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# COULD SURVEY TECHNIQUE OR OTHER RESEARCH CONDITIONS “CHANGE” OUR ECOLOGICAL BEHAVIOUR? – TESTING RESPONSE BIAS IN CONSUMER RESEARCH

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**ABSTRACT:** Based on concerns raised in other disciplines, the presented study aimed to investigate whether response bias affects the results of declarative research on ecological behaviour. The study was conducted in order to determine how the design and execution of declarative tests influenced the obtained results. A series of experiments was conducted in which the research techniques, persons delivering the surveys, or order of questions were changed or modified, or where little incentives were used. The tests showed that the results of declarative research on ecological behaviour is subject to response bias. The respondents declared rarer non-ecological behaviour in face-to-face interviews than in surveys, when the study was conducted by a lecturer, and when they were first asked to express their opinion on this type of behaviour. This effect weakened as the respondents answered further questions in the survey.

**KEY WORDS:** response bias, ecological behaviour, sustainable consumption, survey technique, consumer research

## Introduction

Studies on consumer behaviour are carried out in two basic ways: using stated and revealed preference method (Louviere, 2000). In this study we investigate the first approach. Declarative tests are favored when the studied phenomenon is not directly observable, such as individuals' beliefs and attitudes (Lenzner et al., 2011). A range of studies, especially in the field of psychology, indicate that results obtained in this manner are flawed (Brutus et al., 2010; Ioannidis, 2007; Krosnick, 1999; Krosnick et al., 2002), especially in self-reported questions (Bruce and Desmond, 1997; Caputo, 2017). Some respondents tend to avoid effort they have to put in understanding and interpreting the question, retrieving the relevant information from memory, integrating this information and reporting (Tourangeau and Rasinski, 1988). Respondents tend to avoid the way of thinking named by D. Kahneman (2011) as slow one and tend to think fast. They simply give intuitive responses to find this argument plausible. Such response strategy is defined as *satisficing* (a combination of the words *satisfy* and *suffice*). It means that a respondent gives more or less superficial responses that appear reasonable or acceptable, without going through all the steps involved in the question-answering process (Holbrook et al., 2003; Krosnick, 1991). Consequently, there is inconsistency between the behaviour declared and exhibited in real life. Literature refers to this phenomenon as response bias (Paulhus, 1991). This subject has not been fully explored in studies on consumers' ecological behaviour or, broadly, sustainable consumption. In effect, response bias is ignored at the design and execution stage of research, and when researchers formulate their conclusions based on the results of declarative tests (Ioannidis, 2007). That is why we have undertaken to find out whether response bias can significantly modify the declared ecological behaviours of consumers.

## An overview of the literature

D. L. Paulhus (1991) defined response bias as "a systematic tendency to respond to a range of questionnaire items on some basis other than the specific item content (i.e. what the item was designed to measure)". According to R.E. McGrath et al. (2010) response bias is "a consistent tendency to respond inaccurately to a substantive indicator, resulting in systematic error in prediction". It may be caused or reinforced by a wide range of factors related to the design or execution of a study, including:

- (1) change of survey technique,
- (2) change of person conducting the survey,

- (3) using little incentives,
- (4) changing the order of questions in the survey.

Declarative tests can produce different results depending on the used surveying technique, what is known in literature as mode effect (Cannell et al., 1981; Doušak, 2017). The applied technique affects the respondents' engagement (Holbrook et al., 2003), defines their level of anonymity (Vanderhoven et al., 2012), develops willingness to answer sensitive questions (Burkill et al., 2016) and tendency to provide socially accepted answers (Triki et al., 2017; Yang et al., 2017).

Respondents show tendencies to reduce their engagement especially when the test is carried out using a technique which gives them control over its execution time. For example, such control is greater in telephone than in face-to-face interviews. Control over the duration of the experiment is even greater in respondents who fill out paper questionnaires or do electronic survey (Holbrook et al., 2003; Marta-Pedroso et al., 2007).

