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**Article**

# Experience with the product does not affect the anchoring effect, but the relevance of the anchor increases it

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# Experience with the Product does not Affect the Anchoring Effect, but the Relevance of the Anchor Increases It

*Jozef BAVOĽÁR**

## Abstract

   *The anchoring effect belongs to one of the most extensively studied cognitive biases in judgment and has been shown to be robust in a variety of domains and conditions. This current study on 100 adolescents in Slovakia (aged 16 – 18, 62% females) investigates the role of the anchor relevance and the familiarity of products on one's willingness-to-pay. The presence of the anchoring and adjustment heuristic has been confirmed in the Slovak cultural environment. The magnitude of the anchoring effect is not affected by previous experience with the product. However, the effect is higher when the anchors are relevant. By this, the effect was higher when the anchor was the price paid by other people, rather than when it was the result of obviously irrelevant mathematical operations.*

## Introduction

   The heuristics and biases approach in the area of judgment and decision-making has riveted attention to a variety of demonstrations of irrationality. Heuristics are described as the intuitive, rapid and automatic way of processing information that helps to reduce the complex task of assessing probabilities and predicting values to simpler judgmental operations. While they are useful in most cases and lead to at least satisfactory results, their use in inappropriate situations has mostly been reported. Heuristics can be viewed as demonstrations of System 1 (intuition) when the need to use System 2 (reasoning) is not recognized (Kahneman, 2002). The idea of heuristics comes from Simon (1955), although it has gained more attention from the well-known paper by Tversky and Kahneman (1974). Three main heuristics were proposed in this pioneering article

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– representativeness, availability and anchoring and adjustment. However, the number of heuristics has increased substantially in the previous few decades.

The anchoring and adjustment heuristic belongs to well-documented biases in human judgment. It describes the phenomenon when estimates of numbers are made as adjustments from an initial value. This starting point can be provided as part of the problem or as a totally irrelevant number although sometimes it is just a memory trace based on previous experience. The effect of the anchor is mostly generated in two steps (e.g. Jacowitz and Kahneman, 1995). Firstly, the given anchor is compared with the participant`s estimate (e.g. "Is the Mississippi river longer or shorter than 2000 miles?") and their own estimates are generated afterwards (e.g. „What is the actual length of the Mississippi river?"). The anchoring effect has been demonstrated in a variety of domains such as general knowledge, probability estimates, legal judgments, valuations/purchasing decisions, forecasting, negotiation, and self-efficacy (for review see Furnham and Boo, 2011). Furnham and Boo have provided the dominant explanations of the anchoring affect. Firstly, Tversky and Kahneman (1974) proposed that it is a result of effortful insufficient processes done by System 1. Further explanations have not blamed the sole adjustment, but have focused more on testing the hypothesis that the given anchor is the correct answer (Mussweiler and Strack, 1999; Wegener et al., 2010). External rewards and motivation for correct answers do not help to avoid the anchoring effect (Tversky and Kahneman, 1974; Wilson et al., 1996) although forewarning can reduce it (LeBoeuf and Shafir, 2009).

## 1. Price Anchoring

### 1.1. Anchoring Effect in Price Estimates

While some heuristics and biases are more of academic interest with a minor effect in real situations, this cannot be said for the anchoring and adjustment heuristic. Given that the anchoring effect is robust and present in numerous domains, it has also been reported in consumer behaviour. Anchors influence the number of bought products (Wansink, Kent and Hoch, 1998) and their effect has been observed not only in class or lab experiments, but also in real behaviour. The most illustrative examples are those where the price listed in information about real estate property has an effect on its value for both experts and students (Northcraft and Neale, 1987) or the price expected by the seller of a used car influences the price estimated by experts (Mussweiler, Strack and Pfeiffer, 2000). While these two anchors were relevant to an object to be priced, this is not always the case. Ariely, Loewenstein and Prelec (2003) have demonstrated that even the last two digits of a social security number affect the prices generated

by students for a variety of products (computer accessories, wine bottles, luxury chocolates, and books). Their results have been replicated in another study (Bergman et al., 2010) and Simonson and Drolet (2004) have also shown the effect of this anchor on willingness-to-pay although not on willingness-to-accept. On the other hand, Sugden, Zheng and Zizzo (2013) have reported that anchors are less effective in buying than in selling. The anchoring effect is often used in retail where current prices are presented as discounts from a reference price that serves as the anchor (Chandrashekaran and Grewal, 2006). The effect of the anchor in price estimates is generated the same way as in other domains; after answering question about the appropriateness of a given number as a reasonable price for a selected product, the maximum buying price for this product is elicited (e.g. Simonson and Drolet, 2004). While a variety of individual factors has been examined in relation to the anchoring effect (e.g. attention, knowledge), the characteristics of anchors have mostly been neglected. Therefore, it is proposed that the informational relevance of the anchor and familiarity of objects are potential factors influencing the effect of the anchor in evaluating the price.

