Easy on the Mind: How Rankings Influence Attribute Weights in Multi-Attribute Decision Tasks

This research examines two alternative mechanisms through which rankings may influence attribute weights. While the choice of sorting attribute may serve as a sign of relevance (conversational norms mechanism), consumers could also deduce importance from the ease of processing (comparison fluency mechanism). In four studies we provide evidence for the fluency mechanism. We demonstrate that rankings only influence the weight of less interpretable attributes (study 1). Moreover, the effect increases under a cognitive load manipulation (study 2) and decreases when interpretability is facilitated (study 3). Using eye-movement data, we show that ease of comparison mediates the sorting effect (study 4).

Keywords: *rankings, attribute weights, processing fluency,*

Track: *Consumer Behavior*

1. Introduction

Rankings have become an increasingly popular source of information for consumers in both online and offline purchase environments (Hakanen, 2002). But despite their prominence in our everyday life, only little is known about their role in consumers' decision making. One important aspect pertains to the influence of ranking options on the weight consumers give to different attributes in a multi-attribute decision environment. Rankings present choice options sorted on one particular attribute. For example, hotels can be sorted on price per night or on their distance to the airport. A substantial body of research has indicated that the way information is presented to consumers has an influence on their preferences (e.g. Bettman, Luce and Payne, 1998). Similarly, it has been proposed that ranking options on a particular attribute will cause an increase in the weight of that attribute (e.g. Cai & Xu, 2008). For example, unit price information has been shown to increase in importance when options were presented sorted on this attribute (Russo, 1997). However, the underlying process of this effect is not yet clear. The goal of the current research is to investigate two possible mechanisms: the conversational norms mechanism and the comparison fluency mechanism.

The *conversation norms mechanism* is based on the potential information value of the ranking. This mechanism draws on the theory of conversational logic (Schwarz, 1994), which proposes that communicated information comes with a guarantee of relevance for the receiver (Sperber & Wilson, 1986). Consumers may infer from the choice of sorting attribute in a ranking that this attribute is the most relevant and important aspect of the alternatives in the product category of interest and is considered as important by many other consumers. Therefore they may focus mainly on this attribute in their decision.

The *comparison fluency mechanism* proposes that consumers' perception of attribute importance may be caused by the perceived ease or difficulty of processing information (Schwarz, 2004). One important aspect hereof is the comparability of choice options (Nowlis & Simonson, 1997). Sorting options on one particular attribute in a ranking makes it easier to compare the options on that attribute, hence making it easier to grasp the true value of some attribute value. The increased processing fluency may be interpreted as indicative of attribute importance, resulting in higher attribute weights (Shah & Oppenheimer, 2007).

The comparison fluency mechanism implies a specific boundary condition. A ranking may facilitate the interpretation of attribute levels by making comparison easier. However, building on the literatures of the evaluability hypothesis (Hsee, 1996) and the ease of comprehension (Luce, Bettman and Payne, 2000) we argue that some attributes are inherently easy to interpret and require little to no comparison. Interpretable attributes (as further called in this paper) are associated with faster and less complex processing. Consequently, we expect that interpretable attributes will be used in decision making, both when options are sorted and not sorted on this attribute. This will not happen when the conversational norms mechanism applies, since it implies no effect of the ease of comparing attribute values.

To find out what drives the effect of the choice of sorting attribute in a ranking on attribute weights, we present four studies. In a first study we investigate the influence of sorting on attribute weights of both interpretable and less interpretable attributes. This can help us to test the existence of the boundary condition of attribute interpretability. In study 2 and 3 we examine the role of information processing by manipulating respectively the cognitive load of the task and the ease of comparing attribute values. Finally, in study 4 we use eye-movement data to obtain final evidence for the underlying mechanism.

2. Experimental Studies

2.1 Study 1

In study 1 we investigate the main effect of the choice of sorting attribute on attribute weights. We expect that ranking options on a particular attribute positively influences the weight of this attribute. We also use both an interpretable and a less interpretable attribute in this study, to examine the boundary condition of attribute interpretability.

In order to test our proposals, we asked 64 participants to indicate their willingness to pay for 10 fictional internet subscriptions. For each internet subscription they were given two pieces of information: the monthly subscription costs (in Euros) and the download speed (in megabytes per second). A pretest measuring the evaluability and ease of comprehension identified the attributes as respectively the interpretable and less interpretable attribute. The participants were randomly assigned to two conditions. While half of them were given a ranking sorted on subscription costs, the other half saw a ranking on download speed. Across the 10 internet subscriptions, the two attributes were unrelated (r = .02). In the current and the following studies, attribute weights were estimated using multilevel regression, with the two attributes as continuous variables and the choice of sorting attribute as factor. To facilitate interpretation of the results, the attributes are always centralized and standardized.