Mode effect is also related with the degree of anonymity (Vanderhoven et al., 2012). Respondents are not willing to admit to embarrassing, socially unacceptable behaviour or beliefs if the surveying technique does not provide them with a sufficient feeling of anonymity (Paulhus, 1984). F. Kreuter et al. (2008) observed that in web survey the level of reporting of sensitive information increased in comparison with computer-assisted telephone interviewing (CATI) research. K. S. Chan et al. (2004) observed similar relations. Such relationship is also connected with an aspiration to provide socially desirable responses, which is called social desirability bias. It means the tendency to underreport socially undesirable behaviors as well as over report more desirable attributes (Latkin et al., 2017) and is often motivated by the desire to avoid embarrassment and repercussions from disclosing sensitive information (Tourangeau, Yan, 2007).

The analysed variable, which may result in response bias, is also the person conducting the survey. Experimenter demand effect refers to situations where the subjects try to read the experimenter's intentions through a set of provided guidelines (Fleming and Zizzo, 2013). The effect comes from social conformity as well as the power of the experimenter's social authority. This means that it is likely to obtain different results depending on who is conducting the survey, how the respondents read the experimenter's intentions, and how they perceive his or her authority.

Another phenomenon related to declarative research is the effect of order (McFarland, 1981). It refers to how the order of survey questions affects the obtained results. For example M. C. Rousu et al. (2017) found that self-reported health outcomes were worse when smokers were first asked to report their weight. D. L. Lasorsa (2003) asked participants to rate their interest in

politics, as well as assessed their political knowledge. He found that respondent who first were asked to answer difficult political knowledge questions declared lower interest in this area.

The last tested form of response bias is an influence of using little incentives on the data quality (Castiglioni et al., 2008; Mutti et al., 2014). The influence of monetary incentives are broadly analyzed in literature (Booker et al., 2011), especially in terms of response rate (Singer and Ye, 2013). According to E. Simmons and A. Wilmot (2004), such incentives have a stronger effect than gifts like for example lottery tickets.

## Research methods

The conducted study aimed to assess how declared ecological behaviour is affected by: the research technique (face-to-face interviews, paper and pencil research), person conducted the study (student, lecturer), receiving small incentives for participation taking the survey (organic sweets), and the order of questions (behaviour and opinions). Response bias testing was based on methodological indication discussed by A. L. Holbrook et al. (2003). According to them (1) different groups of people should be interviewed in different way, (2) respondents should not participate in similar research to avoid practice effects (3) there should not be reassignment (respondents who refuse to be interviewed in one mode should not then be interviewed in another mode), (4) respondents should not be able to choose the way they are interviewed (Holbrook et al., 2003).

The main part of the questionnaire comprised two matrix questions (figure 1). The first question regarded behaviours considered unecological, while the second regarded the level of respondents' approval for such behaviours. The surveyed behaviours included:

- (1) taking a shortcut across a lawn (hereafter referred to as behaviour no. 1 and opinion no. 1),
- (2) using disposable plastic bags (behaviour no. 2, opinion no. 2),
- (3) leaving the tap on while brushing (behaviour no. 3, opinion no. 3),
- (4) leaving the lights on while leaving a room (behaviour no. 4, opinion no. 4).

The questions about behaviours employed a five-degree scale (1 – very often; 2 – fairly often; 3 – sometimes; 4 – sporadically, 5 – never). According to J. R. Rossiter (2011) such scale is the most exposed for response bias. The arithmetic means of answers were analyzed (the higher it was the more ecologic behaviour respondents declared) –  $\bar{x}_n$ , where:  $\bar{x}$  – arithmetic mean of respondents' answers,  $n$  – the number of the experimental group according to table 1.

The questions about opinions also employed a five-degree scale, where: 1 – I definitely don't approve of such behaviours; 2 – I generally don't approve of such behaviours; 3 – no opinion; 4 – I generally approve of such behaviours; 5 – I definitely approve of such behaviours. Also, we analyzed the arithmetic mean of the answers, but this time the higher it was the less ecologic opinions respondents declared.

