succeed to capitalize on the strengths and compensate for the weaknesses of the user (Hoch & Schkade, 1996). Among the proposed compensation of weaknesses is the filtering of the information into smaller and more relevant sets, providing the user with useful anchors in situations of judgment under uncertainty, and support and guide the user in situations with low predictability. Hence, an individual's need for closure can also give insight into the usefulness of the decision aids due to its measurement of uncertainty avoidance and predictability, which can hinder reaching closure (Houghton & Grewal, 2000). Moreover, the successful support and ability of consumers to find products that match their personal preferences should be enhanced by decision aids in online shopping environments (Häubl & Trifts, 2000). Thus, the content on an e-vendors website regarding the product descriptions is very important and has to be supportive for the consumer, as well as be high in quality and yield the right amount of information (van der Merwe & Bekker, 2003).



Figure 2: Screenshot from the experiment of a participant with recommendation system

In order to understand the influence of consumer reviews, it is crucial to determine whether the consumers actually read the reviews before purchasing a product, and whether they were the decisive factor for their decision (Mudambi & Schuff, 2010). Ivanova et al. (2013) studied the effects of "spotlight reviews" on Amazon (see figure 1) on the purchase intention of consumers by controlling for valence of the review and its valence intensity, as well as the adoption of the review by the consumer. The adoption of the review is a crucial moderator in this context, because only reviews that are adopted by the consumer have an impact on purchase intention, and adopted positive reviews had a greater influence than adopted negative reviews (Ivanova et al., 2013). This was explained by the fact that the consumer attributed the negative opinions of the reviewer to their preferences and attitudes, rather than the product quality, which results in a decreased trust (Ivanova et al., 2013).

Based on the literature review and earlier concepts, the following hypotheses have been created:

H3a: The use of the decision aids increases relevantly with the need for closure of the participants.

H3b: The use of the decision aids decreases relevantly with increasing experience of the participants with the product category.

H3c: Participants with a high need for closure without experience with the product category use the decision aids relevantly more compared to participants with a high need for closure with product category experience.

Behavior Analysis

Earlier studies regarding the effects of decision aids in online purchase situations did show that the self-reports of the participants were highly unreliable (see Havinga, Schmettow, & Scholz, 2013). Therefore, a behavior analysis was also carried out besides the standard quantitative part of the study following the concept of triangulation. In order to collect the data for the behavior analysis, the screen of the participants was recorded during the whole process of decision-making, including online information collection and processing. The video analysis makes it possible to monitor, rate, and evaluate the behavior of the participants (Benbunan-Fich, 2001; Hargittai, 2004; Rubin & Chisnell, 2008). Furthermore, it allows to draw conclusions and to get more insights into the decision-making process and its determinants in an online context (Hargittai, 2004; van der Merwe & Bekker, 2003). Additionally, screen recordings allow collecting rich, empirical data of natural behavior in an online context and the interaction of the user with the system in an unobtrusive way (Tang, Liu, Muller, Lin, & Drews, 2006). According to Hargittai (2004), the combination of quantitative and qualitative research tools allows for aggregation of the collected data, which is especially desirable given the purpose of this paper. Furthermore, the use of qualitative research methods, such as video recordings of online behavior, can also help to detect unnoticed problems, user-related solutions or new functionalities, and ideas for implementation, which would not be found with solely standardized questions and manipulations or log-file evaluation (Benbunan-Fich, 2001; Rubin & Chisnell, 2008; Thatcher, 2006). Additionally, by following and recording all the performed actions of a consumer during the product search and decision-making process, a comprehensive evaluation of the important and relevant aspects can be ensured and guaranteed (Thatcher, 2006; van der Merwe & Bekker, 2003). As Benbunan-Fich (2001) stated, the direct observation of the interaction of an user with a website is the most feasible and efficient approach to evaluate its usability. Therefore, the observation of the consumer's behavior and evaluation of the website's usability gives an indication whether user requirements are successfully implemented in order to reach a satisfying decision, and give possible implications for optimization if needed. Furthermore, the longitudinal study of Venkatesh and Agarwal (2006) supports the causal relationship between usability and usage of a website as well as between usability and purchase behavior. In sum, the behavior analysis will function as a way to detect the used search strategies and applied decision rules of the consumers, thus explain the second stage of the decision-making process described by Vermeir et al. (2002). Additionally, the results of the behavior analysis will be used to take a closer look at the

applicability of the funneling metaphor and its possible more suitable successor, the consumer decision journey (Court et al., 2009).

Methods

Participants

A total of 60 subjects aged between 19 and 32 (M = 24.17, SD = 2.631) participated in this study. The study stems from a cooperation between the Dutch University of Twente and the German University of Passau. The participants were German-speaking students from the University of Passau with 36 women and 24 men. There were two manipulations present in this study regarding the presence or absence of the decision aids, thus consumer reviews [CR] and the recommendation system [RS]. This resulted in a group of 31 participants that were in the condition with consumer reviews present [CR], opposed to 29 that were in the condition without consumer reviews [nCR]. For the recommendation system, there were 28 in the condition with [RS] and 32 in the condition without [nRS] the product recommendations.

Materials

In this section, the used materials will be described. This section is split into the experiment relevant materials and the analysis relevant materials.

Experimental Materials

The participants completed the experiment on a computer running Microsoft's *Windows 7* as operating system and *Opera* as an Internet browser from Opera Software ASA. For the capture or recording of the screen RenderSoft's *CamStudio Recorder* was used.

Analysis Materials

The analysis of the data gained by the questionnaires was analyzed with IBM's statistical analysis software *SPSS, Version 20.* The analysis of the video recordings and the coding of the screen recordings were done with Techsmith's usability testing software *Morae Manager.*

Procedure

In this section, the research design and manipulation, the various variables and constructs and their operationalization, as well as the psychometric properties of the measurements will be described in detail. Furthermore, the coding scheme for the behavior analysis will be introduced and explained. The variables of the coding scheme relevant for the quantitative analysis will be discussed at the end of this section as well.

Research Design and Manipulation

This study is a between-subjects 2x2 mixed-design experiment with quantitative and qualitative elements. The participants were randomly assigned to either one of the two respective conditions, which were earlier described, differing regarding the presence or absence of either of the two decision aids, namely consumer reviews (see figure 1) and recommendation systems (see figure 2). The manipulation check will be described in detail in the next section. The approximate time to complete the whole experiment was 30 minutes. Between the two questionnaires, the participants had to visit the German website of Amazon and complete an instructed task. The experiment started with a questionnaire about the level of experience with the product category of leisure backpacks. Then, the participants were instructed to search for a leisure backpack and had to open every potential product in a new tab. Further, there were no additional restrictions how to accomplish this task in order to prevent risking that certain types of search strategies or approaches were ruled-out upfront as recommended by Thatcher (2006) as well as not risking limiting the validity of the study. This instruction resembles the "parallel hub-and-spoke" search strategy, where users keep their main tab with search results open in order to simplify the search as well as in this case allowing for easier comparison between the participants and within their product search and evaluation (Thatcher, 2006). At the end of the product search, which was also deliberately chosen by the participants, they had to click on a link to get to the second part of the questionnaire. After they deliberately ended the product search, the participants had to indicate whether they chose a product or not. By answering this question with yes, the participants also had to indicate their individual confidence level with the product choice. This was followed by the manipulation check of the decision aids, thus recommendation system and consumer reviews. In the end, the participants had to answer the German need for closure scale (Schlink & Walther, 2007).

Variables and operationalization of the constructs

The variables and the operationalization of the constructs will be described and explained in this section. The questions regarding demographic statistics, such as age and gender, will not be explained any further. The guideline of the American Psychological Association (2010) recommends to include all outcome measures even if they only were collected and further not included into the data analysis. Therefore, all variables and scales

that were examined, but not further elaborated or used in this study, were moved to the appendix E in order to enhance the overall structure and readability.

Experience

The participants had to indicate their personal level of experience with the given product category of backpacks by rating statements on a 7-point Likert scale ranging from *completely wrong* to *completely right*. The four statements regarded their overall knowledge, experience, competence, and expertise with backpacks. The scale had a Cronbach's alpha of 0.954, which shows an almost perfect internal consistency of interrelatedness of items (Cortina, 1993; Peterson, 1994).

Choice and Confidence in the Choice

Right after the search for a product on Amazon, the participants had to indicate whether they had found a suitable product and thus, either made a choice or postpone the decision. In case of a successful decision, the participants had to give the link to the chosen product and also give an indication of their confidence in the made decision. Again, the questions were given on a 7-point Likert scale ranging from *completely wrong* to *completely right*. The scale consisted of five questions about their overall confidence and satisfaction regarding their product choice. The confidence scale had a Cronbach's alpha of 0.842, which indicates a good internal consistency of interrelatedness of the items (Cortina, 1993).

Manipulation Check for Recommendation Systems and Consumer Reviews

In order to test whether the participants noticed the manipulation in form of the decision aids, the participants had to answer three questions regarding the presence of recommendation systems and three questions regarding the presence of consumer reviews. For a screenshot of the manipulation see figure 1 and 2. Again, the questions were given on a 7-point Likert scale ranging from *completely wrong* to *completely right*. The scale regarding the manipulation check of recommendation systems had an acceptable Cronbach's alpha of 0.788 and the scale regarding the manipulation check of consumer reviews had a sufficient Cronbach's alpha of 0.941 (Cortina, 1993). See the appendix B for the results of the manipulation check.

Need for Closure

In order to test the participant's individual need for closure, a validated German questionnaire with 16 questions was given to them (Schlink & Walther, 2007). Again, the questions were given on a 7-point Likert scale ranging from *completely wrong* to *completely*

right. The scores of three of the sixteen questions were inverted, which measured low need for closure characteristics rather than high need for closure. The scale had a Cronbach's alpha of 0.858, which is quite good (Cortina, 1993). An individual's need for closure is originally measured through five subscales regarding the preference for order, preference for predictability, decisiveness, discomfort with ambiguity, and closed mindedness (Webster & Kruglanski, 1994).

Behavior Analysis – Coding Scheme

In this section, the development and application of the coding scheme for the behavior analysis will be described in detail. Todd and Benbasat (1987) recommend the development of an a priori coding scheme, which ensures that the interpretations are not data-driven. Therefore, the participants have been rated and evaluated first without knowing about their assigned condition, personal characteristics or preferences, to rule out any rater biases, such as confirmation bias or hindsight bias, as much as possible.

In order to develop the coding scheme, the videos of five of the 60 participants have been randomly chosen, and every action and interaction has been transcribed, described, and marked with time indications. Subsequently, the generated data has been compared, merged, and complemented based on the frequency of occurrence, noteworthy incidences, and repeating behavior patterns. Since the participants were asked to open every potential product in a new tab in the browser using the "parallel hub-and-spoke" strategy (Thatcher, 2006), the comparison of the individual behavioral patterns and decision-making strategies, as well as the clear separation between product search and evaluation were easier to capture and monitor. Another benefit is the comparison between the several products, which entered the consideration set. Hence, the coding scheme includes codes to describe both the general search strategies and various attempts of approaches of the participants as well as the initial evaluation strategies for the particular products. In order to enhance the general understanding, the codes have been translated into abbreviations for the analyses, which are also enlisted in the coding scheme in the Appendix A. The general search strategies were globally divided based on the chosen approach referring to the chosen category and/or restrictions (i.e., all or specific categories, excluding and including brands, consumer reviews, volume, price range, etc.) as well as the sorting of the products (i.e., price ascending/descending, popularity, consumer reviews). Regarding the initial evaluation style of the products, the observed behavior can be roughly described based on the simple twostage decision-making process of Häubl and Trifts (2000), which also resembles the funneling analogy. In the first stage, the consumer does an initial screening of the products in order to determine which are worth further consideration and evaluation, thus in this case ideally opens them in a new tab. In the second stage, the consumer does an in-depth comparison based on the selected products to decide, which product will actually be purchased. Or by referring to the work of Goodman (2013), the participants used an include-strategy for the search phase, but an exclude-strategy for the evaluation of the products in the consideration sets. The videos confirmed the proposed stages, however as expected, there were differences between the participants regarding the completion of the stages. Some participants completed stage 1 first and then moved to stage 2 just as described above (LatEva; funneling), but other's moved back and forth between the two stages until they made a decision (QuiEva or DirEva), for example for each product or product page. The latter phenomenon was also found by both Court et al. (2009), thus resembling the consumer decision journey description, and Thatcher (2006). In more detail, Thatcher (2006) described that participants seamlessly switched from analytical search behavior to browsing behavior using hub-and-spoke behaviors within one strategy. Still, others used a mix out of the two just described strategies. This lead to different strategies of decision-making and online search behavior. Therefore, the proposed stages (Häubl & Trifts, 2000) were used as a reference point to analyze the behavior and narrow down more precisely strategies. The strategies were also included into the coding scheme to count the number of times each strategy was used per participant and thereby being able to discover general patterns and preferences.

