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Measuring knowledge of nature and politics in surveys

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ABSTRACT

Measures of knowledge are important in all social sciences, and increasingly so in political science. But there jury is still out on how to actually produce accurate measures of the concept. This study examines three different and fairly common measures of political knowledge: the true/false format, the multiple-choice format and the open-ended format of which the multiple-choice format is the most commonly used measure. Questions such as how knowledge measurements vary when different question formats are used and which format puts the least burden on respondents are explored. To further validate the results outside the realm of political science, a set of very different questions are asked, namely questions relating to the identification of different kinds of animals and plants. Differences across formats in this area should lend additional support to the findings.

An experimental approach is employed where respondents (N=1,209) are randomly assigned to one of the three formats. It is hypothesized that more response options produce less correct answers since it makes guessing more difficult for respondents who do not know the correct answer. Further, more response options should also be more cognitively taxing.

As expected, more response options do indeed produce a lower number of correct answers. And answering questions with more response options take more time, especially for open-ended questions, which is an indication of greater burden on respondents. Looking at nature knowledge as well as political knowledge scores, the four-option format is outperformed by the true/false and the open-ended format. In the case of differences of means the four-option format is rarely able to discriminate between high and low scorers in different subgroups. It also produces lower alphas than the two other measures when reliability tests are performed.

MEASURING KNOWLEDGE OF POLITICS AND NATURE IN SURVEYS

Introduction

Our so called post-industrial economies are increasingly focused on the production and dissemination of knowledge and information. The social sciences have tried to conceptualize the effects of knowledge on different aspects of society, such as the economy (e.g. Bell 1973; Knorr Cetina 1999; Rubio & Baert 2011). Knowledge is also a significant factor in political science due to the construct's importance in studying political behavior (Zaller 1992). How to actually measure knowledge is however not clear-cut. First, it is difficult to decide which set of indicators that are sufficient to represent the general knowledge level of a specific area. Second, one has to determine whether the chosen set of questions is representative of one or several different knowledge dimension or, to borrow Knorr Cetina's terminology (1999), different 'epistemic settings'. Some have claimed that knowledge of political questions is unidimensional (see e.g. Delli Carpini & Keeter 1993). Those who are familiar with party politics are also likely to know some things about other questions that relate to politics. Others claim that political knowledge is multidimensional (e.g. Weith & Krouwel 2013). Finally, one has to decide on what format to use in questionnaires. This last point is the main focus of this note, but the other points will also be touched upon.

Measuring knowledge

Designing the actual question used to test knowledge has been the topic of several previous works, among them Delli Carpini and Keeter (1993). They mention three more or less common formats for these questions: the *true/false* format, the *multiple-choice* format and the *"free response"/open-ended* format. The first question format, the *true/false* format, is a simple statement, e.g. "The Swedish riksdag (parliament) has 349 members," to which respondents can answer "true" or "false". This is a commonly used measure, mainly because it is simple and takes up the least space when using self-administered questionnaires. The second format, the *multiple-choice* is similar to the true/false format, but the question has several factual response options. The third format is the *open-ended* format where respondents can provide virtually any answer to a question such as "How many members are there in the Swedish riksdag?"

Delli Carpini and Keeter (1993) recommend using the multiple-choice format over the true/false-format, arguing that guessing is reduced with more response options. On the same note, Kubinger and Gottschall advocate the use of open-ended format rather than multiple-choice and true/false using the same argument: more response options means less guessing biases. Even though Delli Carpini and Keeter mention the open-ended format they do not test it and dismiss it as too demanding for both respondents and the data management/analysis side (1993, p. 1183). Gibson and Caldeira argue that open-ended format leads to substantial underestimation of knowledge levels, but they make no

persuasive effort to compare the formats (2009). Other worries are that different formats do not measure the same underlying knowledge construct (Ackerman & Smith 1988).

Another important aspect of asking knowledge questions is whether to use (don't know) DK options. Delli Carpini and Keeter recommend DKs since guessing is decreased. This is disputed by Mondak and Davis (2001) who argue that guessing is inevitable and that DKs simply introduces a bias in terms of different guessing propensities. Mondak and Anderson argue that most DK answers reflect reluctance rather than ignorance (2004). Sturgis, Allum and Smith (2008) have dismissed this last argument by showing experimentally that, when asked to give their "best guess", respondents who initially answer DK are only insignificantly more likely to give a correct answer than pure chance would allow. These results are, however, based on only a few items and using the true/false format. Miller and Orr (2008) call these results into question and show that partial knowledge often appears to be hidden within DK responses.

Purpose of the note

This working paper aims to assess several different questions. Three formats are tested: the *true/false* format (here including a "don't know"-option [DK]), the *multiple-choice* format (here called the *four-option* format due to the four response options available to respondents) and the *open-ended* format. How do knowledge measurements vary when different question formats are used? How many response options should be used or should an open-ended format be used where respondents are given no response options at all? Which format puts the least burden on respondents? Are the questions good measures of different knowledge dimensions? To further validate the results outside the realm of political science, a set of very different questions are asked, namely questions relating to the identification of different kinds of animals and plants. If differences across formats are also prevalent in this area, it should provide additional support for the findings.

