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The Perils of Interpreting Age Differences in Attitude Reports: Question Order Effects Decrease with Age

Bärbel Knäuper[1], Norbert Schwarz[2], Denise Park[3], and Andreas Fritsch[4]

Secondary analyses of survey data and two laboratory experiments demonstrate that question order effects decrease with respondents' increasing age. Presumably, the content of preceding questions is less likely to remain accessible for older respondents, thus attenuating or eliminating their impact on answers to subsequent questions. Supporting this assumption, question order effects were obtained for older respondents with high working memory, but not for older respondents with low working memory. This age-sensitivity of question order effects can compromise comparisons across age groups, even to the extent of reversing the ordinal placement of cohorts along the attitude dimension. Theoretical and methodological implications are discussed.

Key words: Self-reports; attitude measurement; age; working memory; cohort comparisons.

1. Introduction

Most of what we know about cohort differences in attitudes and behavior is based on research participants' self-reports, as is our knowledge about changes in attitudes across the life-span. Unfortunately, self-reports can be subject to pronounced context effects, including influences of question wording, question format and question order, as survey researchers have long been aware (for early reviews see Cantril 1944; Payne 1951). Since the early 1980's, research at the interface of survey methodology and cognitive psychology has increasingly illuminated the cognitive and communicative processes underlying these influences (see the contributions in Sirken et al. (1999) for reviews). There is now wide agreement that the question–answering process involves several distinct tasks (Strack and Martin 1987; Tourangeau 1984). Respondents first need to determine the intended meaning of the question to understand which information they are to provide. Next, they need to recall relevant information from memory in order to form a judgment. Once a judgment has been formed, they can usually not report it in their own words, but need to format it in line with the response alternatives provided by the

[1] McGill University, Department of Psychology, 1205 Dr. Penfield Avenue, Montreal, QC H3A 1B1, Canada. Email: barbel.knauper@mcgill.ca
[2] University of Michigan, University of Michigan, ISR, Ann Arbor, MI 48106-1248, U.S.A. Email: nschwarz@umich.edu
[3] University of Illinois, Urbana-Champaign, Urbana, IL 61801, U.S.A. Email: denisep@ux1.cso.uiuc.edu
[4] ISOKOM, Hofmühlenstraße 18, 01187 Dresden, Germany. Email: a.fritsch@isokom.de
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researcher. In addition, respondents may hesitate to communicate an answer that may convey a negative impression and may hence edit their judgment before reporting it. As a large body of findings demonstrates, respondents' performance of each of these tasks is highly context sensitive (for reviews see Schwarz 1999; Sudman, Bradburn, and Schwarz 1996; Tourangeau and Rasinski 1988; Tourangeau, Rips, and Rasinski 2000).

Moreover, each step of the question–answering process requires cognitive resources in the form of attention and memory. At the minimum, respondents need to keep the question in mind while searching memory for relevant information and forming a judgment; similarly, they need to remember the response alternatives to format their judgment. In many cases, they will also need to take the questioner's perspective to determine which information is of interest or which answer may be inappropriate to convey to the interviewer. Hence, the nature of contextual influences is likely to change with respondents' ability to allocate the required cognitive resources. If this happens, respondents' performance may show systematic differences across the life-span, due to changes in cognitive functioning that accompany normal human aging (for reviews see Park 2000 and the contributions in Schwarz, Park, Knäuper, and Sudman 1999). These changes include a decrease in working memory performance, that is, a reduced ability to simultaneously process new information, retrieve information from memory, and execute storage processes (Baddeley 1986). These considerations suggest that older and younger adults may be *differentially* affected by features of the research instrument, resulting in *age-sensitive* context effects that may potentially compromise any straightforward comparison of self-reports across age groups.

