A Work Project, presented as part of the requirements for the Award of a Master Degree in Management from the NOVA – School of Business and Economics

Product quality judgments in a two-sequence cue environment: The impact of working memory capacity and distraction on cue order effects

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January 8th, 2016

Abstract

Previous research demonstrated that the sequence of informational cues and the level of distraction have an impact on the judgment of a product's quality. This study investigates the influence of the force behind the processing of these cues, working memory (WM). The results indicate that without distraction, consumers with low and high WM capacity (WMC) equally base their product evaluation on the first sequential cue. In the presence of a distractor, however, low WM individuals are no longer able to recall the initial cue, and thus derive their product judgment from the final cue. Moreover, evidence of intercultural differences in the perception of product related cues, and their aptitude for signaling a favorable product quality is provided.

Keywords: Cue order effects, WM capacity, dual-task interference, cross-cultural brand trust

Acknowledgments

This research was tremendously supported and supervised by Aristides I. Ferreira and Luis F. Martinez. Their insight and expertise greatly assisted the research, especially in the stages of early literature review, design of the study and acquisition of participants. Their constant availability and valuable feedback was exceptional. I am also extremely grateful for the support of Pedro Neves, who also assisted in gathering test subjects. Finally, I would like to express my gratitude to Dipayan Biswas for his readiness to provide me with invaluable resources of his previous research on the matter.

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WM	Working memory
WMC	Working memory capacity
POR	Portuguese participants
GER_ENG	German and English speaking participants
REP_WAR	Cue order: reputation 1st – warranty 2nd
WAR_REP	Cue order: warranty 1st – reputation 2nd
WMC Total	Total working memory capacity
WM CAP 1	WMC in simultaneous storage & transformation
WM CAP 2	WMC in the coordination category
WM CAP 3	WMC in the supervision category

2 Introduction

"You never get a second chance to make a first good impression." These words, which have been widely attributed to Oscar Wilde, imply the disproportionate influence the first encounter with a person has on the overall perception of that person. This commonly accepted wisdom also applies to brands and products in the marketplace (Biswas & Biswas, 2004). Before consumers reach a final buying decision, they come across various pieces of information or cues that shape their product judgment. Previous research by Biswas, Biswas, & Subimal (2009) demonstrated that in an ordinary shopping scenario, in which there are two informational cues that differ in their strength of signaling a favorable product quality, a cue sequence in which the stronger cue is presented first (strong–weak) will result in a more favorable evaluation of the product relative to a cue sequence in which the weaker cue is displayed first (weak–strong). This so-called *primacy effect* is applicable in situations, in which consumers are not distracted. If distracted, however, consumers will evaluate a product's quality higher following a weak–strong cue sequence, in contrast to a strong–weak cue order, thus exhibiting a so-called *recency effect*.

Prior work has assumed that individuals' WM, a theoretical framework that refers to the processes responsible for the temporary storage and manipulation of information, plays a crucial role in eliciting order effects (Cowan et al., 2005; Biswas et al., 2009). However, the effort to investigate the precise impact of differences in individuals' WMC on cue order effects has been scarce. I intend to illuminate this issue and propose that, in the absence of distraction, individuals with low WMC will show a similar product evaluation behavior to that of high WMC individuals. In contrast, in the presence of distraction, I assume low WMC individuals to rate a target product's quality higher following a weak–strong cue sequence, while high WMC individuals should be able to recall the initial cue and hence show a more favorable product evaluation following a strong–weak cue sequence.

Additionally, in this study I seek to shed light on intercultural differences in the perception of different cue information, specifically reputation and warranty, in a Latin (Portuguese) and an Anglo-Germanic (German and English speaking) sample group.

From a theoretical perspective, this research has the important implication that it substantiates Biswas et al.'s (2009) findings on cue-sequence order effect on product evaluations. More importantly, it adds a supplementary variable to the order effects that accounts for individual differences in information processing. From a managerial perspective, it elucidates the function of distraction in the consumer product judgment process, and suggests where to adequately position informational cues to achieve a superior perception of a target product. Moreover, by employing distraction techniques, managers can hamper consumers in recalling attributes of competing brands and products they might have encountered earlier (Biswas et al., 2009). The exploration of intercultural differences in the perception of informational cues and product characteristics offers further insights to managers, and emphasizes the sensitivity of differences in cultural values.

3 Theoretical Framework

In a first step, I will outline the concept of cue sequence (i.e., the order in which cues are assessed) and product judgments, and depict the influence of WM in the processing of information. Subsequently, I will address the issue of intercultural differences in the perception of the informational product cues employed in this study.

3.1 Cue Sequence and Product Judgements

Consumers generally evaluate the quality of a product based on a range of intrinsic and extrinsic informational cues that they associate with the product. Whereas intrinsic cues comprise the physical attributes of the product (Richardson, Dick, & Jain, 1994), extrinsic cues relate to the consumer's perception of price, store, brand reputation or warranty (Monroe & Dodds, 1988). The present research attends to how consumers draw inferences about a target product's quality based upon the cues they encounter in the marketplace. Hence, the focus of the study lies on extrinsic cues,

specifically on brand reputation and warranty. Previous research has shown that both cues are well suited for the purpose of the study, as consumers infer product quality based on them (Dawar & Parker, 1994; Jain, Slootegraaf, & Lindsey, 2007). Most importantly however, Biswas et al. (2009) demonstrated that both cues signal quality with differing strength, which is crucial in eliciting any effect of the relation between stronger and weaker cues.

Biswas et al. (2009) scrutinized the importance of the cue sequence on final product judgments. Research until that point had produced diverse findings as to whether the order in which cues are presented matter. A number of proposed models purported an indifference of the cue order in a sequence (Anderson, 1981; Lopes, 1985). Others maintained that the order of cues in a sequence affected the consumers overall perception (Carlson, Meloy, & Russo, 2006; Hogarth & Einhorn, 1992; Richter & Kruglanski, 1998). The latter stream of research discovered a *primacy effect* and a *recency effect,* which put more weight on the first cue or the last cue of a sequence, respectively, in judging a product's overall quality. Biswas et al. (2009) considered the different approaches in their study and reached the following conclusion in their results.