Note that this is not an actual factorial design. The note simply looks at different variants of knowledge questions. Still, the three different formats can be ordered by how easily a respondent can guess the correct answer. Less response options makes guessing the correct one easier (see e.g. Kenski 2003). Assuming that some of the respondents guess whenever they do not know the correct answer, it can be hypothesized that the three formats represent three levels of difficulty. True/false should be the easiest, which on average means more correct answers. However, the number of respondents guessing may be distorted by including a DK option. The four-option format has a medium difficulty level, and the open-ended format is the most difficult since no "hints" are given in the form of response options. All items were chosen to provide several different levels of difficulty. The six political items were only presented in text (see appendix table A.1). Animal/plant recognition, however, calls for the use of pictures (see appendix figures A.1-3): the true/false and the open-ended format shows a picture for each item, the four-option format has four different pictures for each item.

Method and representativity

The data was collected in the seventh wave of the Citizen Panel between June 12 and July 7 in 2013. 2,700 mainly opt-in panelists[1] were randomly assigned to three different groups of 900. 2,500 e-mails did not bounce in the initial mailing. 1,209 answered the survey – a net participation rate of 48 percent. Each group received 11 knowledge questions all in all, of which 5 were animals/plant questions and 6 were questions about political facts. Respondents were given all questions in one of the three tested formats. In addition to this experiment, the respondents were also included in two other non-related studies.

As mentioned above, a majority of the sampled panelists were opt-ins and not representative of the population. 68 percent of the sample are male, 63 percent have a high level of education and 43 percent state that they are very interested in politics (the fourth point on a four point scale). Interest in nature, measured on a five point scale, is less skewed with 52 percent interested respondents (defined here as point 4 and 5 on the scale). No significant differences were found between the treatment groups in terms of gender, education or the two interest indicators at the .05-level.

Descriptive results

Figure 1 (animals/plants) and figure 2 (political questions) show what percentage of answers for the different items were correct. Note that the true/false format included a DK option. Figure 1 and 2 include the percentage correct answers with the true/false format counting DKs both as incorrect answers (black bar) and as missing (grey bar). In line with Sturgis, Allum and Smith's (2004) results DKs are counted as "incorrect" answers for the remainder of this study.

Among the animal/plant questions, the most difficult question across all formats was the white-backed woodpecker, on average 23 percent of respondents gave the correct answer (true/false[2]: 43 percent, four-options: 20 percent, open-ended[3]: 5 percent). The political questions show a bit more variation, but on average the most difficult was what percentage of land in Sweden is environmentally protected with 25 percent correct answers (true/false: 35 percent, four-option: 35 percent, open-ended: 3 percent).

[1] 87 percent of the panelists in the original sample were opt-ins. 83 percent of the actual respondents were opt-ins.

[2] Whether the statement was true or not was randomized, and so was the order of the four response options in the four-option format.

[3] While coding the open-ended questions we had to make a decision regarding what is considered as a correct answer and what is an incorrect one. The answers to the animal questions had to be specific, preferably species. "Woodpecker" was considered incorrect, while "white-backed woodpecker" was correct. "Deer" was incorrect, while "red deer" was correct. Still harder to code was the political questions. Answers to more static facts such as the number of counties or the number of MPs in parliament had to be spot on. For questions where the correct answer varies from month to month, such as unemployment rate, we decided on specific intervals which were correct.

