

# **Do Customers Tell Us the Truth? The Bias in Measurement Caused by Anchoring Heuristics**

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## **Abstract**

This article introduces a behavioural economics approach towards decision-making and uses empirical data to indicate how anchoring heuristics might bias measurement results in marketing research. The purpose of the designed research is to decide whether the first piece of information presented to a respondent during an interview might have an influence on their answers. The conclusion that can be drawn from the analysis is that the bias of anchoring heuristics on the households' saving patterns is very significant. The primary structure of the question order has a considerable effect on further decisions. The analysed case shows that behavioural economics can contribute a lot to understanding customer behaviour and could indeed drive more accurate measurement.

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**Keywords:** consumer behaviour, anchoring, questionnaire bias, economic psychology, behavioural economics

## **Introduction**

A major part of our knowledge on consumers is derived from marketing research where respondents declare their specific behaviours. Researchers are aware that drawing conclusions on the basis of the results of declarative studies is encumbered with error. When a study is properly conducted one can assume that declarations are congruent with what a respondent really thinks, but does such a statement actually end the discussion related to the interpretation of results?<sup>121</sup> The results of empirical studies conducted by Fishbein and Ajzen regarding the conformity of declarations and behaviours demonstrate that between the measurement of

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<sup>121</sup> The results of empirical studies conducted by Fishbein and Ajzen indicate that between the measurement of behaviour intention and actual behaviour one may obtain correlations of approximately 0.8 – 0.9. A detailed discussion may be found in: FISHBEIN, M. *Predicting and changing behavior : the reasoned action approach*, New York :, Psychology Press.

behaviour intention and actual behaviour high correlations may be obtained, these will never be functional dependencies though. [Fishbein i Ajzen 2010]

Bringing together psychological knowledge and economics, results in a new focus on many issues which are vital from the point of view of economics, this also concerns market and social research. Researchers are currently aware that even if the textbook situation of perfect co-operation with a respondent is assumed, one more factor needs to be taken into consideration. A consumer unable to go through the whole decision-making process for each decision, relies on certain simplifications (heuristics), which may lead to erroneous decisions. In the case of conducting research, significant concern is that a respondent might pursue decision path declaring future behaviour while displaying a different one in reality. This might result from the structure of the research tool, even though a questionnaire had been constructed in accordance with the appropriate principles.

### **Algorithms and heuristics in the decision-making process**

It is worth bringing two views on decision making closer. The first approach, which assumes the rationality of a consumer's decision is closer to the assumptions of the applied standard decision algorithms. An algorithm is a certain repeatable procedure which guarantees the obtaining of a correct, unambiguous solution provided such a solution exists. The repeatability of a procedure guarantees an identical result using identical input variables. [Piech 2003] On such assumptions and with specified input conditions a consumer's decisions are predictable.

The other approach takes into account the achievements of economic psychology, basing on the shortcuts in decisions (mainly rules of thumb).[Belsky i Gilovich 1999] Main of these shortcuts are called heuristics and are defined as intuitive, rapid and automatic system reducing the complex decisions [Shiloh i in. 2002] or as disproportionate influence on decision makers to make judgments that are biased toward an initially presented value.[Kahneman i Tversky 1979] The most important heuristics which have an influence on consumer decisions are: availability heuristic – causing a change in the judgment of an events' probability on the basis of similar events in memory; representativeness heuristic – distorting judgment on the basis of how easy it is to imagine certain events; anchoring heuristic – assuming the influence of previously possessed information on future decisions, even though the previous information has no influence on a given phenomenon in any way or is untrue.

### **Anchoring heuristic and the determinants of susceptibility to it**

As has been mentioned, in case of anchoring heuristic the consumer relates the whole decision-making process to any available piece of

information on a given topic (where no such pieces of information or associations are available, he/she might use an external suggestion) and based on that information the consumer creates a representation of the value of particular choice variants. [Kahneman i Tversky 1979] From the point of view of a researcher, the knowledge of heuristics helps in designing research tools in a better way (so that the declarations are as close to actual behaviours as possible) and in interpreting the results. Another step in the direction of inclusion of knowledge within the scope of economic psychology to market research is the knowledge of heterogeneity of susceptibility to heuristics and familiarity with determinants of this susceptibility.