The analysis of the results revealed that the choice of sorting attribute indeed had an effect on the weight of the attributes in the decision process, but only the weight of the less interpretable attribute was affected. The findings indicate that the weight of download speed, the less interpretable attribute, increased when options were sorted on this attribute (β = -6.38, t = 2.57, p = .011). The weight of the interpretable attribute, monthly subscription costs, did not differ between sorting on subscription cost and sorting on download speed (β = -2.31, t = -.87, p = .39). These results provide initial support for 1) an effect of choice of sorting attribute on attribute weight, at least for the least interpretable attribute and 2) an explanation in terms of the comparison fluency mechanism.

2.2 Study 2

Study 2 extends the first study by investigating whether the effect of the choice of sorting attribute on attribute weights is moderated by the extent of cognitive load in the evaluation task. In case of the comparison fluency mechanism, a high cognitive load should increase the effect the choice of sorting attribute has on attribute weights. Limiting the participants' cognitive resources hinders the integration of additional product information about the stimulus (Winkielman, Schwarz, Fazendeiro and Reber, 2003). Consequently, a high cognitive load would impede the comparison of non-sorted attributes, even for interpretable attributes, and only the sorting attribute will lend itself to comparisons. In contrast, the conversational norms mechanism implies that a high cognitive load limits participants' selective processing and thus hinders their inferences about the information value, decreasing the sorting effect.

We asked 92 students to participate in a 2 (choice of sorting attribute) x 2 (cognitive load) design, in which they were asked to evaluate 10 non-existing internet subscriptions on a scale from 0 to 100. Participants were randomly assigned to one of two conditions, in which the subscriptions were sorted on either the monthly subscription costs or the download speed. Before they started with the actual task, we manipulated the cognitive load by asking them to memorize either a seven-digit number (high cognitive load condition) or a two-digit number (low cognitive load condition).

The findings of the *low cognitive load* conditions are comparable to those of our first study. As illustrated in figure 1, the weight of download speed was significantly higher when chosen as the sorting attribute (β = 7.22, t = 3.68, p < .001). In contrast, the change in the weights of subscription costs between the two rankings was insignificant (β = 1.61, t = .82, p = .42). In the *high cognitive load conditions*, we found that the weight of download speed increases when options are ranked on download speed (β = 6.09, t = 2.88, p = .006). Similarly, the weight of subscription costs was also higher when options were sorted on subscription costs (β = 6.93, t = 2.78, p = .007).

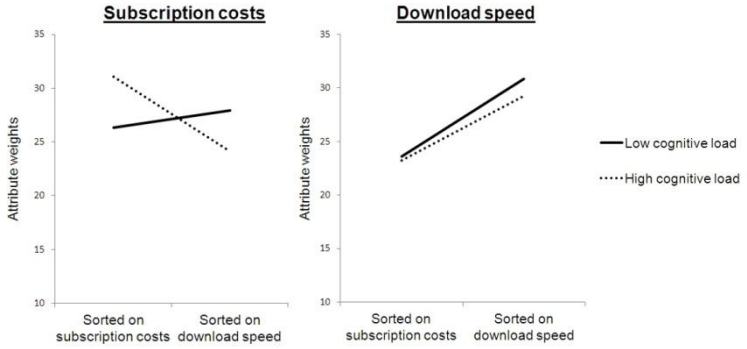

Fig. 1. Sorting effect under low and high cognitive load (study 2)

Replicating our previous findings, only the weight of the less interpretable attribute increased when options were sorted on this attribute under low cognitive load. This sorting effect, however, was found for both the interpretable and less interpretable attribute when cognitive sources were limited. The increase of the sorting effect is consistent with the comparison fluency mechanism. They show that when comparison of non-sorted attributes is impeded, the choice of sorting attribute affects even interpretable attributes.

2.3 Study 3

The goal of the third study was to pursue further evidence for the comparison fluency mechanism. While study 2 demonstrated that the sorting effect increases when comparison is impeded, the current study investigates if the sorting effect is attenuated, when the comparison of all included attributes, both sorted and non-sorted, is facilitated. The conversational norms mechanism, in contrast, should be unaffected by the ease of comparison. In contrast to studies 1 and 2 where interpretability was a characteristic of the attributes, in this study we manipulate the interpretability of attributes empirically.