Figure 1. Percent correct answer, animal/plant questions

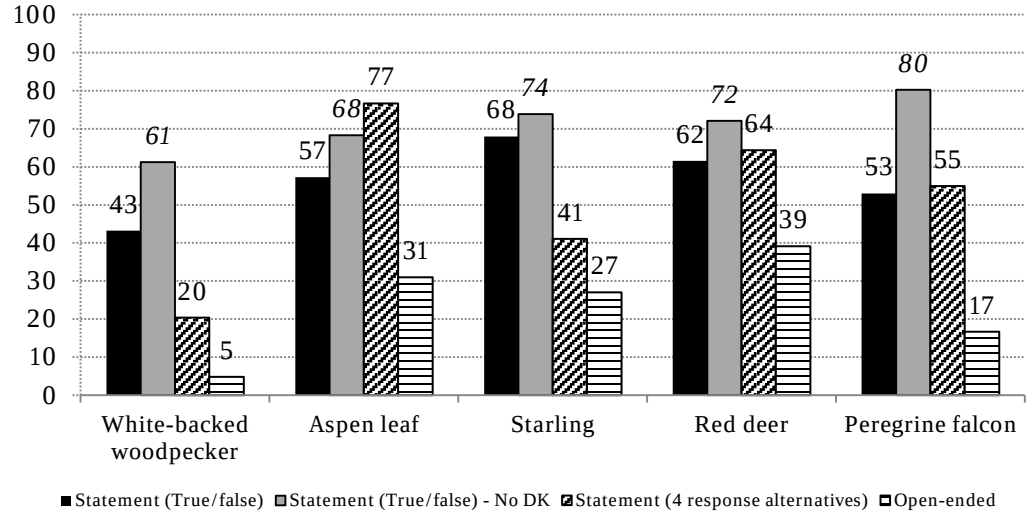
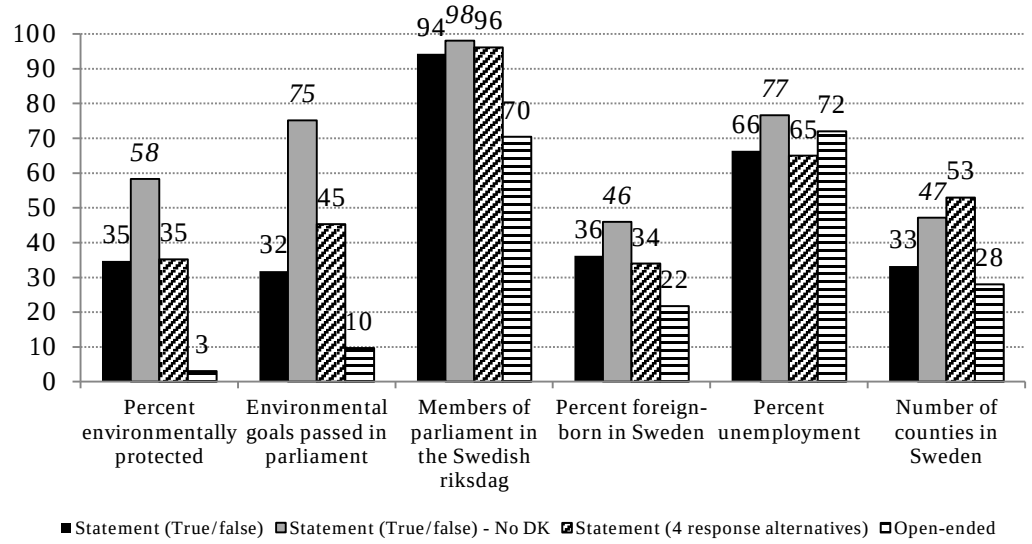


Figure 2. Percent correct answer, political questions



Average percentages of correct answers within each format were calculated (see table 1). The animal/plant questions with true/false format had a mean of 56 percent correct answers, animal/plant four-options: 51 percent, open-ended: 22 percent. Political questions were only slightly easier (and with one additional item), correct/false: 49 percent, four-options: 54 percent, open-ended: 33 percent. A measure of the average number of correct answers shows that differences between the true/false and four-option formats are very small, but open-ended questions produce a much smaller number of correct answers.

Table 1. Descriptive table of correct answers (percentages)

	Nature			*Politics*			*Combined*		
Variable	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**
True/False	56	29	385	49	22	385	52	20	385
Four-option	51	25	419	54	22	419	53	18	419
Open-ended	22	22	405	33	20	405	28	16	405
Total	43	30	1,209	46	23	1,209	44	21	1,209

A two-way ANOVA testing differences between formats (animal/plant questions: $F(2, 1209)=214$, $p<.001$; political questions: $F(2, 1209)=106$, $p<.001$; combined: $F(2, 1209)=253$, $p<.001$). Post-hoc tests showed that there indeed is a significant difference between the open-ended format and the other formats at the .001-level, but no significant difference between true/false and the four-option format.

Question validity

To validate the knowledge measures, the percentages of correct answers are compared between different sociodemographic groups as well as more subjective measures of interest and self-reported knowledge.[4] Women should produce less correct answers to political knowledge questions than men as indicated by earlier research (see e.g. Frazer & Macdonald 2003). This is claimed to be related to different propensities to make guesses. More highly educated respondents should produce more correct answers in general, but should also vary depending on educational discipline (e.g. natural or social science, see the comments under table 2.a). Those more interested in politics and who self-report high political knowledge should provide more correct answers on political knowledge questions. Respondents who are interested in nature and who have higher self-reported knowledge of nature should provide more correct answers to questions about animals and plants.[5] An index of how happy respondents are outdoors versus how happy they are in city areas is also used as a proxy for outdoors education and hence how likely it is that they recognize different species of birds and plants (see e.g. Ford 1986). Intuitively, respondents who enjoy spending more time in nature locations ought to be able to identify animals and plants to a greater degree than those who are inclined to enjoy spending their time in cities (see table 2.b).

As indicated by earlier studies, in general women do indeed provide less correct answers to the political knowledge questions than men, and especially so in the true/false case where a DK option is available and the difference is highly significant (see table 2.a. below). Those with less education had fewer correct answers across all formats, but this

[4] When distinguishing between wrong answers and semi-correct answers to the open-ended questions, very similar differences between means were found. See appendix tables A.2 and A.3.

[5] Sturgis and Smith (2010) have found support for a contagion effect of interest questions on knowledge questions. When an interest question precedes knowledge questions the likelihood that a respondent will give a substantive response increases dramatically. In this survey a grid question with several interest items preceded the knowledge questions.

difference was only significant in the open-ended format. Surprisingly, age seemed to matter relatively little.

