SONDERFORSCHUNGSBEREICH 504

Rationalitätskonzepte,
Entscheidungsverhalten und
ökonomische Modellierung

No. 03-33

Measuring Information Accessibility and Predicting Response-Effects: The Validity of Response-Certainties and Response-Latencies

Volker Stocké*

October 2003

Financial support from the Deutsche Forschungsgemeinschaft, SFB 504, at the University of Mannheim, is gratefully acknowledged.

*Sonderforschungsbereich 504, email: vstocke@rumms.uni-mannheim.de

Universität Mannheim
L 13,15
68131 Mannheim

Abstract

Respondents' reports about the frequency of everyday behavior are often found to differ considerably when either low- or high-frequency response scales are used to record the answers. It has been hypothesized that the susceptibility to this type of response effect is determined by the cognitive accessibility of the respective target information in respondents' memory. The *first* aim of the present paper is to test this hypothesis using two alternative, individual level indicators for the cognitive accessibility of information. These measures are the subjects' self-reported response certainty and the time needed to answer the question under consideration. A *second* issue addressed in this paper is how response certainties and response latencies should be transformed prior to data analysis in order to maximize their predictive power for response effects. Accordingly, the ability of untransformed measures to predict scale effects is compared with that of logarithmic, square-root and reciprocally transformed versions. The empirical results show that untransformed response certainties and response latencies are equally valid predictors about whether and to what extent subjects' answers are affected by the presentation of response options. A square-root transformation is found to have no effect on both measures, whereas a logarithmic transformation slightly improves the validity of response certainties. In contrast, a reciprocal transformation proves to have a substantially positive effect on both measures and improves their ability to predict the reliability of respondents' survey reports.

1. Introduction [1]

Research has shown that survey respondents' answers are often influenced by seemingly irrelevant differences in the way response options are presented. For instance, reports are found to differ substantially, when either numbers from 0 to 10 or from 1 to 11 are used to mark the response categories on an ordered response scale (Schwarz et al., 1998). One particularly important class of effects is that observed when the frequency of everyday behavior is recorded with response categories, with each representing a distinct frequency range. This is done in order to reduce the cognitive demand necessary to answer behavioral frequency questions, such as for example about the number of products purchased in a reference period, and to minimize item non-response. However, the way frequency ranges are created has been found to affect the frequency reports. In the case of low frequency scales the category ranges at the lower end of the response continuum are more narrow and therefore more numerous at the lower end of the frequency continuum. In contrast, high frequency scales provide more detailed response categories at the upper end of the continuum. Experimental studies have found reports about higher consumer expenditure (Menon et al., 1997, Winter, 2002), more frequent sexual activity (Schwarz and Scheuring, 1988) and more commonly feelings of criminal threat (Gaskell et al., 1994) when high- rather than low-frequency response scales were used to collect the data. The type of frequency scales furthermore affects subjects' reports about the prevalence of nightmares (Ji et al., 2000) and how often they undertake cultural activities (Bless et al., 1992).

It has been argued that the insufficient cognitive accessibility of the requested information is the pivotal determinant for how strongly respondents are affected by differences in the way response scales are presented (Schwarz and Hippler, 1987)[2]. This

[1] Helpful comments by Hartmut Esser and Bärbel Knäuper are gratefully acknowledged. This work has been supported by a research grant of the German Science Foundation (DFG) to the Sonderforschungsbereich 504 'Rationality Concepts, Decision Behavior and Economic Modeling' at the University of Mannheim.

[2] In the present paper 'cognitive accessibility' refers to the intensity with which information has been encoded in the memory and the ease with which respondents can therefore retrieve this information. Conceptually this refers to the degree of 'chronic' rather than situationally determined information accessibility.

hypothesis is supported by research where the susceptibility to scale effects has been compared for different subgroups of respondents using varying question topics. In the case of groups of respondents and question topics where the respective information is likely to be more accessible in memory, the effects of different types of response scales are attenuated (Schwarz, 1999). However, what has not yet been tested is whether and, if so, what measures concerning information accessibility at the individual level predict the strength of response effects. Such a test is fruitful, since it provides stronger empirical support for the theoretically assumed role of information accessibility for response effects and about which accessibility indicator is the best predictor in this respect. A valid indicator would furthermore allow the survey researcher to judge the reliability of the data provided by different groups of respondents.

Two groups of individual level measures for information accessibility can be differentiated. Firstly, there are meta-cognitive indicators, which are based on respondents' subjective judgments about aspects of the response process or the quality of the resulting answers. Subjects' self-reports about how certain they feel about a particular answer can be regarded as probably the most often used meta-cognitive indicator (for an overview c.f. Wegener et al., 1995). *Secondly*, there are operational indicators based on directly observable and objective characteristics in the response process or the resulting answers. The time respondents need to answer questions is the most prominent indicator in this group of measures (Bassili 1996a, Bassili and Fletcher, 1991, Fazio, 1990). Whether response certainties or response latencies are more valid indicators for information accessibility and the better predictor for response effects has not been compared systematically.

When used as an indicator for information accessibility in applied research, response latencies are often transformed in order to reduce their characteristically skewed distribution. Three transformations are often used for this purpose: the natural logarithm, the square-root and the reciprocal transformation. Whether these transformations have a positive effect on the validity of response latencies and which maximizes their predictive power has not been studied systematically. Although the distribution of response certainties is often skewed to a considerable degree as well, we are not aware of any studies where transformed versions of this measure are used to predict the antecedents of information accessibility.

The present paper has three closely related aims: *firstly*, to analyze whether individual differences in information accessibility can predict how strongly respondents' answers differ when either high- or low frequency scales are used to record behavioral frequencies; *secondly,* to address the question whether response certainties or response latencies are the more valid indicator for information accessibility and the better predictor for the type of response effects analyzed; and *thirdly*, to examine the effect of different transformations on the ability of both measures to predict how strongly respondents are influenced by different response scales. The dependent variable of the present study consists out of the respondents' reports about the length of their daily TV consumption.

2. Information accessibility and the effect of response scales

A series of split-ballot experiments has proved that respondents' reports about their daily TV consumption differs considerably when either a high- or low-frequency scale is used to record the answers (Bless et al., 1992; Menon et al., 1995; Rockwood et al., 1997; Schwarz, 1988; Schwarz and Bienias, 1990; Schwarz et al., 1985; Schwarz and Hippler, 1987; Stocké, 2001; Winter, 2002). In these studies the response continuum of the number of hours respondents watch TV is categorized as follows: the high frequency scale ranges, in steps of half a hour, from 'up 2 hours' to 'more than 4.5 hours', while the low frequency scale ranges between 'not at all' and 'more than 2.5 hours'. Responses on these scales are compared by computing the proportion of subjects who report behavioral frequencies of '2.5 hours of TV or less' and 'more than 2.5 hours of TV'. According to the results of the first experiment in this line of research, in the case of the high-frequency scale 37.5 percent and under the conditions of the low-frequency scale 16.2 percent of subjects are classified into the category of 'more than 2.5 hours TV' (Schwarz et al., 1985).

These response effects are explained on the basis of two assumptions. *Firstly*, the requested information about the frequency of everyday behavior, in the present case the daily TV consumption, is not available as episodic information in the subjects' memory. Thus respondents cannot simply count instances of this behavior in order to reach an answer. *Secondly*, respondents are assumed to be cooperative and therefore motivated to nevertheless answer the question as correctly as possible (Schwarz et al., 1985). Faced with this dilemma, subjects in a *first* step use the respective response scale as a frame of reference to infer the median TV consumption in society, which is assumed to be

represented by the middle response option of the scale. In a *second* step, subjects use this reference point in order to form a judgment about how their own TV consumption compares with the assumed average in society. In a *third* step, respondents selected that particular response option which is, according to their previous judgment, appropriately located above or below the middle response category. Since the middle response option and therefore the starting point of this response heuristic differs for high- and low-frequency scales, the same inferential process results in subjects producing different behavioral reports.