Eighty-four participants were asked to evaluate 10 job offers on a scale from 0 to 100, while they were given information about the wage (in Euros) and the distance to work (in minutes), respectively the interpretable and less interpretable attribute according to pretesting. The study used a 2 (choice of sorting attribute) x 2 (ease of comparison) experimental design. Participants received a ranking sorted on either one of the two attributes. Moreover, they were either given the normal version of the ranking (*the control condition*), or received a version were the value interpretation was facilitated with the use of colors (*the color condition*). We used the colors green, yellow and red to indicate respectively the four best values, the three medium values and the three worst values of both attributes.

The data of the *control condition* demonstrated, similar to the results of the previous studies, that only the weight of the less interpretable attribute, distance, was significantly higher when the options were sorted on it (β = 10.10, t = 2.86, p = .007). The weight of wage, in contrast, was unaffected by the ranking (β = 3.97, t = 1.28, p = .21). This sorting effect, however, was eliminated in the *color condition*. As illustrated in figure 3, whether the ranking was sorted on wage or on distance had no significant effect on the attribute weights for wage

(β = -.84, t = -.26, p = .79) and for distance (β = 2.47, t = .95, p = .35).

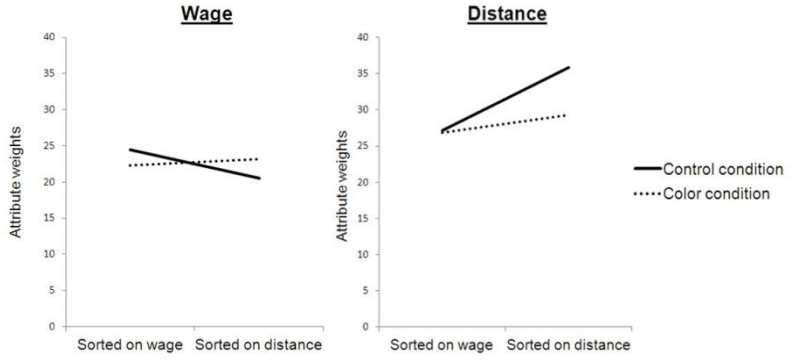

Fig. 2. Sorting effect in the control and color condition (study 3)

The results of this experiment illustrate that the ease of comparison influences the effect the choice of sorting attribute has on attribute weights. Only the weight of the less interpretable attribute was affected by the choice of sorting attribute under normal processing circumstances. The sorting effect, however, disappeared completely when the design of the ranking made the comparison of alternatives on both attributes easier. By showing that the ease of comparison, independent of the choice of sorting attribute, influences attribute weights, we essentially found additional evidence for the comparison fluency mechanism.

2.4 Study 4

The goal of study 4 was to obtain final evidence for the underlying mechanism of the sorting effect, using eye-movement data. The conversational norms mechanism implies that the increase in attribute weights coincides with an increase in attention towards this attribute, since people will primarily look at the attribute they perceive as most relevant. In contrast, the comparison fluency mechanism implies that fluent attributes can be processed faster. The increase in attribute weights of interpretable attributes will therefore coincide with a decrease in both the attention towards this attribute and the time needed to compare attribute values of this attribute.

A total of 56 students were asked to participate in a lab study. As in the first two studies, participants were asked to evaluate 10 internet subscriptions on a scale from 0 to 100, while being given a ranking sorted on either the monthly subscription costs or the download speed. While executing the evaluation task, in this study we simultaneously measured the participants' eye movements with an eye-tracking device.

Data of the effect of sorting on attribute weights revealed results similar to the findings of the previous studies (illustrated by the solid line in figure 3). Download speed, the less interpretable attribute, was found to be more prominent in respondent's decisions, when subscriptions were sorted on this attribute (β = 6.19, t = 3.34, p = .001). In contrast, the weight of subscription costs was only marginally different between the two ways of sorting (β = -3.82, t = -1.80, p = .07).