The coding scheme has been inspired by the work of Hargittai (2004), but has been extended and applied to the given context. Hargittai (2004) provides a general method and instructions how to code and classify the online information-seeking behavior of the user in order to describe their online navigation properly. The proposed coding and classification system of Hargittai (2004) facilitates the quantification of online actions and allowing the aggregation of the resulting rich data, which is also relevant for this study. Therefore, the different contexts of usage as well as the underlying goals and actions have to be included into the description in order to detect patterns and differentiate between various situations and users. However, Hargittai's (2004) work followed a global approach regarding online information-seeking behavior, including search engines and directly accessing websites via URLs, whereas in this study the behavior analysis is restricted to one single website. Hence, the main ideas and frames of the proposed coding and classification scheme were adopted and if necessary transformed to the purpose of this study. Adopted constructs were, for example,

the description of the various actions with codes and additional context-relevant information; such as categorizing the behavior in either product search or product evaluation; on which page the user is residing; how and whether the user is interacting with the site or given information and features as the decision aids or photos; or writing down each product name and assigned running numbers as well as general browser features such as scrolling behavior or the back button

In order to structure the gathered data appropriately, the present coding scheme is divided into several subcategories: Search duration, search strategies and dispersion, search metrics, evaluation strategies, and search behavior on product page. The complete coding scheme and a guideline how to use and apply the coding scheme can be found in the appendix A.

Relevant variables from the Behavior Analysis

The additional relevant variables resulting from the behavior analysis can be globally divided into product search- and product evaluation-related and their different approaches and strategies. The remaining variables resulting from the behavior analysis, which were not further used for the analysis here, can be found in the complete coding scheme in appendix A.

Product Search Strategies and Approaches

As already described, the users showed an initial number of three different strategies or approaches in order to find suitable products. The descriptions in the parentheses give the used abbreviations, which will be also used in the results section. For all full overview and translation of the abbreviation see the appendix A. They either used "all categories" provided by Amazon (AllCat), "specific categories" of Amazon (SpCat), or made use of the "sorting options" provided by Amazon (Sort). The usage of the sorting option (Sort) was therefore only possibly, when either a search attempt including all (AllCat) or specific categories (SpCat) were preceding, but the use of sorting option nevertheless counts as a new approach. The total number of opened pages as well as the number within each attempt was also counted (ResuPage).

Search Effort and Consideration Set

The search effort was described by the time of the participant spent searching. However, additional data was collected to give more insights regarding the effort. Therefore, the described attempts or approaches (AllAtt) and opened pages (ResuPage) were used as additional indications of search effort. Furthermore, the number of opened products (CSS) gave an indication about the consideration set of the participants, which is actually also an indication of the search effort, but will be analyzed separately.

Product Evaluation Strategies and Approaches

There were three different approaches or strategies of the participants for the product evaluation and how they divide the search and evaluation phases. Further, the three strategies give an indication about the way the participants approach each single product and whether they evaluate right away (DirEva), only pre-screen (QuiEva) or directly went back to the search to evaluate later (LatEva).

Indication of Evaluation Effort

The effort of the participants in order to evaluate a product besides reading or interacting with the decision aids has been additionally measured. The clicks on the product photos (Photo), reading or interacting with the product description and information (PDI), i.e. also stopping scrolling or marking or moving with the mouse arrow slowly over text fragments, and further interaction with the product features, such as price information, colors, and further information (ProFeat) have been counted and ultimately added up.

Decision Aids

The variables for the decision aids were split into consumer review- and recommendation system-related. Thus, one set of variables was applicable in cases of a high probability of noticing the presence (or absence) of the consumer reviews (PreCR) or the recommendation system (PreRS). Another set was applicable in cases of reliance or interaction, such as reading or clicking to see more of the consumer reviews (RelCR) or the recommendation system (RelRS). An additional variable was created to count the number of times participants clicked on the recommended products (click-through; ClickR).

Validity and Reliability of the Data

In order to enhance the overall validity and reliability of the study and its measurements, the whole dataset was double-checked by the researcher using all the video-recordings of the participants. Thereby, all possible errors due to transfer of the data, double or missing data, and measurement errors were successfully discovered and corrected. The transferred data of the behavior analysis stemming from the *Morae Manager* was also first transformed and subsequently double-checked.

Results

This section contains the results of the analyses to check the derived hypotheses. The additional analyses of the data regarding, the manipulation check of the conditions of consumer reviews and recommendation system, the search and evaluation strategies, and funneling metaphor can be found in the Appendix B.

Quantitative data analysis

The two main predictors for the hypothesis testing were the *need for closure* and the *experience* of the participants. The NFC-score ranged from 1.19 to 6.44 (M = 4.08; SD = 0.92) and the score of their experience from 1.00 to 6.00 (M = 3.09; SD = 1.46). For all subsequent analysis, the two predictor variables *need for closure* and *experience* have been z-standardized in order to get an equal range and increase the interpretability for interaction effects (Enders & Tofighi, 2007; McClelland & Judd, 1993). Furthermore, following the protocol of Zuur, Ieno, and Elphick (2010) the data was visually screened to avoid statistical problems and detect possible pitfalls during the data analysis. The resulting plots and graphs resulting from the protocol with higher relevance can be found in the Appendix C.

Although for most of the hypotheses the main focus lies on the interaction effects between the experience and the need for closure respectively the moderating effect of the need for closure, the main effects were included in the models (independent of their significance) in order to avoid confusions between the simple main effects and interactions (e.g. Cohen, Cohen, West, & Aiken, 2003). In order to test the various hypotheses, different regression analyses using generalized linear models have been carried out. Furthermore, the potential for overdispersion was controlled by using *deviance* to estimate the scale parameter.

Influence of Need for Closure on Decision-Making and Confidence

In order to get an answer to hypothesis 1a, a binary logistic regression analysis using generalized linear models has been carried out. The chosen model had need for closure (*z*-standardized) and age as continuous variables and gender as categorical variable. Furthermore, the answer *no* was used as the response and *yes* was treated as the reference category. According to the resulting data (see table 2), there was no relevant difference found, which can be assigned to the need for closure of the participants ($\beta = -0.235$).



Figure 3: Boxplot and mean of NFC plotted on the binary choice variable

Table 2. Estimated fixed effects coefficients with	95% Wald confidence interval and alpha error for
H1a and H1b. Reference group for gender is fema	le.

	Variable	Coefficients	CI Low	CI High	Wald Chi-Square	р
H1a	Intercept	0.983	-5.223	7.190	.096	.756
	NFC (z-stand.)	-0.235	-0.876	0.406	.518	.472
	Gender	-0.109	-1.410	1.192	.027	.870
	Age	-0.055	-0.304	0.193	.189	.664
H1b	Intercept	5.250	2.058	8.443	10.390	.001
	NFC (z-stand.)	-0.086	-0.411	0.239	.269	.604
	Gender	0.322	-0.332	0.977	.933	.334
	Age	0.012	-0.115	0.139	.034	.855

For hypothesis 1b, a linear regression analysis using generalized linear models has been carried out (see table 2). Again, the chosen model had need for closure (z-standardized) and age as continuous variables and gender as categorical variable. The response variable was the continuous variable of the average confidence score of the participants. Additionally, the participants who did not chose a product (N = 24) were excluded from this regression analysis, because only participants who made a product choice were asked about their confidence, resulting in a sample size of 36 participants. Again, the results show there is no relevant influence of the need for closure variable on the confidence rating of the participants ($\beta = -0.086$). However, the plotted results (see figure 4) show that generally, except for one outlier, all 36 participants that chose a product had high confidence in their choice [M = 5.73, SD = 0.93].



Figure 4: Mean of Confidence Level plotted on NFC (z-standardized) with Loess Line

Influence of Need for Closure and Experience on Search Effort

The second group of hypotheses measures the search effort of the participants and the influence of the need for closure and experience. The collected data resulting from the behavior analysis gives several measures and therefore indications for the search effort. Thus, the number of opened pages with results on Amazon (ResuPage), the total number of different search attempts (AllAtt), the time indications spent searching for products (TTS), and the consideration set size (CSS). All respective regression analyses were carried out with the same chosen model, except for the response variables, with need for closure and experience (both z-standardized), and age as continuous variables and gender as categorical variable. The different search effort indicators will be discussed one after another and are also shown in table 1. For all search effort indicators consisting of count-data, except for the time measure (TTS), Poisson loglinear regression analyzes using a generalized linear model have been carried out. Further, in order to analyze the influence of the NFC and experience on the spent time searching for products (TTS), a Gamma regression analysis with log link using a generalized linear model was carried out.

Number of opened search result pages (ResuPage)

The results indicate that none of the predictors had an influence on the number of opened search result pages (M = 18.53, SD = 11.71). Neither the need for closure ($\beta = 0.079$) and product category experience ($\beta = 0.070$) showed main effects, nor was an interaction effect between the two variables ($\beta = 0.018$). Therefore, for this particular indicator of the search effort, it can be stated that the hypotheses 2a, 2b, and 2c can be rejected. However, additional analyses showed a main effect for gender ($\beta = 0.399$). The regression parameters can be seen in table 3.

All Attempts (AllAtt)

The three different search attempts have been summed up to create the response variable. Again, the results indicate that none of the predictors had a relevant influence on the number of used search attempts (M = 7.20, SD = 6.29). Neither the need for closure ($\beta = 0.123$) and the experience ($\beta = 0.192$) showed main effects (see figure 5), nor showed the two variables an interaction effect ($\beta = 0.122$). The regression parameters can be seen in table 3.



Figure 5: All Search Attempts (AllAtt) plotted on Experience (z-standardized) with Loess Line

Time searching for products

The results indicate that both predictors, thus the need for closure ($\beta = 0.085$) and their experience ($\beta = 0.068$), did not reach statistical significance regarding their influence on the time spent to search for products (M = 343.80, SD = 157.39) as main effects as well as jointly as an interaction effect ($\beta = -0.031$). The regression parameters can be seen in table 3.

	Variable	Coefficients	CI Low	CI High	Wald Chi-Square	р	
Number of opened search result pages (ResuPage)							
	Intercept	3.310	1.778	4.841	17.942	.000	
H2a	NFC (z-stand.)	0.079	-0.092	0.250	0.820	.365	
H2b	EXP (z-stand.)	0.070	-0.088	0.228	0.746	.388	
	Gender	0.399	0.059	0.740	5.285	.022	
	Age	-0.027	-0.089	0.034	0.750	.386	
H2c	NFC x EXP	0.018	-0.152	0.188	0.044	.835	
All Att	tempts (AllAtt)						
	Intercept	1.706	-0.385	3.796	2.557	.110	
H2a	NFC (z-stand.)	0.123	-0.096	0.342	1.211	.271	
H2b	EXP (z-stand.)	0.192	-0.016	0.400	3.274	.070	
	Gender	0.033	-0.406	0.471	0.021	.884	
	Age	0.010	-0.073	0.093	0.054	.816	
H2c	NFC x EXP	0.122	-0.091	0.334	1.259	.262	
Time s	searching for prod	ucts					
	Intercept	5.804	4.612	6.997	91.008	.000	
H2a	NFC (z-stand.)	0.085	-0.061	0.231	1.297	.255	
H2b	EXP (z-stand.)	0.068	-0.064	0.200	1.023	.312	
	Gender	0.219	-0.052	0.490	2.508	.113	
	Age	-0.005	-0.052	0.043	0.037	.847	
H2c	NFC x EXP	-0.031	-0.168	0.105	0.200	.654	
Consi	deration Set Size						
	Intercept	2.320	1.273	3.367	18.860	.000	
H2a	NFC (z-stand.)	0.104	-0.018	0.225	2.811	.094	
H2b	EXP (z-stand.)	0.017	-0.097	0.132	0.088	.766	

Table 3. Estimated fixed effects coefficients with 95% Wald confidence interval and alpha error for H2a, H2b and H2c. Reference group for gender is female.