Table 2.a. Differences of means – sociodemographic variables

	Female–Male	Younger–Older	High edu–low edu	Natural sci edu–no NSE	Social sci edu–no SSE
Nature: True/false	3.6	5.9	5.6	3.4	-4.0
Nature: Four-option	-0.3	4.0	4.8	4.6	-4.1
Nature: Open-ended	0.1	0.8	4.9*	4.8	-7.0**
Politics: True/false	-10.6***	1.6	3.0	-5.0	2.7
Politics: Four-option	-0.4	-5.1*	1.8	-3.5	2.4
Politics: Open-ended	-5.2*	0.7	3.7	6.1*	-2.3
All items, all formats	-1.2	-0.3	3.5**	0.9	-1.6

***Comments*: Significant two-tailed independent sample t-tests are indicated by: *=p<.05, **=p<0.01, ***=p<0.001. Differences have the following setup: Gender: Female vs. Male; Age: >35 vs. <=35 years old; Education: high education vs lower education; Natural science education: natural science education vs. non-natural science education; Social science education: social science education vs. non-social science education. Natural science education includes disciplines such as "Forestry/agriculture" or "Natural science", social science education includes disciplines such as "Media/journalism" and "Social science".**

In general, subjective measures matters more than socioeconomic measures do. As anticipated, respondents more interested in politics give more correct responses to political questions, while those more interested in nature give more correct answers to nature questions than those who do not. The same pattern is seen for subjective knowledge measures. The countryside/city index (see comments under table 2.b) also seem to be related to correct answers on animal/plant questions, which indicate that people who like to spend time in nature are more familiar with the animals/plants featured in the questionnaire.

Table 2.b. Differences of means – subjective variables

	Interested in nature	Interested in politics	High subj knowledge: Nature	High subj knowledge: Politics	City/ Countryside
Nature: True/false	18.3***	-1.0	21.4***	5.3	-12.6***
Nature: Four-option	10.7***	8.1***	15.9***	8.0***	-10.4***
Nature: Open-ended	11.8***	1.0	15.4***	-0.2	-9.8***
Politics: True/false	-1.6	9.9***	0.9	8.4***	-1.2
Politics: Four-option	-2.2	3.3	-0.9	4.2	-4.7*
Politics: Open-ended	2.7	6.3**	2.8	5.8**	0.2
All items all formats	5.2***	-6.4***	8.9***	5.9***	-6.0***

***Comments*: Significant two-tailed independent sample t-tests are indicated by: *=p<.05, **=p<0.01, ***=p<0.001. Differences have the following setup: Political interest: high political interest vs low political interest; Nature interest: high nature interest vs low nature interest; Subjective nature knowledge: high knowledge vs. low knowledge; Subjective political knowledge: high knowledge vs. low knowledge; City/countryside index: enjoys city locations more vs enjoys nature locations more. Interest in politics is measured on a 4 point scale (4=high interest), interest in nature and subjective knowledge measures uses a 5 point scale (4/5=high interest). The**

countryside/city balance index is based on a grid question with 8 items which are about how happy respondents are when they are in different places measured on a 4 point scale. The items were "Forests", "Lake areas", "Agricultural areas", "Seaside", "Mountains", "Large cities", "Smaller cities" and "Parks". The first 5 were counted as countryside areas, and the last three as city areas. Countryside items were computed as negative values (the happier, the more negative numbers on the index). The means of countryside items and the means of the city items were merged to form a single index (Mean: -0.12, SD: 0.23, Min: -1, Max: 0.78) (<0=enjoys spending time in the nature).

The Cronbach's alpha coefficients shown in table 3 indicate that the four-option format is consistently the least reliable measure. The political knowledge items get lower alphas than the nature items, which could imply that there is a wider range of underlying factors (see also the Dimensionality section below). Feldt tests of significance comparing two independent Cronbach's alpha values (Feldt 1969) were carried out showing that most of the alphas did not differ from each other. But the four-option format alphas are consistently and significantly lower than the two other formats alphas.

Table 3. Cronbach's alpha across conditions and question content

	Alpha	n	No of items
Nature: True/false	0.52[b]	385	5
Nature: Four-option	0.42[a]	419	5
Nature: Open-ended	0.44	405	5
Politics: True/false	0.40	385	6
Politics: Four-option	0.32[c]	419	6
Politics: Open-ended	0.47[b]	405	6
Combined: True/false	0.54[b]	385	11
Combined: Four-option	0.45[a]	419	11
Combined: Open-ended	0.51	405	11

Comments: Feldt tests (1969) were made to test significance between the different formats within each domain as well as the combined format measures. The letters denote the following: a=significantly different from true/false questions, b=significantly different from four-option questions, c=significantly different from open-ended question at the .05-level.