1. How often do you behave in those ways:

	very often	fairly often	sometimes	sporadically	never
taking a shortcut across a lawn					
using disposable plastic bags					
leaving the tap on while brushing					
leaving the lights on while leaving a room					

first matrix

2. What is your attitude towards those behaviours:

	I definitely don't approve of such behaviours	I generally don't approve of such behaviours	no opinion	I generally approve of such behaviours	I definitely approve of such behaviours
taking a shortcut across a lawn					
using disposable plastic bags					
leaving the tap on while brushing					
leaving the lights on while leaving a room					

second matrix

Figure 1. The design of basic version of the questionnaire

Source: author's own work.

The differences in the mean results were analysed statistically using the difference of mean test ("t-test") and the two sample Kolmogorov–Smirnov test ("K-S test") to assess the accordance of variable distribution. The calculations were done in SPSS. In total, the study was conducted on a sample of 866 students of the University of Bialystok Faculty of Economics and Management, who were divided into 9 study groups. There was additional group of students who were asked to assess the difficulty of each question (N=60). According to table 1, three groups (no 1, no 2, no 3) were conducted by a lecturer teaching a course of environmental economics and other by a student.

Three groups (no 1, no 4, no 8) were surveyed using the direct interview method. Two groups (no 3, no 6) were surveyed with using small incentives to participate in the study. In one group (no 7) the order of matrices was changed – first the respondents were asked about their opinion, and then about their behaviour. In two groups (no 8, no 9), the order of questions within the matrices was changed.

Such selection of groups was intended to create the possibility of pair-wise comparison. In the given set, there was at least one pair of groups that differs only by one factor (controlled experimental variable) while the other experimental conditions remind unchanged. This allowed to deduce that the observed discrepancies were due to the change of the controlled variables. Thus, groups no 1 and no 2 as well as groups no 4 and no 5 differed only in the research technique. Groups no 1 and no 4 as well as groups no 2 and no 5 differed only by the person who conducted research. Groups no 2 and no 3 as well as groups no 5 and no 6 differed only in the use of incentives. Groups no 5 and no 7 differed only in the order of matrices. Finally, groups no 4 and no 8 as well as groups no 5 and no 9 differed only in the order of questions within the matrices.

**Table 1.** The size and conditions of study groups

a person conducted research	interview (only basic version)	questionnaire			
		basic version	using incentives	whole matrix reversed	
lecturer (only basic version)	group 1 N=97	group 2 N=100	group 3 N=95	-	
student	basic version	group 4 N=102	group 5 N=101	group 6 N=101	group 7 N=80
	question within the matrix reversed	group 8 N=88	group 9 N=102	-	-

Source: author's own work.

Women constituted a majority (68.6%) of all respondents. 69.3% respondents were aged between 20 and 23. More than half of them (59.1%) reported that they originated from a town or a city.

## Results of the research

### Research technique and declared ecological behaviours

In the first experiment, the research technique was the controlled variable. The experiment was carried out in two rounds – the first one conducted by a lecturer, the other by a student (groups no 1 and no 2 as well as no 4 and 5 were compared). The aim was to assess whether respondents avoid declaring non-ecological behaviours when surveyed face-to-face.

**Table 2.** The comparison of respondents' declarations depending on the research technique employed

Question	in surveys conducted by lecturer			in survey conducted by student		
	interview – questionnaire $\bar{X}_1 - \bar{X}_2$	t-test	K-S test	interview – questionnaire $\bar{X}_4 - \bar{X}_5$	t-test	K-S test
behaviour 1	3.25-2.79	0.002**	0.030**	3.03-2.73	0.085*	0.196
behaviour 2	2.51-2.27	0.164	0.884	2.44-2.29	0.060*	0.615
behaviour 3	4.16-4.26	0.570	0.980	4.15-4.18	0.594	1.000
behaviour 4	3.34-3.34	0.999	1.000	3.5-3.26	0.563	0.769
opinion 1	3.18-3.19	0.913	1.000	2.75-3.09	0.019**	0.046**
opinion 2	2.84-2.81	0.816	0.907	2.66-2.7	0.749	1.000
opinion 3	4.20-4.05	0.352	0.995	4.06-4.27	0.103	0.499
opinion 4	3.56-3.72	0.252	0.902	3.77-3.63	0.361	0.930

\*\* statistically significant difference at significance level of 0.05

\* statistically significant difference at significance level of 0.10

Source: author's own work.