## 1.2. Informational Relevance of Anchor

Do types and sources of anchors matter? While it seems to be logical that anchors which come from an area related to the objects of interest should be more efficient at influencing judgments, direct comparison is weakly empirically supported. In the pioneering work in this field, an estimated percentage of African states in the United Nations was influenced by an obviously wholly irrelevant number from the wheel of fortune (Tversky and Kahneman, 1974) and Englich, Mussweiler and Strack (2006) even used a dice to generate an anchor for judicial sentencing decisions. A direct comparison of relevant and irrelevant anchors has only been reported by two known studies where the effect of the anchor was found to be the same when relevant and irrelevant anchors were provided (Englich, Mussweiler, and Strack, 2006; Mussweiler, 2001). Experiments which have replicated the study with the last two digits of social security number as an obviously irrelevant anchor for the price estimate (Ariely, Loewenstein and Prelec, 2003) have provided heterogeneous results. Some studies have confirmed it in buyers (Simonson and Drolet, 2004), albeit with a lower magnitude (Bergman et al., 2010; Fudenberg, Levine and Maniadis, 2012) or with no effect at all (Alevy, Landry and List, 2010). One type of clearly irrelevant anchors is the result of mathematical computations. Tversky and Kahneman (1974) have shown that the estimated result of multiplying numbers from 1 to 8 depends on the rank of these numbers (from 1 to 8 or reversed) although this example is idiosyncratic as the potential anchors are part of the expression (Smith and Windschitl, 2011).

### 1.3. Familiarity of Object

Some studies which have investigated the anchoring effect have looked at domains which participants have had previous experience with (e.g. Mussweiler, Strack and Pfeiffer, 2000) or asked about their general knowledge (e.g. Jacowitz and Kahneman, 1995). Other studies have asked for estimates related to completely unknown areas (Mussweiler and Strack, 2001). While the characteristics of anchors have been investigated to some degree, the properties of these anchored products have been out with scientific interest (Sugden, Zheng and Zizzo, 2013). More than one product has been used in most studies investigating price anchoring, but the comparison of objects or at least their categorization has been absent. An illustrative example is the study by Ariely, Loewenstein and Prelec (2003) and their followers (Alevy, Landry and List, 2010; Simonson and Drolet, 2004; Bergman et al., 2010; Fudenberg, Levine and Maniadis, 2012) who worked with social security numbers as the anchor for price estimates. The correlations between the anchor and willingness-to-pay were the same for the average and rare wine, higher for the wine than for the design book, but lower than for the Belgian chocolates and PC accessories (Ariely, Loewenstein and Prelec, 2003) and slightly lower in a replicating study (Bergman et al., 2010). Fudenberg, Levine and Maniadis (2012) report more heterogeneous correlations between the social security number and willingness-to-pay when only one of six correlations was significant and four were even negative. On the other hand, Simonson and Drolet (2004) have reported consistent results for four similar products – a toaster, phone, backpack, and radio headphones. As shown, these findings do not allow generalizations to be made about the role of object familiarity in price anchoring.

## 2. Methods

### 2.1. Present Study and Hypothesis

The present study has four aims. Firstly, while the anchoring effect has been widely reported in a variety of domains, including price setting, there is no known research in Slovakia. The current results can provide additional information about the universality and robustness of this phenomenon. The expectation of the study was that the anchoring effect would be present in the sample as it is a general cognitive bias not dependent on culture. Secondly, the standard anchoring procedure includes a question regarding an anchor (e.g. would you be willing to pay this price for this product?). However, these questions are rarely present in real consumer behaviour, mainly in the case of irrelevant anchors.

