

RESEARCH NOTE

Midpoint Misperceptions on 1-to-10 Scales

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How many posts are needed to build a 100-ft fence with 10-ft intervals? The most intuitive approach to solving this problem (division) suggests that 10 posts are sufficient, but the correct procedure is to divide and then add one, to account for a post at each boundary. Survey respondents interpreting 1-to-10 scales may make a similar mistake, using division to incorrectly determine that the scale's midpoint is half the highest value. Such a misperception would bias item means downward, defeat the purpose of a forced-choice scale, and introduce inferential uncertainty.

Consider the New Russia Barometer item that asks respondents to place their country on a scale, where 1 represents complete dictatorship and 10 represents complete democracy. Rose (2002) presented results from this item in three categories: (a) those rating the Russian Federation closer to a dictatorship by selecting a value between 1 and 4; (b) those rating the Federation closer to a democracy by selecting a value between 6 and 10; and (c) those placing their responses midway between the scale endpoints at a value of 5.

Such coding of 5 as the "psychological mid-point" of a 1-to-10 scale (Rose, Munro, & Mishler, 2004) has been reflected in some studies (Tio, LaCaze, & Cottrell, 2007; Trussell, Vaughan, & Stanford, 1999), but not in others that have divided responses at the numeric median of 5.5 (Shin Cohen-Schotanus et al., 2008; Chu, 2004). This choice can have important inferential consequences: The Rose coding suggests that more Russians in 2004 rated their country closer to a democracy than to a dictatorship, because 40% selected a value more than 5, only 33% selected a value less than 5, and 27% chose 5 (Rose, Munro, & Mishler, 2004). However, if 5.5 is considered the cut point between scale halves, then a majority of Russians (60%) rated their country closer to a dictatorship.

Data

Points 5 and 6 represent an equivalent marginal leaning on a 1-to-10 scale. Therefore, if respondents interpret this scale correctly, then over a large number of diverse and balanced items, sometimes more respondents should lean leftward to 5 relative to 6, sometimes more respondents should lean rightward to 6 relative to 5, and sometimes respondents should lean leftward to 5 and rightward to 6 at similar rates. But if some respondents perceive 5 to be the midpoint of a 1-to-10 scale, then responses should be systematically biased in favor of 5 relative to 6, because 5 will attract responses from those who lean toward the left of the scale and from those who are neutral and misperceive 5 as the midpoint.

The 2005–2008 wave of the World Values Survey contained 47 items that measured responses on a 1-to-10 scale.¹ These items had substantial variation in subject matter and response distribution: the most commonly selected value on the scale was 10 for 19 of the items and 1 for 18 of the items, and topics included the perceived benefits of science and technology, essential characteristics of democracy, self-reporting of political ideology and income, and the justifiability of practices such as abortion and prostitution (see Appendix A for item wording and prompts).

Two dichotomous variables were constructed for each item: for one of these variables, a response of 5 was coded as 1, and all other non-missing values were coded as 0; for the other variable, a response of 6 was coded as 1, and all other non-missing values were coded as 0. Values of these variables were then compared to each other with a two-tailed difference-in-proportions test at the 0.05 significance level.

Results

Response distributions provided evidence in favor of the hypothesis that some respondents interpret 5 to be the midpoint of a 1-to-10 scale. The percentage selecting 5 was higher than the percentage selecting 6 for 44 of the 47 items, with no statistical difference for items v46, v93, and v162. Table 1 reports statistics for this analysis.

¹The 2005–2008 wave of the World Values Survey was conducted in 57 countries with a target population of adults aged 18–85 years, although older and younger respondents were included in some surveys. Calculation of an overall response rate was not possible, since response rates for several surveys were not available in the documentation. Responses to some items were not measured in each country or were not measured on a 1-to-10 scale. Respondents in several African countries had difficulty placing responses on a 1-to-10 scale in which each endpoint corresponded to a statement; responses from African countries were not included in the analysis since additional—and sometimes varying—information was provided in some cases: Respondents in Ghana and Rwanda were instructed that 5 indicated a neutral position, but respondents in Ethiopia were told that the scale forced a preference for 5 or 6 (see World Values Survey technical documentation).