When two cues that differ in strength were sequentially presented, the *primacy effect* was evident in the subsequent product judgment. In other words, a strong–weak cue sequence elicited a more favorable product quality evaluation relative to a weak–strong sequence. This was firstly based on the notion that the first cue is generally highly indicative and serves as a stronger indicator of product quality compared to other cues that consumers come across down the line (Biswas & Biswas, 2004). Furthermore, other research (Carlson et al., 2006) suggests that a strong initial cue establishes a favorable initial perception, to which consumers will adhere in their assessment of ensuing cues. Correspondingly, a weaker first cue may form a relatively adverse first impression, which is then likely to prevail during the evaluation of the subsequent cues (Carlson et al., 2006).

A further argument related to the previous is that of anchoring (Biswas et al., 2009). The cognitive bias refers to the tendency to rely heavily on the first piece of information available in

decision making and product evaluation. From then on, the following analysis is realized with regard to the anchored reference value and subsequent pieces of information are less persuasive (Tversky & Kahneman, 1974; Kahneman, 2003). In a strong–weak cue order sequence, the effect is that the judgment of a target product's quality may not be sufficiently adjusted downwards after regarding the second, relatively weaker cue (Biswas et al., 2009). Accordingly, in a weak–strong sequence, a first relatively weaker cue will inhibit the consumers from adjusting their perception of a target product's quality upwards, after encountering the second, stronger cue. On the basis of the above arguments, I put forth the hypothesis:

H1: Consumers will judge a target product's quality to be higher following a strong–weak cue sequence relative to a weak–strong cue sequence (*primacy effect*).

Irrespective of the results of the first hypotheses, Biswas et al. (2009) remarked that the conditions of the above scenario may not resemble those of the actual marketplace, as consumers are often distracted in their shopping process (Nowlis & Shiv, 2005). The distractions might occur in a variety of forms such as advertisements of competitor products, distinct price offers, or the consumer's personal behavior (e.g., talking on the phone or listening to music while shopping). In as much as the distraction might modify consumers' perception of a product's quality, the experimental setting should simulate the actual marketplace and address the potential effect of distraction on the expected *primacy effect* (Biswas et al., 2009).

3.2 Working Memory

The development of the second hypothesis is grounded on the concept of WM and its impact on the cue order effect. Therefore, I will briefly introduce the general concept of WM, and then delve into the specific effects of distraction on WM.

Baddeley and Hitch (1974) introduced WM as a "limited-capacity system that holds and manipulates information" (p. 56), responsible for the storage and processing of information in

memory (Corbin, McElory, & Black, 2010). It can be best thought of as a temporary storage system (Baddeley, 2003).

His proposed model for WM consists of four interactive components. The core component, the central executive, coordinates the operations of two slave systems, the phonological loop, which stores rapidly decaying auditory memory traces (phonological store) and revives those (articulatory rehearsal component), and a visuo-spatial sketchpad, which provides its visual correspondent. The fourth and most recently added component is the episodic buffer, which links information across domains to assemble integrated units of visual, spatial, and verbal information with time and order sequencing (Baddeley, 2003).

WM is assumed to be crucial for a variety of cognitive activities as language comprehension, learning, problem solving and reasoning (Baddeley, 1992; Bailey, Dunlosky & Kane, 2008). Strong correlations between the capacity of WM and the constructs such as problem solving and reasoning skill have indicated that subjects with higher WMC perform better in these areas (Corbin et al., 2010).

An important aspect of WM as a temporary storage system is the finding that the amount of information that can be kept active at any given time is limited, and information can get lost (Turner & Engle, 1989; Park, Chun, & Kim, 2007). The underlying assumption is that processes and structures compete for a shared limited capacity (Baddeley & Hitch, 1974). Accordingly, a task with high processing requirements should decrease the overall amount of additional information that can be maintained (Daneman & Carpenter, 1980). One way this would transpire is if a more challenging process demands more attention and therefore displaces existing additional information, or if that process consumed a larger portion of the capacity otherwise available for storage (Daneman & Carpenter, 1980).

3.2.1 WM and Distraction

Challenging mental processes include distraction from manifold sources. The form of distraction on WM itself can vary and ranges from auditory distraction (Banbury, Tremblay, Macken,

& Jones, 2001), to proactive interference (Kane & Engle, 2000), and concurrent-task distractors (e.g., riddles) (Marsh, Hicks, & Cook, 2005). The latter will be employed for the use of the current study. Based on the theory of Conway and Engle (1994) and Posavac, Sanbonmatsu, Kardes, & Fitzsimons (2004), who asserted that distracting consumers during the completion of parallel tasks reduces the capacity of WM and drifts attention away from the primary task, Biswas et al. (2009) conducted their cue sequence study with an additional distractor in form of a riddle that had to be solved simultaneously. Their results indicated that the loaded WM decreases the influence of cues that were observed earlier in a cue sequence, and hence prompts individuals to rely more on cues they come across later. Accordingly, they showed that the *primacy effect*, actuated by the initial sequential cue in a situation without any distraction, subsides and gives way to a *recency effect* once the consumer is distracted (Biswas et al., 2009). This notion would advise one to place the stronger cue last, instead of first, in order to elicit a more favorable product evaluation (Biswas et al., 2009).

In summary, in the presence of a distractor, individuals' WM will be crowded and impede the ability to rehearse the first cue, and hence diminish its influence when evaluating the target product. Rather, the last cue is more accessible in participants' memory, which is why introducing the stronger cue last increases subjects' judgment of the target product's quality (Biswas et al., 2009). Based on the above argumentation, I hypothesize:

H2: When consumers are distracted, they will judge a target product's quality to be higher following a weak–strong cue sequence relative to a strong–weak cue sequence (*recency effect*).

3.2.2 Functional Categories of WM

In their study, Biswas et al. (2009) raised the question of the precise influence of WMC on the *primacy* and *recency effect* in their product scenario. In order to extend their findings, I will add the variable of WMC to the study, and test it in three separate WM tasks that are in line with a functional categorization of WM by Oberauer, Süß, Schulze, Wilhelm, & Wittmann (2000).