Does the anchoring effect also occur when an anchor is presented, but not directly connected with the object to be priced? Some studies use self-generated anchors (e.g. the number of current U.S states is probably the anchor for the number of U.S. states in 1880, Epley and Gilovich, 2006) that are the same for all participants. However, Northcraft and Neale (1987) found that the anchoring effect was present when the listing price for the real-estate property was presented only among other information with no question asking about the appropriateness of this price. Would it be confirmed in a different sample and for different objects? The first hypothesis connects these two questions:

H1: *The estimated prices of products will be higher in the high anchor group in comparison with the low anchor group.*

Besides these two connected aims related to the pure occurrence of the anchoring effect, the role of two factors was investigated. The first factor was called familiarity and was operationalized as the experience with objects of interest (product). The subjects were asked to state the price for four products with which they were familiar and four objects they had little or no experience with. The second factor was called relevance (between the anchor and object) and also had two levels. The relevant anchors were presented as prices paid by other people; irrelevant anchors were acquired as the result of simple mathematical operations. The following two hypotheses were presented as:

H2: *The anchoring effect will be lower in products with which subjects had previous experience.*

H3: *The anchoring effect will be higher in products where the anchors are related to the desired outcome (price paid by another person).*

## 2.2. Sample

Most of the previous studies on the anchoring effect have been conducted on adult samples. These have predominantly been on university students, but as high school students face financial decisions as well (e.g. almost half of them have a bank account and 90% have a bankcard, Slovak Banking Association, 2014), their price estimates should also be the object of research interest. The sample consisted of 100 adolescents from a secondary school in Rožňava, Eastern Slovakia, aged between 16 and 18 years ($M_{age}$ = 17.05, SD = .81, 62% females). 50 students in this between-subjects study had objects with a low anchor (58% females) and 50 students with a high anchor (66% females). The sample size is comparable with previously mentioned anchoring studies (e.g. 116 subjects in Wilson et al., 1996, or 55, 132, 90, 53, 44, and 95 students in 6 different experiments in Ariely, Loewenstein and Prelec, 2003).

## 2.3. Procedure

The design of the experiment (products, their description) was solely developed for this study following the standard anchoring procedure. Pictures and short descriptions of eight products were presented to each participant followed by an anchor. A low anchor was always half of a high anchor (e.g. 8 and 16). The anchor could be provided as the price paid by a hypothetical person ("relevance" condition, e.g. "Mr. Peter bought this pasameter for 30 euros") or as a result of a mathematical task ("irrelevance" condition, e.g. "Compute: 90/3=…"). Given that the mathematical tests were really simple, all participants came up with the same anchor. As well as the way of providing the anchor, products were also categorized as familiar or unfamiliar. The group of familiar objects consisted of a rucksack, mobile phone, USB key and a winter hat. Four objects were also in the group of unfamiliar objects. These included a pasameter (a tool for measuring length), sushi, a diamond knife sharpener and a Doppler (a machine for receiving sounds from the body, e.g. from the foetus in a mother`s body). Two factors – the relevance of the anchor and the familiarity of the products – were combined. The relevant and irrelevant anchors were provided in half of the familiar and half of the unfamiliar products. After presenting each product and an anchor, the participants were asked about the maximum price they would pay for this product. The characteristics of products and anchors are summarized in Table 1.

## 2.4. Statistical Analysis

All price estimates were standardized to allow a within-subjects comparison of objects with different prices and anchors. Firstly, the differences between the estimated price of each product and the average anchor were computed (as an example, 22.5 for the pasameter as the midpoint between 15 and 30) so estimated prices above the average changed into positive values and prices below the average changed into negative values. These differences were standardized using z transformations for each product price. Eight transformed price estimates were combined into four variables as means of two corresponding z scores in order to have the combinations of two factors (relevance, familiarity). Each of these four new variables combined two objects, which included: a) familiar products with relevant anchors, b) familiar products with irrelevant anchors, c) unfamiliar products with relevant anchors, and d) unfamiliar products with irrelevant anchors. These four variables together with the anchor were included in a mixed ANOVA 2 (anchor: low vs high) x 2 (familiarity: familiar vs unfamiliar object) x 2 (relevance: relevant vs irrelevant anchor) to investigate the main effects of these three variables as well as their interactions.

T a b l e  1

**Characteristics of Products and Anchors Provided to the Participants**

| Product | Picture | Product familiarity | Anchor relevance | Low anchor | High anchor |
|---|---|---|---|---|---|
| Pasameter | | Unfamiliar | Relevant | 15 | 30 |
| Sushi | | Unfamiliar | Irrelevant | 8 | 16 |
| Rucksack | | Familiar | Irrelevant | 15 | 30 |
| Knife Sharpener | | Unfamiliar | Relevant | 17 | 34 |
| Mobile phone | | Familiar | Irrelevant | 6 | 12 |
| USB key | | Familiar | Relevant | 10 | 20 |
| Doppler | | Unfamiliar | Irrelevant | 8 | 16 |
| Winter hat | | Familiar | Relevant | 10 | 20 |

*Source:* Author.