	Gender	0.286	0.052	0.520	5.739	.017
	Age	-0.020	-0.062	0.022	0.913	.339
H2c	NFC x EXP	-0.095	-0.213	0.023	2.480	.115

Consideration Set Size

The results indicate some relevant findings regarding the influence on the consideration set size (M = 7.65, SD = 3.55). The regression parameters can be seen in table 3. Again, the results indicate that the influence of the need for closure ($\beta = 0.104$; see figure 6) and of the product category experience ($\beta = 0.017$) were not statistically significant, as well as the interaction between the two variables ($\beta = -0.095$). Furthermore, additional analyses showed a main effect for gender ($\beta = 0.286$).



Figure 6: Consideration Set Size plotted on NFC (z-standardized) with Loess Line



Figure 7: Marginal significant interaction effect between the need for closure (z-standardized) and the product category experience (z-standardized) on the consideration set size with Loess line

Influence of Need for Closure and Experience on Decision Aids Usage

The data to test the third group of hypotheses resulted from the behavior analysis. The different response variables are the reliance on the consumer reviews (RelCR), the noticing of the presence or absence of both the consumer reviews (PreCR) and the recommendation system (PreRS) respectively. Due to the fact that all variables are count-data, Poisson loglinear regression analyses using generalized linear models have been carried out for the three different variables. Unfortunately, the data of the reliance on RS (RelRS) and click-through of recommendations (ClickR) could both not be analyzed due to lack of incidences among the differing conditions and therefore lack of statistical power. For all the variables has been the same model chosen, except for the respective response variable, with need for closure and experience (both z-standardized) and age as continuous variables as well as gender and the respective manipulated condition (regarding either the consumer reviews or recommendation system) as categorical variables. The different indicators for decision aids usage and notice will be discussed one after another. The resulting data can be found in table 4.

Reliance on Consumer Reviews

The results indicate that the usage of the consumer reviews was generally seldom (M = 2.02, SD = 3.32) and not equally distributed with several outliers and many zeros, also due to conditional and occasional (none written yet) absence of the consumer reviews. The Poisson regression analysis indicated two main effects, but no interaction effects. The need for closure influenced the reliance on the consumer reviews positively ($\beta = 0.394$; figure 8). The experience of the participants did not show any relevant effect on the reliance on the CR ($\beta = 0.146$). Neither was an interaction effect between the need for closure and the product category experience present ($\beta = 0.182$). Additionally, there was also a main effect due to the conditional manipulation of the consumer reviews ($\beta = -2.482$).



Figure 8: Reliance on Consumer Reviews plotted on the need for closure (z-standardized)

Presence and Absence of the Consumer Reviews

The Poisson regression analysis regarding the presence and absence notice of the consumer reviews (M = 3.98, SD = 3.88) did not show any relevant results. There were neither any main effects founds for the need of closure ($\beta = 0.225$) or the experience with the product category ($\beta = 0.254$), nor was an interaction effect between the two response variables ($\beta = 0.002$). The regression parameters can be seen in table 4.

Presence and Absence of the Recommendation System

The results of the Poisson regression analysis regarding the presence and absence notice of the recommendation system (M = 5.20, SD = 6.57) failed to show relevant effects.

Again, there were neither any main effects due to the participants' need for closure ($\beta = 0.027$) or product category experience ($\beta = 0.016$), nor any interaction effects between the two predictors ($\beta = -0.033$). The regression parameters can be seen in table 4.

	Variable	Coefficients	CI Low	CI High	Wald Chi-Square	р	
Relianc	e on CR						
	Intercept	1.474	-1.482	4.431	0.955	.328	
НЗа	NFC (z-stand.)	0.394	0.072	0.715	5.771	.016	
H3b	EXP (z-stand.)	0.146	-0.260	0.552	0.495	.482	
	CR	-2.482	-3.812	-1.151	13.370	.000	
	Gender	-0.073	-0.754	0.607	0.045	.832	
	Age	-0.008	-0.127	0.110	0.019	.891	
H3c	NFC x EXP	0.182	-0.161	0.525	1.081	.299	
	NFC x CR	0.076	-1.354	1.506	0.011	.917	
	EXP x CR	-0.547	-1.783	0.689	0.752	.386	
Presence and Absence of CR		'R					
	Intercept	0.875	-1.751	3.501	0.427	.514	
НЗа	NFC (z-stand.)	0.225	-0.126	0.577	1.577	.209	
H3b	EXP (z-stand.)	0.254	-0.169	0.677	1.384	.239	
	CR	-0.268	-0.837	0.302	0.850	.357	
	Gender	-0.039	-0.616	0.539	0.017	.896	
	Age	0.027	-0.077	0.131	0.252	.616	
H3c	NFC x EXP	0.002	-0.285	0.290	0.000	.987	
	NFC x CR	-0.064	-0.683	0.554	0.041	.839	
	EXP x CR	-0.282	-0.874	0.310	0.873	.350	
Presenc	e and Absence of R	S					
	Intercept	2.584	0.092	5.076	4.130	.042	

Table 4. Estimated fixed effects coefficients with 95% Wald confidence interval and alpha error for H3a, H3b and H3c. Reference group for gender is female and for the respective decision aid the condition without decision aid.

H3a	NFC (z-stand.)	0.027	-0.218	0.271	0.045	.832
H3b	EXP (z-stand.)	0.016	-0.233	0.265	0.016	.899
	RS	-1.965	-2.657	-1.273	30.997	.000
	Gender	0.055	-0.432	0.542	0.048	.826
	Age	-0.015	-0.114	0.083	0.092	.762
H3c	NFC x EXP	-0.033	-0.279	0.213	0.069	.793
	NFC x RS	-0.195	-0.913	0.523	0.283	.595
	EXP x RS	-0.290	-1.018	0.439	0.606	.436

Discussion

Influence of Need for Closure on Decision-Making and Confidence

The results indicate that the influence of the need for closure on the product choice of the participants was not relevant. Therefore, the hypothesis 1a has to be rejected. Hence, the need for closure did not increase the chance of a product choice relevantly. Furthermore, the results also show that the need for closure had also no relevant influence on the confidence rating of the participants in their product choice. Hence, an increase in the need for closure did not result in an higher confidence rating. However, the overall high confidence rating indicates a lack of variance and therefore covariance (Zuur et al., 2010), which results in a ceiling effect. Concluding, the hypothesis 1b can be rejected due to lack of distinctiveness between the chosen predictors and the confidence level of the participants.

Influence of Need for Closure and Experience on Search Effort

The second group of hypotheses stated that the need for closure [H2a] and the product category experience [H2b] influences the search effort negatively. However, the third hypothesis [H2c] stated that participants with a high need for closure and no experience will show significantly more search effort than the participants with a high need for closure and experience with the product category.

Regarding the opening of product search pages, the results favor the rejection of hypotheses 2a, 2b, and 2c. However, the results show a main effect for gender, indicating that women opened significantly more pages with search results than men.

The response variable regarding the total number of different search attempt done by the participants also failed to reach statistical significance. However, the results showed a tendency with marginal statistical significance that the number of used attempts slightly increased with the experience of the participants (see figure 5). Nevertheless, the results favor the rejection of hypotheses 2a, 2b, and 2c.

The results of the analysis testing the spent time searching for products were also not statistically relevant. Despite the lack of significance, the results of the time indication have to be treated cautiously anyway, due to the rather high divergence of the measured time, which is also indicated by the high standard deviation in relation to the mean. The results lead to the conclusion that the hypotheses 2a, 2b, and 2c have to be rejected.

Regarding the consideration set size of the participants, the results again favor the rejection of all three hypotheses 2a, 2b, and 2c. However, the need for closure influences the size of the consideration set marginally but not significantly (see figure 6), indicating a tendency that the consideration set size increases slightly with an increase in the need for closure. However, there was no main effect due to the product category experience on the consideration set. Therefore, the hypothesis 2a and 2b had to be rejected regarding the consideration set size as well. However, the interaction effect between need for closure and experience was marginally significant ($\beta = -0.095$). In order to further investigate the interaction effect, it has been visualized. To visualize the effect appropriately for two continuous predictors, the need for closure has been categorized into three groups divided in high NFC (above +1 SD), moderate NFC (between -1 SD and -1 SD), and low NFC (under -1 SD). The results show three tendencies (see figure 7). The slope of the moderate need for closure Loess line shows that it runs almost parallel to the x-axis, thus the product category experience, and therefore seems to have no relevant influence on the consideration set size. However, an increase of the consideration set size with an increase of the experience of the participants with the product category can be seen within the low need for closure group. Furthermore, the consideration set size of participants with a high need for closure decreased with increasing experience with the product category. However, despite the tendency, the hypothesis 2c has to be rejected as well. Additionally, the main effect for gender on the consideration set size indicated that the size of the consideration set of the women was significantly bigger than the consideration set size of the men.

Concluding, the four implemented measures to give an indication of the participant's search effort all failed to confirm the hypothesis 2a, 2b, and 2c. Therefore, it can be concluded that the influence of the need for closure and product category experience as well as the interaction between the two predictors did not influence the search effort of the participants relevantly. The most promising response variable was the consideration set size of the participants, which showed some marginal effects due to the need for closure and the interaction between the need for closure and the product category experience.

Influence of Need for Closure and Experience on Decision Aids Usage

The tests for the third group of hypotheses was done with less predictors than planned, due to the lack of incidences among the differing conditions and therefore lack of statistical power data of the reliance on RS (RelRS) and click-through of recommendations (ClickR).

However, the need for closure of the participants had a significant effect on the reliance on consumer reviews of the participants. Thus, the number of times that a participant relied on the consumer reviews increased relevantly with their need for closure (see figure 8). However, as already stated, the results have to be treated cautiously due to the high number of zeros in the sample (see figure 8 and appendix C). Therefore, the hypothesis 3a can be confirmed, whereas hypotheses 3b and 3c have to be rejected regarding this variable.

The results of the analyses on the response variables regarding the notice of the presence or absence of the consumer reviews and the recommendation system both did not show any relevant effects. Therefore, the hypotheses 3a, 3b, and 3c have to be rejected regarding both variables as well. Regarding the results of the notice of the presence and absence the recommendation system also have to be treated with caution due to the high standard deviation and again high number of zeros (Zuur et al., 2010).

Concluding, the results regarding the influence of the need for closure and the product category experience as well as the interaction between the two predictors on the decision aids failed to show significant results to confirm the hypotheses. However, there was one relevant result showing that the need for closure relevantly influenced the reliance on the consumer reviews positively.

Additionally, the results showed a significant difference between the reliance on consumer review of the participants in the manipulated condition regarding the consumer reviews and without the manipulation. The same effect was present for the notice of presence

or absence of the recommendation system. However, both can be seen as an additional manipulation checks.