Oberauer et al. (2000) differentiate between three functional categories that express the three primary functions ascribed to WM: *Simultaneous storage and transformation* of information, *coordination,* and *supervision.* For the purpose of differentiating these functions, *processing* is defined as "the transformation of information or the derivation of new information," (Oberauer et al., 2003, p. 169). Moreover, *storage* is defined as the retention of new information that is briefly presented over a period of time in which the information is no longer visible or audible.

The category of *storage and transformation* is based on the view that WM has the dual function of maintaining mental contents in an active accessible state, while executing cognitive operations on them or other contents (Oberauer et al., 2003). For the corresponding WM task in this study, in order to categorize a task as requiring *processing,* it is essential that it demands not only conserving given information but also transformation of the same.

Coordination entails the operation of building new relations between information elements, and arranging these into structures. Responses are based on the resulting mental structure (Oberauer et al., 2003). In order to create new relational knowledge the reasoning system needs simultaneous access to various information elements. Simultaneous access to distinct elements is granted by arranging them in a common coordinate system. Similarly to the other functional categories, this coordinate system is thought to only provide limited capacity to maintain elements and keep them divided (Oberauer et al., 2003).

Supervision refers to the process of monitoring continuous cognitive operations and actions, and the selective activation of the processes that are of relevance for the current task, as well as the inhibition of distracting ones (Oberauer et al., 2003).

In summary, individuals' WMC can give hints about their abilities in cognitive processes, such as reading comprehension and reasoning skills (Corbin et al., 2010). Subjects with high WMC are adept at keeping a larger amount of information active for a longer period of time, relative to individuals with low WMC. Thus, one would expect participants with high WMC to be able to

remember the first cue in a cue sequence, and evaluate the target product's quality based on both cues. In contrast, participants with low WMC are likely to be only capable of remembering and judging the product's quality based on the final cue. Furthermore, participants with high WMC are less prone to be influenced by the distractor riddle. Hence, I formulate the following hypotheses:

H3: In the distractor scenario, participants with low WMC will base their product judgment on the second cue, resulting in a more favorable quality evaluation in a weak–strong cue order sequence, and a less favorable evaluation in the strong–weak cue order sequence.

H4: In the distractor scenario, participants with high WMC will base their product judgment on the first cue, resulting in a less favorable quality evaluation in a weak–strong cue order sequence, and a more favorable evaluation in the strong–weak cue order sequence.

Concerning the specific influence of the three separate functional WM categories, it would be interesting to investigate whether either one of them was a particularly strong indicator for the processing of information and the subsequent product evaluation in the cue sequence. The ability to *supervise* and inhibit irrelevant information, for instance, might be more critical in the shopping scenario task with a distractor than the *coordination* function. However, Oberauer et al. (2003) found that all three functional categories are highly correlated and simultaneously active in the majority of mental operations. While *simultaneous storage and processing* have to be coordinated with each other in a dual-task combination, which requires some form of *supervisory* function, the construct *coordination* demands the storage of elements in order to construct new relations among them (Baddeley, 1996; Oberauer et al., 2003). Due to the intricate interrelation of those three functional WM categories, I will not put forth a hypothesis concerning the influence of each of them. Nevertheless, I will conduct a thorough statistical analysis of them and report noticeable effects.

3.3 Cultural Differences

In their study, Biswas et al. (2009) used brand reputation and warranty as cues for their target product scenario. In a pretest they found that brand reputation was regarded as the stronger cue to signal a good product quality relative to warranty, which was consequently marked as the weaker cue. The large majority of their participants were American undergraduate students.

For the current study I mainly recruited Portuguese (63%) and German (15%) undergraduate and graduate students as well as students (22%) from a variety of other countries (i.a. Netherlands, France and China). While I assumed that for German and other students, who conducted the experiment in English, the stronger of the two cues would be brand reputation, relative to warranty, I expected Portuguese students to place more importance on the warranty cue, relative to reputation. This assumption was based on the following arguments.

First, the presumption that Portuguese consumers regard warranty as the stronger cue for a good product quality builds on data gathered in 2012 in Portugal and Spain, which shows a general deterioration of trust in public and corporate institutions in those countries (Torcal, 2014). The European Social Survey showed that both countries experienced the highest increase in institutional distrust in Europe since 2008 (Armingeon & Guthmann, 2013). Edelman (2015) also measured a continuing decrease of trust in companies in Portugal in 2014. Studies showed that this distrust is partially due to the negative perception of the political responsiveness of representative institutions, and exacerbated by the increasing perception of political corruption, which also stains the economic sector (Alesina & Wacziarg, 2000; van der Meer, 2010). Others offer another purely economic argument, which holds that the lack of trust is a consequence of the decline of economic conditions and the general crisis of the welfare state in the last two decades (e.g., Offe, 2003).

Compared to Portuguese, Germans show a larger overall trust in products and institutions (Rosenbloom & Haefner, 2009). Edelman's overview of trust (*Trust Index*), which indicates the average of a country's trust in the institutions of government, business and media, further indicates

that the levels of trust in countries such as Germany, China, France or the Netherlands are in the top third compared worldwide.

The effect of culture has a profound effect on the national consumer decision-making process (Clark, 1990). Hofstede underpinned this notion (1980; 1997) by referring to culture as the "collective mental programming of the people in an environment" (1980, p. 43). Hofstede's framework classifies national culture on five dimensions, of which one refers to uncertainty avoidance. In cultures with strong uncertainty avoidance, people employ different means that are available to facilitate future predictions and seek security (Hofstede, 1997). Hofstede's framework applied to Portugal reveals that the country has a very high preference for avoiding uncertainty with a score of 99 of possible 120 points, compared to Germany, which scores 65 points (Hofstede, 2015). Hofstede (2001) further emphasizes the disparity by stating that "in Germany everything which is not allowed is forbidden", while in Latin countries, including Portugal, "everything is permitted, even that is forbidden" (Ferreira, Braun, & Sydow, 2013, p. 8). Based on the above line of argument, I offer the following hypotheses:

H5: Portuguese participants will place more importance on the warranty cue in the evaluation of the target product's quality.