Question efficiency

Another aspect of choosing a good measure is how much time it takes to answer each question. Differences between nature and politics could be a result of the fact that the nature questions featured pictures, which might take longer to process than simply having to read a text. Average time spent on nature questions was generally longer than the time spent on the politics questions using the same format, but it is not significantly different from zero in all cases (true/false: p=0.05; four-option: p=0.00; open-ended: p=0.00). The pictures could also explain why it takes as long to answer the four-option animal question, having four different pictures, as it takes processing a single picture in the open-ended question format (17 versus 16 seconds/item, a non-significant difference [p=0.57]). This pattern is not observable in the case of politics questions where the four-option format takes less time (11 seconds/item) than the open-ended (14 seconds/item), a difference which is significant (p=0.00). Respondents in the Citizen Panel might also be generally

unaccustomed and unfamiliar with things related to nature, but such an effect is indistinguishable from the picture effect. Unfortunately, for technical reasons it was not possible, in this specific survey, to match time spent with specific survey answers, which is why the analysis cannot link time with other indicators.

Table 3. Time use

	Mean time used (sec)	Mean sec/item	Median (sec/item)	SD (sec/item)	N
Nature: True/false	53	11	8	8	356
Nature: Four-option	84	17	15	9	370
Nature: Open-ended	82	16	14	11	355
Politics: True/false	57	10	8	7	339
Politics: Four-option	68	11	9	8	364
Politics: Open-ended	84	14	12	9	356

***Comments*: Time was measured on a page by page basis and the pages contained all the items within one area (first all the nature questions on one page then all the politics questions on a second page), which means two time measures per respondent (pages=2,250). Answer times exceeding 5 minutes/page were excluded: 110 pages or 4.9% of all pages shown.**

Finally, item nonresponse is a good indicator of quality, but even though the open-ended format induces the most item nonresponse, it is a surprisingly low number considering there was no specific non-response discouragement (true/false: 0.02 percent, four-option: 0.02 percent, open-ended: 2.36 percent).

Dimensionality

A factor analysis reveals, not surprisingly, that the animal/plant and the political questions are fairly separate areas of knowledge. There are indications that knowledge about environmental politics is a different dimension from "general" politics but there is some overlap. Note however that the very low explanatory power suggest a non-complete set of items to measure these potential knowledge dimensions. Furthermore, factor analyses assume continuous variables and the items used are all dichotomized.

Table 4. Obliquely rotated factor loadings, all 11 items included, dichotomous variables

Component	1	2	3
Woodpecker	0.22		0.22
Aspen leaf	0.34		
Starling	0.48		
Red deer	0.43		
Peregrine falcon	0.43		
Pct area protected			0.30
No of env goals		0.23	0.29
No of MPs		0.33	
Pct foreign-born		0.28	

Pct unemployed		0.28	
No of municipalities		0.47	

Eigenvalues	1.45	0.36	0.1
Percentage of total variance	13.2	3.3	0.9
Number of items	5	5	3

loadings=>abs(.2)

Discussion

Measuring knowledge is rife with various sorts of problems. This note attempts to shed some more light on the various issues that have been put forth by for example Delli Carpini and Keeter (1993). At least six main topics related to measuring knowledge have been touched upon in this note: 1) how many response options to use, 2) what those response options should be and 3) what facts to probe. One also has to 4) choose between a true/false format and having several different factual response alternatives and 5) whether the presented statement (in the case of a true/false question) is true or false. A sixth point is that one has to choose whether to use a DK response alternative or not. The discussion will focus mainly on issues 1-3 and briefly on issue 6.

The data examined in this study indicates that results vary substantially between different formats, which previous research also has shown (e.g. Kenski 2003). The results presented in this note show that the open-ended format produces significantly less correct answers, which by itself could suggest a more realistic or "correct" representation of actual knowledge levels. It is more likely that 5 percent know what the white-backed woodpecker looks like (using the open-ended format)[6] than 43 percent (using the true/false format). However, it is likely that some respondents who have partial knowledge in the area simply do not answer when they are not sure of the correct answer (see e.g. Mondak & Davis 2001). In that sense, the open-ended format is likely to underestimate knowledge levels.

One of the most important differences between the presented formats is the chance of randomly picking out the correct answer. If respondents have a hunch what the correct answer is, response options makes picking the correct answer easier. The chance of picking out the correct answer among two response options is 50 percent (note that introducing a DK option decreases guessing, but at the same time it introduces a bias in terms of different guessing propensities), while if you have four response options there is 25 percent chance. Interestingly, Miller and Orr (2008) point out that since more response options increases the amount of available information, it could also potentially "motivate respondents to draw on their partial knowledge" (p. 779). This could be one of the reasons why the four-option and true/false format does not differ as much as one

[6] 85 percent were actually close in this case by simply answering woodpecker or another non-correct woodpecker species.

could expect, along with the fact that the true/false format carried a DK option (which deflated the amount of correct responses).

The open-ended format provides as many response options as there are combinations of buttons on a respondent's keyboard. Intuitively speaking, using open-ended format should be the most reliable measure of levels of knowledge in a population since it mitigates guesswork. This notion is strengthened to some degree by stronger correlations and more significant correlations with, for example, education. The standard true/false variant also performs relatively well. Using open-ended questions with pictures also introduces a barrier to simply looking up the answers on the internet, a problem that is apparent in self-administered questionnaires. Respondents cannot easily look up a picture on the internet, and even though it might be possible to do so, it still takes longer. As such, it might not be a viable strategy for most respondents. By contrast, imagine searching for the number of MPs in the Swedish riksdag, a fact found in a matter of seconds, which also makes it practically impossible to discern "googlers" from "non-googlers".