Empirical support for the assumed informative function of response scales is provided by results according to which respondents estimate more TV consumption in society when they have before been presented with a high- rather than a low-frequency scale (Schwarz and Hippler, 1987). Furthermore, it has been shown that the type of response scale has stronger effects on the proxy reports about the TV consumption of friends, compared with those observed when questions about their own television behavior are answered (Schwarz and Bienias, 1990). Since subjects' knowledge about TV consumption patterns among their peers is likely to be even more restricted than that about their own habits, this result supports the role of information accessibility as a determinant of scale effects. Other results show stronger differences in the response behavior for questions about the daily TV consumption compared with those when students were asked about their average grades from the previous year (Rockwood et al., 1997). Since the former information can be assumed to be less salient and therefore cognitively less accessible, this result can be regarded as evidence for the role of information accessibility as well. Furthermore, older respondents' reports about the frequency of their meat consumption have been found to be more strongly affected by the type of frequency scale than those of younger respondents (Schwarz, 1999). This difference in susceptibility may result from a deterioration in short-term memory with increasing age and the resulting poorer information accessibility. Interestingly, older respondents proved to be less prone to scale effects when the topic is the frequency of health-related symptoms. This reversal in the susceptibility to scale effects probably results because concerns about health-related topics increases with age and because the respective information is more intensively encoded in the memory.

3. Response latencies and response certainties as indicators for information accessibility

Empirical evidence about the validity of response latencies as a measure for information accessibility is mainly available from research about the determinants of attitude-behavior consistency, the degree of attitude stability and how strong attitude reports are prone to response effects. Here, the response time is an indicator for the degree to which an evaluation is associated with an attitude object and the ease with which respondents can therefore answer an attitude question. Thus, response latencies represent an important aspect of attitude strength. Since strong attitudes have in particular been found to be predictive for behavior and resistant to change, response latencies can be expected to predict both attitude properties (Krosnick and Petty, 1995). Selecting an attitude answer in surveys can be regarded as a special case of attitude-behavior consistency. Accordingly, the previous arguments about the association between response latencies and attitude properties should therefore apply to the degree of respondents' susceptibility to response effects as well: faster attitude reports should be less affected by any irrelevant factors in the response situation.

A series of empirical studies has shown that the time necessary to answer questions about attitudes towards political candidates predicts how closely related electoral decisions are to these evaluations: the subjects self-reported voting behavior is more in line with their political attitudes when the attitude questions are answered with increasing rapidity (Bassili, 1993, Bassili, 1995; Bassili and Bors., 1997; Fazio and Williams, 1986; Fletcher, 2000). Support for the validity of response latencies as a measure for the degree of attitude accessibility has been found in the field of consumer research as well. Attitudes towards a variety of products were more predictive of consumers' intentions to use these products when these judgments took less time (Kokkinaki and Lunt, 1997).

Other research has found that attitudes that are expressed more quickly are more resistant to persuasion than evaluations which took longer to be generated. For instance, attitudes towards gender-related affirmative action and subjects' attitudes towards pornography are more resistant against counter arguments when response latencies are found to be rather short (Bassili, 1996b). Furthermore, the time necessary to answer attitude questions has been proven to predict how likely subjects' expect these attitudes to change in future: the longer it takes to judge whether abortion should be liberalized, the

more likely respondents report that these attitudes are likely to be unstable (Huckfeldt and Sprague, 2000).

The empirical evidence about response latencies' ability to predict how strongly respondents' answers are prone to response effects is inconsistent. It has been frequently observed that subjects' answers about their attitude towards a general liberalization of abortion are more positive when reported before rather than after the question about the legitimacy of an abortion when pregnancy is the result of rape. Research has shown that the strength of this question order effect can be successfully predicted with response latencies. The differences between the question order conditions are found to be less pronounced for respondents with relatively fast response latencies when answering the question about whether women should in general have the right to decide on abortion (Stocké, 2002a). In another study, whether self-reported attitudes towards surveys do predict subjects' cooperation in the sense of refraining from socially desirable response behavior was analyzed. Results showed that these attitudes increasingly predict how prone subjects are to incentives regarding social desirability when these evaluations were highly accessible and the attitude questions were therefore answered rapidly (Stocké, 2002b). In contrast, evidence from an extensive study about the determinants of response effects is negative with respect to the predictive power of response latencies. What was tested, among other indicators for information accessibility, was whether response latencies predict the strength of response order effects, the influences from a middle response option and those of acquiescence (Bassili and Krosnick, 2000). According to the results, response latencies do not predict any of the analyzed types of response effects. Whether response latencies are a valid indicator for the strength of response effects in the field of factual survey questions has not been analyzed yet.

Results about the validity of respondents' response certainty are mixed as well. In the area of research about the determinants of attitude-behavior consistency, it has been found that attitudes towards political candidates are a better predictor for subjects' voting behavior when these attitudes have been characterized as certain (Warland and Sample, 1973). Furthermore, stronger associations are found between respondents' attitudes towards the liberalization of abortion and their behavioral intentions in this area when subjects feel increasingly more certain about their attitude reports (Renata, 1999). In contrast, the correlation between subjects' environmental consciousness and their self-

reported behavior in this domain does not vary with the certainty of their attitude judgments (Mielke, 1985).

Whether response certainty predicts the susceptibility to response effects has been tested with mixed results. Altogether four experimental studies have tested as to what degree question order effects are a function of subjects' response certainty. In none of these studies was response certainty proven to predict the analyzed type of response effect (Krosnick and Schuman, 1988, Schuman et al., 1981). What has been tested as well was whether the effect of context items with liberal or conservative content on respondents' support for intensifying welfare spending and improving defendants' rights is less pronounced for subjects with greater response certainty (Lavine et al., 1998). Here, the size of this context effect was found to decrease with the increasing certainty of the focal attitude answers. However, this moderator effect does not attain the level of statistical significance. Positive results are available from a study where respondents' reports about their generalized attitudes towards abortion proved to be less susceptible to question order effects when these evaluations are characterized as more certain (Stocké, 2002a). In this study, the predictive power of the certainty measure was directly compared with that of response latencies. In a multivariate analysis the initially observed explanatory power of response certainties is greatly reduced and not statistically significant anymore when the moderating role of response latencies is controlled at the same time.

4. Effect of different transformations

Several transformations are applied in order to remove or at least reduce the characteristic skewness of response latency data. Most often the natural logarithm, the square root or a reciprocal transformation is used (Bargh and Chartrand, 2000). The evidence for the validity of raw response latencies and all transformed versions of this measure is positive. The only exceptions are square root transformed response times, which failed in the only available study to predict response effects. However, no comparative research has been done about the effect of different transformations on the validity of response latencies.

Bassili (1996b) successfully utilized raw response latencies in order to predict the degree of attitude stability. In research from the area of attitude-behavior consistency, response latencies have been used without any transformation as well (Bassili and Bors, 1997; Bassili, 1995; Fletcher, 2000). In these studies raw response latencies proved to be a

valid predictor for the degree to which political attitudes explain subjects' behavior in this area. Other research has shown the concurrent validity of raw response latencies: self-reports about the importance of different attitude topics have been found to be significantly related to the speed with which respective attitude questions have been answered (Bauman and Dent, 1982). In this study a log transformation did not affect the predictive power of the latency data.