### **Previous studies**

The anchoring heuristic was introduced and popularized in seminal work of Kahnemann and Tversky [1974] but it was also mentioned previously by Brown in 1953 [Chapman i Johnson 1994] and by Slovic.[1967] As well as the aforementioned pioneering work of Kahneman and Tversky anchoring effect has been corroborated in many empirical studies. Davis studied married couples asking one person to predict the other person's consumer choices. [Davis et al. 1986] The fivefold repeated study demonstrated strong anchoring of forecasts in preferences of the surveyed individuals. Anchoring effect was also confirmed in the studies of decisions taken in organisations[Bromiley 1987], and what is interesting, this heuristic is also present even in the estimates of real estate experts [Kristensen i Gärling 2000] and in the decisions of financial analysts. [Northcraft i Neale 1987]

The anchoring effect has also been translated into business practice. On the basis of Wansink's research results [Wansink i in. 1998] one may conclude that information at the point of sale may indeed influence the number of purchased goods.

Other publications corroborating the effect of the anchoring heuristic constitute a ten-year-old cycle of experiments concerning the estimating of salaries by R. Kopelman and A. Davis [Kopelman i Davis 2004], bidding prices at online auctions [Hao i Gwebu 2007], comparison of the heuristic's impact force on estimating time and money [Monga i Saini 2008] decision making by investors [Dagher 2009] or decisions of horse-race bettors. [Johnson et al. 2009]

It is worth highlighting the studies demonstrating the limits of the anchoring heuristic. According to the studies of Chapman and Johnson [1994] an effect is reduced and even disappears when an anchor value is wildly distant from real values. In the same article, scale consistency is indicated as a limit on the effect. According to the authors the anchoring

effect is only possible when an anchor and an estimated value are of the same dimension. On such an assumption, an anchor expressed as the length of a section should not influence an estimated value expressed as e.g. time. Also Brewer and Chapman [2002] indicated that the separation of scale on which an anchor occurs and a scale with an estimated value destroys the mentioned effect (in this case a number was the anchor – a dimensionless quantity).

However, several years later it was proven that the anchoring effect occurs when dimensions are mixed, although it is relatively weaker. This type of anchoring was named „basic anchoring“.

In a study by Oppenheimer [Oppenheimer et al. 2007] the participants of an experiment were asked to draw lines and then to estimate some quantities. It turned out that the participants which drew relatively longer lines were more inclined to make higher numerical estimates. Also Critcher and Gilovich [2008] corroborated the existence of “basic anchoring”.

In research of anchoring heuristic’s impact force, a relatively long impact of the anchor effect was also supported. In studies conducted by Mussweiler [2001] it was demonstrated that even a week may elapse between anchoring and the consumer’s judgment without any noticeable diminishing of the effect.

According to the literature review some relations have been proven. The higher the ambiguity, the lower the familiarity and personal involvement with the problem, the stronger the anchoring effects [Exel et al. 2007]. But on the other hand many authors shows the mitigation of this effect [Galinsky i Mussweiler 2001];[LeBoeuf i Shafir 2009]. The abovementioned papers are only part of a the discussion about the anchoring heuristic. More detailed review of the research about the topic may be found in [Furnham i Boo 2011].

From the point of view of market research practice, the question as to whether the anchoring heuristic may influence study results and whether the possible influences on the differences related to the course of thinking process and decision making may be determined by social-demographic features, seems to be much more interesting. In order to identify this scope a study was designed, in which the following hypotheses were tested:

H1: Identical questions about preferences in the interviewer questionnaire may generate various results depending on an established “anchor” (preliminary information provided which theoretically does not influence subsequent questions)

H2: The social-demographic features of respondents differentiate the impact of respondents’ cognitive inclinations related to an anchoring heuristic.