Consistent with this conjecture, Knäuper (1999) observed in extensive secondary analyses that older respondents show larger response order effects, in particular in telephone interviews. The average recency effect across 14 survey experiments was 31 percentage points for respondents aged 65 and older, but only 14 percentage points for respondents younger than 65. That older respondents are particularly likely to endorse the last response alternative read to them presumably reflects that it is difficult for them to hold the earlier response alternatives in mind while thinking about their answers. It is also worth noting that these age-related differences in the size of response order effects can be large enough to reverse the ordinal placement of cohorts, suggesting, for example, that older respondents hold either more conservative or more liberal attitudes than younger respondents depending solely on the order in which response alternatives are presented (see Knäuper 1999).

The present studies extend this research from response order effects to question order effects. We first review the variables that influence the emergence of response order effects and subsequently discuss the likely role of age-related changes in cognitive functioning.

2. Question Order Effects

The content of preceding questions can influence all stages of the question–answering process, from question comprehension to judgment formation and response formatting (see Schwarz 1999; Schwarz and Sudman 1992; Tourangeau and Rasinski 1988). Of particular relevance to the present studies are the recall and judgment formation steps.

When asked an attitude question, respondents are unlikely to have a ready-for-use answer available in memory. Even when they hold a general opinion on the topic, this opinion may not map onto the specifics of the question asked. Hence, respondents typically need to form a judgment when asked. To do so, they rarely retrieve all information that may be relevant to the judgment at hand, but truncate the search process as soon as enough information has come to mind to form a judgment with sufficient subjective certainty. Accordingly, the judgment is based on the subset of relevant information that is most accessible in memory, which is often information that has just been brought to mind in the process of answering a preceding question (see Schwarz and Bohner 2001 for a review of attitude construction processes). How accessible information influences the judgment depends on how it is used (Schwarz and Bless 1992a). Information that is used in forming a mental representation of the attitude object results in assimilation effects. In this case, positive (negative) information that comes to mind is seen as a feature of the attitude object, resulting in more positive (negative) attitude judgments. Conversely, information that is used in forming a mental representation of a standard against which the attitude object is evaluated, results in contrast effects. In this case, accessible positive (negative) information results in a more extremely positive (negative) standard of comparison, relative to which the attitude object is evaluated more negatively (positively; e.g., Schwarz and Bless 1992b).

In addition, some questions influence answers to subsequent ones by increasing the accessibility of a general norm, like the norm of evenhandedness (Schuman and Ludwig 1983; Schuman and Presser 1981). For example, Hyman and Sheatsley (1950) asked Americans in 1948 if "the United States government should let Communist reporters from other countries come in here and send back to their papers the news as they see it." When this question was asked first, only 36 percent of the American respondents supported freedom of press for communist reporters. However, when respondents were first asked if "a Communist country like Russia should let American newspaper reporters come in," a proposition that most respondents endorsed, support for communist reporters in the United States increased to 73 percent. Endorsing freedom of the press for American reporters in Russia apparently made respondents aware that the same principle should apply to communist reporters coming to the United States.

Note that all of these processes require that the information brought to mind by preceding questions is still accessible in working memory when respondents answer subsequent questions. If the information no longer comes to mind, no question order effect is expected. For this reason, survey researchers commonly separate related questions by a number of "buffer" items, hoping that interspersed unrelated questions will decrease the accessibility of previously used information (see Wänke and Schwarz 1997). Given age-related declines in memory, the same logic suggests that question order effects should decrease with respondents' age.

3. Age and Question Order Effects

Specifically, we predict (i) that question order effects are less pronounced for older than for younger respondents and (ii) that this age-related difference can be traced, at least in part, to older respondents' limited working memory capacity. As noted earlier,

working memory refers to the ability to simultaneously process new information, retrieve information from memory, and execute storage processes (Baddeley 1986). Working memory capacity declines over the life-span, beginning in early adulthood and increasing slowly and linearly with age (see Verhaeghen, Marcoen, and Goosens 1993 for a review and meta-analysis). Some research has suggested a more rapid decline after around age 65 (see e.g., Wilson et al. 2002 for recent empirical support from longitudinal analyses), consistent with the pattern observed in Knäuper's (1999) meta-analysis of response order effects.