The effect of sorting on the *attention* towards attributes was examined by comparing the respondents' gaze duration (in seconds) for the included attributes over the two conditions. Supporting the comparison fluency mechanism, we found that the gaze duration towards the download speed information was shorter when the ranking was sorted on this attribute, then when not sorted on download speed itself (M = 15.25 vs. M = 21.03; F(1, 54) = 6.52, p = .013), while the gaze duration towards the price information was unaffected by the choice of sorting attribute (M = 12.06 vs. M = 14.43; F(1, 54) = 1.11, p = .30). A mediation analysis, however, revealed a suppression effect. While the sorting options on the less interpretable

attribute causes a decrease in attention towards this attribute, we found a positive relationship between attention and the attribute weights. Therefore, not attention per se, but another factor that exceeds the impact of attention, explains the relationship between sorting and attribute weights. In line with our expectations, we propose ease of comparison as an explaining variable.

We tested this proposal by investigating the time needed for each individual comparison (in seconds) between values of the same attribute as a proxy for the *ease of comparison*. As illustrated by the dashed lines in figure 3, the data showed that comparisons between download speed values took significantly longer when options were not sorted on download speed (M = 1.28 vs. M = 1.06; $F(1, 54) = 3.83$, $p = .056$). The time needed for comparing price information, in contrast, was not affected by the choice of sorting attribute (M = 1.21 vs. M = 1.40; $F(1, 54) = .58$, $p = .48$). A mediation analysis demonstrated that time per comparison explains the relationship between sorting and attribute weights for less interpretable attributes.

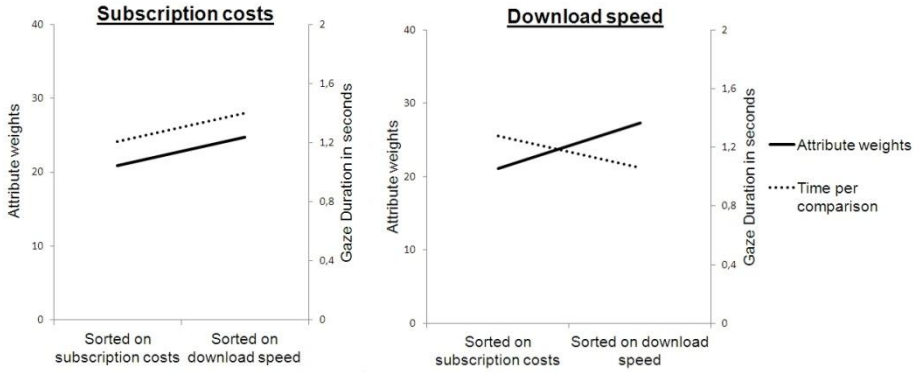

Fig. 3. Effect of sorting on attribute weights and gaze duration (study 4)

In sum, while the findings of our regression analysis replicate the findings of the previous studies, the eye-movement data provides further evidence for the comparison fluency mechanism. Participants paid less attention to the less interpretable attribute, when the ranking was sorted on this attribute, indicating a faster processing. Moreover, they needed less time for comparing attribute values. The interpretable attribute, already easy to process, is left unaffected by the choice of sorting attribute. Finally, the results showed that ease of comparison mediates the relationship between sorting and attribute weights.

3. General Discussion

Consistent findings across four studies demonstrate the applicability of the comparison fluency mechanism as an explanation for the rankings' effect on attribute weights. Sorting all options on one particular attribute increases the fluency with which options are compared on this attribute. The increased fluency of processing attributes is then interpreted as a greater importance of these attributes. Moreover, we found support for the attributes' inherent interpretability as a boundary condition. Interpretable attributes can be evaluated independently, reducing the need of comparing the values of different options and therefore eliminating the sorting effect.

The current research contributes to both theory and practice. First, while prior research has demonstrated that rankings influence consumer decisions, this research is the first to empirically investigate the underlying process for the effect of rankings on attribute weights. With the testing and establishment of the comparison fluency mechanism we add both to the decision aids literature (e.g. Häubl and Murray, 2003) and fluency literature (e.g. Schwarz,

2004). Second, because of the high relevance of product lists both for traditional and online companies, the current research has also strong managerial implications for choice environments, in which rankings or similar decision aids are common. Understanding the underlying mechanism of the sorting effect can help marketers in using rankings in a way that ensures the maximalization of utility. Moreover, increasing the fluency of attributes, such as quality, can ensure their role in consumers' decisions, even when not chosen as the sorting attribute.

In sum, over the last decades rankings have become a ubiquitous decision tool for customers. Nevertheless, the existing body of literature is yet very limited. The present research contributes to this literature by empirically testing the influence of rankings on attribute weights and delivering evidence for a possible explanation. Fluency, and more particular the fluency of comparing options on a certain attribute, was found to explain how rankings influence consumers' decisions.

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