The respondents declared more pro-ecological behaviours when the survey used face-to-face methods. Statistically significant differences in the experiment which was carried out by the lecturer were only observed in the first question concerning behaviour. In the experiment carried out by the student both the first and second question about behaviour and the first question on opinions showed statistically significant differences. This may mean that some response bias occurred, although the effect weakened over the course of the experiment.

The results of the experiment indicate that there is a relation between the research technique used and the response to the first question. This confirms that the research technique affects the strength of the declared ecological

attitude. Yet it is still uncertain whether this deviation is due to the specificity of the question or the fact that it was asked as the first one in the survey.

Therefore, the experiment was carried out once again, but this time the order of questions was reversed. This means that the question about *behaviour 1* last in the matrix, *behaviour 2* was penultimate, and so on. The survey was carried out by a student.

**Table 3.** The comparison of respondents' declarations depending on the research technique employed with question within the matrix reversed

Question	interview-questionnaire $\bar{x}_g - \bar{x}_g$	t-test	K-S test
behaviour 1	3.04-2.48	0.004**	0.393
behaviour 2	2.84-2.68	0.455	0.979
behaviour 3	4.11-4.07	0.862	0.873
behaviour 4	3.61-3.29	0.091*	0.486
opinion 1	3.18-2.84	0.057*	0.094*
opinion 2	2.95-3.03	0.706	0.908
opinion 3	4.27-4.03	0.141	1.000
opinion 4	3.77-3.66	0.547	0.802

Source: author's own work.

With the order of questions reversed within each matrix, the declared responses on damage to green areas (behaviour 1) were nevertheless significantly different, even though this time the question was posed last. The change in order did not reduce the mode effect. This indicates that the question itself may be somewhat specific and would cause response bias no matter where it is placed in the survey. However, there were also statistically significant differences (at 0.10) in declarations on leaving the lights on, which was the subject of the first question after reversing the matrix. This confirms that the first question in the survey is the most likely to suffer from response bias.

The experiment did not identify, however, the reasons for the consistent deviation in the question about damaging green areas. According to previous research (Podsakoff et al., 2011), difficult questions are more likely to suffer from mode effect, especially the complex, abstract or ambiguous items. This indication led us to ask another group of respondents (N=60) to assess the level of difficulty of answering the each of the posed questions. We employed a six-degree scale, where: 1 was very easy to answer and 6 was very difficult to answer. When it comes to questions concerning behaviours, the respond-

ents found question no. 1, about taking a shortcut across a lawn, to be the most difficult (4.0 difficulty rank). Similarly ranked was question no. 4 (3.88 difficulty rank). The question no. 2 was found easier by the respondents (3.63 difficulty rank). However, when it comes to assessing the difficulty of expressing opinions, the respondents considered the most difficult questions 1 (4.00 difficulty rank) and 2 (4.08 difficulty rank). Such observation confirms that questions considered by the respondents difficult and requiring cognitive effort are particularly exposed to the occurrence of mode effect.

### Interviewer's influence on declared ecological behaviours

Next, the study looked into whether the ecological behaviours declared by respondents are affected by the person carrying out the survey. An influence of the interviewer/poller was checked in interview and questionnaire by comparison the results obtained in research conducted by lecturer teaching a course in environmental economics and student. It was hypothesized that respondents will declare more ecological behaviour when research is conducted by the lecturer, especially in interviews.