Although a working memory account of diminishing question order effects in older age is intuitively appealing, we note that measures of working memory capacity are highly correlated with other measures of cognitive ability. Age-related performance declines are found for many tasks of fluid cognitive abilities, including speed, reasoning, fluency and other aspects of memory (e.g., Hertzog 1989; Hultsch, Hertzog, and Dixon 1990; Park et al. 1996; Salthouse 1985; Salthouse and Meinz 1995). However, from the perspective of attitudes and public opinion research, the key question is if age-related changes in cognitive functioning affect the emergence of question order effects in ways that can result in misleading conclusions about substantive differences in attitudes and opinions across cohorts or across the life-span. Whether working memory capacity is the *sole* source of such differences, or one of a highly correlated set of sources, can be addressed once age-related changes in the emergence of question order effects have been documented to begin with.

4. The Present Research

The present research explores the emergence of question order effects in attitude reports as a function of respondents' age and working memory capacity. We first report secondary analyses that demonstrate that the size of question order effects decreases with respondents' age in sample surveys. In subsequent laboratory experiments, we trace this decrease to age-related limitations in respondents' working memory capacity. The resulting age-sensitivity of question order effects presents a serious methodological challenge for research that involves comparisons across the life-span or across cohorts. As our results will illustrate, age-sensitive question order effects can reverse the ordinal placement of cohorts: Depending on the order in which the same two questions are asked, we may conclude, for example, that older respondents hold more liberal attitudes, or more conservative attitudes, than younger respondents. Unless we want to run the risk of misinterpreting age-sensitive context effects as substantive differences, we need to arrive at a better understanding of age-related differences in the response process. The present research draws attention to this issue.

4.1. Study 1: Secondary Analyses

One of the most robust question order effects in the survey literature has been reported by Schuman and Presser (1981) and Schuman (1992). Respondents are asked two questions about their attitudes toward legal abortion, which present justifications of differential acceptability:

"*Do you think it should be possible for a pregnant woman to obtain a legal abortion if she is married and does not want any more children?*" *Response alternatives: yes, no* (Question A).

"*Do you think it should be possible for a pregnant woman to obtain a legal abortion if there is a strong chance of serious defect in the baby?*" *Response alternatives: yes, no* (Question B).

Not surprisingly, respondents commonly report more support for a legal abortion when it is justified by the risk of a "serious defect in the baby" (Question B) rather than by the mere desire not to have "any more children" (Question A). More important, their answers depend on the order in which these questions are asked. Specifically, support for abortion because a woman "does not want any more children" (Question A) is higher when this question is asked first and drops dramatically when this question is preceded by the child defect question (Question B). This order effect reflects that the child defect question introduces a highly legitimate justification, relative to which the desire not to have any more children seems less justified, resulting in a contrast effect. We predicted that the size of this question order effect would decrease with respondents' age due to decreased availability of the first question in working memory at the time the second question was answered.

4.1.1. Method

Our secondary analysis is based on data reported by Schuman and Presser (1981, SRC-79). Their experiment was embedded in a larger survey of $N = 777$ respondents in the Detroit metropolitan area in August of 1979. Respondents were asked the above questions in telephone interviews, in two different orders (A-B vs B-A). The data of this study are archived with ICPSR (Study number 7940; http://www.icpsr.umich.edu).

We reanalyzed these data to test whether the question order effect decreases with respondents' age. Given the constraints of the sample size in the older age ranges, we did not control for cohort differences in educational attainment but address this issue in the subsequent laboratory experiments.

4.1.2. Results and Discussion

Figure 1 shows a breakdown of Schuman and Presser's (1981) data as a function of respondents' age. As expected, the size of the usually obtained question order effect decreased with respondents' age. Specifically, 69.1% ($n = 246$) of the respondents age 18 to 54 supported abortion in the case of a woman who "does not want any more children" (Question A) when this question was asked first, whereas only 49.6% ($n = 244$) did so when this question was preceded by the child defect question (Question B), resulting in a question order effect of 19.5 percentage points ($\chi^2 = 19.49, df = 1, p < .001$). This order effect decreases with respondents' age and is no longer observed for respondents aged 65 and older, whose answers are not affected by question order.