Researchers have successfully used the natural log of response latencies in order to predict how the accessibility of subjects' party identification increases with the closeness of the election day (Mulligan et al., 2003). According to the results of this study, subjects reported the strength of their party identification with increasingly faster response times the longer the ongoing election campaign had increased the accessibility of this political attitude. Reciprocally transformed response latencies have been found to predict how strongly subjects' attitudes towards different consumer products determine the probability that these products are actually chosen. Accordingly, consumer behavior is more consistent with fast rather than slow product evaluations (Kokkinaki and Lunt, 1997). Another study using reciprocally transformed response latencies proves that the accessibility of preferences about different TV programs successfully explains respondents' self-reported strength of preference (LaBarbera and MacLachlan, 1979). In contrast, the only study we are aware of where square-root transformed response latencies were utilized found only negative evidence for the validity of this type of latency data (Bassili and Krosnick, 2000). Here, the transformed time necessary to answer the questions does not predict for any of the four analyzed types of response effects how strongly these answers are affected.

5. Empirical study

In order to answer our research questions we utilized a split ballot experiment in which respondents were randomly assigned to one of two experimental conditions. Under both conditions subjects were asked to report how many hours they watch television every day. This question was answered either on a high- or a low-frequency response scale. What was analyzed was whether the typically observed effects of different response scales can be predicted with response certainties and the time needed to answer the TV-consumption item. Furthermore, the predictive power of differently transformed versions of both measures was compared.

5.1 Sample

The respondents in this study were a multi-stage, local probability sample of residents in the metropolitan area of Mannheim, Germany (about 300.000 inhabitants). In the first step, households were listed using a random walk procedure. In the second step, the respondents were selected among the adult residents in the households using the 'last-birthday' method. Altogether 110 interviews were conducted, with 53.6 percent respondents being female and 46.5 percent male. The mean age of the participants was 46.8 years and they had completed on average 10.9 years of schooling. The sample consisted of 13.6 percent blue-collar workers, 65.5 percent civil servants and salaried employees, 9.1 percent self-employed and 11.2 percent subjects not participating in the labor market. The response rate was 34.0 percent.

5.2 Procedure

Data was collected with computer assisted face-to-face interviews in the respondents' homes. Subjects were randomly assigned to one of the two experimental conditions. Dependent on these conditions, interviewers presented show cards with either a low- or a high-frequency response scale. The experiment was carried out as a part of a longer interview which took on average 58 minutes to be completed. Respondents answered the question about their daily TV consumption in the second half of these interviews. The interviewer recorded the response latency and asked respondents immediately after answering the question about their response certainty. In the advance letter, the survey was described as centering on 'habits in everyday life' and 'social problems in society'. Neither the experimental character of the survey nor the fact that response times were being measured were revealed before the end of the interview.

5.3 Operationalization

The high- and low-frequency response scales, the response certainty and response latencies were operationalized as follows:

- *High- and low-frequency scales:* For both types of frequency scales the response continuum for the length of daily TV consumption was divided into 7 distinct response options. In the case of the low-frequency version, the extreme options were defined by 'no

TV consumption' and 'more than 2 hours of TV consumption'. For the high frequency scale these endpoints were 'up to 2 hours' and 'more than 4.5 hours'. Between these extreme response alternatives, both scales ranged in steps of half a hour (cf. table 1 in the 'descriptive results' section for a detailed description of both scales).[3] Answers on both types of response scales can be compared when respondents are categorized into groups with less than 2.5 hours and 2.5 or more hours of daily TV consumption.

- *Raw response certainty*: Directly after the question about the length of daily TV consumption subjects were asked to report how certain they felt about their answer to this question. Responses were recorded using a seven point likert scale, with endpoints labeled with 'absolutely certain' (scale value 1) and 'not at all certain' (scale value 7).[4]

- *Raw response latencies:* Response times were recorded together with the responses in a sequence involving four stages during the computer assisted interviews. In the *first* stage, interviewers read the question from the computer screen and switched on the time measurement directly after the question text had been read. *Second*, the time measurement was switched off immediately after respondents answered the question. In the *third* stage of the data collection sequence the interviewer entered the response into the laptop computer. In the *fourth* stage the interviewer judged whether the time recorded represented exactly the time that was necessary to answer the question. This was for example not the case when respondents asked clarifying questions, had to be probed in order to give an appropriate answer or when subjects were distracted by external factors. Under all these conditions the recorded time includes components that do not belong to the response process in a narrow sense. Thus, some response latencies were coded as invalid. This was the case for 21.8 percent of the answers. In order to prevent a selection of the sample according to the reasons of invalid time measurements, missing values have been imputed using the population mean of response times. The precision of response latency measurement, based on the technical restrictions of the interview software, is one-hundredth of one second.

[3] The question wording reads as follows: 'Would you please tell me for a typical weekday, how long you watch television. Please tell me the number of the appropriate response option from this list'.

[4] The question reads as follows: 'Would you please tell me how certain you are about your answer about the length of your daily TV consumption'.

- *Transformed response certainties and response latencies:* In order to test whether the transformation of response latencies and response certainties affects their validity as an indicator for information accessibility, different versions of both measures have been computed and included in the analysis. For a first version the natural logarithm and for a second the square root function were used to transform the data. For a third version, the reciprocal of the measures has been computed. This is defined for raw response certainties (RC) as 1/RC and for the raw response latencies (RL) as 1/RL. The reciprocal values were multiplied by –1 and then +1 was added in order to match the direction of all other versions of the accessibility indicator. Accordingly, low values on all eighth versions of the indicator represent high accessibility and high values indicate a low degree of accessibility.

5.4 Results

The results of our data analysis are presented in three sections. *First*, the respondents' answers about their daily TV-consumption and the explanatory variables are described. In this section the structure of associations between the indicators for information accessibility and therefore their convergent validity is analyzed as well. In the *second* section what is being tested is whether raw response certainties and response latencies can predict how strongly individual respondents' answers are influenced when either high- or low-frequency scales are used for data collection. In the *third* and final section of the empirical analysis the predictive power of differently transformed variants of both accessibility measures is compared with the validity of their original versions.

5.4.1 Descriptive results

In table 1 the respondents' answers about their daily TV consumption are presented for subjects who received either a high- or low-frequency scale. As in other experiments, responses were found to be strongly affected by the type of response scale. Whereas under the condition of a low frequency scale 80.4 percent of respondents reported watching TV between 0 and 2.5 hours a day, this proportion is only 57.4 percent for the high frequency scale.

Table 1: Reports about the daily TV consumption for high- and low-frequency scales

Low-frequency response scale	N	%	High-frequency response scale	N	%
(1) not at all	1	1.8			
(2) up to half a hour	4	7.1			
(3) between 0.5 and 1 hour	7	12.5			
(4) between 1 and 1.5 hours	17	30.4			
(5) between 1.5 and 2 hours	10	17.9	(1) up to 2 hours	24	44.4
(6) between 2 and 2.5 hours	6	10.7	(2) between 2 and 2.5 hours	7	13.0
(7) more than 2.5 hours	11	19.6	(3) between 2.5 and 3 hours	13	24.1
			(4) between 3 and 3.5 hours	4	7.4
			(5) between 3.5 and 4 hours	5	9.3
			(6) between 4 and 4.5 hours	0	0.0
			(7) more than 4.5 hours	1	1.9
Summarized response behavior					
0 to 2.5 hours	45	80.4	0 to 2.5 hours	31	57.4
More than 2.5 hours	11	19.6	More than 2.5 hours	23	42.6
Total	56	100	Total	54	100

According to their self-reports respondents are rather confident about the time they spend watching TV every day. On the response scale between 1 (absolutely certain) and 7 (not at all certain) the population mean is 1.9 and therefore near to the certainty endpoint of the scale (cf. table 2). In contrast, the mean raw response latency is 6.6 seconds and indicates a relative long response process: answering the target question seems to be objectively a difficult task.[5] The conclusions about the degree of information accessibility therefore differ whether subjects self-reports or the response latencies as a objective indicator are taken into account.