Conclusions

Possible explanations

Need for Closure

The results of earlier studies regarding the influence of need for closure on decisionmaking and the urgency to come to a definite decision (Vermeir et al., 2002; Vermeir & Van Kenhove, 2005) could not be replicated and confirmed. Generally, the results lacked statistical significance. Thus, the expectation that one of the main objectives of high need for closure individuals to resolve the ambiguity by making a fast and good decision would take place was not met. Further, the overall confidence level of participants that made a choice was independent of their need for closure and generally very high. However, the results of the confidence rating have to be treated cautiously due to the lack of variance and covariance and a present ceiling effect. It can be argued that an appropriate measure of confidence in a product choice would be more reliable if applied after the consumer or participants had some time to fully evaluate and intensively test the product. For most participants just made the product choice and it seems to be logical that they are confident in the choice, otherwise they would have indicated to postpone their decision. Regarding the further main effects of need for closure on the overall search effort measured by several indicators, the results failed to show interesting findings. Surprisingly, only one marginal relevant influence of the need for closure on the consideration set size has been found, but also lacking statistical significance. Here, the consideration set size was slightly increased with the increasing need for closure of the participants. The overall lack of significant results may generally be due to the fact that the need for closure is dependent on the situation or context (Webster & Kruglanski, 1994) and that the accountability for their action was not high, because no consequences were present when the participants made a possible bad choice (Webster et al., 1996). Another explanation could be the fact that the task was either enjoyable, thereby decrease the actual need for closure and aversion of ambiguity and uncertainty (Houghton & Grewal, 2000) or the task was too broad and in an too general product context.

Regarding the influence of need for closure on the decision aids usage, the results also showed the same pattern. Only one relevant influence of the need for closure has been found
on the reliance on the consumer reviews. The results showed that an increase of the need for closure resulted in a relevant increase of the reliance on the consumer reviews. Earlier research indicates that compensation strategies for the absence of haptic features, such as in an online context, exist and that consumers might use other information sources to get an indication of the quality of potential products (Peck, 2011), such as photos or in this case apparently consumer reviews. This might further indicate, that the participants were mainly in a state of *seizing* and the measure of the experience did not indicate it reliably (Webster & Kruglanski, 1994) or enjoyed browsing for products without being accountable for their actions. However, the most important aspect is the adoption of the consumer reviews (Ivanova et al., 2013), for it could be also possible that an individual just screens the consumer reviews looking for confirmation of the already existing opinion or attitude. Further, it may also indicate that the response variables regarding the notice of the presence and absence of the respective decision aids were no relevant predictors in this context. Another possible explanation for the lack of influence of need for closure might come from the high correlation of need for closure with the personal need for structure [r = .70] (Schlink & Walther, 2007). The website of Amazon is well structured and arranged and commonly known with lots of useful features and criteria, which might decrease the uncertainty and ambiguity and weaken the need for closure through the contextual influence of familiarity with Amazon. However, the main problem remains that the need for closure alone was not an appropriate predictor to describe the effects and further influences as well as (latent) variables that need to be researched.

Experience

The lack of relevant influence of the experience of the participants resembles the results of the need for closure. The only relevant result stems from the number of different search attempts, which increased with an increasing experience. Thus, indicating that the experience with the category led to a broader set of techniques or search terms to look for in order to find an adequate or suitable product. However, this does not tell about the accuracy of the search terms, for the participants could also randomly search because they want to see new products. Or the participants could be experts of the product category and know the exact criteria to find the best products fast or deliberately postpone their choice. Further, the chosen product category could be too general with less importance of experience or expertise to find an appropriate product. For example, Moorthy et al. (1997) found an inverted u-shaped relationship between the experience of the consumers and their search activity, indicating that

often the consumers with relative expertise or knowledge to engage in most effortful search. Hence, consumers, who are either novices or experts both engage in less search activity, because they either know enough or too less to start and therefore prefer to look for experts in the field for advice. Concluding, the results should be seen skeptically, because the effect of experience on search effort can go both sides and individual characteristics, such as the need for closure, need for cognition (Cacioppo et al., 1996), or maximizers versus satisficers (Polman, 2010), should be used to get the whole picture. For example, the joy of browsing, the preference for or fondness of the product category at hand might all weigh in on the effect of experience on the individual search effort or usage of decision aids.

Need for Closure x Experience

Based on the interesting suggestion derived from earlier studies (Vermeir et al., 2002; Vermeir & Van Kenhove, 2005) resulted the idea that the experience with a product category could be an appropriate indicator for the state of the individual (freezing vs. seizing) regarding the influence of need for closure on the issue at hand. However, opposed to the expectations, this did not hold true for this study. Except for one regression analysis with a marginal interaction effect between need for closure and experience on the consideration set size, all analyses failed to show relevant interaction effects between the two variables. The found effect showed a tendency that for high need for closure individuals, a decrease of the consideration set size could be seen from low product category experience to high experience. This effect was actually hypothesized and expected, but failed to reach statistical significance. Furthermore, for low need for closure participants the opposite effect took place, with an increase of the consideration set size from low experience to high experience. Additionally, the influence of moderate need for closure seemed to be independent from the experience on the consideration set size.

Behavior Analysis: Search and Evaluation Strategies

The linked search strategies of Thatcher (2006) to the found strategies or approaches in this study (see appendix B) showed the applicability of these results and can be seen as an confirmation of the excellent work done by Thatcher (2006). Furthermore, the described design patterns for information retrieval systems [IRS] of Schmettow (2006) did also resemble lots of features which are nowadays included into the navigational structure in webshops such as Amazon. Table 5 gives an overview of some of the patterns and the adopted features. It should be noted that the comparison is far from complete and the described adoption are only implemented to this specific context of this study.

Rich results	Sorting or ranking function; (Specific) Categories
Good Hit Good Example	Free-Recall vs. Recognition: (Specific) Categories & filters
More of this	Recommendation System
Rank by Authority	Consumer Reviews and product ratings; Sorting and ranking function

Table 5: Design patterns for IRS adopted and implemented by Amazon

The implementation and adoption of the described features, such as filtering the results and therefore giving the option of using an include/exclude function for a big amount of data, is intended to increase the navigational ease for consumers. However, while analyzing every action and behavior and transcribing it, it was obvious that many of the functions and features are (possibly unintentionally) ignored. Hence, the consumer engage in cumbersome search journey through lots of data, although some clicks on specific categories, filters and ranking would simplify the whole process. Nevertheless, this would be advisable for high need for closure individuals, but subjects that enjoy the uncertainty and love to browse may intentionally ignore the functions. Still, some support or help to get a grasp of the wide array of possibilities of the search functions would be advisable for many consumers.

Future research directions

Generally, the main focus of the present study laid on the interaction effects and possible enhancement of the understanding of different influences, in this case experience, on the situational manifestations of the need for closure. Opposed to the expectations, the results did not shed more light on this issue. Therefore, future researches regarding this topic should search for other latent variables, which might influence the extent of need for closure more directly or use more predictors for indicating the residence of the participants in the *seizing* or *freezing* state. Furthermore, future researches should apply the given behavior analysis scheme in order to confirm its general reliability and validity in various contexts. It is also advisable to replicate this study in other situations, such as with fewer restrictions to a specific webshop or the usage of niche product categories with experts and novices as participants or actual users who are planning to buy specific products. Additionally, concurrent think-aloud or retrospective think-aloud might help to resolve issues and get insights into the rationale why participants refused to follow the instructions or behaved in a specific manner, which

may be due to lack of skill instead of lack of interest. Another beneficial addition in future research dealing with this issue might be the use of an eye-tracker to gain more insights into the actual perception of the decision aids for example and the ignorance of other potentially important website features.

New Approach: Combining Need for Closure and Maximizers/Satisficers

Due to its potential to investigate and confirm new ideas, backed up by quantitative data, the behavior analysis is also an appropriate way to test new connections, and describe and approach usual phenomena from another point of view (Hargittai, 2004). There are some similarities between the discussed decision-making strategies regarding individual characteristics and behavioral patterns. The concepts of *need for closure* (Webster & Kruglanski, 1994) and *maximizers versus satisficers* (Polman, 2010; Schwartz et al., 2002) could possibly be interrelated somehow. Unfortunately, the literature does not provide any suggestions or previous attempts to link the two concepts. However, the orthogonality in figure 9 ought to be seen with caution in this case, due to the reasonable overlap between the two concepts, and is merely used to illustrate the idea.

Before explaining the common characteristics of the two concepts, the maximizers versus satisficers concept will be explained. According to Polman (2010), the individual differences regarding the effort consumers are willing to invest in order to make a decision can be divided globally into two categories. On the one hand, there are consumers that are called maximizers, who are willing to invest a lot of effort in order to find the best possible options (Polman, 2010; Schwartz et al., 2002). On the other hand, there are consumers that are called satisficers or simply non-maximizers, who are characterized as being comfortable with acceptable options (Polman, 2010; Schwartz et al., 2002). Due to the exerted effort of maximizers to make a choice, by intensive investigations and pursuing of multiple potential alternatives, they maximize their chance for a good decision, but also for a bad decision (Polman, 2010). However, the trade-off between effort and accuracy often plays an important role to make decisions that are rather satisfactory, but would not be perceived optimal if the decision costs no effort at all (Häubl & Trifts, 2000). This is especially applicable in situations with difficult to compare and/or numerous alternatives (Häubl & Trifts, 2000).



Figure 9: New approach for junction of need for closure and maximizers vs satisficers

The overlap or common characteristics between maximizers and low need for closure individuals are time and effort intensive investigations, deliberately postpone judgment until they are satisfied, and therefore, pursuing multiple potential alternatives. Individuals, who are maximizers and high in need for closure, share the desire to make the best decision according to their own opinion, are both selective, and have existing decision preferences or criteria. Satisficers and low need for closure individuals are both less selective and are satisfied with acceptable options, however, might not enjoy searching for products. The shared decisionmaking behavior patterns of individuals with a high need for closure and who are satisficers include low effort and choosing the first acceptable options that meet their own cut-off points.

Need for Closure x Need for Cognition

Another potential addition would be the intertwining of the need for closure and need for cognition in future studies regarding decision-making. The need for cognition was created to assess the differences between individuals regarding their desire for effortful and elaborative thought (Cacioppo et al., 1996; Neuberg, Judice, & West, 1997). Earlier studies showed a negative relationship between the two constructs [r = -.28] by Webster and Kruglanski (1994), which was replicated with the need for closure scale used in this study [r = -.38] by Schlink and Walther (2007). The subscales of the need for closure scale are the preference for order, preference for predictability, decisiveness, discomfort with ambiguity, and closed-mindedness (Webster & Kruglanski, 1994). Especially, the preference for order [r = -.31] and closed-mindedness [r = -.32] were negatively and significantly correlated with the need for cognition (Neuberg et al., 1997; Webster & Kruglanski, 1994). This might indicate that individuals with a heightened need for closure and low need for cognition seem to be more close-minded and have an increased preference for order or control. This again is conform to the earlier descriptions of neglecting alternative views or opinions and being in charge of the process, when closure is already reached (Houghton & Grewal, 2000). However,

when a state of closure is not reached, the increased information processing and search might be moderated by the need for cognition. Further, individuals with a high or heightened need for closure might feel uncomfortable due to the ambiguity [r = -.13] and uncertainty and might be interested in reaching closure either way (Webster & Kruglanski, 1994). However, the path to closure might be different, because individuals might try to reach closure effective or fast, for example. Thus, the combination of need for closure and need for cognition might enhance the understanding and gives a broader insight and idea of specific decision-making approaches. For a possible characterization of the interplay of both constructs see table 6.

The typology still falls short regarding the relevance of the issue at hand and other contextual or situational factors, but covers more potential style to approach such situations. Future research should address the applicability of the proposed combination of the two constructs.

	Low Need for Closure	High Need for Closure
Low Need for Cognition	inconsequent, superficial	fast, superficial
High Need for Cognition	long-lasting process inconsequent	profound, consequent

Table 6: Need for Closure x Need for Cognition: Potential Decision-Making Characteristics

Limitations of this study

Although the need for closure of an individual is related to their motivation, the situational motivation or motivational level of the participants at the beginning of the experiment has not been measured or controlled. Further, the study lacks a comparison of the coding consistency of the gathered data resulting from the behavior analysis. Thus, the interrater agreement and reliability could not be estimated, which implicates that the conclusions based on the data resulting from the behavior analysis should be treated with caution. However, the most important limitation is the lack of effects due to the chosen predictor variables. Further, the zero-inflation in the data (Zuur et al., 2010) regarding the decision aids usage and notice of the decision aids decreases the applicability of the data and reliability and validity of the results.