Although these secondary analyses do not allow us to address the underlying processes, they highlight how age-related differences in the response process can suggest potentially misleading substantive conclusions about cohort differences. When Question A is asked first, we would conclude that older cohorts hold more conservative attitudes towards

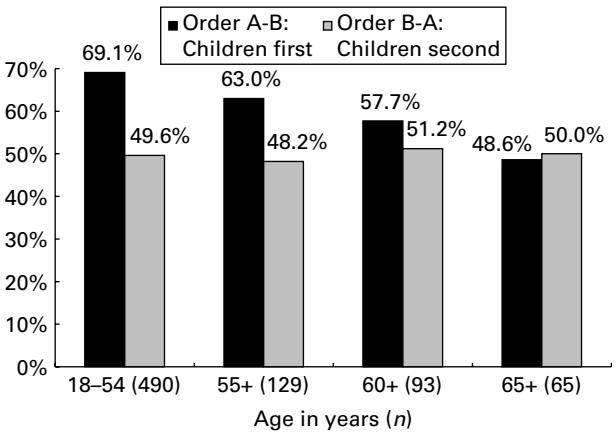

Fig. 1. Secondary analyses (SRC-79, August): Percent supporting abortion for women who are married and do not want any more children

abortion than younger cohorts, or that attitudes towards abortion become more conservative across the life-span. Yet, when this question is preceded by Question B, we would conclude that attitudes towards abortion are thoroughly independent of cohort and age. The latter conclusion, however, would be misleading because the data merely reflect that younger respondents' judgments were influenced by the preceding child defect question, whereas older respondents' judgments were not.

4.2. Studies 2 and 3: Laboratory Experiments

The results of our secondary analyses are open to different theoretical interpretations. We assume that older adults' working memory limitations make it less likely that preceding information comes to mind when they answer a subsequent question. On the other hand, several researchers suggested that older adults are more likely to hold well-formed, crystallized attitudes than younger adults and may therefore be less likely to be influenced in their answers (e.g., Sears 1986). However, several observations argue against an attitude strength account of age-sensitive context effects. First, attempts to demonstrate that crystallized attitudes are less susceptible to context effects have consistently failed (Krosnick and Abelson 1992; Krosnick and Schuman 1988). Second, Visser and Krosnick (1998) observed that attitude strength increases through middle adulthood (roughly to age 50) and declines after that, dropping below the levels reported by college students around age 65 on most of the measures used. Note that this curvilinear relationship suggests that older respondents should be more, rather than less, susceptible to question order effects if resistance to these effects were driven by attitude strength. Finally, it is not the case that older adults are *generally* less influenced by features of the research instrument. As described above, Knäuper (1999) found larger response order effects for older than for younger adults, presumably because older adults have more difficulty holding the earlier response alternatives in memory while thinking about their answers.

To provide a more focused test of the working memory hypothesis, we conducted laboratory experiments with older and younger adults and included a measure of working

memory. We predicted (a) that young adults, who generally have good working memory, would show pronounced question order effects; (b) that these effects would be strongly attenuated or absent for older adults with poor working memory; and (c) that older adults with good working memory would fall in between these extremes. In addition, we controlled for participants' level of educational attainment by ensuring that all age groups had received a comparable level of formal education.

We used two different types of questions for these experiments. First, we replicated the abortion question experiment used in the secondary analysis. Second, we used a set of questions that evoke the norm of evenhandedness described above (Schuman and Ludwig 1983).

4.2.1. Method

Participants

165 older adults (aged 60 to 100, mean age 75.34) and 82 younger adults (aged 19 to 42, mean age 29.45) participated in three experiments, administered as part of a single session of data collection. Older participants were recruited from the human subject core at the Center for Applied Research in Cognitive Aging at the University of Michigan as well as through newspaper advertisements. Younger participants were recruited only through newspaper advertisements. 54.5% of the older and 58.5% of the younger group were women.