[5] On average it took respondents 4.3 seconds to answer each of the other 126 questions in the interview. The response time necessary to report the length of their daily TV consumption is therefore 2.3 seconds longer compared with the other questions in the questionnaire.

Table 2: Descriptive statistics for the different indicators of information availability

	Min/Max	Mean	Median	Standard deviation
Raw response uncertainty [a)]	1/7	1.86	1.00	1.30
Logarithmic response uncertainty	0.00/1.95	0.45	0.00	0.56
Square root response uncertainty	1.00/2.65	1.30	1.00	0.41
Reciprocal response uncertainty	0.00/0.86	0.27	0.00	0.32
Raw response latency [b)]	27.00/3263.00	662.27	566.00	529.10
Logarithmic response latency	3.30/8.09	6.15	6.34	0.93
Square root response latency	5.20/57.12	23.82	23.79	9.80
Reciprocal response latency	0.96/1.0	0.99	1.00	0.005

[a)] Scale value 1= 'absolutely certain', 7= 'not at all certain'. [b)] The unit of measurement is one-hundredth of a second; Sample size: N=110.

Raw response certainties and response latencies deviate to a different, but in both cases significant, degree from a normal distribution. The Kolmogorov-Smirnov test statistics are 0.30 ($p < 0.01$) for the certainty measure and 0.12 ($p < 0.01$) for the response latencies. According to this result the distribution of certainties is much more strongly skewed than the response latencies. Our data furthermore shows that the transformation of data is not very effective in solving this problem. In the case of response certainties, none of the transformations reduces the deviation of the data from a normal distribution. The Kolmogorov-Smirnov test statistics are 0.34 ($p < 0.01$) for the log certainties, 0.33 ($p < 0.01$) for the square root transformed version and 0.36 ($p < 0.01$) for the reciprocal transformation. In the case of response latencies a square root transformation reduces the skewed distribution of data to a substantial degree. Here, the Kolmogorov-Smirnov test statistics is 0.06 ($p > 0.1$) and indicates a non-significant deviation from the normal distribution. However, all other transformations of response times proved to be ineffective in this respect. The Kolmogorov-Smirnov test is 0.14 ($p < 0.01$) for the log transformation and 0.26 ($p < 0.01$) for the reciprocal transformation. In summary, with the exception of square root transformations in the case of response latencies, the analyzed types of transformation proved to be of little value for improving the shape of the data distributions.

Table 3: Correlation between the different indicators for information availability (Pearson's correlation coefficients)

	RC	LOG-RC	SR-RC	REC-RC	RL	LOG-RL	SR-RL	REC-RL
Raw response certainty (RC)	1.00	--	--	--	--	--	--	--
Logarithmic RC (LOG-RC)	0.96***	1.00	--	--	--	--	--	--
Square root RC (SR-RC)	0.99***	0.99***	1.00	--	--	--	--	--
Reciprocal RC (REC-RC)	0.88***	0.98***	0.94***	1.00	--	--	--	--
Raw response latency (RL)	0.15	0.20**	0.18*	0.23**	1.00	--	--	--
Logarithmic RL (LOG-RL)	0.11	0.15	0.13	0.17*	0.85***	1.00	--	--
Square root RL (SR-RL)	0.14	0.19**	0.17*	0.21**	0.96***	0.96***	1.00	--
Reciprocal RL (REC-RL)	0.05	0.07	0.06	0.07	0.51***	0.84***	0.67***	1.00

Sample size: N = 110; Significance: *** $p \leq 0.01$; ** $p \leq 0.05$; * $p \leq 0.1$

The structure of the correlation between different accessibility indicators is as expected in the case of their convergent validity: the association between all indicators of information accessibility has a positive sign (c.f. table 3). In particular the relation between the differently transformed versions of the same type of accessibility indicator is found to be strong and in each case statistically significant. The correlation between response certainties ranges between 0.88 and 0.99 and those between response latencies between 0.51 and 0.96. The positive association between response certainties and response latencies indicates that the more time subjects need to answer the TV consumption question, the more uncertain they feel about their reports. However, the strength of these relationships is rather weak and in many cases statistically insignificant. The inter-indicator correlation ranges between 0.05 and 0.23. Accordingly, response certainties and response latencies can be regarded as related, but by no means identical measures.

5.4.2 Predictive power of raw response certainties and response latencies for the respondents' susceptibility to response effects

In the following section, what is being analyzed is whether and to what extent untransformed versions of response certainties and response latencies predict the degree to which respondents' answers are affected by the type of response scale. The dependent variable in the following analysis is the dichotomous and across scale versions' comparable response variable presented in table 1 above. Logistic regression analysis is utilized to analyze the data. According to our hypothesis the effect of response scales is expected to increase when the requested information becomes less accessible. An interaction parameter between the type of response scale on the one hand and the response certainties as well as response latencies on the other hand should prove to be a significant predictor of response behavior.

In the *first* stage, the results of our analysis as shown in table 4 prove that using either a high- or a low-frequency scale has a statistically significant effect on the length of the reported daily TV consumption (c.f. model 1). Furthermore, the respondents' education is a significant and their age a marginally significant predictor for their response behavior. Less educated respondents reported watching more TV and younger subjects tended to report less TV consumption.[6] Regression model 2, presented in table 4, tests whether subjects' susceptibility to effects from different response scales differs according to their self-reported response certainty. This is confirmed, since the interaction parameter between the type of response scale and the certainty measure is found to be a statistically significant predictor for the behavioral reports about the intensity of TV consumption. In model 3 the relevance of response latencies in this respect is analyzed. Here, response times prove to be a valid predictor for the susceptibility to response effects as well: the response latency times response scale interaction explains in a significant way the response behavior. According to the reduction of predictive power for response behavior when the interaction between the scale type and response certainties and response latencies is removed from the regression equation, both accessibility indicators have exactly the same predictive power

[6] Additionally, the effect of subjects' sex, socio-economic status, income, religious denomination and marital status on the response behavior has been tested (results not reported). None of these factors proved to be related to the response behavior and are therefore not included in this and the following analysis.

for scale effects. In both cases the explained deviance, as measured with pseudo r^2, is reduced by 4.6 percent points.