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Another limitation stems from the fact that the participant sample consists mainly of students. Therefore, the external validity and applicability has to be proven in much bigger and more diverse samples due to the regional and educational indifference of the given sample. Furthermore, the student were recruited from the faculty of economical computer science, which suggests that the participants were also somewhat more skilled in the interaction with the Internet and its browser and website functions. Participants that are less familiar with computers and the Internet and feel uncomfortable might show more signs of heightened need for closure.

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Appendix

1 Appendix A: Coding Scheme with Guideline

This document contains the full coding scheme as well as a guideline how to use and apply it, and which aspects and implications are worth considering and following during the coding. It starts with the original coding scheme and the modification of it to this given context in order to be applicable in the *Morae Manager* developed by *TechSmith*. The different tasks and markers will be fully explained and round up by example scenarios to resolve any ambiguity or misunderstandings. Shortcuts how to simplify working with *Morae* will be also given.

1.1 Original Coding Scheme

Coding Scheme

Description	Measurement	Code	Abbreviation
Search Duration			
Total time on Amazon	Time (Seconds)	TT	ТоТ
Time searching on the main page [H2]	Time (Seconds)	TMP + 1, 2,, n	TTS
Time evaluating products	Time (Seconds)	TEP + 1, 2,, n	TTE
Distribution of time: TMP and TEP	Time (Seconds)	DoT (Determined by TMP and TEP)	DoT
Search Strategies and Dispersion			
Attempts [H2]	Number of used search queries		AllAtt
All categories*	Each used search query,	D	AllCat
Specific categories*	change of search query, as well as category or sorting	E	SpCat
Sorting options*	options, will count as a new attempt	F	Sort

Search Metrics

Consideration Set (Size) [H2]	Number of considered/ opened products	G	CSS
Product pages with results	Number of opened pages	Н	ResuPage
Back-button	Count	Ι	Back
Evaluation Strategies			
1 - Tab opening, back to main page	Yes/No + Count	К	LatEva
2 - Tab opening, quick screen, back to main page	Yes/No + Count	L	QuiEva
3 - Tab opening, complete evaluation of product, accept/reject	Yes/No + Count	Μ	DirEva
Search Behavior on Product Pag	e / Tab		
Reliance on [H3]			RelDA
Consumer Reviews	Yes/No + Count	0	RelCR
Recommendation System	Yes/No + Count	Р	RelRS
Noticing of presence/absence [H3]			PreDA
Consumer Reviews*	Yes/No + Count	Q	PreCR
Recommendation System*	Yes/No + Count	R	PreRS
Click-through on recommendation	Count	S	ClickR
Clicks on Photos	Count	Т	Photo
Product Description & Information		U	PDI
Features	Count	V	ProdFeat
Price information		(all included into	
Various colors*		one variable (V) in this context, due to	
Volume information		the lack of discriminant power)	

Scrolling Behavior

Scrol

l	No scrolling	Count	W	NoScrol
5	Scrolling down and up	Count	Х	ScrolDU
S	Scrolling down, up, down	Count	Y	ScrolDUD
S	Scrolling down, up, down, up	Count	Ζ	ScrolDUDU

* Needs further specifications for the given context

1.2 Guideline for Coding Scheme

The purpose of this guideline is to explain the exact application and usage of the coding scheme in order to resolve any possible misunderstanding or ambiguity.

The complete original coding scheme (see above) has been modified and divided into variables that are either count-based or time-based. Thus, some of the variables or measures may only be in the original coding scheme, but not in the legend of the codes below. This can be due to the importance of the measure, but lack of applicability during the coding session, because the variable will be composed of the different measures. Hence, later on the obtained data can be used to complete the variables of the original coding scheme, such as distribution of time or total number of attempts, for example. Furthermore, almost all of the to-be-coded actions are either product search (TMP) or product evaluation related (TEP). This is clearly indicated by the tasks (see below), except for the descriptive tasks (T1S, TT, and T2S), which indicate the needed time for the preceding and following survey, and the total time spent on Amazon. However, some actions are related to both kinds of global tasks, such as navigational actions (scrolling or clicking of the back-button). Thus, the tasks give a time indication for each phase (TMP1 or TEP2, i.e.), and ultimately also show the distribution of spent time for both search and evaluation of the products. Within these two most important stages, which usually alternate continuously during the whole process, the markers give a broader understanding and description of the shown behavior. Due to the fact that the Morae Manager does not allow using one task several times, every TMP and TEP task has to be indicated with a running number (1, 2, 3, etc.) to indicate the sequence.

For every action or behavior that received a marker, the field text note will be used to further describe the action with relevant information, such as "*Product 1*", "*Page 2 of Attempt*"

3", and other significant incidents. This will be also explained more thoroughly and shown in the scenarios below.

The rest of this guideline is as follows: First, the tasks, which can be seen as the framework of the coding scheme, will be described and explained. Second, the markers within one or both of the task specifications will be described and clarified. Third, useful shortcuts in order to work with the *Morae Manager* more efficiently will be given. At last, the scenarios will be used to resolve any issues or ambiguities.

1.2.1 Tasks

Code	Name	Description / Characteristics / Features
T1S	Time first Survey	Time needed for the first survey, after the
		product search
TT	Total Time of Product Search and Evaluation	Total Time spent on Amazon
T2S	Time second Survey	Time needed for the second survey, after
		the product search
ТМР	Time searching on the main page	Includes every action done during the
		product search except on the product
		pages (tab). TMP must be added with a
		number [1, 2, 3,, n], due to the
		alternating sequencing between TMP and
		pairs.
TEP	Time evaluating products	Includes every action done during the
		residing on the product page (tab) and
		therefore evaluation of the products. TEP
		must be added with a number [1, 2, 3,,
		n], due to the alternating sequencing
		between TMP and TEP, thus ideally they
		always come in pairs

UND Unrelated of failuoin beliavior

When the user does engage in experiment unrelated behavior, such as not following the instructions (kind of product, visit other website, etc.) or visits the Instruction Page again.

1.2.2 Markers

Code	Name	Characteristics / Features
В	Close Tab of Product	User closes a considered product (will be written down in the Note accompanied by the number of the closed Product)
		However, <i>not</i> when closing a tab of Amazon or extra tab for photos etc.
С	Cheat	User cheats during the questionnaires by looking up the answer on Amazon (especially for the manipulation check regarding the decision aids; also written down in the Text Note)
D	Attempts –	User searches for a product within the "All categories" option,
	All Categories	without any include/exclude-restrictions (every action or alteration counts as a new attempt and will be written down in
	[see Scenario 1 below]	the Text Note)
Е	Attempts –	User searches for a product within a specific category, either
	Specific Categories	recommended categories based on a query with a brand name,
	[see Scenario 1 below]	or in the left side menu (every action or alteration counts as a new attempt, except marking several brands/criteria for ex- /inclusion in a sequencing action, and will be written down in
		the Text Note)
F	Attempts – Sorting Options	User searches for a product and changes the ranking or sorting of how the product should be displayed (every action or alteration counts as a new attempt and will be written down in the Text Note)
G	Products opened in a	User opens a potential product in a new tab as instructed and

	new tab / Considered	the name of the product and number will be written down in the
	Draduata	Tout Note (later only the number of the product)
	Floducts	Text Note (later only the number of the product)
	[see Scenario 2 and 4	Also: User may neglect the instructions and opens product in
	below]	the same tab. however, those will also count, but will be noted
		· · · · · · · · · · · · · · · · · · ·
Н	Product pages with	For every attempt done by the user, the respective attempt and
	results	page will be noted (i.e. "Page 1 of Attempt 2") as well as every
		following page within the same attempt (i.e. "Page 3 of A3).
	[see Scenario 1 below]	Thus when Code D E or F is applied Code H must be used as
		well
		wen.
Ι	Back-Button	User clicks the back-button to jump to the previous page (i.e.
		from Page 2 of A2 to Page 1 of A2). The context will be
		written down in the Text Note (i.e. Product, Attempt, Page etc.)
Κ	Evaluation Strategy 1	Product open in a new tab, immediately back to main page
		(regarding product with number will be written down in the
		Text Note)
L	Evaluation Strategy 2	Product open in a new tab, quick screen, then back to main
		page (regarding product with number will be written down in
		the Text Note)
М	Evolution Stratagy 2	Draduat anon in a new tab complete evaluation (photos
111	Evaluation Strategy 5	Product open in a new tab, complete evaluation (photos,
	[see Scenario 4 below]	CR/RS, scrolling, product description and information etc.) of
		product, either accept (for now) or reject (regarding product
		with number will be written down in the Text Note)
0	Reliance on CR	Stopping on the CR to read them clicking on the different star-
0	Remainee on ere	reting to get detailed CDs, using CDs as an evolute star-
	[see Scenario 5 below]	Taking to get detailed CKs, using CKs as an exclude-strategy
		during the search (at least 4-Star-Rating, i.e.). This code is
		always accompanied by Code Q, but specifies it. (again,
		regarding product with number will be written down in the
		Text Note + Scores* has to be assigned)
р	Reliance on RS	Stanning on the RS to check the products clicking on the
		arrows to lat the PS show more products. This code is always
		arrows to let the KS show more products. This code is always
		accompanied by Code R, but specifies it by showing that the
		user interacts clearly without necessarily opening a product (S).

		(again, regarding product with number will be written down in the Text Note + Scores* has to be assigned)
Q	Noticing of pre-/absence of CR or searching for CR [see Scenario 5 below]	User scrolls along the consumer reviews and cannot <i>not</i> have seen them, or ideally stops to read them (will be written down in the Text Note accompanied by the number of the opened Product + Scores* has to be assigned)
R	Noticing of pre-/absence of RS or searching for RS	User scrolls along the recommendation system and cannot <i>not</i> have seen it, or ideally stops to investigate them (will be written down in the Text Note accompanied by the number of the opened Product + Scores* has to be assigned).
S	Click-ThroughonRecommendation///////////////////////////////	User clicks on a product displayed by the recommendation system or on the front page. This Code S is always accompanied by Code G, because a new product is opened (ideally in a new tab, see Code G) and Code P.
Т	Clicks on Photos [see Scenario 2 below]	User clicks on the available photos of a product (regarding product with number will be written down in the Text Note)
TOP- PREIS	Top-Preis offer	User clicks on or ignores a specific product with a TOP-PREIS sticker on it, comparable to best-price offer.
U	Product Description &Information[see Scenario 7 below]	User stops scrolling or clicks on the link to see the Product Description and Information. (regarding product with number will be written down in the Text Note)
V	Features(Price&VolumeInformation,Colors, etc.)[see Scenario 2, 6 & 7below]	User looks at the several other features of the product, such as the price, volume, colors, main picture and other features. <i>Also</i> clicking on the different colors or versions of the product (regarding product with number will be written down in the Text Note)
W	No Scrolling on Tab	User remains on the top of the results or product page (regarding product or attempt with number will be written

down in the Text Note)

Х	Scrolling down and up	User scrolls downs and up again on the results or product page
		(regarding product or attempt with number will be written
		down in the Text Note)
Y	Scrolling down, up, down	User scrolls downs and up and down again on the results or product page (regarding product or attempt with number will be written down in the Text Note)
Ζ	Scrolling down, up, down, up	User scrolls downs and up and down and up again on the results or product page (regarding product or attempt with number will be written down in the Text Note)

Although some of the used letters and codes to describe the actions may seem somewhat illogically regarding the used abbreviations (markers) and/or the given order within the scheme, it is due to the modification of the scheme and the codes during several test-runs. However, during the coding, the markers will be used interchangeably and were used for the first videos in this manner, therefore it was decided to hold on to this order. An additional reason was to prevent errors and complications during the recoding of the already coded videos, because in *Morae Manager* assigned letters cannot be changed at once without losing the already coded actions and recode every single action again.

Furthermore, a code to describe the usual *scrolling down* behavior of the user has not been included into the coding scheme due to the normal nature of scrolling down, when investigating and inspecting a website. Therefore, only behavior that deviated from the usual actions was been included, such as repeated scrolling, no scrolling (code W) etc.