### **Study purpose and methodology**

For the purpose of the study two versions of a questionnaire were prepared. They contained the same questions which were presented in a different order in one thematic section. These questions related to preferences in the allocation of funds.<sup>122</sup> The respondents were asked to decide how they would allocate three specific sums of money (1000 PLN, 10,000 PLN and 100,000 PLN). Ways of response were selected by taking into account the behavioural life-cycle theory as well as Keynesian saving motives where preventative and saving motives were combined.[Lindqvist 1981]

One group (A) was first asked to allocate 1000 PLN, then 10,000 PLN and finally 100,000 PLN. The second group (B) did the same in reverse order. A discussed block of questions was placed in the middle part of the questionnaire with the questions asked five minutes after the beginning of the interview. The questions were placed in the questionnaire in such a way so that a respondent answering the first question was unaware that he/she will be asked about his/her preferences twice more (the first question was placed at the bottom of the page, the subsequent question was placed on the next page).

According to an approach differentiating levels of money management it is expected that the structure will change as the a sum of money grows (the more a given sum can be categorised as a property, the smaller the temptation to spend this sum instantly, however, the more a given sum can be categorised as ready cash, the greater the temptation to spend it instantly).

However, assuming that an anchoring heuristic will not influence the results, the response structures should be similar in both respondent groups irrespective of the order of the questions. On the assumption of the correctness of the anchoring heuristic's influence on the choices, the differences between the two groups should be visible. To make it possible to verify the second hypothesis, at the end of the questionnaire there was also a set of questions characterizing respondents with respect to demographic and economic features. For the purpose of identifying statistical significance of differences obtained in two groups a test of means was employed.

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<sup>122</sup> The study was conducted on a representative sample of 400 households in the Wielkopolska region, Poland. The technique employed was a face-to-face interview. Groups selected for the studies with particular versions of the questionnaire did not vary in relation to basic socio-economic features (sex, age, education, income).

## Results

The following analysis regards the two most characteristic variants: the allocation of funds to current expenses (treating money as cash) and funds' allocation to an increase in property.

Group A, which started with the question about 1000 PLN would allocate the major part of this sum to current expenses (85%). As the amount increased the share of current expenses decreased (29% for the amount of 10,000 PLN and 11% for the sum of 100,000 PLN). The option „saving in order to increase property” reached 5% for the question about 1000 PLN, for the question about 10,000 PLN - 30%, and for the question about 100,000 PLN - 44%. Chart 1 presents the results for the first group.

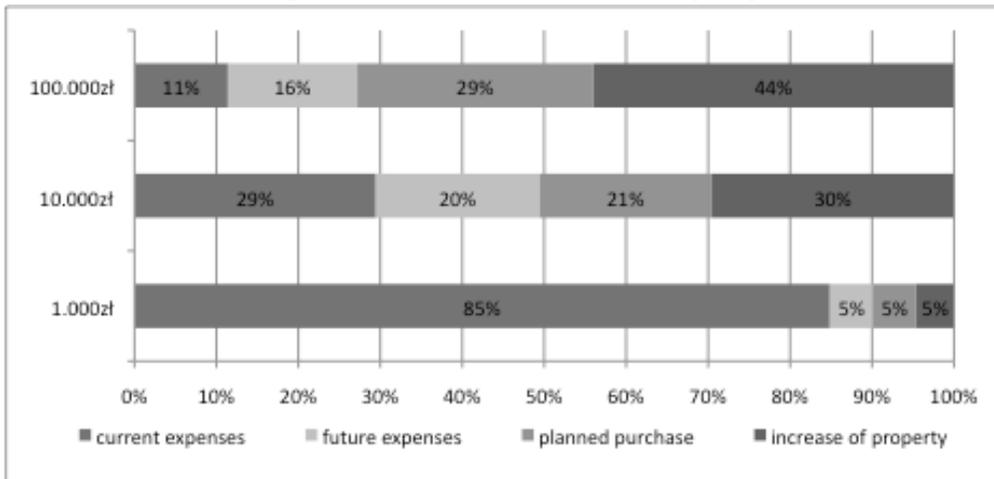


Chart 1. Structure of sums' allocation for group A

Source: own research

In group B, which started with the question about 100,000 PLN the share for current expenses was considerably lower (4%). As the value of the sum to be allocated decreased that share increased reaching 12% for 10,000 PLN and 36% for 1000 PLN. „Saving in order to increase property”, on the other hand, initially obtained a relatively large share – 57%. That share decreases as the amount decreased, down to 36% at 10,000 PLN and 16% at 1000 PLN. Results for the second group are shown in chart 2.