Table 1
Results from 1-to-10 Scales on the 2005–2008 Wave of the World Values Survey

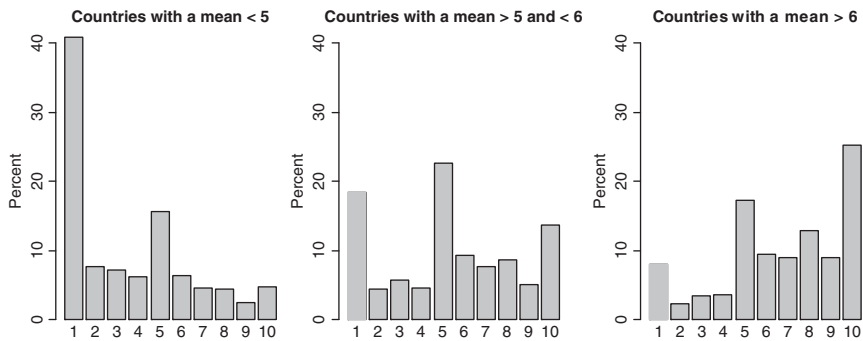
Variable	Obs.	Pct 5	Pct 6	<i>z</i> -score	<i>p</i> -value	Median	Mean	Mode
v22	65,892	12.6	10.9	9.6	.00	7	6.9	8
v46	63,189	11.5	11.3	1.1	.26	8	7.2	8
v47	56,709	16.5	11.6	23.7	.00	6	5.8	5
v68	60,899	15.4	13.8	8.0	.00	6	6.0	7
v91	46,095	12.7	10.8	9.1	.00	7	7.1	10
v92	45,916	9.8	9.2	3.2	.00	8	7.3	10
v93	45,890	9.3	9.3	0.4	.68	8	7.3	10
v94	44,846	14.9	10.0	22.3	.00	6	6.0	10
v114	45,513	27.3	14.1	49.2	.00	5	5.7	5
v116	58,889	12.2	9.2	16.9	.00	6	5.8	8
v117	54,262	19.6	10.0	44.4	.00	5	5.5	5
v118	61,737	14.7	8.6	33.3	.00	5	4.8	1
v119	58,434	16.1	6.7	50.3	.00	3	3.9	1
v120	58,151	14.0	7.5	35.8	.00	4	4.4	1
v121	56,534	15.2	11.0	20.8	.00	7	6.4	10
v122	49,263	12.2	9.6	13.2	.00	7	6.8	10
v123	49,008	13.6	11.2	11.6	.00	7	6.7	8
v152	54,140	12.3	8.5	20.2	.00	7	6.6	10
v153	52,095	12.1	6.6	30.1	.00	3	4.0	1
v154	54,955	4.6	4.2	3.1	.00	10	8.6	10
v155	54,728	9.0	7.9	6.9	.00	8	7.4	10
v156	52,334	10.6	6.5	23.7	.00	3	4.2	1
v157	53,611	7.1	6.0	7.4	.00	9	8.1	10
v158	54,538	8.1	6.8	8.2	.00	9	7.9	10
v159	54,737	7.4	6.0	9.2	.00	9	7.6	10
v160	53,171	7.2	6.5	4.3	.00	9	7.9	10
v161	55,303	5.3	3.9	10.7	.00	10	8.6	10
v162	56,677	5.2	5.0	1.3	.20	9	8.6	10
v163	55,701	14.3	13.2	5.4	.00	7	6.3	8
v178	46,665	7.8	6.8	5.9	.00	9	7.7	10
v192	62,914	6.6	5.7	6.3	.00	9	7.4	10
v198	58,270	7.2	3.5	28.1	.00	1	2.6	1
v199	56,145	7.7	3.5	30.3	.00	1	2.6	1
v200	58,992	5.6	2.4	28.2	.00	1	2.2	1
v201	61,817	3.5	1.4	23.3	.00	1	1.8	1
v202	57,102	12.0	4.9	43.3	.00	3	4.0	1
v203	58,170	11.4	4.9	40.6	.00	1	2.9	1
v204	60,679	13.3	6.1	42.7	.00	3	3.7	1
v205	61,071	17.3	8.0	49.0	.00	5	5.0	1
v206	56,264	12.5	6.3	35.7	.00	4	4.4	1
v207	57,876	8.7	3.5	37.4	.00	1	2.5	1
v208	56,281	2.8	1.2	19.5	.00	1	1.6	1
v221	42,106	14.2	11.2	12.8	.00	7	6.6	10
v244	39,631	12.6	7.0	26.7	.00	5	5.0	1
v245	39,532	12.0	7.2	23.2	.00	4	4.6	1
v246	39,480	12.0	8.8	14.4	.00	7	6.6	10
v253	59,531	17.2	12.4	23.3	.00	5	4.6	5

Note: Pct 5 and Pct 6 indicate the percentage of respondents selecting 5 or 6, respectively. The *z*-score is the *z*-score for a difference-in-proportions test that the proportion that selected 5 is equal to the proportion that selected 6, and the *p*-value is the corresponding two-tailed *p*-value for that *z*-score.