There are however some other issues with this format. What should be done with answers that are almost, but not quite, correct? Suppose respondents answer "woodpecker" rather than "white-backed woodpecker" or answer that there are 289 counties in Sweden, rather than 290. Coding open-ended questions always involves making case-by-case interpretations. In this study, these were coded as wrong answers. One possible alternative would be to code these as slightly correct answers (0.5 points rather than 1, see e.g. Randler 2008), but then one ends up having to define several different criteria. On the other hand, having open-ended questions makes it possible to discern several levels of knowledge, and not simply correct and incorrect. Those who have a hunch, but do not recall the exact answer and are unable to formulate it without help, ought to differ from those who have no idea. Still, differing guessing propensities is still a problem here.

What facts to investigate, the content of a question, is a more ethereal aspect of measuring knowledge, or as Delli Carpini and Keeter puts it: '[o]ne cannot easily define the "sampling frame" of political facts' (1993, p. 1181), a problem which is also true when dealing with nature facts. Questions ranged from difficult (white-backed woodpecker and number of environmental goals passed in parliament) to easier questions (aspen leaf and number of MPs) to discriminate between different knowledge levels as suggested by Delli Carpini and Keeter (ibid., p. 1187). The response options were also designed to be fairly far away from the correct answer since it is often difficult to say whether for example the unemployment rate is 8.7 or 8.8 - both could be true due to uncertain measuring methods.

Summary

As always in the survey methodology field, different measures have their own distinctive advantages and disadvantages. One conclusion, however, is that both the true/false and the open-ended format outperform the four-option format, no matter if one looks at nature knowledge or political knowledge scores. In the case of differences of means the four-option format is rarely able to discriminate between high and low scorers in different

subgroups. It also produces lower alphas when reliability tests are performed. However, determining whether to use the true/false or the open-ended format is still an unresolved question.

As mentioned earlier, this is not a factorial design. Since the true/false format included a DK response option, it produced similar knowledge levels as the four-option format. A stringent factorial design could not have included a true/false version, since it does not suit questions with more than two substantial response options (the response could only be either "true" or "false"). A follow-up study should either exclude the DK option or add it to the four-option format of which the latter would be preferable.

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Appendix

Figure A.1. True/false format, animals/plants

47. Är det en vitryggig hackspett man kan se på bilden?

Ja
Nej
Vet inte

48. Är det asplöv man kan se på bilden?

Ja
Nej
Vet inte

49. Är det en stare man kan se på bilden?

Ja
Nej
Vet inte

50. Är det en kronhjort man kan se på bilden?

Ja
Nej
Vet inte

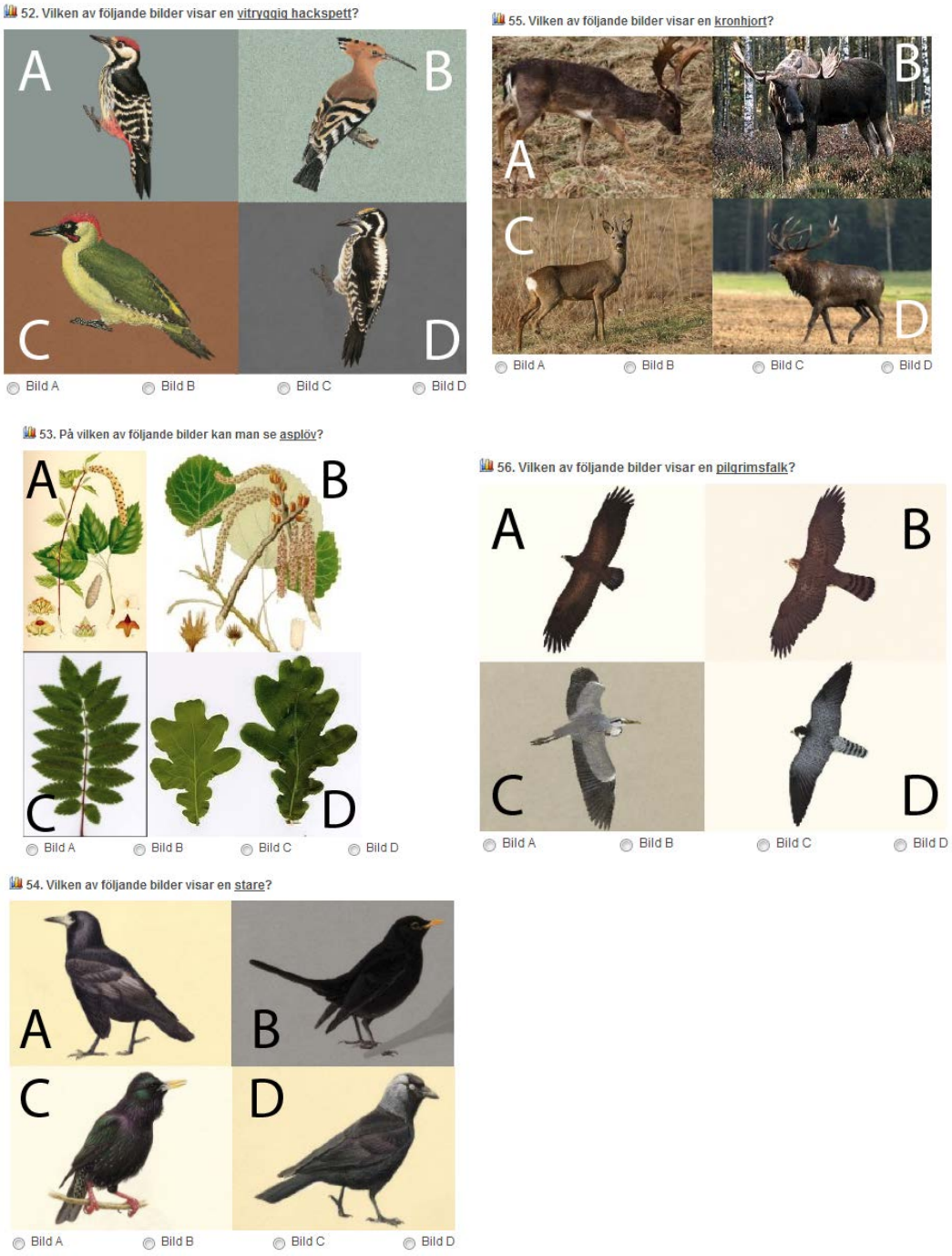
51. Är det en pilgrimsfalk man kan se på bilden?