Table 4: Effect of response scales on the probability of reporting high vs. low TV consumption and the moderating role of raw response certainties and response latencies for the strength of this response effect (logistic regression results) [7]

	Model 1	Model 2 Response Certainty	Model 3 Response Latency
	B (Wald-Statistic)	B (Wald-Statistic)	B (Wald-Statistic)
(1) EDUCATION (years)	-0.35 (5.96)**	-0.26 (2.91)*	-0.46 (7.57)***
(2) AGE (years)	0.03 (2.91)*	0.03 (4.35)**	0.02 (1.66)
(3) RESPONSE SCALE (low-frequency) a)	-1.33 (7.80)***	-1.55 (9.11)***	-1.67 (10.14)***
(4) RESPONSE ACCESSIBILITY (scale values)	--	1.14 (4.93)**	-1.38 (6.84)***
(5) RESPONSE SCALE • ACCESSIBILITY	--	-1.20 (4.25)**	-1.25 (4.28)**
Constant	2.36 (1.59)	1.25 (0.39)	4.05 (3.51)*
Pseudo r^2 reduction when removing 'RESPONSE SCALE • ACCESSIBILITY'	--	0.046	0.046
Total pseudo r^2	0.154	0.204	0.221
N	110	110	110

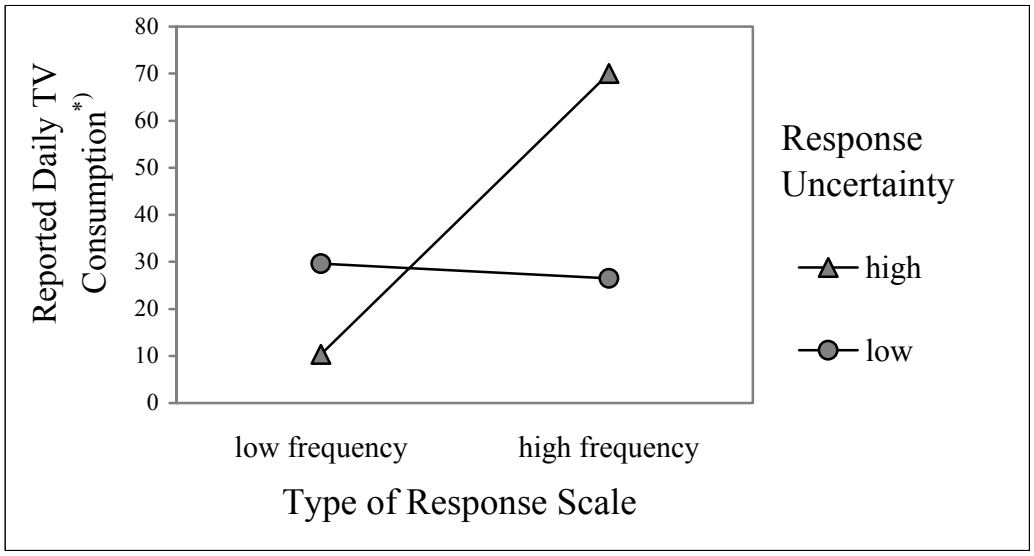
a) Reference category: 'high-frequency'; Significance: *** $p \leq 0.01$; ** $p \leq 0.05$; * $p \leq 0.1$

Figure 1 illustrates the significant interaction effect between the type of response scale and subjects' response certainty. According to the results, those respondents who feel confident about the reported length of their TV consumption are found to be practically unaffected by the type of response scale used to record their answers. In this group 29.6 percent of subjects reported watching more than 2.5 hours of TV a day with the low-frequency scale and 26.5 percent did so when a high frequency scale was used. In contrast, the answers from subjects with low response certainty differ strongly depending on the type of response scale. Here, with the low-frequency scale, 10.3 percent reported watching more than 2.5 hours TV per day, whereas this proportion is 70.0 percent with the high-frequency

[7] The estimation of multiplicative parameters in regression analysis is likely to cause high multicollinearity. Without addressing this problem, the tolerance of interaction parameters in our analysis is in some cases as low as 0.03. In order to reduce multicollinearity, it is recommended to include the respective variables in z-standardized form into regression models (Cronbach, 1987). Although this affects regression parameter on the lower level of hierarchical models, this treatment leaves interaction parameters on the highest level unaffected (Aiken and West, 1991: 28ff.). After the metric measures of information accessibility in our analysis were standardized, the tolerance of all parameters in all regression models is found to be 0.60 or higher.

scale. Accordingly, the self-reported response certainty is a strong predictor for subjects' susceptibility to the analyzed type of response effects.

Figure 1: Predictive power of subjects' response certainties for effects of different types of response scales on their reports about the length of daily TV consumption [8]



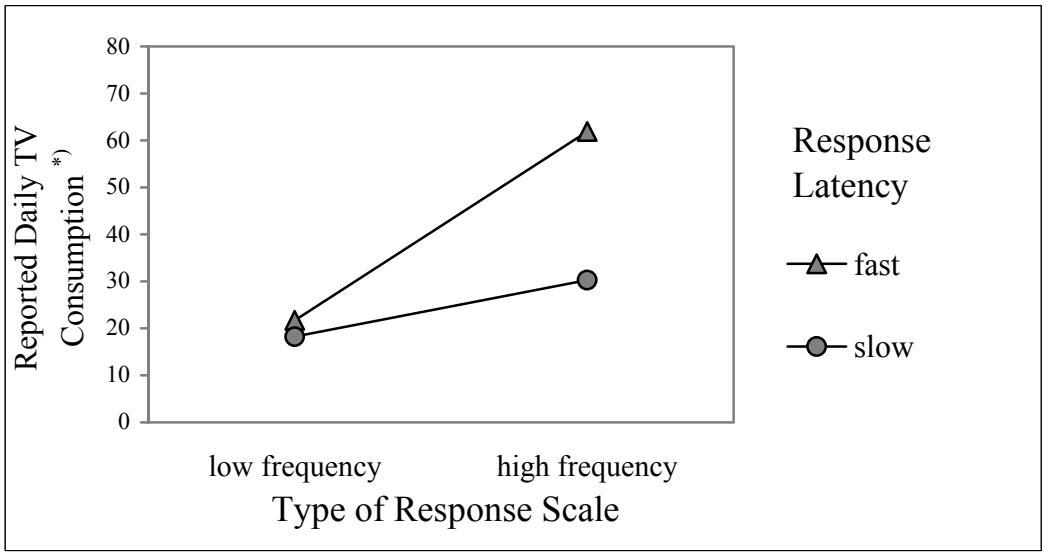
*) Percentage of respondents who reported watching more than 2.5 hours of TV every day

Figure 2 presents the significant interaction effect between the type of response scale and the time necessary to answer the question about the extent of TV consumption. The results closely correspond to those found for the moderating role of response certainties. Here, subjects' behavioral reports are only slightly affected by the presentation of the response options when these responses were made more rapidly. Under these conditions 21.7 percent of subjects reported watching more than 2.5 hours of TV every day with the low-frequency scale and 30.3 percent when the high-frequency scale was used. Subjects' answers with longer response times were found to be much more strongly affected. Here, the low-frequency scale leads to 18.2 and the high-frequency scale to 61.9 percent reports of heavy TV consumption. In summary, response latencies as well as response certainties

[8] In this figure, the sample has been split into as many equally-sized subgroups as possible. The group with high uncertainty represents 44.5 and with low uncertainty 55.5 percent of the respondents.

can be regarded as valid indicators for the cognitive accessibility of information and as good predictors for the analyzed type of response effects.