H6: German and other participants, who conduct the study in English, will rate the importance of reputation as stronger indicator of the target product's quality.

4 Research Method

In the following, the research method to investigate the effects of differential cue strengths, order sequence and WMC is presented, including a comprehensive description of the material and procedure used, and an accurate account of the procedure of the data collection.

4.1 Participants

Two hundred and fifteen people participated in the experiment. Ten participants had to be excluded from the final sample due to incompleteness of answers. Consequently, the final sample consisted of 205 individuals (62% female), of which the majority was Portuguese (n = 130; M_{age} = 22; SD = 3.27), and German (n = 30; M_{age} = 24.3; SD = 1.67). The remaining subjects (n = 45; M_{age} = 22.9; SD = 1.97) were of different origin, but spoke English proficiently. Their proficiency (B2 of Common European Framework) was ensured by the admission standards of the universities. Most of them were recruited at NOVA School of Business and Economics and ISCTE University Institute of Lisbon.

4.2 Materials and Procedure

The study employed a 2 (cue sequence: strong–weak versus weak–strong) x 2 (distraction level: undistracted versus distracted) between-subjects design, which resulted in a total of four groups. The groups differed in their positioning of the stronger and weaker cue, and in the absence or presence of the distractor riddle (appendix A). In order to be able to conduct the experiment with several participants simultaneously, I prepared a Portuguese (see appendix B) and an English version of the three WM tasks in PowerPoint (appendix C). The respective PowerPoint version was projected onto a screen at the front of the room. Participants were provided with a booklet (appendix D), in which they were instructed to note their responses.

As fourth step of the experiment, subjects were presented with a shopping scenario in which they were gathering information of a target product. As in the original study by Biswas et al. (2009) a wristwatch was selected as the product for the study since the target student population was likely to be familiar with the product. The particular version of the wristwatch scenario was also handed out in form of a study booklet to all participants. Participants in the distraction conditions received an additional separate sheet of paper containing the riddle, which had the purpose of crowding their WM. I randomized the allocation of scenario conditions, and ensured that all four groups were of equal size.

Since it was of vital importance that participants attended to the product scenario, as well as to the riddle distractor, in their native tongue or a language that they were proficient in, I had the four versions of the original scenario (appendix E) of Biswas et al. (2009) translated into Portuguese (appendix F) and German (appendix G). The objective of this was to avoid any form of foreign language effect, which might have distorted participants' perception of the target product's quality (Keysar, Hayakawa, & An, 2012; Costa et al., 2014). For the multitude of participants that originated from other countries, it was unfeasible to present the product scenario in each of their native tongues. However, their proficient level of English was considered sufficient to avert any unintended effects.

After I informed the participants about the broad context of the study, and the expected time for completion (30 minutes), I started the PowerPoint presentation that was comprised of three parts. All WM tasks are in line with Oberauer et al. (2000). According to his segmentation of prominent WM tasks, each task tested one of the delineated functional categories of WM (appendix H). Each task was introduced with two demonstration sets, and three consecutive practice trials. Next, participants were presented with the twelve relevant trials for analysis.

The first WM task was a modified backward digit span, which aimed at tapping participants' capacity for simultaneous storage and transformation. A series of digits was presented successively and had to be remembered and reproduced in descending order. Digits were presented sequentially for 1000 ms each on the screen. After the last digit, two question marks appeared, which signaled participants to note down their response. After everyone had recorded their response, I manually activated the next set of digits. The list length of digits ranged from two to eight. A maximum score of three for each of the twelve blocks could be achieved, for digits that were recalled correctly and in the right position. This amounted to a maximum of 36 points. After the final trial, participants were informed that the task had ended, and were given the instructions for the second WM task.

The second WM task explored participants' WMC in the coordination construct. In the alpha span task a series of words was presented sequentially, one word every second. Once the sequence

had finished, participants had to recall the first letters of the words in alphabetical order. The trials' list lengths varied between two and eight word items. The demand profile of the alpha span is certainly similar to the backward digit span, although it does demand more of the coordination component. The score for the second WM task was computed analogous to the first task.

The third WM task was a numerical version of switching, designed after Allport, Styles, & Hsieh (1994). Participants had to observe a display with a randomly arranged number of digits, and alternate between scanning the digits shown and counting the number of total digits in the display. Participants were asked to mark down both types of results on their sheets. The displays with the array of digits were illustrated for 5000 ms. Scores were computed based on the number of correctly recalled digits, and correct number of overall ciphers, yet again adding up to a total of 36.

Subsequent to the final WM task, participants read the hypothetical scenario in which they were prompted to imagine they were shopping for a wristwatch at the mall. In line with previous studies (Biswas et al. 2009; Gürhan-Canli, 2003), each cue was displayed on a separate page. Portuguese participants in the weak–strong condition first read about the brand's good reputation and then on the following page that the watch had a good warranty. The procedure for participants in the strong–weak condition was identical, except that they encountered the warranty cue first, and brand reputation cue second. Thereafter, they judged the product's quality and reliability, and performed a number of manipulation check questions. To evaluate the dependent variable, *perceived quality*, two seven-point items were used (Dodds, Monroe & Grewal, 1991). The final score of perceived quality was generated by taking the average of the two items, (1) expected quality (1= very low quality, 7= very high quality), and (2) expected reliability (1= not at all reliable, 7= highly reliable). Eventually, as an additional measure for participants' proclivity for warranty and general security, they responded to the question whether "generally speaking, people can be trusted or that one cannot be too careful in dealing with people" (Sun, 2011), and indicated their perception of the target product's trustfulness,

reliance, and honesty (1= not trustful at all, 7= very trustful) (Hur, Kim, & Kim, 2014). A general *trust score* item was computed based on the average of those three dependent variables.