Ja
Nej
Vet inte

<< Föregående

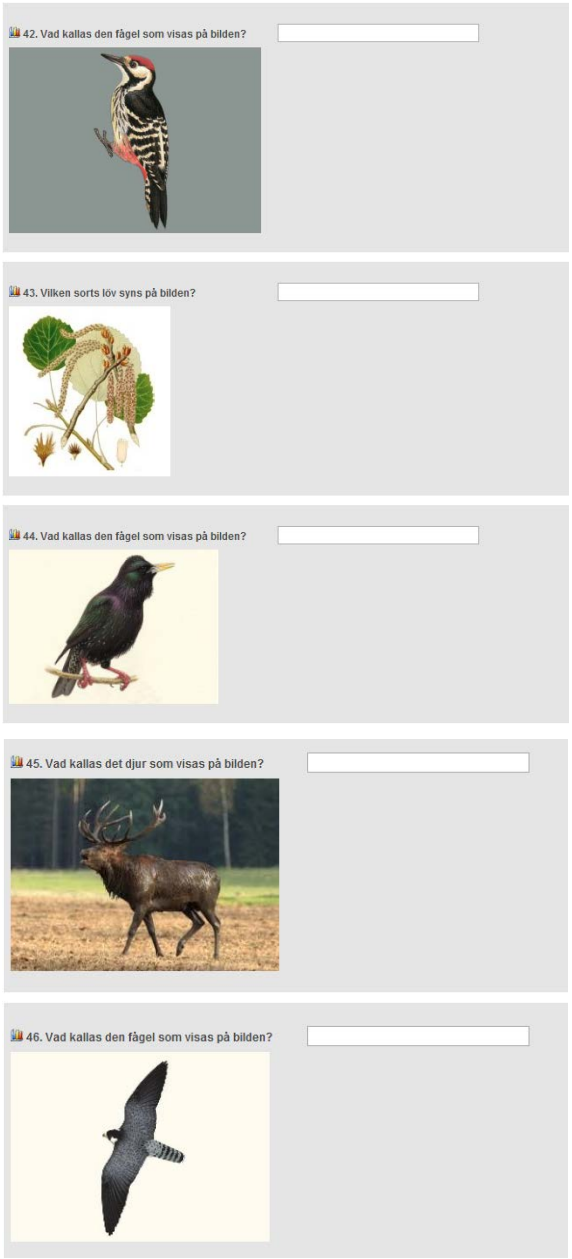
Comments: From top left to bottom right: white-backed woodpecker (true), aspen leaf (false), starling (false), red deer (false), peregrine falcon (true).

Figure A.2. Open-ended format, animals/plants



Comments: From top left to bottom right: white-backed woodpecker (A), aspen leaves (B), starling (C), red deer (D), peregrine falcon (D).

Figure A.3. Open-ended format, animals/plants



Comments: From top to bottom, a white-backed woodpecker, aspen leaves, starling, red deer, peregrine falcon.