**Table 4.** The comparison of respondents' declarations depending on the interviewer

Question	in interviews			in questionnaires		
	lecturer-student $\bar{x}_1 - \bar{x}_4$	t-test	K-S test	lecturer-student $\bar{x}_2 - \bar{x}_5$	t-test	K-S test
behaviour 1	3.25-3.03	0.122	0.075*	2.79-2.73	0.698	1.000
behaviour 2	2.51-2.44	0.711	1.00	2.27-2.28	0.914	0.998
behaviour 3	4.16-4.15	0.917	1.000	4.26-4.18	0.608	0.983
behaviour 4	3.34-3.50	0.293	0.999	3.34-3.26	0.594	0.998
opinion 1	3.18-2.75	0.03**	0.010**	3.19-3.09	0.455	1.000
opinion 2	2.85-2.66	0.222	0.638	2.81-2.70	0.451	0.862
opinion 3	4.20-4.06	0.332	0.911	4.05-4.26	0.132	0.901
opinion 4	3.56-3.77	0.149	0.113	3.72-3.63	0.555	0.742

Source: author's own work.

Changing the interviewer resulted in a significant difference in the respondents' declared behaviour only in the case of face-to-face surveys. Moreover, the change was only noted in the first question, both in matrix one and two. It is anticipated that the power of authority only works in face-to-

face conditions and has no effect in surveys filled out in paper. Also, it can be expected that the influence of the interviewer would diminish across further questions in the survey.

### Little incentives and declared ecological behaviours

Next, the study looked into whether the ecological attitude declared by respondents is affected by receiving little incentives. The influence was evaluated in the survey conducted by both the lecturer and the student.

**Table 5.** The comparison of respondents' declarations depending on rewards for the respondents

Question	surveys conducted by lecturer			survey conducted by student		
	without rewording – with rewording $\bar{x}_2 - \bar{x}_3$	t-test	K-S test	without rewording – with rewording $\bar{x}_5 - \bar{x}_6$	t-test	K-S test
behaviour 1	2.79-2.79	0.997	1.000	2.73-2.60	0.395	1.000
behaviour 2	2.27-2.14	0.417	0.986	2.29-2.31	0.892	0.994
behaviour 3	4.26-4.05	0.229	0.792	4.18-4.16	0.906	0.817
behaviour 4	3.34-3.21	0.434	0.939	3.26-3.18	0.627	0.817
opinion 1	3.19-3.25	0.649	0.999	3.09-3.00	0.519	0.969
opinion 2	2.81-2.81	0.997	0.851	2.70-2.70	1.000	1.000
opinion 3	4.05-4.04	0.961	0.973	4.27-4.23	0.752	1.000
opinion 4	3.72-3.64	0.594	0.836	3.63-3.59	0.798	1.000

Source: author's own work.

No significant changes due to the reward were observed. What is more, it did not matter whether the rewards were given by the student or the lecturer. The use of incentives did not affect the respondents' average declarations on ecological behaviour nor the distribution of their answers.

### Order of questions and declared ecological behaviours

The final analysed variable in the study was the influence of the order of questions. The original version of the survey had respondents first declaring statements about ecological behaviours, followed by their opinion on the

subject. The experiment tested whether changing the sequence of questions would have a significant influence on the obtained results. The order of questions within the matrix was not altered, but rather the order of whole matrices. It is hypothesised that respondents avoid declaring non-ecological behaviour when they are first asked to express their opinion on the subject in question.

**Table 6.** The comparison of respondents' declarations depending on order of questions in the questionnaire

Question	behaviour asked first – opinion asked first $\bar{x}_5 - \bar{x}_7$	test-t	K-S test
behaviour 1	2.73-3.10	0.012*	0.901
behaviour 2	2.29-2.76	0.004*	0.737
behaviour 3	4.18-3.91	0.154	0.201
behaviour 4	3.26-3.23	0.853	0.996
opinion 1	3.09-3.23	0.387	0.092
opinion 2	2.70-2.95	0.130	0.142
opinion 3	4.27-4.04	0.149	0.642
opinion 4	3.63-3.74	0.533	0.992

Source: author's own work.

After reversing the order of questions, the respondents declared that they are less likely to conduct the two first of the analysed non-ecological behaviours. This means that they declared more pro-ecological behaviour if they were first asked to express their opinion. It is expected that the subjects endeavoured to keep their answers consistent and did not want to admit to behaviour that did not go in line with the opinion they expressed earlier. This resulted in a tendency to diminish the frequency of declared non-ecological behaviour.