Source: World Values Survey 2005 Official Data File v.20090901, 2009. World Values Survey Association (www.worldvaluessurvey.org).

Figure 1

Distribution of responses to the divorce item on the 2005–2008 wave of the World Values Survey.



Note: Figures display responses to the divorce item (v205) of the 2005–2008 wave of the World Values Survey for countries whose mean response level was less than 5 (left graph), fell between 5 and 6 (middle graph), and was higher than 6 (right graph). The percentage selecting 5 exceeded the percentage selecting 6 in each of these groupings at a statistically significant level. The numbers of observations were 29,528, 8,966, and 22,577, respectively. See Appendix A for item text and prompt.

Source: World Values Survey 2005 Official Data File v.20090901, 2009. World Values Survey Association (www.worldvaluessurvey.org)

Response distributions eliminated alternate explanations. For most items, the median exceeded 5.5, so the observed attraction to 5 relative to 6 was not because lower points were more likely to be selected. Moreover, 10 was often labeled as the positive end of the scale (e.g., v22) or with a positively-worded phrase (e.g., v198 to v208), so the observed attraction to 5 relative to 6 did not reflect a form of acquiescence bias (Cronbach, 1941; Javeline, 1999) in which respondents resolved ambivalence by leaning toward the positive pole.

For 11 items (v198–v208), respondents were asked to indicate their opinion about a particular practice *being never justifiable* (1), *always justifiable* (10), or *somewhere in between*. Divorce (v205) received the mean level of support closest to the scale midpoint on these items and was therefore used in a further test of midpoint misperceptions. On the divorce item, the percentage selecting 5 was higher than the percentage selecting 6 at a statistically significant level when grouping the nineteen countries that had a national mean less than 5 ($z = 35.9$, $p < .01$, two-tailed), when grouping the twenty countries that had a national mean greater than 6 ($z = 24.4$, $p < .01$, two-tailed), and when grouping the seven countries that had a national mean between 5 and 6 ($z = 24.3$, $p < .01$, two-tailed). Figure 1 presents responses for these groupings, illustrating that the observed attraction to 5 relative to 6 on the divorce item was robust to response distribution.

Discussion

Surveys as diverse as the Canadian National Justice Survey, the American Housing Survey, and political barometers in Europe, Asia, Africa, Latin America, and the Arab world measure responses on 1-to-10 scales expected to press those who would otherwise select the midpoint to choose between a slightly left 5 and a slightly right 6. But this practice should be reconsidered. Analysis of the 2005–2008 wave of the World Values Survey suggested that some respondents consider 5 to be the middle of a 1-to-10 scale, which undercuts the effectiveness of a midpoint-less scale designed to foreclose fence-sitting (Vavra, 1997) and satisficing (Krosnick, 1991).

Provisions are available to preempt midpoint misperceptions if researchers prefer the forced-choice feature and relatively large number of points of a 1-to-10 scale. Lack of a middle option can be explicitly indicated by applying labels to 5 and 6 (e.g., “*slightly favorable*” and “*slightly unfavorable*”), and implied with a coloring scheme (see Tourangeau, Couper, & Conrad, 2007, for a seven-point example) or a horizontal bar above adjacent pairs of numbers (Reynolds, 1966). Ten-point scales can also be built with branching (see Krosnick & Berent, 1993, for a seven-point example), asking respondents to rank one pole over the other, and then to indicate on a 1-to-5 scale how much

Appendix A

Table A1

Items Measured with a 1-to-10 Scale on the 2005–2008 Wave of the World Values Survey

Variable	Item text and prompts
v22	All things considered, how satisfied are you with your life as a whole these days? Using this card on which 1 means you are “ <i>completely dissatisfied</i> ” and 10 means you are “ <i>completely satisfied</i> ” where would you put your satisfaction with your life as a whole?
v46	Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means “ <i>no choice at all</i> ” and 10 means “ <i>a great deal of choice</i> ” to indicate how much freedom of choice and control you feel you have over the way your life turns out.
v47	Do you think most people would try to take advantage of you if they got a chance, or would they try to be fair? Please show your response on this card, where 1 means that “ <i>people would try to take advantage of you,</i> ” and 10 means that “ <i>people would try to be fair</i> ”
v68	How satisfied are you with the financial situation of your household? [1 = <i>Completely dissatisfied</i> , 10 = <i>Completely satisfied</i>]
	Here are some other statements. Please indicate how much you agree or disagree with each of these statements. For these questions, a 1 means that you “ <i>completely disagree</i> ” and a 10 means that you “ <i>completely agree</i> .”
v91	... Science and technology are making our lives healthier, easier, and more comfortable. [1 = <i>Completely disagree</i> , 10 = <i>Completely agree</i>]