Both age groups were comparable in formal education. 44.3% of the older sample were high school graduates, had attended trade, technical, or business school, or had some years of college. 52.7% of the older sample had a bachelor's degree or higher. Of the younger participants, 47.6% were high school graduates, had attended trade, technical, or business school, or had some years of college. 52.5% had a bachelor's degree or higher. All participants had 20/40 corrected vision, were screened for audition, and were walk-ins in good health.

Working Memory Measure

Working memory capacity is typically measured by assessing a person's ability to store information in memory while simultaneously performing another cognitive task. We adopted a reading span procedure from Salthouse and Babcock (1991). Participants heard simple sentences, read out loud, one at a time (e.g., "After dinner, the chef prepared desserts for his guests."). After each sentence, they answered a question presented on the computer screen (e.g., "What did the chef prepare? – A. fish; B. dessert; C. salad") by pressing the appropriate key. In addition, participants had to remember the last word in each of the sentences they heard. At the end of a sequence of sentences, participants wrote these words on an answer sheet (e.g., "guest"). The number of sentences in a sequence varied from 1 to 6. There were three trials at each of these six levels. The task was discontinued when a participant made an error on the storage component of at least two of the three trials at a particular level. The dependent measure was the total number of trials (ranging from 0 to 18) on which the processing component (answering the question about the sentence) and the storage component (remembering the last word in the sentence) were correct. Higher scores indicate higher working memory capacity.

Question Presentation

The experiment was computer administered and participants were run in groups of four. Each participant sat at a computer and was separated from the other participants with room dividers. The questions and response alternatives were presented on a touch screen with the text being displayed in 18-point Helvetica bold font. The field to be touched for indicating the answer was sufficiently large to accommodate possible problems with motor coordination among the elderly. Questions were presented visually, one-at-a-time, with all response alternatives displayed with the question. Presentation rate was self-paced, as in a real-world self-administered survey.

We used two sets of questions that have shown robust question order effects in representative samples, namely the abortion questions used in the secondary analyses (reported above as Questions A and B) and two questions about labor relations (all taken from Schuman and Presser 1981). The labor relations questions read:

"*Do you believe that workers and unions have the right to strike when wages and working conditions don't suit them?*" *Response alternatives: yes, no* (Question C)

"*Do you believe that businessmen have a right to shut down their factories and stores when labor conditions and profits don't suit them?*" *Response alternatives: yes, no* (Question D)

Experimental Design

The above procedures result in responses to two sets of questions, which we treat as two separate question order experiments in the subsequent analyses. Each experiment follows a 2 (question order A-B vs B-A) $\times$ 3 (young adults; older adults with high working memory; older adults with low working memory) factorial design. The latter factor is a blocking factor and participants within each block were randomly assigned to the two question order conditions.

Hypothesis Tests

Recall that we predict (a) that young adults would show pronounced question order effects; (b) that these effects would be strongly attenuated or absent for older adults with poor working memory; and (c) that older adults with good working memory would fall in between these extremes. To provide a focused test of this pattern, we coded the dichotomous answers 0 (no) and 1 (yes) and computed planned contrasts (see Rosenthal and Rosnow 1985), using the contrast weights shown in Table 1.

Table 1. Contrast Weights for a Priori Contrasts

	Young	Old/low WM	Old/high WM
Overall test			
Order A-B	+3	+2	+1
Order B-A	−3	−2	−1
Older respondents			
Order A-B	0	+2	+1
Order B-A	0	−2	−1

4.2.2. Results

Working Memory and Group Assignment

On average, younger participants achieved a reading span score of 11.91 ($SD = 3.13$), as compared to 5.84 ($SD = 3.52$) for older participants, $t(245) = 13.25$, $p = 000$. This age difference is consistent with previous research (see Salthouse, Babcock, and Shaw 1991 for a review). For the subsequent analyses, we compared the younger respondents (mean age: 29.45, mean reading span score: 11.91, $SD = 3.13$, $n = 82$) with older respondents with higher versus lower working memory. The latter two groups (older respondents with higher working memory and older respondents with lower working memory capacity) were created on the basis of a median split of the older respondents' reading span scores. The resulting group of older respondents with higher working memory has a mean age of 72.51 and a reading span score of 8.56 ($SD = 3.23$, range $= 6 - 16$, $n = 84$) and the group of older respondents with lower working memory has a mean age of 78.30 and a reading span score of 3.01 ($SD = 1.81$, range $= 0 - 5$, $n = 80$). Reading span score comparisons show that the reading span differs significantly between all three groups (all $t > 7.70$, all $p = .000$).