To prevent further misunderstandings regarding the recommendation system of Amazon, the Text Note will also be used to differentiate between the usual recommendations system and an alternate RS ("weitere mit 'freizeitrucksack' getaggte Produkte"), which was not manipulated during this study and was displayed for some participants. However, the goal of the behavior analysis and this coding scheme is to describe the behavior and its underlying factors and influencers, therefore, the alternate RS has to be described as well during the coding sessions (i.e., Product 1 – Presence of alternate RS).

*) Scores. The used scores [0; 1; 2] are only used to specify the codes O, P, Q, and R. Thus, the presence (=0) or absence of the Recommendation System and Consumer Reviews,

and the reason of the absence. Hence, was the absence due to the manipulation of the experiment (=1) or just none consumer reviews written yet (=2). Actually, there is no possible situation in which score 2 could be assigned to the recommendation system codings, for there only two options present (=0) and absent (=1), because they are provided by Amazon and not dependent on the contribution of fellow consumers as the consumer reviews.

1.2.3 Shortcuts Morae Manager

CTRL + M	=	log new marker + code
CTRL + T	=	log new task
CTRL + J	=	move the green task-starting flag to the current time
CTRL + K	=	move the red task-ending flag to the current time

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1.2.4 Scenario	0 1 Alle Kategorien	Freizeitrucksack Deuter	Los
Amazon.de Warehouse Deals	Outley Spar-Abo Amazon /	Apps Amazon Browser-Leiste Jetzt verkaufen Tra	de-h Geschenke
Kategorien Sport & Freizeit Wanderrucksäcke bis 45L Daypacks Outdoor-Rucksäcke Tagearucksäcke mit Deckel	Jeuter Endecke Jeuter Bite-Ruce "Freizeitrucksack Der 1-16 von 42 Ergebnissen	n Sie Deuter in dissen Kalegorien: <u>isaacke Devpenks Kuhurbeute</u> Outdoor-Ricksacke <u>Sch</u> uter*	Marker Details
LINKTONIK & FOID Baby Computer & Zubehör Küche & Haushalt Spielzeug – Weniger Kategorien Versandoption (<u>Wa in ion</u>) – Kostenicise Lieferung ab	R	Deuter Rucksack V-20 AS 45x30x2 EUR-59-96 EUR 39,99 AufLager	20 cm vo Attempt 3 - Clicks on the recommended categories in which consumers can find products of the brand Deuter - chooses Outdoorrucksäcke
EUR 20 Bestellwert		VAUDE Kindertrage Farfalla Comf	Score Score not set

Earlier, the user already searched for "Freizeitrucksack Deuter", thus Code D "Attempt 1 – Freizeitrucksack Deuter" as a Text note, and "Freizeitrucksack Deuter 30 l", thus Code D "Attempt 1 – Freizeitrucksack Deuter 30 l". Now, he starts his third attempt (Code E) by clicking on a suggested category "Outdoor-Rucksäcke" including the preferred brand "Deuter" (indicated by the red arrow). A simpler way to write down the Attempt (Code E) is the usage of abbreviations, such as "Attempt 3 - C: Outdoor-Rucksäcke > Deuter; Q: Freizeitrucksack Deuter; Sorting: - ;". Thus, C for category, Q for query or search term, and Sorting. After clicking the link, it is also necessary to mark this event with Code H, because at the same time a new page with results will open and write down the note of "Page 1 of Attempt 3". As can be seen in the picture, the user could have also clicked the link to the category on the left side menu or clicking on the drop-down menu left to the search bar (indicated by the two green arrows) during one of the TMP-tasks.

1.2.5 Scenario 2



The user has chosen a product to evaluate (TEP). Therefore, the marker with code G has been used. However, the user has not opened the product in a new tab, as instructed at the start of the experiment, thus, this is written down in the Text note (see red arrow). Further, the user might see the product features (code V; green arrow) or click on the photos (code T; purple arrow).

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During one of the logged TEP-tasks, the user resides on product page 1 and evaluates the product and looks around. Then, the user sees the other recommended products and clicks on the soon-tobe product 2 (code S; green arrow). This is a clear indication of usage of the Recommendation System provided by Amazon.

🔹 À Amazon 🕼 Beator	wa. × 🖣 Deuter Future 26 Volu × 🌗 Deuter Future 30 SL: A × 🕂		
vvvvamazon.de/s/ref=nb_sb_	лозь 🔶	Marker Details	×
31	Deuter Wanderrucksack Futura 28, 53 x 34 x 26 von Deute EUR 103.05 EUR 76,90 - EUR 93,39 % Gewönne versateffetig in 255 5 Tages. 8 Andere Angebote EUR 76,90 neu (4 Angebote) EUR 59,00 gebraucht (1 Angebot)	Type - definition M - Search Strategy 3 (ST3) Text note Product 5	•
	Deuter Futura 28 von Deuter EUR 103,68 s		Ŧ

During one of the logged TMP-tasks, the user opens a new product in a new tab (code G; green arrow), but follows his strategy by first opening some products and immediately turn back to the search query results on the main page (code M). Therefore, the product will not be evaluated until either the user is satisfied with the selected products for comparison and evaluation or stops searching and starts evaluating due to fatigue. However, the logged task remains TME+n, because the user does not stop searching and starts evaluating yet.



During one of the logged TEP-tasks, the user evaluates the opened tabs with potential products. The user stops scrolling and remains on the consumer reviews for several seconds. The mere fact that he/she stops or scrolls slowly indicates that the user recognized the presence of the CR (code Q) and *also* relies his/her evaluation to some extent on the CR (Code O). The same counts for clicking on specific star-ratings, which shows the reliance on consumer reviews.



During one of the logged TEP-tasks, the user evaluates and browses the product 3 and checks the different colors or versions of the backpack (code V + Text note) as the green arrow in the picture indicates. This is also possible within the photo-tab, which opens in a new tab, and often displays the different colors and versions as well as the photos of them. This also has to be indicated in the Text Note.



The difference between the codes U (Product Description and Information) and V (Features) can be seen as marginal or confusing. Thus, two screenshots have been made to show the difference. The picture above shows an example of V, with all the features and descriptions of the products on the top page, such as photos (extra code T, when clicked on them), price, delivery information, and the summary of features etc. See the green arrows to indicate the features.

However, the Product Description and Information, as indicated by the Code U refers to the more detailed and longer description as shown in the screenshot below. This information does include the summarized information about the consumer reviews as well, as can be seen in the screenshot.



2 Appendix B: Additional Analyses

2.1 Manipulation Check Decision Aids

In order to test the manipulation for the respective decision aids consumer reviews and recommendation system, two linear regression analyses using generalized linear models have been carried out. The models had the respective manipulation check for either the consumer reviews or the recommendation system as response variable and the respective decision aid as categorical variable.

Both, the manipulation check for the consumer reviews ($\beta = -2.996$) as well as for the recommendation system ($\beta = -1.543$) were successfully. This shows that the conditions with the decision aids both received relevantly higher ratings that the participants saw the respective decision aid opposed to the condition without the decision aids (see table 7). The effect was even higher for the consumer reviews, indicating that they are more visible and relevant to the participants or their absence is more noticeable.

Variable	Coefficients	CI Low	CI High	Wald Chi- Square	р
Consumer Reviews					
Intercept	5.398	4.765	6.030	279.718	.000
CR	-2.996	-3.905	-2.086	41.637	.000
Recommendation System					
Intercept	5.345	4.718	5.972	279.018	.000
RS	-1.543	-2.402	-0.684	12.403	.000

Table 7. Estimated fixed effects coefficients with 95% Wald confidence interval and alpha error for manipulation check of the DAs. Reference group for both consumer reviews and recommendation system is the condition without the respective decision aid.

2.2 Differences in Evaluation Strategies and Effort

The most appearing appliance of strategies was found for the first evaluation strategy (LatEva), in which the participants or consumer opened a new tab and went directly back to the main search page and evaluated the product later thoroughly (M = 3.17; SD = 3.65) with a total usage number of 190 times. In the second most used strategy (DirEva; strategy number 3), the participants opened the potential product in a new tab (or sometimes just clicked on it,

refusing to follow the instructions) and did a complete evaluation of the product and accepted it (for possible further comparison and evaluation) or rejected it right away (M = 2.15; SD = 2.49). This was one was used 129 times. The third most popular strategy (QuiEva) was the strategy number 2, in which participants also opened new product in a new tab, did a quick screen of the product whether it is suitable for further evaluation later, and went back to the main search page. This was one was used 120 times (M = 2.00; SD = 2.54). The frequencies can be also seen in table 8.

Evaluation Strategy	Description	Abbreviation	Frequency
Direct Evaluation (1)	Complete product evaluation right away	DirEva	190
Later Evaluation (2)	First completing search, then evaluation of consideration set	LatEva	120
Quick Check (3)	Quick screening of product (reject/accept), later full evaluation	QuiEva	129

Table 8: Frequencies of the used Evaluation Strategies of the participants



Consumer Reviews

Figure 10: Main effect of Consumer Reviews on Product Site Interaction

In order to investigate the invested effort of participants on the product site itself (M = 14.45, SD = 11.12) to evaluate the products, another Poisson regression analysis using 62

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generalized linear models has been carried out. The response variable *product site interaction* resulted from a summation of the various indicators, such as the clicking on photos (photo), viewing the product description and information (PDI), and the product features (ProFeat; including price, product color, volume of backpack). The chosen model consisted of the following predictors with need for closure and experience (both z-standardized), and age as continuous variables as well as gender and the both manipulated conditions (consumer reviews on/off and recommendation system on/off) as categorical variables.

The results indicate that there are no main effects of the need for closure or experience on the number of interaction with the site to evaluate the products as well as no interaction effect between the need for closure. However, there was a significant difference found between the consumer review conditions regarding the interaction with the product site information ($\beta = 0.437$). This main effect indicated that participants in the condition without consumer reviews interacted significantly more with the product site and displayed productrelated information than participants with available consumer reviews (see figure 10 above). This might indicate that the lack of decision aids in the form of consumer reviews increased the interaction with other available data and compensation for the absence of consumer reviews (Peck, 2011).



Figure 11: Marginal interaction effect of NFC x RS on Product Site Interaction with Loess Line

Furthermore, there was a marginally significant interaction effect between the manipulated condition with the recommendation system and the need for closure ($\beta = 0.392$). This interaction effect shows a tendency that an increase of the need for closure of the participants resulting also in an increase of interaction with the product site for participants without the recommendation system. However, the loess line of the participants with available recommendation system resembles more a bell-shaped distribution with most interaction with the product site for moderate need for closure levels. See table 9 below for the relevant parameters and data.

Table 9. Estimated fixed effects coefficients with 95% Wald confidence interval and alpha error for product evaluation effort. Reference group for gender is female, for both consumer reviews and recommendation system the condition without the respective decision aid.

Variable	Coefficients	CI Low	CI High	Wald Chi-Square	р
Intercept	1.403	-0.476	3.283	2.142	.143
NFC (z-stand.)	-0.037	-0.390	0.316	0.042	.838
EXP (z-stand.)	0.327	-0.139	0.794	1.893	.169
CR	0.437	0.038	0.836	4.601	.032
RS	0.040	-0.356	0.436	0.039	.843
Gender	0.268	-0.139	0.675	1.665	.197
Age	0.033	-0.038	0.105	0.834	.361
NFC x EXP	-0.038	-0.247	0.172	0.124	.725
NFC x CR	-0.125	-0.543	0.293	0.345	.557
NFC x RS	0.392	-0.032	0.816	3.281	.070
EXP x CR	-0.240	-0.700	0.220	1.045	.307
EXP x RS	-0.202	-0.612	0.208	0.935	.334

Search and information-seeking strategies

The work of Thatcher (2006) regarding different cognitive search strategies was also helpful in order to compare the found strategies and pattern with existing findings. Due to the specific decision-making context and related information-seeking strategies, the successful placing of the found approaches of this study into the provided framework for search engine usage strategies confirms the applicability and validity of the comprehensive study of Thatcher (2006). The resulting strategies and search patterns of the participants can be divided into three main categories (see AllCat, SpCat, and Sort of the coding scheme) from which variations among the categories or combinations of the two were also possible. These strategies and combinations resemble most of the found strategies of Thatcher (2006). The Table 10 shows the respective strategies of this study and the accompanying strategies of Thatcher (2006). Furthermore, the instruction during the product search to open a product in a new tab in the browser was also found and described strategy by Thatcher (2006), as already described earlier, called the "parallel hub-and-spoke" approach. Despite of the provided instruction, many participants did not behave accordingly and opened the products within the same tab and eventually started the search all over again and/or got lost during the search. However, it remains unknown whether they deliberately refused to follow the instruction, for example because they generally reject or dislike this strategy, or whether it was due to inattentiveness or not reading the instructions adequately. For example, some participants opened the product only in a new tab, after they already prescreened the product (*QuiEva*) within the same tab and considered it worthy to open it in a new tab for later evaluation.