(continued)

Table A1
Continued

Variable	Item text and prompts
v92	... Because of science and technology, there will be more opportunities for the next generation. [1 = <i>Completely disagree</i> , 10 = <i>Completely agree</i>]
v93	... Science and technology make our way of life change too fast. [1 = <i>Completely disagree</i> , 10 = <i>Completely agree</i>]
v94	... We depend too much on science and not enough on faith. [1 = <i>Completely disagree</i> , 10 = <i>Completely agree</i>]
v114	In political matters, people talk of "the left" and "the right." How would you place your views on this scale, generally speaking? [1 = <i>Left</i> , 10 = <i>Right</i>] Now please indicate your views on various issues. How would you place your views on this scale? 1 means you completely agree with the statement on the left; 10 means you completely agree with the statement on the right; if your views fall somewhere between, you can choose any number in between.
v116	... [1 = <i>Incomes should be made more equal</i> , 10 = <i>We need larger income differences as incentives for individual effort</i>]
v117	... [1 = <i>Private ownership of business and industry should be increased</i> , 10 = <i>Government ownership of business and industry should be increased</i>]
v118	... [1 = <i>The government should take more responsibility to ensure that everyone is provided for</i> , 10 = <i>People should take more responsibility to provide for themselves</i>]
v119	... [1 = <i>Competition is good. It stimulates people to work hard and develop new ideas</i> , 10 = <i>Competition is harmful. It brings out the worst in people</i>]
v120	... [1 = <i>In the long run, hard work usually brings a better life</i> , 10 = <i>Hard work doesn't generally bring success—it's more a matter of luck and connections</i>]
v121	... [1 = <i>People can only get rich at the expense of others</i> , 10 = <i>Wealth can grow so there's enough for everyone</i>]
v122	Some people believe that individuals can decide their own destiny, while others think that it is impossible to escape a predetermined fate. Please tell me which comes closest to your view on this scale on which 1 means " <i>everything in life is determined by fate</i> ," and 10 means that " <i>people shape their fate themselves</i> ."
v123	All things considered, would you say that the world is better off, or worse off, because of science and technology? Please tell me which comes closest to your view on this scale: 1 means that " <i>the world is a lot worse off</i> ," and 10 means that " <i>the world is a lot better off</i> ."
	Many things may be desirable, but not all of them are essential characteristics of democracy. Please indicate for each of the following things how essential you think it is as a characteristic of democracy. Use this scale where 1 means "not at all an essential characteristic of democracy" and 10 means it definitely is "an essential characteristic of democracy."
v152	... Governments tax the rich and subsidize the poor. [1 = <i>not at all an essential characteristic of democracy</i> , 10 = <i>it definitely is an essential characteristic of democracy</i>]
v153	... Religious authorities interpret the laws. [1 = <i>not at all an essential characteristic of democracy</i> , 10 = <i>it definitely is an essential characteristic of democracy</i>]
v154	... People choose their leaders in free elections. [1 = <i>not at all an essential characteristic of democracy</i> , 10 = <i>it definitely is an essential characteristic of democracy</i>]
v155	... People receive state aid for unemployment. [1 = <i>not at all an essential characteristic of democracy</i> , 10 = <i>it definitely is an essential characteristic of democracy</i>]
v156	... The army takes over when government is incompetent. [1 = <i>not at all an essential characteristic of democracy</i> , 10 = <i>it definitely is an essential characteristic of democracy</i>]
	And how essential are these things as characteristics of democracy?
v157	... Civil rights protect people's liberty against oppression. [1 = <i>not at all an essential characteristic of democracy</i> , 10 = <i>it definitely is an essential characteristic of democracy</i>]

(continued)