## Discussion

In general, results of the research correspond with relevant studies so far. It reveals that the results of research based on self-reported declarations are exposed to response bias, as was indicated in many studies (e.g. Bruce and Desmond, 1997; Caputo, 2017). Thus, this type of research requires special attention at the stage of design as well as at implementation stage in order not to affect respondents' answers. In our study, the technique influenced the

answers given by the respondents (similarly: Doušak, 2017; Holbrook et al., 2003; Vanderhoven et al., 2012; Burkill et al., 2016). Our results are similar to those obtained by C. Marta-Pedrosoa et al. (2007) who observed that respondents declared higher willingness to pay for preserving the Cereal Steppe of Castro Verde in direct interview than in web survey. We observed, as in study by A. Triki et al. (2017), that during direct interviews respondents are prompted to provide socially acceptable answers. Respondents were less prone to admit non-ecological behaviours. It corresponds with research conducted by F. Kreuter et al. (2008), where the number of responses to sensitive information increased with the level of respondents' anonymity (similarly: K.S. Chan et al., 2004).

In our research the relations between question difficulty and mode effect was observed. It confirms the relation indicated by P.M. Podsakoff et al. (2012) who revealed that complex, abstract or ambiguous questions are subject to response bias.

In presented research respondents' declarations concerning ecological behaviours were influenced by the person who conducted the survey. Such effect, described by P. Fleming and D.J. Zizzo (2013), is often observed in experiments. In our study the effect was only observed in direct research. The difference between respondents' answers was insignificant in case of paper-and-pencil interviews. We presume that social conformity – responsible for this effect – occurred only in face-to-face contact with the person considered as authority. What is more the research results could depend on the power of the experimenter's social authority, which remains unknown in our research.

The research conducted confirmed that the order of questions in the questionnaire influences respondents' answers. We assume that in our study it was due to respondents' willingness to maintain consistency throughout the questionnaire. This observation is similar to that described by M. C. Rousu et al. (2017), where smokers declared their health outcomes as weaker after reporting their weight. We think that respondents in our research underreported their non-ecological behaviours when firstly they expressed their opinion about themselves.

In our research we have not observed any impact of incentives on research results. In the literature the impact of monetary incentives is usually undertaken (Booker et al., 2011). We used smaller incentives (ecological sweets). According to our research with little incentives to encourage respondents to attend research does not generate response bias.

## Conclusions

Summing up, the research results indicated that response bias should be considered as a potential problem in ecological behaviour research. It was shown that the research technique, person carrying out the survey, and the order of questions in the questionnaire may affect the ecological behaviours declared by respondents. There was no observed influence of using small incentives. The strength of response bias weakened over the course of responding to further survey questions. This means that the initial questions in the survey are the most susceptible to error. It was also observed that the strength of mode effect is greater in questions which are perceived by the respondents as difficult. In general respondents declared less non-ecological behaviour when the survey was carried out in the form of face-to-face interviews, no matter who conducted it (lecturer or student). Respondents declared less non-ecological behaviour when they were first asked to express their opinion on the subject in question.

Research revealed that researchers can unconsciously influence the results of a declarative research, in this case exploring respondents' ecological behaviour. We suppose that non-ecological behaviours are generally negatively evaluated within society. Hence, people can avoid admitting them in declarative research, especially if they are asked directly. This in turn indicates, that this type of behaviour should be explored using methods that ensure anonymity. In particular, direct research – like face-to-face interviews – should not be conducted by a person who is known and recognized as an authority by respondents. We recommend not to ask respondents in the first place for expressing their self-opinion about non-ecological behaviours and then – their own behaviours. This is because non-ecological behaviours are usually socially undesirable. Some respondents, after expressing disapproval for them, might try to adjust responses on their behaviours to their previous answers. This is because respondents tend to maintain consistency throughout their answers.

### The contribution of the authors

Anna Matel – 50% (conception, literature review, acquisition of data, analysis and interpretation of data).

Tomasz Poskrobko – 50% (conception, literature review, acquisition of data, analysis and interpretation of data).

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