Participants in the two distractor conditions were clearly instructed to consider the riddle before attending to the product scenario, then to complete the wristwatch scenario whilst thinking about a solution to the riddle, to finally return to the same and solve it. A paragraph on each page of the booklet stressed the importance of finding a solution to the riddle at the end of the study. The riddle that was adopted, was similar to those employed in Marsh et al. (2005). In an email correspondence with Dipayan Biswas, its level of difficulty was deemed adequate. As part of the manipulation check questions, participants indicated their level of distraction on a seven-point scale (1 = not distracted at all, 7 = very distracted), and marked whether they knew had known the riddle before.

It is worth noting that a fictitious brand name for the target product was used in order to avoid any preconceptions during the quality assessment. Furthermore, to signal the favorable quality of the product, the adjective "good" (good warranty) was employed, rather than numbers (e.g., 3 years). This, too, served to prevent individual subjective differences in the appraisal of numbers, as some participants might consider a 3-year warranty more attractive than others (Biswas et al., 2009). Appendix H provides an additional comprehensive overview of the relevant variables and moderators of the presented study outline.

5 Results and Discussion

The first manipulation check question asked participants to recall the sequence in which they read about the cues. No participant failed this manipulation check question. The dependent variable, labeled perceived quality, was found to be reliable ($\alpha = .75$). As assumed, the distractor rating of the riddle had a moderate trend toward significance ($p = .068$), as it was greater than the midpoint of the scale ($M = 4.32$; $t(101) = 1.845$). In the original study by Biswas et al. (2009), the distractor level was only slightly more significant ($M = 4.42$, $t(52) = 2.75$).

In order to validate or refute H1 – H4, one must first attend to H5 and H6 and analyze participants' preferences of cue information to determine the ultimate stronger and weaker cue for the Portuguese (POR) and the German/ English (GER_ENG) groups. A significant difference in the scores for POR was observable, *importance reputation* (M = 5.18), and *importance warranty* (M = 5.59), $t(130) = -2.275$, $p = .007$. There was also a moderate trend toward a significant difference in the scores for the same variable in GER_ENG, *importance reputation* (M = 5.24), and *importance warranty* (M = 4.79), $t(75) = 1.846$, $p = .069$. Thus, it can be maintained that for POR a good warranty represents the stronger cue, relative to a good reputation. In contrast, for GER_ENG a good reputation is paramount, relative to a good warranty, even though the ratio was smaller than the critical threshold ($p > .05$). H5 could therefore be verified, and H6 partially supported.

The results of the items that tested for participants' general proclivity for trust emphasized POR's inclination for risk aversion (trust people: yes, n = 31; no, n = 53), especially relative to GER (yes, n = 21; no, n = 9), and to a certain degree relative to ENG (yes, n = 19; no, n = 26). The difference in trust was significant, χ^2 (2, N = 159) = 9.947, $p = .007$). The item *trust score* further showed a higher score for GER_ENG (M = 13.46), compared to POR (M = 12.71), a difference that was, however, not significant, $F(2, 156) = 2.600$, $p = .110$. It is to mention that the group ENG comprised 14 different nationalities (appendix J), which makes it difficult to draw precise conclusions in this particular regard.

As discussed previously, due to the different perception of the strong and the weak cue between POR and GER_ENG, the statistical analysis for H1 and H2 was conducted separately for both groups. In the wristwatch scenario without distractor, Portuguese participants evaluated the product's quality lower in the sequence, in which the reputation cue preceded the warranty cue (REP_WAR) (M = 5.19). In the sequence that presented the warranty cue before the reputation cue (WAR_REP), the wristwatch's quality was rated significantly higher (M = 5.65), $F(1, 65)=5.042$, $p < .05$. Contrary to the assumption that in the distractor scenarios POR participants would rate the

target product's quality higher following a weak–strong sequence, perceived quality was still slightly higher in the WAR_REP sequence (M = 5.39) as opposed to the REP_WAR sequence (M = 5.31). A 2 (cue-sequence) by 2 (distraction level) ANOVA, however, did only reveal a smaller and not significant interaction effect, $F(1, 61) = 0.101$, $p = .751$. The assumption was that individuals would be distracted by the riddle to a degree that obstructed them from recalling the first cue. The absence of the expected *recency effect* in the distractor sequence might thus be due to an insufficient distraction by the riddle. Although in general the level of distraction caused by the riddle was evaluated as sufficient to cause the expected effect, the rating of distraction was self-assessed by participants and might after all not have been sufficient.

In the GER_ENG group, in the scenario without distractor, perceived quality of the watch was evaluated higher in the REP_WAR sequence (M = 5.56) than in the WAR_REP cue order (M = 4.98). This effect of a higher product evaluation following a first stronger cue was significant, $F(1, 37) = 4.055$, $p = .05$. In the two scenarios with distractor, perceived quality was rated higher following a weaker first cue and a stronger second cue (M = 5.61), relative to a REP_WAR sequence (M = 5.25). Although this difference is not significant ($F(1, 34) = 0.988$, $p = .327$), a tendency towards the expected effect is noticeable.

To conclude, a *primacy effect* in the absence of distraction was clearly observable in the POR and the GER_ENG group, as the target product's quality was judged more favorable following a strong–weak cue sequence, relative to a weak–strong cue sequence. A *recency effect* was only partially visible in the distractor scenarios. Thus, H1 can be validated, whereas H2 must be refuted.

For the purpose of this paper, I only considered the Portuguese group of participants in the analysis of the moderator role of WM on the cue order effect. The sample of GER_ENG participants (n = 75) was likely to be too small to exhibit and substantiate the influence of WMC. Nevertheless, I still carried out the analysis of the data of the GER_ENG sample in SPSS (appendix K; for a brief summary of the main results, see appendix L).

First, I calculated the average score for the total WMC (WMC Total) score, and each of the three functional categories, *storage and transformation* (WM CAP 1), *coordination* (WM CAP 2), and *supervision* (WM CAP 3). For each of the different categories, I split the participant sample at the median of the respective category's score, and designated participants with a score lower than the medium as "low WM", and those with a score higher than the medium as "high WM" individuals in the corresponding WM category (i.e. WM CAP 1: *Mdn* = 26; WM CAP 2: *Mdn* = 20; WM CAP 3: *Mdn* = 26; WM Total: *Mdn* = 69). Subsequently, I performed a 2 (WMC) by 2 (cue sequence) ANOVA for the scenarios with and without riddle distractor.