Strategies provided by Thatcher (2006)	Description	Code(s)	Abbreviations
Broad First	Attempt: All Categories	D	AllCat
Search engine narrowing down	Attempt: Specific Categories	E & F	SpCat, Sort
To-the-point	Attempt: Specific Categories and Sorting Criteria	E & F	SpCat, Sort
Sequential player	Sudden change of Attempt: All Categories to Specific Categories or Sorting Criteria and vice versa	D, E, F	AllCat, SpCat, Sort
Deductive reasoning	Attempt: All Categories (maybe also Specific Categories)	D & E	AllCat & SpCat
Parallel player strategy	Attempt: All Categories, Specific Categories, Sorting Criteria	D, E, F	AllCat, SpCat, Sort

Table 10: Related search strategies

The "broad first" approach gives the user the safety in preventing "risky" behavior of being to specific in their search term and/or category usage. However, serves as a well-used

approach in the beginning in order to define the parameters of the search in a broader way and then successive specify the search and approach. The "search engine narrowing down" strategy differs from the "broad first" strategy in the way that the user choses specific categories to narrow the search down. But the user still uses a safe approach, because the logical choice of an appropriate category prevents information loss or exclusion of relevant information and products. Furthermore, when the category proves to be useful, the user can use further specifications by using search terms or sorting options within the category or even selecting further subcategories. Contrary to those described strategies, which are all called "safe-strategies" (Thatcher, 2006), consumers using the "to-the-point" strategy leave the safe "territory". The user tries to get an answer to the problem right away, resembling the characteristics of high need for closure individuals after the crystallization point or "freezing state" (Kruglanski & Webster, 1996), and not successively narrowing the search field or consideration set. Therefore, the "to-the-point" strategy can be also seen as a reversed funnel. Thus, the user's approach is characterized by being specific and straightforward instead of general or broad at first to get the best possible answer, but using continually more broader terms or categories when the first attempts proved unsuccessful. The "sequential player" strategy is combination of the earlier explained "safe-player" strategies and the "to-the-point" strategy in which the user rapidly changes his/her strategy from one to the other. This strategy is actually rather unstructured or indicates no clear strategy at all. In the "parallel player" strategy, the user conducts several search attempts in different browser windows or browser tabs. The advantage of this strategy is the diversity of search terms or approaches and thereby the possibility to compare results immediately. Furthermore, the strategy does provide more structure and ability to following specific paths without stopping or altering other possible successful approaches immediately as in the "to-the-point" strategy. Additionally, the "deductive reasoning" strategy was one of the most prominent strategies in this study due to the fact that the strategy does not influence the other ones and stands aside from the rest. The user does try different search terms, which might sometimes not seem logical or related to the search task, but were due to the fact that the initial term was either too specific or broad. Here, the participants did often try the "broad first" strategy at first and saw the huge number of results and often changed the term or added extra terms such as brands or specific use purposes or application areas.

Funneling vs. Consumer Decision Journey

In order to investigate the issue between the funneling metaphor and the, in comparison, relative new idea of the consumer decision journey (Court et al., 2009), the data of the consideration set formation resulting from the behavior analysis has been investigated for this matter. The already described evaluation strategies or approaches favor the consumer decision journey and conflict with the conventional process of product evaluation and choice described by the funneling metaphor. Hence, although several participants stayed with one approach or strategy during the study, some drifted away from their usual pattern for specific products or due to different categories, for example.



3.1 Boxplots to check for outliers and homogeneity (conditional boxplots)



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Boxplot of Consideration Set Size (CSS)



Boxplot for noticing presence/absence of CR



Boxplot for noticing presence/absence of CR for both conditions



Boxplot of Reliance on CR

Boxplot of opened search pages (ResuPage)



Boxplot for noticing presence/absence of RS



Boxplot for noticing presence/absence of RS for both conditions



Boxplot of Reliance on RS



Boxplot of Reliance on CR for both conditions



Boxplot of Click-through on RS



Boxplot of Reliance on RS for both conditions



Boxplot of Click-through on RS for both conditions











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1 •	-																	
Correlati	ons	AllCat	SpCat	Sort	CSS R	lesuPage	LatEva	QuiEva	DirEva	RelCR	PreCR	PreRS	AveNFC A	veEXP	AllAtt	SiteInte	TTS	TTI
AllCat	Pearson Correlation		.138	149	050	.465**	034	113	.003	120	.111	.069	.063	.225	.649**	021	.240	102
	Sig. (2-tailed)		.294	.254	.703	.000	.796	.391	.981	.359	.397	.601	.633	.084	.000	.875	.065	.436
SpCat	Pearson Correlation	.138		.106	.117	.466**	.107	.126	134	110	105	.113	.039	.061	.800**	.221	.580**	.037
	Sig. (2-tailed)	.294		.422	.374	.000	.418	.338	.306	.405	.425	.389	.765	.642	.000	.090	.000	.775
Sort	Pearson Correlation	149	.106	1	009	.026	025	136	.124	.014	.042	.231	.129	.117	.242	.176	880.	.80.
	Sig. (2-tailed)	.254	.422		.947	.846	.851	.301	.346	.918	.749	.076	.326	.374	.062	.180	.505	.510
CSS	Pearson Correlation	050	.117	009	1	.323*	.393**	.497**	.332**	.124	.321*	.208	.262*	002	.049	.687**	.338**	.543*
	Sig. (2-tailed)	.703	.374	.947		.012	.002	.000	.010	.345	.012	.111	.043	686	.712	.000	800	.000
ResuPage	Pearson Correlation	.465**	.466**	.026	.323*	1	.234	.110	082	158	053	.016	.119	.086	.604**	.250	.**068	.137
	Sig. (2-tailed)	.000	.000	.846	.012		.072	.402	.533	.227	689.	.906	.364	.513	.000	.054	.000	.297
LatEva	Pearson Correlation	034	.107	025	.393**	.234	1	338**	490**	.044	039	.119	.290*	024	.047	.227	.198	.118
	Sig. (2-tailed)	.796	.418	.851	.002	.072		800.	.000	.736	.766	.366	.025	.858	.720	.081	.130	.371
QuiEva	Pearson Correlation	113	.126	136	.497**	.110	338**		.207	092	.098	028	018	045	015	.204	.162	.088
	Sig. (2-tailed)	.391	.338	.301	.000	.402	.008		.112	.482	.455	.829	.893	.735	.910	.119	.215	.503
DirEva	Pearson Correlation	.003	134	.124	.332**	082	490**	.207	1	.191	.459**	.232	041	.036	059	.451**	012	.504*
	Sig. (2-tailed)	.981	.306	.346	.010	.533	.000	.112		.143	.000	.074	.754	.782	.654	.000	.929	.000
RelCR	Pearson Correlation	120	110	.014	.124	158	.044	092	.191	1	.592**	.064	.234	046	144	.108	076	.564*
	Sig. (2-tailed)	.359	.405	.918	.345	.227	.736	.482	.143		.000	.625	.072	.728	.274	.413	.563	.000
PreCR	Pearson Correlation	.111	105	.042	.321*	053	039	.098	.459**	.592**	-	.401**	.206	.041	.004	.491**	.034	.631*
	Sig. (2-tailed)	.397	.425	.749	.012	689.	.766	.455	.000	.000		.002	.115	.758	.974	.000	.798	.000
PreRS	Pearson Correlation	.069	.113	.231	.208	.016	.119	028	.232	.064	.401**		.048	.056	.179	.346**	.066	.285
	Sig. (2-tailed)	.601	.389	.076	.111	.906	.366	.829	.074	.625	.002		.718	.674	.172	.007	.615	.02
AveNFC	Pearson Correlation	.063	.039	.129	.262*	.119	.290*	018	041	.234	.206	.048		146	860	.162	.163	.257
	Sig. (2-tailed)	.633	.765	.326	.043	.364	.025	.893	.754	.072	.115	.718		.267	.458	.217	.215	.048
AveEXP	Pearson Correlation	.225	.061	.117	002	.086	024	045	.036	046	.041	.056	146		.206	.059	.103	.095
	Sig. (2-tailed)	.084	.642	.374	.989	.513	.858	.735	.782	.728	.758	.674	.267		.115	.656	.435	.470
AllAtt	Pearson Correlation	.649**	.800**	.242	.049	.604**	.047	015	059	144	.004	.179	.098	.206		.186	.566**	013
	Sig. (2-tailed)	.000	.000	.062	.712	.000	.720	.910	.654	.274	.974	.172	.458	.115		.156	.000	.923
SiteInte	Pearson Correlation	021	.221	.176	.687**	.250	.227	.204	.451**	.108	.491**	.346**	.162	.059	.186	-	.319*	.719**
	Sig. (2-tailed)	.875	.090	.180	.000	.054	.081	.119	.000	.413	.000	.007	.217	.656	.156		.013	.000
TTS	Pearson Correlation	.240	.580**	.088	.338**	.890**	.198	.162	012	076	.034	.066	.163	.103	.566**	.319*		.226
	Sig. (2-tailed)	.065	.000	.505	.008	.000	.130	.215	.929	.563	.798	.615	.215	.435	.000	.013		.083
TTE	Pearson Correlation	102	.037	.087	.543**	.137	.118	.088	.504**	.564**	.631**	.285*	.257*	.095	013	.719**	.226	_
	Sig. (2-tailed)	.436	.779	.510	.000	.297	.371	.503	.000	.000	.000	.027	.048	.470	.923	.000	.083	
**. Correl	ation is significant at th	ne 0.01 lev	el (2-tailed	Ÿ														
 Correla 	tion is significant at the	e 0.05 level	(2-tailed)	ľ														

T.T. RAU – MASTER'S THESIS

3.3 Correlation Matrix

THE INFLUENCE OF NEED FOR CLOSURE AND DECISION AIDS ON ONLINE PURCHASE BEHAVIOR

4 Appendix D: Syntax of the Analyses

4.1 Hypothesis 1:

4.1.1 Hypothesis 1a: Choice

* Generalized Linear Models. GENLIN CHOICE (REFERENCE=LAST) BY GENDER (ORDER=ASCENDING) WITH AGE ZAveNFC /MODEL ZAveNFC GENDER AGE INTERCEPT=YES DISTRIBUTION=BINOMIAL LINK=LOGIT /CRITERIA METHOD=FISHER(1) SCALE=DEVIANCE COVB=MODEL MAXITERATIONS=100 MAXSTEPHALVING=5 PCONVERGE=1E-006(ABSOLUTE) SINGULAR=1E-012 ANALYSISTYPE=3(WALD) CILEVEL=95 CITYPE=WALD LIKELIHOOD=FULL /MISSING CLASSMISSING=EXCLUDE /PRINT CPS DESCRIPTIVES MODELINFO FIT SUMMARY SOLUTION.

4.1.2 Hypothesis 1b: Confidence

* Generalized Linear Models. GENLIN AveCONF BY GENDER (ORDER=ASCENDING) WITH AGE ZAveNFC /MODEL ZAveNFC GENDER AGE INTERCEPT=YES DISTRIBUTION=NORMAL LINK=IDENTITY /CRITERIA SCALE=DEVIANCE COVB=MODEL PCONVERGE=1E-006(ABSOLUTE) SINGULAR=1E-012 ANALYSISTYPE=3(WALD) CILEVEL=95 CITYPE=WALD LIKELIHOOD=FULL /MISSING CLASSMISSING=EXCLUDE /PRINT CPS DESCRIPTIVES MODELINFO FIT SUMMARY SOLUTION.