## 3. Results

The presence of an anchoring effect as the difference between the low and high anchor group was confirmed with a large effect size ($F(1,98) = 40.16$, $p < .001$, $\tau^2 = .29$). However, the main effects of relevance ($F(1,99) = .00$, $p = 1.00$, $\tau^2 = .00$)

and familiarity ($F(1,99) = .00$, $p = 1.00$, $\tau^2 = .00$) were not significant. The interaction of anchor and familiarity had no effect ($F(1,99) = .00$, $p = .95$, $\tau^2 = .00$) although the interaction of anchor and relevance did with a medium effect size ($F(1,99) = 13.79$, $p < .001$, $\tau^2 = .12$). The next two interactions – relevance and familiarity ($F(1,99) = .00$, $p = 1.00$, $\tau^2 = .00$) and all three factors together ($F(1,99) = .91$, $p = .34$, $\tau^2 = .01$) were not significant. As shown in Graph 1, the relevance of the anchor increased the framing effect. The prices generated in the relevance condition were lower in the low anchor group and higher in high anchor group.

Graph 1

**Interaction of Anchor and Relevance**
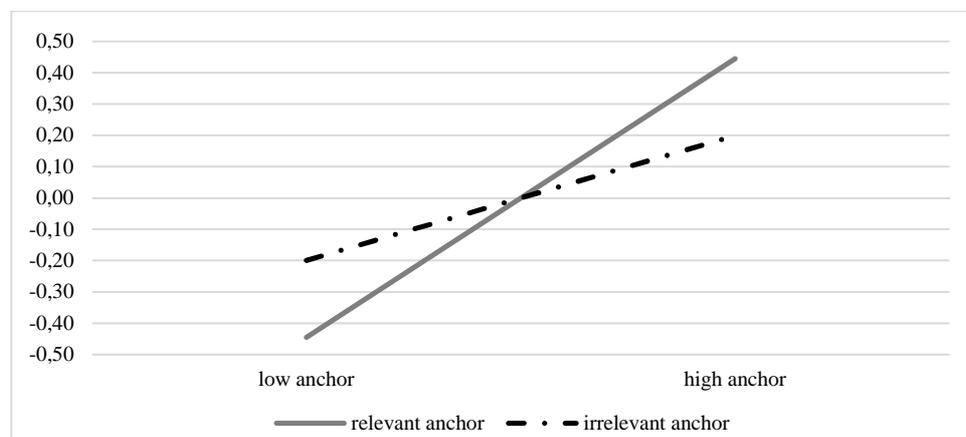


*Source:* Author`s computation.

Table 2

**Comparison of Low and High Anchor Groups in Mean Price**

| Object | Anchor | Mean | SD | t | p | Cohen's d |
|---|---|---|---|---|---|---|
| Pasameter. | Low | 12.81 | 7.06 | –5.47 | < .001 | 1.10 |
| | High | 21.52 | 8.76 | | | |
| Sushi | Low | 6.20 | 4.98 | –3.08 | < .001 | .62 |
| | High | 10.85 | 9.41 | | | |
| Rucksack | Low | 22.68 | 6.62 | –3.09 | < .001 | .62 |
| | High | 28.48 | 11.49 | | | |
| Sharpener | Low | 12.60 | 6.26 | –5.18 | < .001 | 1.04 |
| | High | 20.56 | 8.87 | | | |
| Mobile phone | Low | 28.31 | 16.57 | –1.61 | .11 | .32 |
| | High | 34.13 | 19.29 | | | |
| USB key | Low | 9.97 | 3.41 | –5.30 | < .001 | 1.06 |
| | High | 14.26 | 4.60 | | | |
| Doppler | Low | 21.02 | 15.12 | –0.42 | .67 | .08 |
| | High | 22.14 | 10.75 | | | |
| Winter Hat | Low | 8.71 | 3.68 | –3.96 | < .001 | .79 |
| | High | 13.98 | 8.66 | | | |

*Source:* Author`s computation.

While examining the prices of each product separately, significant differences were identified in the prices of six out of the eight products by the independent samples t-test (Table 2). Two products with irrelevant anchors had no anchoring effect and were recognized as causes of relevance significance in the ANOVA reported above.