As illustrated in the profile plot in figure 1, the *primacy effect* is significantly apparent in both the low WM and the high WM participant group, $F(1, 63) = 5.927$, $p = .018$. The *primacy effect* was less pronounced in high WM subjects (difference in $M = .172$) relative to those with low WM (difference in $M = .831$). The overall congruity in quality perception between low and high WM participants in the cue sequences without distractor was not surprising. Without the riddle distractor that should crowd low WM individuals' memory traces of the first cue, both groups are able to recall the first cue, and thus evaluate the product's quality similarly.

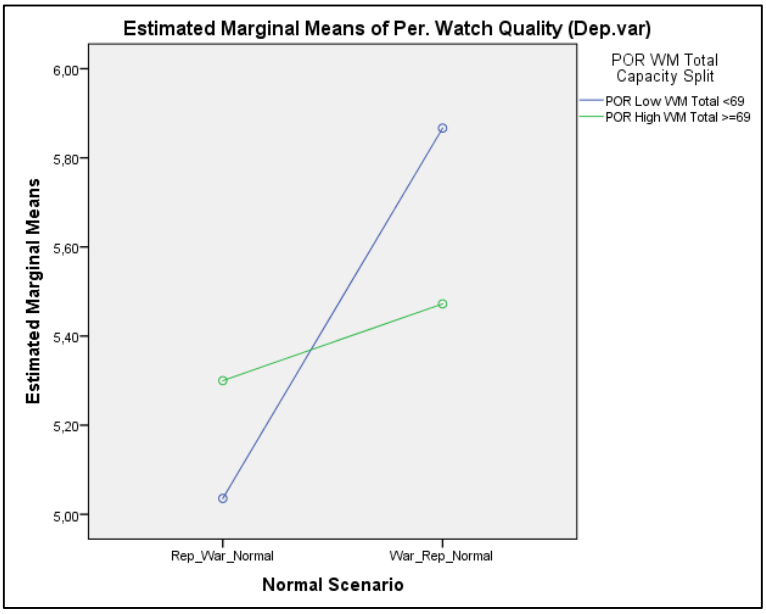

Figure 1. Marginal means of the dependent variable perceived quality for Portuguese low (blue) and high (green) WM participants in the product scenarios without distractor. On the x-axis the cue sequence is indicated.

Figure 2 depicts the means of perceived quality in the two distractor scenarios. Interestingly, low WM participants rated perceived quality marginally higher in the weak–strong cue order (REP_WAR: *M* = 5.38) than in the strong–weak cue sequence (WAR_REP: *M* = 5.33). In contrast, high WM participants showed the same evaluation behavior as in the wristwatch scenarios without distractor. Within their group, perceived quality was rated more favorably following a strong–weak cue sequence (*M* = 5.42) compared to a weak–strong cue order (*M* = 5.23). These results suggest that low WM participants seem unable to recall the first cue when evaluating the target product, which is why they scored higher in the weak–strong (REP_WAR) cue sequence. Individuals with high WM, in contrast, seem to possess sufficient WMC to acknowledge, rehearse, and be manipulated by the first cue in their evaluation procedure.

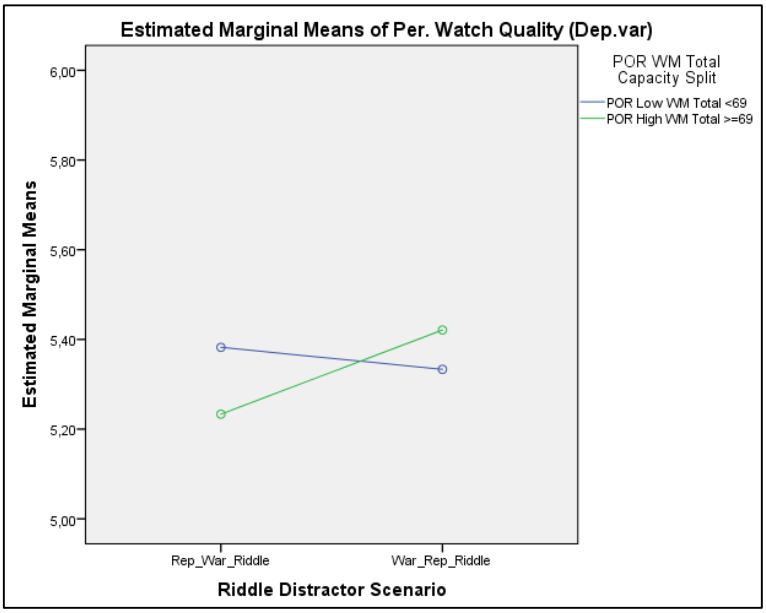

Figure 2. Marginal means of the dependent variable *perceived quality* for Portuguese low (blue) and high (green) WM participants in the product scenarios with distractor. The x-axis again signals the cue sequence.

Based on these observations, H3 and H4 can be validated. Whereas in the distractor scenario, participants with low WMC base their product evaluation on the second cue, and thus display a *recency effect*, participants with high WMC base their product judgment on the first cue in a sequence, exhibiting a *primacy effect*.

With regard to the influence of individual differences in the three functional WM categories, the most striking results were that evaluation patterns were most similar in the WM CAP 1 and WM CAP 3. After the split in both categories, the low as well as the high WM group showed largely identical product judgment as in the Total WM category, in that a *primacy effect* prevailed in the non-distractor scenario, while in the distractor scenario low WM participants altered their evaluation pattern to a *recency effect* (appendix L).

The product judgment pattern in WM CAP 2 differed from that in the other two functional WM categories, inasmuch as the effect of WMC on the product perception was less pronounced, though still vaguely perceptible (low WM: REP_WAR: $M = 5.42$; WAR_REP: $M = 5.40$; high WM: REP_WAR: $M = 5.24$; WAR_REP: $M = 5.37$). Overall, as suspected, all three WM categories were highly correlated and a particular effect or supreme importance of one of the WM categories in the present task was indistinguishable.