Figure 2: Predictive power of subjects' response latencies for effects of different types of response scales on their reports about the length of daily TV consumption [9]



*) Percentage of respondents who reported watching more than 2.5 hours of TV every day

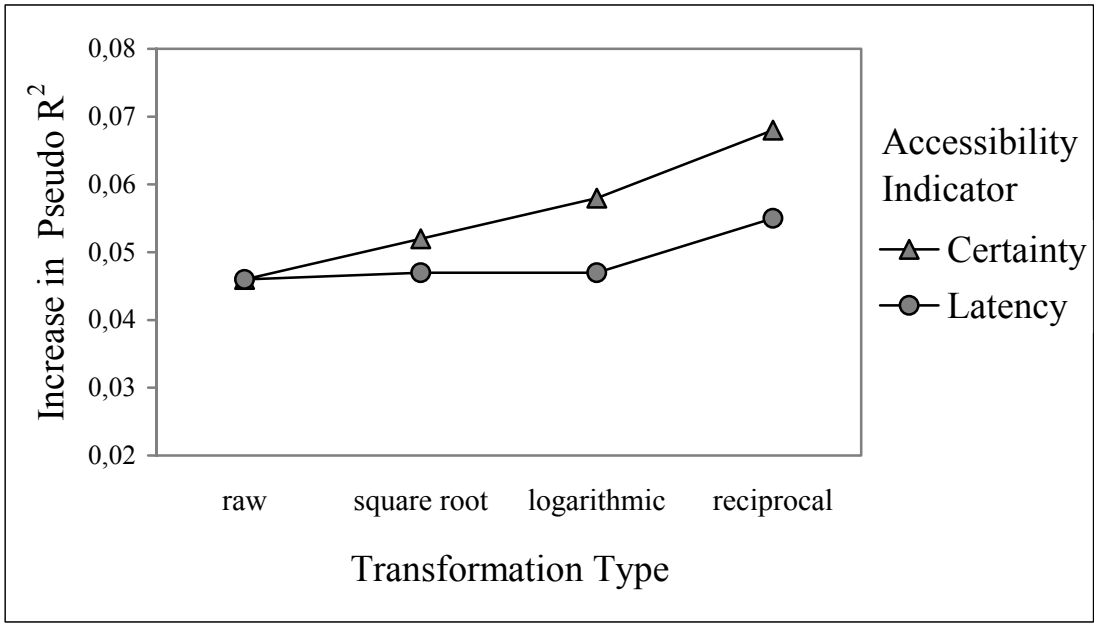
5.4.3 Effect of transformation on the predictive power for response effects

In the following part of the analysis what is being tested is whether the transformation of response certainties and response latencies affects the ability to predict how strongly subjects are influenced by the way response options are presented. This is done with a total of six multivariate logistic regression analyses, where each combination of accessibility indicator and transformation type is tested with respect to its predictive power. For each of these analyses what is being computed is how much explained variance in the response behavior can be added when the respective 'scales type' times 'accessibility indicator' interaction is introduced into the regression model. Figure 3 presents these increases in pseudo r^2 for different transformations of response certainties and response latencies.

[9] The sample has been split into equally-sized subgroups with fast and slow response latencies. The group with fast response times amount to 50.9 and the group with slow response latencies 49.1 percent of the respondents.

Taking raw response latencies as a starting point, the logarithmic and square root transformations are found to be mostly irrelevant for how effectively this measure predicts subjects' susceptibility to response effects. When raw response latencies are used to predict the effect of different response scales, this increases the pseudo r^2 of the regression model by 4.6 percentage points and this figure is 4.7 in the case of log as well as square root transformed response times. In contrast, the reciprocal transformation clearly has a positive effect on the predictive power of this accessibility measure: with a reciprocal transformation the inclusion of response times and their predictive power for how strongly subjects are affected by scale effects increases the explained variance by 5.5 percent. Compared with raw response latencies the reciprocally transformed version of this accessibility measure improves the predictive power for the analyzed type of response effects by 0.8 percent points in pseudo r^2.

Figure 3: Effect of transformation of response certainties and response latencies on their predictive power for subjects' susceptibility to different types of response scales when reporting their daily TV consumption



In the case of response certainties the different transformations have a much stronger effect on the predictive power of this accessibility measure. When raw response latencies are included into the regression model in order to predict how strongly individual respondents are influenced by different response scales, the explained variance increases by 4.6

percentage points in terms of pseudo r^2. A log transformation increases this value to 5.2 and a square root transformation even to 5.8 percentage points. But, the strongest improvement of predictive power is found in the case of a reciprocal transformation: using reciprocal transformed response certainties to predict the susceptibility to the analyzed type of response effects increases the explained variance of the regression model by 6.8 percentage points. Compared with raw response certainties, this is an improvement in the ability to predict how strongly subjects' answers are affected by the way response options are presented of 2.2 percentage points.

6. Summary and discussion

In the first step our study replicates the well-documented effects of differently categorized response scales on the respondents' answers about the length of their daily TV consumption. According to the results, 19.6 percent of the subjects reported watching more than 2.5 hours of TV every day when a low-frequency response scale is used to record the answers, whereas this proportion is 42.5 percent in the case of a high-frequency scale. This difference in the response behavior of 22.9 percentage points is nearly identical with the 21.3 percentage points observed in the first study with the same experimental design (Schwarz et al., 1985). The way response options are presented therefore has a rather robust effect on the subjects' behavioral reports.

The *first* stage of our study focused on whether individual differences in the cognitive accessibility of the requested information can be used to judge how strongly respondents' answers are affected by the presentation of response options. In this part of the analysis the predictive power of response certainties and response latencies is compared. According to our results both measures are significant predictors for how strongly respondents are affected by the presentation of the response scales: the more certain subjects are about the correctness of their behavioral reports and the less time they needed to answer the frequency question, the weaker are the effects of the scale type on the response behavior observed. Furthermore, the predictive power of both accessibility measures is found to be equally strong. Our results provide additional and more direct support for the assumed role of information accessibility as a pivotal determinant for the analyzed type of response effects (Schwarz and Hippler, 1987).

The *second* stage of our study tested whether a logarithmic, square root and reciprocal transformation of response certainties and response latencies affected their validity as measures for the cognitive accessibility of information. Such transformations are frequently used in order to correct the characteristically skewed distribution of latency data and to attain a better approximation to a normal distribution. Since self-reported response certainties are often also positively skewed, the same argument applies in the case of this measure as well. However, according to our results only the square root transformation of response latencies has the assumed positive effect on the data distribution. All other transformations, in particular in the case of response certainties, are either inconsequential or even have a negative effect on the skewed nature of the data distributions. Nevertheless, a comparison of the two raw versions with the in total six transformed types of accessibility measures partly reveals clear differences in their predictive validity.

In the case of response latencies, a log and square root transformation has no impact on the ability of this measure to predict response effects: the explanatory power of these versions is identical with that of raw response latencies. However, a reciprocal transformation clearly has a positive effect and increases the explained variance, compared with raw response latencies, by 0.9 percentage points and therefore the predictive power for response effects by 20 percent. In the case of the response certainties all transformations improve the validity of the raw measure. Here, the logarithmic and square root transformations increase the predictive power by 0.6 and 1.2 percentage points. This is an improvement in the ability to predict the susceptibility to scale effects of between 13 and 25 percent of the predictive power of raw response certainties. However, the reciprocal transformed certainty measure is by far the best predictor: the predictive power of raw certainties is improved by 2.2 percentage points and therefore the ability to predict subjects' susceptibility to scale effects is improved by 48 percent.

In summary, both, response certainties and response latencies, are found to be valid indicators for individual differences in the availability of information and, with respect to their raw versions, are equally good predictors for the type of response effects analyzed. Furthermore, applying a reciprocal transformation increases the predictive power of both indicators. However, since this transformation has a more positive effect in the case of the certainty indicator, this indicator slightly outperforms the response latencies' ability to predict response effects in this version. This slight disadvantage of response latencies with respect to their predictive power is probably offset by the more cost-efficient way of

collecting this data. In principle response times are available as a byproduct of computer assisted survey interviews and can easily be recorded. The extra questions necessary for collecting response latencies, in contrast, doubles the interview time and therefore the financial costs as well as placing an extra burden upon respondents with regard to answering the additional questions. On the other hand, it is unclear to what extent our results about the predictive power of response latencies in the particular case of scale effects can be generalized to other kinds of response effects. Furthermore, research about precisely when response latencies are a valid predictor for response effects is sparse.