## 4. Discussion

The anchoring effect belongs to the most robust phenomenon in the area of judgment research and its presence has been demonstrated in a variety of domains and cultural conditions with numerous variations. The present study extends the number of countries given that the effect has been confirmed in Slovakia with an emphasis, in this case, on price anchoring. Its results are in concordance with the majority of previous studies which have investigated the anchoring effect (e.g. Ariely, Loewenstein and Prelec, 2003; Simonson and Drolet, 2004) They have reported the presence of price anchoring, even with one slight modification appearing only rarely (e.g. Northcraft and Neale, 1987) – missing question asking about the appropriateness of given anchor as a right answer.

Besides verifying the existence of the anchoring effect in relation to price estimates in Slovakia, the current study has focused on two of its aspects. They include the familiarity of products to be valued and the relevance of the anchor in relation to the outcome (price) asked from participants. As far as it is known, there has been no study directly investigating the effect of object familiarity in price anchoring. However, some generalizations of past results have been possible. Both experts and laymen are susceptible to price anchoring (Northcraft and Neale, 1987) and prices of both known and unknown objects are affected by the anchor (Simonson and Drolet, 2004). It seems that the anchoring effect is present independent of the amount of experience with products and this finding has also been confirmed in the current data. From the two products with no anchoring effect, one belongs to the group of familiar products (mobile phone) and one to the unfamiliar group (doppler). When put together, the familiarity of objects was neither responsible for the presence nor the magnitude of the anchoring effect. Although the hypothesis was that the known products would be those with a smaller anchoring effect, it was found that it does not matter whether people apprize the objects they have previous experience with or not. This finding can have serious implications in marketing and consumer behaviour research. Anchors have the potential to influence the perception of a reasonable price for a given product independently of its frequency of use or the amount of information about it.

While familiarity had no effect on the anchoring effect, this is not the case for the relevance of anchors. The anchors related to the product and asked question (operationalized as prices paid by other people) caused a higher anchoring effect in comparison with the results of mathematical operations as representatives of irrelevant anchors. When related anchors were provided, the estimated prices were lower in the low anchor condition and higher in the high anchor condition. A number of studies have reported the presence of an anchoring effect with anchors obviously irrelevant with respect to the task (e.g. the numbers from the wheel of fortune, Tversky and Kahneman, 1974, or the last two digits of social security number in price anchoring, Ariely, Loewenstein and Prelec, 2003). Yet, a direct comparison has been rare (Englich, Mussweiler and Strack, 2006; Mussweiler, 2001) and this study helps to fill this gap and shows that the source of the anchoring information can have a significant role. The observed effect was not universal as even the irrelevant anchors caused an anchoring effect in half of the products. Two objects from the "irrelevant" group (mobile phone, doppler) did not show the presence of an anchoring effect while two objects (sushi, rucksack) did. However, it is difficult to identify the difference between them which is responsible for it. Thus, an examination of the carefully chosen groups of products divided according to more criterions is needed to explore the mechanism behind it.

As the majority of people more often experience buying than selling behaviour, the current study focuses on the first of them. Although the anchoring effect was not found in selling behaviour as a willingness-to-accept (Simonson and Drolet, 2004), it requires closer investigation. The effect can differ when we sell – for example, buyers anchor to the previous selling price (Beggs and Graddy, 2009) and lower prices can be viewed as obvious losses. However, this comparison is not as possible in buying behaviour. The only price that can serve as a potential anchor (e.g. previous stable price of a product) is rarer when buying. A buyer's anchor is generally closer to incidental prices (Nunes and Boatwright, 2004) and past prices, competitor prices or the cost of goods sold which can have the potential to evoke the anchoring effect too (Bolton, Warlop and Alba, 2003).

The narrow age range is an obvious limitation of the present study. High school students were selected for this study, as they are a group heading towards the age of adulthood and who need to be prepared for forthcoming financial decisions. All participants were between 16 and 18 years with probably fewer shopping experiences in comparison with older age categories. Older people may have more experience with some of the presented products and more stable preferences so the effect of the anchor can be lower. On the other hand, people at the age of about 17 have the same level of decision-making skills in comparison

with the adult population (Strough, Parker and Bruine de Bruin, 2015) and have the same cognitive abilities to estimate risks (Albert and Steinberg, 2011). Moreover, further studies should also take into account other demographic, social and personality characteristics as well as customer experience (e.g. responsibility for buying, experience with certain products). On the other hand, while previous studies dealing with price anchoring have reported the results for each object separately, this study provides a more general view. Its presence has been confirmed and the role of anchor relevance has been found.

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