Additionally, a correlation analysis of the entire sample of POR and GER_ENG participants suggests a significant correlation of -.289 ($p = .003$) between *distraction level* and *importance of reputation*. Interestingly, this indicates that the more individuals were distracted, the less they regarded the reputation as pivotal cue in their evaluation process. In contrast, the more participants were distracted, the more decisive became the warranty cue in their evaluation process, although not significantly, $r(101) = .069$, $p = .459$. This might have substantial managerial implications, as the results indicate that the more consumers are distracted, the less they rely on the intangible asset of reputation, but instead seek security and certainty in the form of a binding covenant. A full table of all correlations can be found in appendix M, and a brief overview of the most relevant ones at the end of appendix L.

6 General Discussion

Biswas et al. (2009) have consolidated the theories of how multiple cues affect the judgment of a target product, and extended existing research on how the order of cues that differ in strength

influence consumers' perception of that target product. Nevertheless, there has been little attempt to investigate the force behind the processing of these cues, which is WMC. Consumers generally consider various cues before they make up their mind about a product, and base disproportionate importance in their judgment on the first cue they are able to recall. Biswas et al. (2009) asserted that in a marketplace scenario, while when consumers are not distracted the stronger cue should be placed before the weaker cue, when distracted, consumers should come across the stronger cue last. However, there are considerable differences in WMC between individuals that affect the amount of information that can be actively maintained. Consequently, the first cue that can be recalled differs from consumer to consumer, with and without distraction. In that respect, Biswas et al.'s (2009) suggested cue order would be challenged in its unconditional applicability, and an approach would have to be found that accounts for the individual differences in WMC of consumers. This study further attempts to explore intercultural differences in the perception of the different cues, and their aptitude for signaling a favorable product quality.

With regard to order effects, the results of this research substantiate Biswas et al.'s (2009) findings to a large degree. The study demonstrates that, in a situation without concurrent distractors, the evaluation of a target product is more favorable following a strong–weak cue sequence relative to a weak–strong cue sequence, thus exhibiting a *primacy effect*. The *primacy effect* converts to a *recency effect* when consumers are distracted, to the extent that the target product's quality is judged higher when the stronger cue is presented last instead of first. Although the strength of the *recency effect* was not significant, the results' tendency towards the effect does to a certain degree support previous findings. As discussed in the preceding section, despite its apparent sufficient distraction, the level of distraction was measured based on self-appraisal, and might after all not have been enough to crowd participants' WM adequately.

Disregarding the individual differences in WMC, it can be maintained that when there is no distraction, WM is loaded less and the rehearsal of the first cue information is facilitated for consumers

(Cowan et al., 2005). In the presence of a powerful distractor, however, it is to assume that consumers' WM is too crowded to rehearse the initial cue and summon that information at the stage of product evaluation. Accordingly, distractions diminish the effect of the first cue and the information consumers come across last becomes critical for their ensuing product judgment. From a marketing perspective, this implies that the use of informational product cues would have to be adjusted to the specific buying experience, considering factors such as shopping environment, additional tasks that are performed simultaneously, whether one is shopping alone or with company, and other circumstances.

By taking into consideration the results of the effect of WMC on the order effects, a number of additional variables further complicate the effective employment of cue order effects. The research revealed that in the absence of any distractor consumers with lower and consumers with higher WMC rate the target product's quality similarly. Both groups are able to recall and base their evaluation on the initial cue information. In a situation with distraction, consumers with low WMC are no longer able to recall the first cue, and thus base their product judgment on the later cue. Consequently, in order to elicit a more favorable product evaluation, consumers with low WMC should be presented with the stronger cue immediately before the product judgment. Consumers with high WMC, in contrast, are capable of remembering the first cue and hence evaluate the target product based on the same. Therefore, high WMC individuals should come across the stronger cue first in order to evoke a higher product appreciation.

From a practical perspective, in the marketplace it certainly appears ambitious to estimate someone's WMC at first glance, or even based on superficial indicators such as education or profession, and manipulate the order of cue information accordingly. However, as online marketplaces are continuously growing, there might be greater opportunities in the future to assess consumers' current level of distraction, and simultaneously manipulate cue order correspondingly. From a managerial perspective, distraction could also be used as a mean for directing consumers'

attention and perception of a target product (Biswas et al., 2009). The indication that distraction impedes consumers to recall anything but the final cue urges managers to place the strongest cue immediately before the buying decision.

The finding that the more consumers were distracted, the less they relied on the brand's reputation as principal selection criterion, and the more they sought security in form of the warranty cue, offers further valuable insight for marketers. Depending on the environment in which a product or service is purchasable, marketers ought to advertise the appropriate product attribute. While in a highly distractive environment, product aspects that convey reliability and assurance might be more effective, in a purchase scenario without distraction, product attributes and associations that serve transformational motives might be more expedient.

The current research further sheds light on the distinct perception of the selected cues in Latin, and Anglo–Germanic countries. Whereas Portuguese consumers deduce higher product quality from a good warranty, German and the English speaking consumers of this study deem a good brand reputation to be indicative of a high product quality. This finding should compel managers to take heed of the sensitive difference in perception of product attributes worldwide.

7 Limitations and Future Research

The study is concluded by a critical reflection on methodological issues of the empirical research and a suggestion for future research directions. As in most experimental studies, a hypothetical scenario in a classroom setting was employed. Nonetheless, the familiarity of the product (wristwatch) can be regarded as adequate to ensure participants acted like actual consumers in the marketplace (Biswas et al., 2009). It is to mention that the product scenario was solely based on informational components, disregarding affective components, which also play a vital role in the purchase decision process. A further limitation is that due to the demanding three WM tasks at the beginning of the experiment, only two cues were used. As in Biswas et al. (2009), this served to keep participants' attention active in the concluding product scenario, in order to obtain clear order effects.

Finally, the method of assessing participants' WMC could have been designed more meticulously using a computer based approach that is geared to the reaction times of each individual. However, the available resources did not allow for that option.