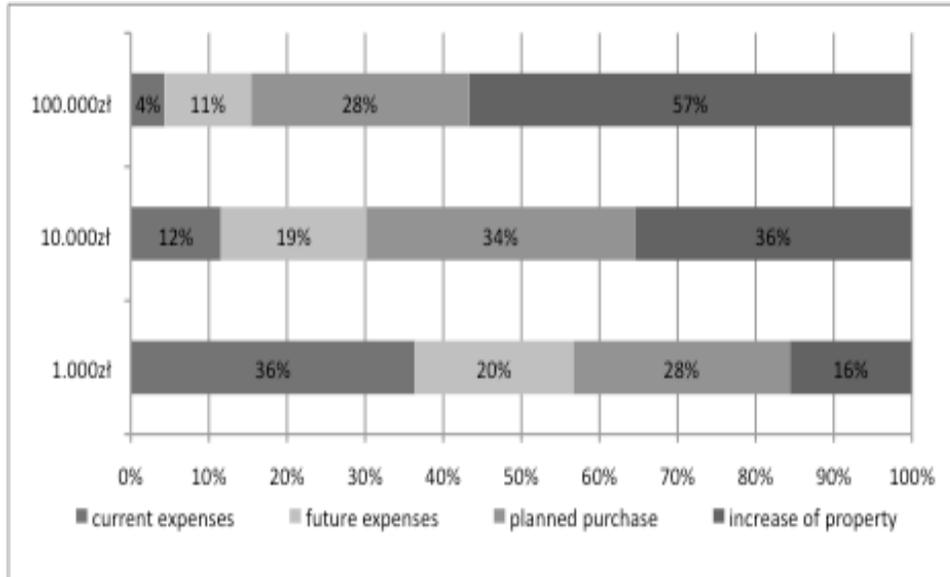


Chart 2. Structure of sums' allocation for group B

Source: own research

The anchoring of group A on the sum of 1000 PLN and the first allocation resulted in an almost a threefold increase of funds allocated to current expenses for the sum of 100,000 PLN (group A – 11%, in group B, where it constituted the first allocation with no bias from the previous question - 4%).

Similarly, group B was anchored on the sum of 100,000 PLN and the first allocation exerted some influence on successive decisions which resulted in a more than a threefold increase in funds allocated to the increase of property for the sum of 1000 PLN (16% in group B, whereas only 5% in group A). The originally established structure of allocation had a considerable effect on further decisions. Similar results are likely to be obtained in other research areas (not related to saving).

The average difference in the structure of the allocation of 1000 PLN to current expenses is 491 PLN and it is statistically reliable at a level of 0.05. The study results allow for the positive verification of the first hypothesis and makes it possible to state that the impact of anchoring heuristic on households' saving decisions is very strong.

For the analysis of the impact of demographic and economic variables, six variables which are very often used in marketing research for segmentation, were selected:

- sex;

- age (studies at relative measurement level, for the purposes of the analysis re-coded to five age groups: up to 30 years of age, 31-39 years of age, 40-49 years of age, 50-59 years of age, over 60 years of age);
- education – three groups: primary + vocational, secondary general, higher;
- life cycle stage (single person, living with parents, single person, living apart, a person living with a partner, without children, a person living with a partner and children, the youngest child is less than 7 years old, a person living with a partner and children, the youngest child is 7 years old or more, (all) children have become independent, (I) we live apart);
- income (up to 2000 PLN, 2001-3600 PLN, 3601-6000 PLN, over 6000 PLN);
- optimism (measurement on the basis of four questions regarding present condition and four predictive questions, responses aggregated to a continuous scale enabled the distinguishing of three groups: pessimists, neutral, optimists).

In the left part of table 1, the basic information on the results obtained for particular segmentation variables is presented, in the right part the most important information relating to means testing is provided. With respect to the same scale, the study was conducted using actual values expressed in the Polish zloty. The table contains actual values, in order to simplify interpretation in the subsequent part, the text values are converted into structures and differences are given in percentage points.