Abortion Experiment

As shown in Figure 2, the laboratory data replicated the pattern obtained in the secondary analyses. Specifically, 92.9% of the younger respondents supported legal abortion in the case of a woman who "does not want any more children" (Question A) when this question was asked first, whereas only 67.5% did so when this question followed the child defect question (Question B), resulting in a difference of 25.4 percentage points, $t(59.94) = 2.98$, $p < .004$. The same pattern is also observed for older respondents with high working memory, although the size of the question order effect is attenuated to a difference of 18.6 percentage points and no longer reaches conventional levels of significance, $t(80.57) = 1.75$, $p < .08$. Finally, older respondents with low working memory showed no reliable question order effect, $t(78) = 0.51$, $p = .62$, replicating the pattern we observed for the oldest respondents in the secondary analyses.

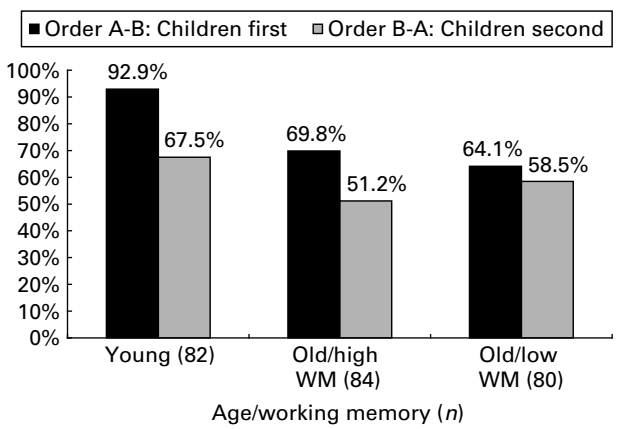

Fig. 2. Abortion experiment: Percent supporting abortion for women who are married and do not want any more children

A planned contrast, using the weights shown in the top panel of Table 1, confirms the overall reliability of the predicted pattern, $t(240) = 3.16$, $p < .002$. Moreover, a planned contrast using the weights shown in the bottom panel of Table 1 confirms that the responses of older adults with high working memory differ from the responses of older adults with low working memory, $t(240) = 1.91$, $p = .057$. This latter contrast is consistent with the hypothesis that the effect is due to working memory capacity rather than age per se.

Labor Relations Experiment

Replicating Schuman and Presser's (1981) finding, 50.0% of the young respondents endorsed that "businessmen have a right to shut down their factories and stores when labor conditions and profits don't suit them" when this question was asked first, whereas 71.0% did so when this question was preceded by a question about unions' right to strike, $t(78.22) = 2.01$, $p < .05$. The same pattern was obtained for older respondents with high working memory, as shown in Figure 3, $t(82) = 2.69$, $p < .009$. Older respondents with low working memory, however, were again unaffected by question order, $t(78) = 0.20$, $p = .84$.

A planned contrast (see top panel of Table 1) again confirmed the reliability of the predicted overall pattern, $t(240) = 2.94$, $p < .004$. Moreover, a comparison of older respondents with high and low working memory (see bottom panel of Table 1) again confirms that these two groups differ from one another, $t(240) = 2.27$, $p < .02$, consistent with the hypothesis that working memory capacity rather than age per se is the crucial variable.