In the future, it would be interesting to explore the level or form of distraction that inhibits high WMC individuals from recalling the initial cue and that sways their evaluation behavior to a *recency effect*. In this regard, it would be further insightful to investigate how a third sequential cue would influence quality judgments, especially with high WMC. Does the *primacy effect* prevail? Is the effect substituted by a *recency effect*? Or does a new effect arise, in which the intermediate cue information becomes the anchor for the subsequent product evaluation, if the WM of high WMC individuals is too crowded?

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Disclaimer

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Appendix

Appendix A

Three versions of the riddle distractor (please see attached files)

Appendix B

WM tasks PowerPoint version in Portuguese (please see attached files)

Appendix C

WM tasks PowerPoint version in English (please see attached files)

Appendix D

Answer Sheet WM Tasks - English and Portuguese (please see attached files)

Appendix E

Wristwatch scenario in four conditions (REP_WAR / WAR_REP) x (no-distraction / distraction) in English (please see attached files)

Appendix F

Wristwatch scenario in four conditions (REP_WAR / WAR_REP) x (no-distraction / distraction) in Portuguese (please see attached files)

Appendix G

Wristwatch scenario in four conditions (REP_WAR / WAR_REP) x (no-distraction / distraction) in German (please see attached files)

Appendix H

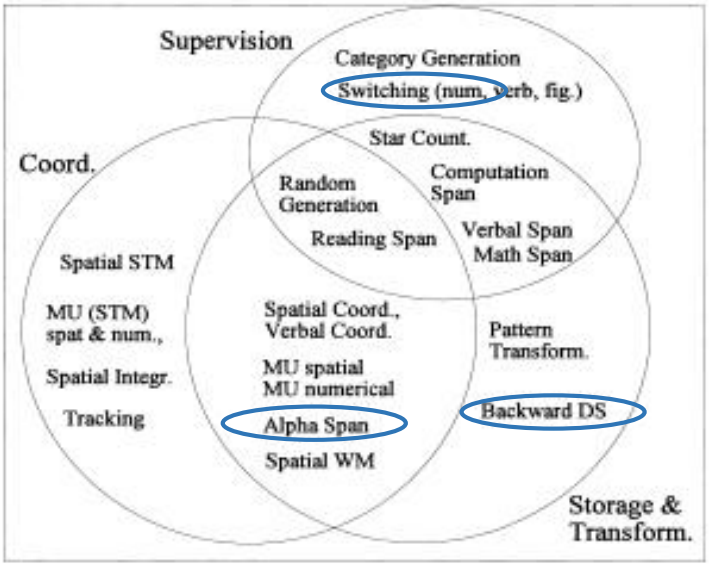

Figure 3. Classification of working memory tasks into three overlapping functional categories. The WM tasks employed in this study are circled in blue.

Appendix I

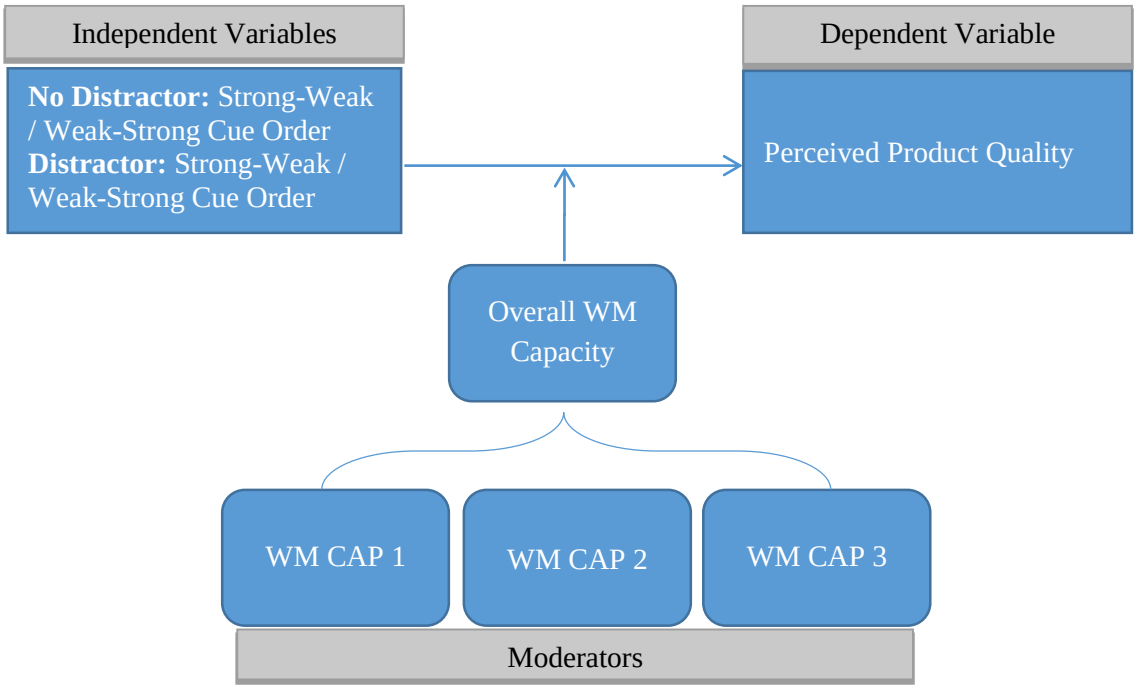

Figure 4. Overview of the relevant variables and moderators of the presented study outline. WM operates as moderator on the perceived product quality in the four different conditions.

Appendix J

Nationality	**# of participants**
Portuguese	130
German	30
English	3
Swedish	4
Norwegian	3
Dutch	5
Chinese	5
Mandarin	1
French	11
Italian	6
Russian	1
Czech	2
Finnish	1
Bahasa Indonesia	1
Hungarian	1
Polish	1

Table 1. Overview of participants' country of origin.

Appendix K

SPSS data and output (please see attached files)

Appendix L

Overview of SPSS analysis (please see attached files)

Appendix M

Correlations of the SPSS analysis (please see attached files)

Appendix N

Evaluation of participants' scores in all tasks of the experiment in Excel (see attached files)

Appendix O

Participant condition overview (please see attached files)