7. References

[1] Aiken, L. S. and West, S. G. (1991): Multiple Regression: Testing and Interpreting Interactions. Newbury Park: Sage.

[2] Bargh, J. A. and Chartrand, T. L. (2000): The Mind in the Middle. A Practical Guide to Priming and Automaticity Research. In: H. T. Reis and C. M. Judd (Eds.): *Handbook of Research Methods in Social and Personality Psychology*. Cambridge, UK: Cambridge University Press.

[3] Bassili, J. N. (1993): Response Latency versus Certainty as Indexes of the Strength of Voting Intentions in a CATI Survey. *Public Opinion Quarterly*, **57,** 54-61.

[4] Bassili, J. N. (1995): Response Latency and the Accessibility of Voting Intentions: What Contributes to Accessibility and How it Affects Vote Choice. *Personality and Social Psychology Bulletin*, **21,** 686-695.

[5] Bassili, J. N. (1996a): The How and Why of Response Latency Measurement in Telephone Surveys. In: N. Schwarz and S. Sudman (Eds.): *Answering Questions. Methodology for Determining Cognitive and Communicative Processes in Survey Research.* San Francisco: Jossey-Bass.

[6] Bassili, J. N. (1996b): Meta-Judgemental versus Operative Indexes of Psychological Attributes: The Case of Measures of Attitude Strength. *Journal of Personality and Social Psychology*, **71,** 637-653.

[7] Bassili, J. N. and Bors, D. A. (1997): Using Response-Latency to Increase Lead Time in Election Forecasting. *Canadian Journal of Behavioural Science*, **29,** 231-238.

[8] Bassili, J. N. and Fletcher, J. F. (1991): Response-Time Measurement in Survey Research. A Method for CATI and a New Look at Nonattitudes. *Public Opinion Quarterly*, **55,** 331-346.

[9] Bassili, J. N. and Krosnick, J. A. (2000): Do Strength-Related Attitude Properties Determine Susceptibility to Response Effects? New Evidence From Response Latency, Attitude Extremity, and Aggregate Indices. *Political Psychology*, **21,** 107-132.

[10] Bauman, K. E. and Dent, C. W. (1982): Influence of an Objective Measure on Self-Reports of Behavior. *Journal of Applied Psychology*, **67,** 623-628.

[11] Bless, H., Bohner, G., Hild, T. and Schwarz, N. (1992): Asking Difficult Questions: Task Complexity Increases the Impact of Response Alternatives. *European Journal of Social Psychology* , **22,** 309-312.

[12] Cronbach, L. J. (1987): Statistical Tests for Moderator Variables: Flaws in Analyses Recently Proposed. *Psychological Bulletin*, **102,** 414-417.

[13] Fazio, R. H. (1990): A Practical Guide to the Use of Response Latency in Social Psychological Research. In: C. Hendrick and M. S. Clark (Eds.): *Review of Personality and Social Psychology: Vol. 11. Research Methods in Personality and Social Psychology.* Newbury Park, CA: Sage.

[14] Fazio, R. H. and Williams, C. J. (1986): Attitude Accessibility as a Moderator of the Attitude-Perception and Attitude-Behavior Relations: An Investigation of the 1984 Presidential Election. *Journal of Personality and Social Psychology*, **51,** 505-514.

[15] Fletcher, J. F. (2000): Two Timing: Politics and Response Latencies in a Bilingual Survey. *Political Psychology*, **21,** 27-55.

[16] Gaskell, G. D., O' Muircheartaigh, C. A. and Wright, D. B. (1994): Survey Questions about the Frequency of Vaguely Defined Events. *Public Opinion Quarterly*, **58,** 241-254.

[17] Huckfeldt, R. and Sprague, J. (2000): Political Consequences of Inconsistency: The Accessibility and Stability of Abortion Attitudes. *Political Psychology*, **21,** 57-79.

[18] Ji, L.-J., Schwarz, N., and Nisbett, R. E. (2000): Culture, Autobiographical Memory, and Behavioral Frequency Reports: Measurement Issues in Cross-Cultural Studies. *Personality and Social Psychology Bulletin*, **26,** 585-593.

[19] Kokkinaki, F. and Lunt, P. (1997): The relationship between involvement, attitude accessibility and attitude-behaviour consistency. *British Journal of Social Psychology*, **36,** 497-509.

[20] Krosnick, J. A. and Petty, R. E. (1995): Attitude Strength: An Overview. In: R. E. Petty and J. A. Krosnick (Eds.): *Attitude Strength. Antecedents and Consequences.* Mahwah, N.J.: Erlbaum.

[21] Krosnick, J. A. and Schuman, H. (1988): Attitude Intensity, Importance, and Certainty and Susceptibility to Response Effects. *Journal of Personality and Social Psychology*, **54,** 940-952.

[22] LaBarbera, P. A. and MacLachlan, J. M. (1979): Response Latency in Telephone Interviews. *Journal of Advertising Research*, **3,** 49-55.

[23] Lavine, H., Huff, J. W., Wagner, S. H. and Sweeney, D. (1998): The Moderating Influence of Attitude Strength on Susceptibility to Context Effects in Attitude Surveys. *Journal of Personality and Social Psychology*, **75,** 359-373.

[24] Menon, G., Raghubir, P. and Schwarz, N. (1995): Behavioral Frequency Judgements: An Accessibility- Diagnosticity Framework. *Journal of Consumer Research*, **22,** 212-228.

[25] Menon, G., Raghubir, P. and Schwarz, N. (1997): How Much Will I Spend? Factors Affecting Consumer's Estimates of Future Expense. *Journal of Consumer Psychology*, **6,** 141-164.

[26] Mielke, R. (1985): Eine Untersuchung zum Umweltschutz-Verhalten (Wegwerf-Verhalten): Einstellung, Einstellungs- Verfügbarkeit und soziale Normen als Verhaltensprädiktoren. *Zeitschrift für Sozialpsychologie*, **16,** 196-205.

[27] Mulligan, K., Grant, J. T., Mockabee, S. T. and Monson, J. Q. (2003): Response Latency Methodology for Survey Research: Measurement and Modeling Strategies. *Political Analysis*, **11,** 289-301.

[28] Renata, F. (1999): Attitude Strength and the Attitude-Behavior Domain: Magnitude and Independence of Moderating Effects of Different Strength Indices. *Journal of Social Behavior & Personality*, **14,** 177-197.

[29] Rockwood, T. H., Sangster, R. L. and Dillman, D. A. (1997): The Effect of Response Categories on Questionnaire Answers. *Sociological Methods & Research*, **26,** 118-140.

[30] Schuman, H., Presser, S. and Ludwig, J. (1981): Context Effects on Survey Responses to Questions About Abortion. *Public Opinion Quarterly*, **45,** 216-223.

[31] Schwarz, N. (1988): Was Befragte aus Antwortvorgaben lernen: Zur informativen Funktion von Antwortvorgaben bei Verhaltensfragen. *Planung und Analyse*, **15,** 103-107.

[32] Schwarz, N. (1999): Frequency Reports of Physical Symptoms and Health Behaviors: How the Questionnaire Determines the Results. In: D. C. Park, R. W. Morell, and K. Shifren (Eds.): *Processing in Medical Information in Aging Patients: Cognitive and Human Factors Perspectives* **.** Mahwah, N.J.: Erlbaum.