4.2 Hypothesis 2:

4.2.1 ResuPage

* Generalized Linear Models. GENLIN ResuPage BY GENDER (ORDER=ASCENDING) WITH AGE ZAveNFC ZAveEXP /MODEL ZAveNFC ZAveEXP GENDER AGE ZAveNFC*ZAveEXP INTERCEPT=YES DISTRIBUTION=POISSON LINK=LOG /CRITERIA METHOD=FISHER(1) SCALE=DEVIANCE COVB=MODEL MAXITERATIONS=100 MAXSTEPHALVING=5 PCONVERGE=1E-006(ABSOLUTE) SINGULAR=1E-012 ANALYSISTYPE=3(WALD) CILEVEL=95 CITYPE=WALD LIKELIHOOD=FULL /MISSING CLASSMISSING=EXCLUDE /PRINT CPS DESCRIPTIVES MODELINFO FIT SUMMARY SOLUTION.

4.2.2 AllAtt

* Generalized Linear Models.

GENLIN AllAtt BY GENDER (ORDER=ASCENDING) WITH AGE ZAVeNFC ZAVeEXP /MODEL ZAVeNFC ZAVeEXP GENDER AGE ZAVeNFC*ZAVeEXP INTERCEPT=YES DISTRIBUTION=POISSON LINK=LOG

/CRITERIA METHOD=FISHER(1) SCALE=DEVIANCE COVB=MODEL MAXITERATIONS=100 MAXSTEPHALVING=5 PCONVERGE=1E-006(ABSOLUTE) SINGULAR=1E-012 ANALYSISTYPE=3(WALD) CILEVEL=95 CITYPE=WALD LIKELIHOOD=FULL

/MISSING CLASSMISSING=EXCLUDE

/PRINT CPS DESCRIPTIVES MODELINFO FIT SUMMARY SOLUTION.

4.2.3 TTS

* Generalized Linear Models.

GENLIN TTS BY GENDER (ORDER=ASCENDING) WITH AGE ZAVeNFC ZAVeEXP /MODEL ZAVeNFC ZAVeEXP GENDER AGE ZAVeNFC*ZAVeEXP INTERCEPT=YES DISTRIBUTION=GAMMA LINK=LOG

/CRITERIA METHOD=FISHER(1) SCALE=DEVIANCE COVB=MODEL MAXITERATIONS=100 MAXSTEPHALVING=5 PCONVERGE=1E-006(ABSOLUTE) SINGULAR=1E-012 ANALYSISTYPE=3(WALD) CILEVEL=95 CITYPE=WALD LIKELIHOOD=FULL

/MISSING CLASSMISSING=EXCLUDE

/PRINT CPS DESCRIPTIVES MODELINFO FIT SUMMARY SOLUTION.

4.2.4 CSS

* Generalized Linear Models.

GENLIN CSS BY GENDER (ORDER=ASCENDING) WITH AGE ZAVeNFC ZAVeEXP /MODEL ZAVeNFC ZAVeEXP GENDER AGE ZAVeNFC*ZAVeEXP INTERCEPT=YES DISTRIBUTION=POISSON LINK=LOG

/CRITERIA METHOD=FISHER(1) SCALE=DEVIANCE COVB=MODEL MAXITERATIONS=100 MAXSTEPHALVING=5 PCONVERGE=1E-006(ABSOLUTE) SINGULAR=1E-012 ANALYSISTYPE=3(WALD) CILEVEL=95 CITYPE=WALD LIKELIHOOD=FULL

/MISSING CLASSMISSING=EXCLUDE

/PRINT CPS DESCRIPTIVES MODELINFO FIT SUMMARY SOLUTION.

4.3 Hypothesis 3:

4.3.1 RelCR

* Generalized Linear Models.

GENLIN ReICR BY GENDER CR (ORDER=ASCENDING) WITH AGE ZAveNFC ZAveEXP

/MODEL ZAveNFC ZAveEXP CR GENDER AGE ZAveNFC*ZAveEXP CR*ZAveNFC CR*ZAveEXP INTERCEPT=YES

DISTRIBUTION=POISSON LINK=LOG

```
/CRITERIA METHOD=FISHER(1) SCALE=DEVIANCE COVB=MODEL
MAXITERATIONS=100 MAXSTEPHALVING=5 PCONVERGE=1E-006(ABSOLUTE)
SINGULAR=1E-012 ANALYSISTYPE=3(WALD) CILEVEL=95 CITYPE=WALD
LIKELIHOOD=FULL
```

/MISSING CLASSMISSING=EXCLUDE

/PRINT CPS DESCRIPTIVES MODELINFO FIT SUMMARY SOLUTION.

4.3.2 PreCR

* Generalized Linear Models.

GENLIN PreCR BY GENDER CR (ORDER=ASCENDING) WITH AGE ZAveNFC ZAveEXP

/MODEL ZAveNFC ZAveEXP CR GENDER AGE ZAveNFC*ZAveEXP CR*ZAveNFC CR*ZAveEXP INTERCEPT=YES

DISTRIBUTION=POISSON LINK=LOG

/CRITERIA METHOD=FISHER(1) SCALE=DEVIANCE COVB=MODEL MAXITERATIONS=100 MAXSTEPHALVING=5 PCONVERGE=1E-006(ABSOLUTE) SINGULAR=1E-012 ANALYSISTYPE=3(WALD) CILEVEL=95 CITYPE=WALD

LIKELIHOOD=FULL

/MISSING CLASSMISSING=EXCLUDE

/PRINT CPS DESCRIPTIVES MODELINFO FIT SUMMARY SOLUTION.

4.3.3 PreRS

* Generalized Linear Models. GENLIN PreRS BY GENDER RS (ORDER=ASCENDING) WITH AGE ZAveNFC ZAveEXP /MODEL ZAveNFC ZAveEXP RS GENDER AGE ZAveNFC*ZAveEXP RS*ZAveNFC RS*ZAveEXP INTERCEPT=YES DISTRIBUTION=POISSON LINK=LOG /CRITERIA METHOD=FISHER(1) SCALE=DEVIANCE COVB=MODEL MAXITERATIONS=100 MAXSTEPHALVING=5 PCONVERGE=1E-006(ABSOLUTE) SINGULAR=1E-012 ANALYSISTYPE=3(WALD) CILEVEL=95 CITYPE=WALD LIKELIHOOD=FULL /MISSING CLASSMISSING=EXCLUDE

/PRINT CPS DESCRIPTIVES MODELINFO FIT SUMMARY SOLUTION.

4.4 Additional Analyses

4.4.1 Evaluation Strategies / SiteInte

* Generalized Linear Models.

GENLIN SiteInte BY GENDER RS CR (ORDER=ASCENDING) WITH AGE ZAveNFC ZAveEXP

/MODEL ZAveNFC ZAveEXP CR RS GENDER AGE ZAveNFC*ZAveEXP CR*ZAveNFC RS*ZAveNFC CR*ZAveEXP RS*ZAveEXP INTERCEPT=YES DISTRIBUTION=POISSON LINK=LOG

/CRITERIA METHOD=FISHER(1) SCALE=DEVIANCE COVB=MODEL MAXITERATIONS=100 MAXSTEPHALVING=5 PCONVERGE=1E-006(ABSOLUTE) SINGULAR=1E-012 ANALYSISTYPE=3(WALD) CILEVEL=95 CITYPE=WALD LIKELIHOOD=FULL

/MISSING CLASSMISSING=EXCLUDE

/PRINT CPS DESCRIPTIVES MODELINFO FIT SUMMARY SOLUTION.

5 Appendix E: Unused Scales and Measures

5.1 Preferences or expectations of a backpack

This scale referred to the preferences and expectations of the participants regarding a backpack. The question whether they participants had general preferences and expectations were answered by rating five statements, which were given on a 7-point Likert scale ranging from *completely wrong* to *completely right*. In more detail, the five statements gave an indication about the personal preferences and expectations regarding the features and functions of a backpack; an idea of a personal budget limit or maximal price; expertise to know what are important aspects; and an idea for which purposes the backpack will be needed. The scale had a Cronbach's alpha of 0.797, which is sufficient.

5.2 Dichotomous questions regarding brands and backpacks

The participants had to answer two dichotomous questions regarding brand preferences. The first asked the participants whether there are brands they would generally prefer or reject, and therefore include or exclude upfront. When answered with yes, they had to report the names of the to-be-included or -excluded brands. Furthermore, they had to answer another dichotomous question (yes/no), asking them whether they already own a backpack. In case of answering the question with yes, they were also asked how many months they own it, from which brand the backpack is, and the volume of the backpack. However, the participants were asked to only answer the question in case they were completely sure.

5.3 Consumer susceptibility to interpersonal influence

This construct gives an indication about the need of an individual to buy or use particular products and brands in order to identify with significant others or enhance their image in the opinion of them; their willingness to rely their purchase decisions on expectations of others; and whether they observe others to learn about products and seeking information (Bearden, Netemeyer, & Teel, 1989). Again, the questions were given on a 7-point Likert scale ranging from *completely wrong* to *completely right*. Four of the eight questions that the participants had to answer were altered and explicitly related to either the recommendation system characteristics or consumer reviews, making it an appropriate scale for this context. In more detail, the participants had to give an indication whether they rely their decision on the past choices of other people; whether they usually ask other people or friends for help and whether they do it in general or only when they lack experience with the

product category, thus giving a latent relation to decision aids in a broader sense; and whether they read, write or actually use consumer reviews and/or product recommendations. The scale had a Cronbach's alpha of 0.597, which seems to be due to the, in this case, rather independent determinants of explicit decision aids usage and general susceptibility regarding decision-making, and therefore lack of correlation between some of the items.

5.4 Attitude toward Consumer Reviews and Recommendation Systems

The two scales asked questions about their general attitudes toward consumer reviews and recommendation systems, with each consisting of four questions. Again, the questions were given on a 7-point Likert scale ranging from *completely wrong* to *completely right*. The participants were asked whether the purpose of the respective decision aid is to inform consumers about products, the reliability of the presented information regarding the quality indication, and whether they actually support or aid consumers to reach a decision. The scale regarding the consumer reviews had a Cronbach's alpha of 0.744, which is acceptable (Cortina, 1993). The other scale regarding the recommendation systems had a Cronbach's alpha of 0.829, which is good (Cortina, 1993). After this question came the introduction to the product search task on Amazon.

5.5 Missed Features

The participants were also asked to report possible features or functionalities, which they missed during the product search on Amazon. This was an open question and the participants could indicate five features they have missed. Further, this was besides finding other potential ideas also a way to shed some light on the subjective perception of the presence or absence of decision aid(s) and the consequences. The data was aggregated with the information about their assigned condition and manipulation and likewise evaluated.

5.6 History and Purpose of Amazon Use

The usage history and underlying reasons for the use of Amazon were asked on a scale with four questions plus two single additional questions. The questions of the first scale were given on a 7-point Likert scale ranging from *completely wrong* to *completely right* and had a Cronbach's alpha of 0.783. The four questions asked the participants whether their intention to use Amazon is based on collecting product information, other consumer reviews, product recommendations, or buying products. Further, the participants had to indicate how often they were using Amazon in the past three months in order to buy products and to inform themselves about products. The two questions were given on a 5-point Likert-scale ranging from *never*, *1 to 5 times*, *6 to 10 times*, *11 to 20 times* to *above 20 times*.

5.7 Specific Preferences of a Backpack

In order to get insights into the specific preferences for a backpack, the participants had to answer several questions regarding this subject. They had to give an indication of their maximum price (in Euro), minimum expected volume (in liter), maximal weight (in gramm), and indicate their preferred colors, which were eleven in total with multiple answers possible. Furthermore, they had to answer five questions on a 7-point Likert scale ranging from *totally unimportant* to *totally important*. The questions asked them of their rating of importance of several aspects: low price, big volume or much storage, low weight, color, good consumer reviews, and many consumer reviews.