Table 1. Means test for selected segmentation variables

Variable	Variable value	Study version	N	Mean	The standard error of the mean	t	Significance (bilateral)	Difference between means
Cumulative monthly income in a household	up to 2000	A	57	374.6	53.6	-4.46	.000	-407.6
		B	28	782.1	71.7			
	2001-3600	A	62	412.9	50.6	-6.50	.000	-431.5
		B	63	844.4	43.1			
	3601-6000	A	50	349.0	59.0	-5.30	.000	-417.7
		B	57	766.7	52.5			
	over 6000	A	29	305.2	81.3	-5.26	.000	-509.0
		B	43	814.2	57.6			
Sex	female	A	101	334.2	40.3	-8.10	.000	-457.1
		B	91	791.2	39.2			
	male	A	156	377.6	32.8	-9.64	.000	-447.3
		B	121	824.9	32.8			

Age	up to 30 years of age	A	39	344.9	64.0	-3.74	.000	-396.8
		B	24	741.7	86.2			
	31-39 years of age	A	52	405.8	59.4	-4.96	.000	-412.7
		B	38	818.4	58.3			
	40-49 years of age	A	57	421.1	56.0	-5.64	.000	-399.8
		B	67	820.9	43.4			
	50-59 years of age	A	78	350.6	45.5	-7.45	.000	-474.1
		B	65	824.8	44.5			
	over 60 years of age	A	31	217.7	62.6	-5.53	.000	-587.5
		B	19	805.3	89.3			
Education	primary+vocational	A	52	403.9	58.0	-5.30	.000	-417.8
		B	46	821.7	53.5			
	secondary general	A	108	376.9	38.4	-8.00	.000	-439.6
		B	85	816.5	39.4			
	higher	A	96	313.5	41.9	-7.96	.000	-479.0
		B	79	792.5	42.6			
Optimism	pessimists	A	45	404.4	65.2	-3.80	.000	-381.8
		B	29	786.2	73.4			
	neutral ones	A	47	426.6	59.6	-6.310	.000	-459.4
		B	50	886.0	41.9			
	optimists	A	164	325.6	30.9	-10.43	.000	-472.2
		B	131	797.8	32.7			

Source: own calculations based on the studies conducted

For particular categories of identified segmentation variables the differences studied assume values ranging from 17 to 59 percentage points. All analyzed differences are statistically reliable at a level of 0.05 which makes it possible to positively verify the hypothesis H2 which was put forward earlier. Individuals most susceptible to an anchoring heuristic are as follows: individuals from the so called „empty nest II“ – whose children have become independent and live apart (the difference amounts to 59 percentage points), the oldest individuals (also 59 percentage points) and individuals with the highest income (51 percentage points). On the other hand, the most consistent responses were given by individuals who have children up to 7 years old (37 percentage points) and individuals with the lowest income (40 percentage points).

Among the investigated variables, susceptibility is most varied in such variables as: life cycle stage, age, household income. On the other hand, susceptibility is least diversified within the scope of sex and (contrary to expectations) optimism.

## **Conclusion**

As the study results indicate when designing a questionnaire, heuristics' impact must be borne in mind. The results cited also reveal that when interpreting results, heuristics should also be taken into account. Knowledge of their impact's force and diversity within the scope of respondents' features studied, as standard, may help in the interpretation of some issues. It relates to the studies in which we pose questions about declarations, especially within the scope of a the financial market (decisions regarding insurance, saving, taking out loans).

It is worth noticing that the use of heuristics, even though they sometimes lead to erroneous judgments and decisions, is not, from the point of view of the efficiency of a consumer's action, a worse solution than the use of algorithms. Heuristics may obviously be unreliable and more risky. They also do not guarantee that a task will be solved. The subsequent use of a heuristic in similar input conditions may lead to a completely different result, and sometimes may even turn out to be completely ineffective. However, heuristics have an edge in the cases of problems that cannot be unambiguously and comprehensively defined, or are too complex for the use of an algorithm. From the point of view of efficiency, labour input where thinking could be done by means of an algorithm, could consume inefficient amounts of time. In such cases the application of simple decision-making heuristics leading to an acceptable result is much faster. The advantages resulting from their use i.e. time and cognitive effort saving are in general greater than the costs related to the risk of a potentially erroneous decision.

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