[33] Schwarz, N. and Bienias, J. (1990): What Mediates the Impact of Response Alternatives on Frequency Reports of Mundane Behaviors. *Applied Cognitive Psychology*, **4,** 61-72.

[34] Schwarz, N., Grayson, C. E. and Knäuper, B. (1998): Formal Features of Rating Scales and the Interpretation of Question Meaning. *International Journal of Public Opinion Research*, **10,** 177-183.

[35] Schwarz, N. and Hippler, H. J. (1987): What Response Scales May Tell your Respondents: Informative Functions of Response Alternatives. In: H. J. Hippler, N. Schwarz, and S. Sudman (Eds.): *Social Information Processing and Survey Methodology.* New York: Springer.

[36] Schwarz, N., Hippler, H.-J., Deutsch, B. and Strack, F. (1985): Response Scales: Effects of Category Range on Reported Behavior and Comparative Judgments. *Public Opinion Quarterly*, **49,** 388-395.

[37] Schwarz, N. and Scheuring, B. (1988): Judgements of Relationship Satisfaction: Inter- and Intraindividual Comparisons as a Function of Questionnaire Structure. *European Journal of Social Psychology*, **18,** 485-496.

[38] Stocké, V. (2001): The Influence of Frequency Scales on the Response Behavior. A Theoretical Model and its Empirical Examination. Working-Paper No. 01-24: Sonderforschungsbereich 504, University of Mannheim.

[39] Stocké, V. (2002a): Die Vorhersage von Fragenreihenfolgeeffekten durch Antwortlatenzen: Eine Validierungsstudie. *ZUMA-Nachrichten*, **50,** 26-53.

[40] Stocké, V. (2002b): Soziale Erwünschtheit bei der Erfassung von Einstellungen gegenüber Ausländern. Theoretische Prognosen und deren empirische Überprüfung. Arbeitspapier No. 02-09: Sonderforschungsbereich 504.

[41] Warland, R. H. and Sample, J. (1973): Response Certainty as a Moderator Variable in Attitude Measurement. *Rural Sociology*, **38,** 174-186.

[42] Wegener, D. T., Downing, J., Krosnick, J. A., and Petty, R. E. (1995): Measures and Manipulations of Strength-Related Properties of Attitudes: Current Practice and Future Directions. In: R. E. Petty and J. A. Krosnick (Eds.): *Attitude Strength. Antecedents and Consequences.* Mahwah, N.J.: Erlbaum.

[43] Winter, J. (2002): Bracketing Effects in Categorized Survey Questions and the Measurement of Economic Quantities. Working-Paper No. 02-35: Sonderforschungsbereich 504, University of Mannheim.

Nr.	Author	Title
03-34	Volker Stocké Bettina Langfeldt	Umfrageeinstellung und Umfrageerfahrung. Die relative Bedeutung unterschiedlicher Aspekte der Interviewerfahrung für die generalisierte Umfrageeinstellung
03-33	Volker Stocké	Measuring Information Accessibility and Predicting Response-Effects: The Validity of Response-Certainties and Response-Latencies
03-32	Siegfried K. Berninghaus Christian Korth Stefan Napel	Reciprocity - an indirect evolutionary analysis
03-31	Peter Albrecht Cemil Kantar	Random Walk oder Mean Reversion? Eine statistische Analyse des Kurs/Gewinn-Verhältnisses für den deutschen Aktienmarkt
03-30	Jürgen Eichberger David Kelsey Burkhard Schipper	Ambiguity and Social Interaction
03-29	Ulrich Schmidt Alexander Zimper	Security And Potential Level Preferences With Thresholds
03-28	Alexander Zimper	Uniqueness Conditions for Point-Rationalizable Solutions of Games with Metrizable Strategy Sets
03-27	Jürgen Eichberger David Kelsey	Sequential Two-Player Games with Ambiguity
03-26	Alain Chateauneuf Jürgen Eichberger Simon Grant	A Simple Axiomatization and Constructive Representation Proof for Choquet Expected Utility
03-25	Volker Stocké	Informationsverfügbarkeit und Response-Effects: Die Prognose von Einflüssen unterschiedlich kategorisierter Antwortskalen durch Antwortsicherheiten und Antwortlatenzen
03-24	Volker Stocké	Entstehungsbedingungen von Antwortverzerrungen durch soziale Erwünschtheit. Ein Vergleich der Prognosen der Rational-Choice Theorie und des Modells der Frame-Selektion

Nr.	Author	Title
03-23	Daniel Schunk	Modeling the Use of Nonrenewable Resources Using a Genetic Algorithm
03-22	Brian Deal Daniel Schunk	Spatial Dynamic Modeling and Urban Land Use Transformation: An Ecological Simulation Approach to Assessing the Costs of Urban Sprawl
03-21	Thomas Gschwend Franz Urban Pappi	Stimmensplitting und Koalitionswahl
03-20	Thomas Langer Martin Weber	Does Binding or Feeback Influence Myopic Loss Aversion - An Experimental Analysis
03-19	Peter Albrecht Carsten Weber	Asset/Liability Management of German Life Insurance Companies: A Value-at-Risk Approach in the Presence of Interest Rate Guarantees
03-18	Markus Glaser	Online Broker Investors: Demographic Information, Investment Strategy, Portfolio Positions, and Trading Activity
03-17	Markus Glaser Martin Weber	September 11 and Stock Return Expectations of Individual Investors
03-16	Siegfried K. Berninghaus Bodo Vogt	Network Formation and Coordination Games
03-15	Johannes Keller Herbert Bless	When negative expectancies turn into negative performance: The role of ease of retrieval.
03-14	Markus Glaser Markus Nöth Martin Weber	Behavioral Finance
03-13	Hendrik Hakenes	Banks as Delegated Risk Managers
03-12	Elena Carletti	The Structure of Bank Relationships, Endogenous Monitoring and Loan Rates
03-11	Isabel Schnabel	The Great Banks‘ Depression - Deposit Withdrawals in the German Crisis of 1931

Nr.	Author	Title
03-10	Alain Chateauneuf Jürgen Eichberger Simon Grant	Choice under Uncertainty with the Best and Worst in Mind: Neo-additive Capacities.
03-09	Peter Albrecht Carsten Weber	Combined Accumulation- and Decumulation-Plans with Risk-Controlled Capital Protection
03-08	Hans-Martin von Gaudecker Carsten Weber	Surprises in a Growing Market Niche - An Evaluation of the German Private Annuities Market
03-07	Markus Glaser Martin Weber	Overconfidence and Trading Volume
03-06	Markus Glaser Thomas Langer Martin Weber	On the trend recognition and forecasting ability of professional traders
03-05	Geschäftsstelle	Jahresbericht 2002
03-04	Oliver Kirchkamp Rosemarie Nagel	No imitation - on local and group interaction, learning and reciprocity in prisoners break
03-03	Michele Bernasconi Oliver Kirchkamp Paolo Paruolo	Expectations and perceived causality in fiscal policy: an experimental analysis using real world data
03-02	Peter Albrecht	Risk Based Capital Allocation
03-01	Peter Albrecht	Risk Measures
02-51	Peter Albrecht Ivica Dus Raimond Maurer Ulla Ruckpaul	Cost Average-Effekt: Fakt oder Mythos?
02-50	Thomas Langer Niels Nauhauser	Zur Bedeutung von Cost-Average-Effekten bei Einzahlungsplänen und Portefeuilleumschichtungen
02-49	Alexander Klos Thomas Langer Martin Weber	Über kurz oder lang - Welche Rolle spielt der Anlagehorizont bei Investitionsentscheidungen?
02-48	Isabel Schnabel	The German Twin Crisis of 1931