5. Discussion

We explored the role of age-related changes in cognitive functioning in the emergence of two of the most robust question order effects in the survey literature, namely the abortion context effect identified by Schuman and Presser (1981) and the norm-of-evenhandedness effect initially identified by Hyman and Sheatsley (1950) and investigated in more detail

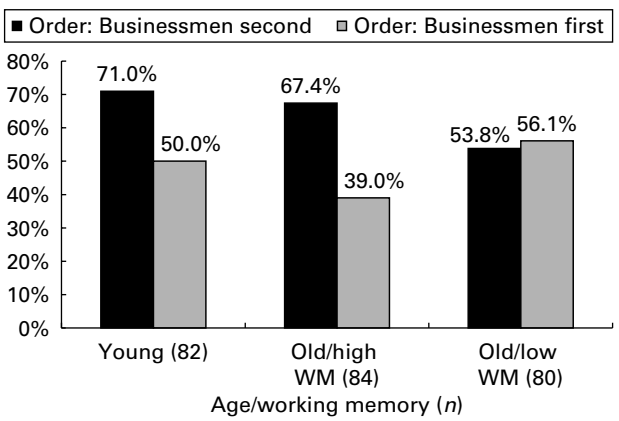

Fig. 3. Strike experiment: Percent supporting businessmen's right to shut down their factories and stores

by Schuman and Ludwig (1983). As expected on theoretical grounds, the results of our secondary analyses and laboratory experiments converge on the conclusion that question order effects decrease with respondents' age. The laboratory experiments further suggest that this decrease is a function of age-related changes in respondents' cognitive function, as indexed by working memory capacity. In both experiments, older adults with high working memory capacity showed the usually obtained question order effects, whereas no question order effects were observed for older adults of comparable age with low working memory capacity. Given that working memory is correlated with other age-related changes in cognitive function (Park 2000), future research may fruitfully address the relative contributions of different cognitive abilities. Finally, the obtained differences cannot be traced to differences in educational attainment, given that participants' level of formal education was equated across the age groups in the laboratory experiments.

As a mirror image of these findings, Knäuper (1999) observed that response order effects *increase* with respondents' age. Specifically, older respondents are more likely than younger respondents to endorse the last response alternative read to them in telephone interviews, presumably because limited working memory capacity interferes with the simultaneous consideration of multiple response alternatives. The observed decrease in question order effects and increase in response order effects is compatible with a working memory account of age-sensitive context effects, but difficult to reconcile with an attitude strength account (Sears 1986), which would predict similar resistance across different forms of context effects.

As the present findings illustrate, age-sensitive context effects have the potential to invite misleading conclusions about cohort differences in attitudes and opinions. For example, when respondents were first asked whether legal abortion should be available to a woman who "does not want any more children," younger respondents reported more liberal attitudes towards abortion than older respondents, resulting in cohort differences of more than 20 percentage points in the secondary analyses (Study 1) as well as the laboratory experiment (Study 2). Yet, when the child defect question preceded the general abortion question, these cohort differences were either eliminated (Study 1) or strongly attenuated (Study 2). Similar reversals of the ordinal placement of cohorts have been observed as a function of age-sensitive response order effects (Knäuper 1999). For example, Schuman and Presser (1981) asked respondents in a telephone interview, "Should divorce in this country be easier to obtain, more difficult to obtain, or stay as it is now?" Depending on conditions, the response alternative "more difficult" was read to respondents as the second or as the last alternative. Consistent with the general results of the meta-analysis (Knäuper 1999), the size of the observed recency effects increased with respondents' age. More than 61 percent of the respondents aged 65 and above endorsed that divorce should be more difficult to obtain when this alternative was presented last, whereas only 36.4 percent of the respondents younger than age 55 did so, resulting in a cohort difference of more than 24 percentage points. Yet no cohort difference was observed when "more difficult" was presented as the middle alternative, with 31.8 percent of the older and 31.4 percent of the younger respondents endorsing this alternative.

These examples highlight how age-related changes in cognitive functioning can give rise to age-related differences in the response process. At present, we know on the basis of meta-analyses that age-related differences in the emergence and size of response order

effects are quite common (Knäuper 1999); whether this also holds for the age-related differences in the emergence and size of question order effects documented in the present studies awaits further research.

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