Table A1
Continued

Variable	Item text and prompts
v158	... The economy is prospering. [1 = <i>not at all an essential characteristic of democracy</i> , 10 = <i>it definitely is an essential characteristic of democracy</i>]
v159	... Criminals are severely punished. [1 = <i>not at all an essential characteristic of democracy</i> , 10 = <i>it definitely is an essential characteristic of democracy</i>]
v160	... People can change the laws in referendums. [1 = <i>not at all an essential characteristic of democracy</i> , 10 = <i>it definitely is an essential characteristic of democracy</i>]
v161	... Women have the same rights as men. [1 = <i>not at all an essential characteristic of democracy</i> , 10 = <i>it definitely is an essential characteristic of democracy</i>]
v162	How important is it for you to live in a country that is governed democratically? On this scale where 1 means it is " <i>not at all important</i> " and 10 means " <i>absolutely important</i> " what position would you choose?
v163	And how democratically is this country being governed today? Again using a scale from 1 to 10, where 1 means that it is " <i>not at all democratic</i> " and 10 means that it is " <i>completely democratic</i> ," what position would you choose?
v178	Thinking at your own country's problems, should your country's leaders give top priority to help reducing poverty in the world or should they give top priority to solve your own country's problems? Use this scale where 1 means " <i>top priority to help reducing poverty in the world</i> " and 10 means " <i>top priority to solve my own country's problems</i> ."
v192	How important is God in your life? Please use this scale to indicate. 10 means " <i>very important</i> " and 1 means " <i>not at all important</i> ."
Please indicate for each of the following statements whether you think it can always be justified, never be justified, or something in between.	
v198	... Claiming government benefits to which you are not entitled. [1 = <i>never justifiable</i> , 10 = <i>always justifiable</i>]
v199	... Avoiding a fare on public transport. [1 = <i>never justifiable</i> , 10 = <i>always justifiable</i>]
v200	... Cheating on taxes if you have a chance. [1 = <i>never justifiable</i> , 10 = <i>always justifiable</i>]
v201	... Someone accepting a bribe in the course of their duties. [1 = <i>never justifiable</i> , 10 = <i>always justifiable</i>]
v202	... Homosexuality. [1 = <i>never justifiable</i> , 10 = <i>always justifiable</i>]
v203	... Prostitution. [1 = <i>never justifiable</i> , 10 = <i>always justifiable</i>]
v204	... Abortion. [1 = <i>never justifiable</i> , 10 = <i>always justifiable</i>]
v205	... Divorce. [1 = <i>never justifiable</i> , 10 = <i>always justifiable</i>]
v206	... Euthanasia, ending of the life of the incurable sick. [1 = <i>never justifiable</i> , 10 = <i>always justifiable</i>]
v207	... Suicide. [1 = <i>never justifiable</i> , 10 = <i>always justifiable</i>]
v208	... For a man to beat his wife. [1 = <i>never justifiable</i> , 10 = <i>always justifiable</i>]
v221	Turning to the question of ethnic diversity, with which of the following views do you agree? [1 = <i>Ethnic diversity erodes a country's unity</i> , 10 = <i>Ethnic diversity enriches life</i>]
v244	Are the tasks you perform at work mostly manual or mostly cognitive? If you do not work currently, characterize your major work in the past. Use this scale where 1 means " <i>mostly manual tasks</i> " and 10 means " <i>mostly cognitive tasks</i> "
v245	Are the tasks you perform at work mostly routine tasks or mostly creative tasks? If you do not work currently, characterize your major work in the past. Use this scale where 1 means " <i>mostly routine tasks</i> " and 10 means " <i>mostly creative tasks</i> "

(continued)

Table A1
Continued

Variable	Item text and prompts
v246	How much independence do you have in performing your tasks at work? If you do not work currently, characterize your major work in the past. Use this scale to indicate your degree of independence where 1 means “no independence at all” and 10 means “complete independence”
v253	On this card is a scale of incomes on which 1 indicates the “lowest income decile” and 10 the “highest income decile” in your country. We would like to know in what group your household is. Please, specify the appropriate number, counting all wages, salaries, pensions and other incomes that come in.

Note: Item text and prompts drawn from the Field Report for the U.S. Values Survey 2006.

they prefer that pole over the other. Surveys can also employ a ten-point scale from 0 to 9 (Gupta & Gupta, 1998; Smith & Williams, 2004), which should reduce midpoint errors because the numeric middle of the scale coincides with half the scale’s highest value. Regardless of the particular technique, though, researchers using a scale with an even number of points should ensure that respondents realize that the scale lacks a middle value that can be selected.

Recommendations for interpreting responses to existing 1-to-10 scale items are less obvious, though. Post hoc analysis cannot partition, for example, the 27% that rated the Russian Federation at a 5 into the group that interpreted 5 as slightly closer to a dictatorship and the group that was ambivalent between the two endpoints. Estimations can be made, of course, but in cases such as this, the more defensible options may be either to consider 5 and 6 as representing neutrality or to report the mean response level (see Rose, Munro, & Mishler, 2004). More generally, though, researchers should note the uncertainty of inferences that may be influenced by midpoint misperceptions.

Acknowledgements

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