Table A.1. Political knowledge questions

Format	Question	Correct answers/response options:			
True/false	11.5 percent of Sweden's area is environmentally protected	(True)			
	The Swedish rikdag has passed 16 environmental goals	(True)			
	The Swedish riksdag has 349 members of parliament	(True)			
	9 percent of Sweden's population is foreign-born	(False)			
	12.8 percent of the Swedish workforce is unemployed	(False)			
	There are 272 counties in Sweden	(False)			
Four-option	What percentage of Sweden's area do you think is environmentally protected?	1) 24	**2) 11.5**	3) 6.5	4) 17
	How many environmental goals has been passed in the Swedish riksdag?	**1) 16**	2) 33	3) 3	4) 7
	How many members of parliament are there in the Swedish riksdag?	1) 299	2) 325	**3) 349**	4) 375
	How many percent of the Swedish population are foreign-born?	1) 12	2) 20	**3) 15**	4) 9
	How many percent of the Swedish workforce is unemployed?	**1) 8.7**	2) 6.9	3) 12.8	4) 5
	How many counties are there in Sweden?	1) 320	**2) 290**	3) 272	4) 180
Open-ended	What percentage of Sweden's area do you think is environmentally protected?	(11.5)			
	How many environmental goals have been passed in the Swedish riksdag?	(16)			
	How many members of parliament are there in the Swedish riksdag?	(349)			
	How many percent of the Swedish population are foreign-born?	15			
	How many percent of the Swedish workforce is unemployed?	(8.7)			
	How many counties are there in Sweden?	(290)			

***Comments*: The four-option format's correct response option is bolded**

Table A.2. Differences of means – sociodemographic variables

	Gender	Age	Education	Natural science ed	Social science ed
Nature: Open-ended	0.1	0.8	4.9*	4.8	-7.0**
Nature: Open-ended, semi-correct	1.4	1.6	3.9	4.9	-6.9**
Politics: Open-ended	-5.2*	0.7	3.7	6.1*	-2.3
Politics: Open-ended, semi-correct	-5.3*	0.2	4.2	5.4	-1.2
All items, all formats	-1.2	-0.3	3.5**	0.9	-1.6

***Comments*: Answers were considered semi-correct if respondents wrote, for example, "woodpecker" rather than "white-backed woodpecker". See table 2.a for further details.**

Table A.3. Differences of means – sociodemographic variables

	Interest in nature	Interest in politics	Subjective knowledge: Nature	Subjective knowledge: Politics	Countryside/ City
Nature: Open-ended	-11.8***	-1.0	-15.4***	0.2	-9.8***
Nature: Open-ended, semi-correct	-13.3***	-0.3	-16.4***	0.9	-9.4***
Politics: Open-ended	-2.7	-6.3**	-2.8	-5.8**	0.2
Politics: Open-ended, semi-correct	-2.4	-6.6***	-2.6	-6.8***	0.4

Comments: **Answers were considered semi-correct if respondents gave a response that was within a certain interval. For example +/-2 on the number of environmental goals passed in parliament. See table 2.a for further details.**

Svensk titel: Att mäta kunskap om natur och politik i enkäter

LORE working paper 2014:3

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SAMMANFATTNING

Kunskapsmått är viktiga i alla samhällsvetenskaper och de blir allt viktigare inom statsvetenskapen. Det är dock fortfarande oklart hur man faktiskt bör gå tillväga för att mäta begreppet kunskap. Den här studien undersöker tre olika och relativt vanliga mått på politisk kunskap: sant/falskt-formatet, flervalsformatet och fritextformatet (öppen fråga) av vilka flervalsformatet är det vanligast använda. Frågorna som undersöks är bland annat hur kunskapsmått varierar när olika format används och vilket format som lägger minst börda på respondenterna. För att ytterligare validera resultaten utanför den statsvetenskapliga disciplinen används också en annan uppsättning frågor, nämligen sådana som relaterar till kunskap om djur och natur. Skillnader mellan formaten inom det här området ger ytterligare stöd till resultaten.

Ett experimentellt tillvägagångssätt används där respondenter (N=1 209) fördelas slumpmässigt att svara på frågor med ett av formaten. Det antas att ju fler svarsalternativ en fråga har desto färre rätta svar ges eftersom det gör det svårare att svara rätt för respondenter som inte vet det rätta svaret. Vidare borde fler svarsalternativ vara mer kognitivt krävande.

Som förväntat ger frågor med fler svarsalternativ lägre andel rätta svar. Dessutom tar det längre tid att svara på sådana frågor, speciellt när det kommer till fritextfrågor, något som indikerar att de är mer betungande för respondenter. Oavsett om man undersöker andelen rätta svar på kunskap om politik eller på kunskap om natur, så överträffas flervalsformatet av både sant/falskt- och fritext-formatet. När det kommer till skillnader i medeltal kan flervalsformatet sällan skilja på olika undergrupper. Vid reliabilitetstester blir också alpha-måtten lägre för flervalsformatet än för de båda andra formaten.

The Laboratory of Opinion Research (LORE) is an academic web survey center located at the Department of Political Science at the University of Gothenburg. LORE was established in 2010 as part of an initiative to strengthen multidisciplinary research on opinion and democracy. The objective of the Laboratory of Opinion Research is to facilitate for social scientists to conduct web survey experiments, collect panel data, and to contribute to methodological development. For more information, please contact us at:

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