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Middle responding: An unobtrusive measure of national cognitive ability and personality

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ABSTRACT

Response style - the tendency to provide uniform answers to questionnaire items regardless of item content - is seen as a challenge in psychology and sociology studies. It is an especially serious issue in cross-cultural research as different cultures exhibit different response styles, compromising construct comparability. Response styles have been associated with a variety of personality and cultural characteristics, including intelligence. This study analyzed new data from 44,096 respondents chosen probabilistically from 52 countries. At the national level, a specific type of middle responding - avoidance of categorical opposites and preference for an "in-between" option - is exceptionally strongly related to national IQ ($r = 0.80$ to 0.91, depending on sample and item type). In conclusion, (1) middle responding can be a valid proxy measure of national cognitive achievement, and (2) a low national IQ reflects the prevalence of a simplistic and rigid personality, whereas a high IQ reflects a fluid, dynamic, and adaptable personality that seems able to morph in accordance with situational factors. This finding creates new dilemmas in cross-cultural psychology and provides a new perspective on the way that nations cope with the challenges of the modern world.

1. Introduction

Response style or response bias - the tendency to provide more or less uniform answers to questionnaire items regardless of item content - is a serious challenge in research that relies on self-descriptions scored on a Likert-type scale. It is an especially serious concern in cross-cultural studies as it has been shown that different nations tend to exhibit different response styles (Harzing, 2006; Kemmelmeier, 2016; Smith, 2004, 2011; Smith et al., 2016). This compromises cross-cultural comparability of self-reports.

Individual and national differences in response style have been explained as a function of a variety of factors related to non-cognitive aspects of personality and culture (He, Bartram, Inceoglu, & van de Vijver, 2014; He, van de Vliert, & van de Vijver, in press; Kemmelmeier, 2016; Smith et al., 2016). A different perspective was provided by Meisenberg (2008) who demonstrated that nation-level measures of two of the most common response styles - extreme responding (the tendency to choose the positive extreme of a Likert scale) and acquiescence (the tendency to agree with all statements) are negatively associated with average national cognitive ability.

Meisenberg's brief study deserves more attention than it has received. Although it does not go into much detail about the relationship between response style and cognition, its main assertion is plausible in the light of evidence from other studies. For example, extreme responding has been associated with simplistic thinking: the tendency to see the world simplistically, as good or bad, black or white, etc., without nuances (Naemi, Beal, & Payne, 2009). This impoverished thinking pattern can be expected to prevail in individuals with lower cognitive abilities as it is less demanding cognitively than considering multiple options. It might be easier for such individuals to choose systematically an unambiguous particular position on a Likert scale, such as "very important" or "strongly agree", than consider nuanced responses, such as "somewhat important", "agree to some extent".

If cognitive ability is related to accuracy in self-assessments of one's personality traits, values, or beliefs on a Likert scale, the use of such scales becomes problematic when the study involves respondents with relatively low abilities or respondents with diverse abilities, as one would be comparing blurred images with other blurred images, or blurred images with sharp ones. This may be a serious problem in cross-cultural studies comparing samples from nations whose average cognitive levels are different, adding another argument in support of Heine, Lehman, Peng, and Greenholtz (2002) who have famously criticized the use of Likert scales in cross-cultural research, albeit for reasons unrelated to differences in cognitive ability. A potential remedy when

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researchers need to compare cognitively diverse individuals or national samples on self-reports would be to dispense with Likert scales. This may not be a practical solution at the individual level as researchers would be unable to measure intensity. In ecological studies, however, intensity can always be measured by comparing aggregated means or percentages of respondents who have selected a particular forced-choice response. This method might be a good alternative to Likert scales in cross-cultural research across nations that diverge widely on cognitive measures such as IQ, or mathematics achievement in PISA OECD or Trends in International Mathematics and Science Study (TIMSS).

What would be the effect of a forced-choice categorical response format, asking the respondents to choose between two opposites, such as "usually bold" and "usually shy", with an intermediate option ("in-between") for those who do not identify with either of the two categorical responses? Would we still detect national differences in response patterns: a tendency to provide categorical answers versus a tendency to choose the "in-between option"?

If there are such differences, their implications may or may not be important. It is possible that they merely reflect response styles that do not provide any substantial information about worldwide cultural contrasts and are simply a nuisance to cross-cultural researchers. But another scenario is also possible. We can hypothesize that nations that exhibit a preference for middle responding are those with higher cognitive skills. They can be expected to have higher percentages of individuals who are capable of adapting their behaviors, values, ideologies, and attitudes to situational demands rather than being similar across situations. Therefore, their preference for middle responding may mean "What I do and who I am depends on the situation".

Scant as the literature may be in this field, it provides some support for this hypothesis. More intelligent individuals adapt better to changing tasks (Lepine, Colquitt, & Erez, 2000). According to Pulakos, Dorsey, and White (2006), "The ability to modify one's behavior or focus and deal effectively with a variety of different and dynamic situations may simply be a function of having higher levels of intelligence" (p.48). Those authors cite a long list of studies demonstrating that cognitive ability can contribute to one's ability to adapt to novel tasks. These studies do not prove directly that more intelligent individuals have more fluid personalities but certainly point in that direction. Task adaptation is simply a form of situational adaptation.

Another line of research provides a similar perspective. Ego-resiliency (ER) is a term used to describe a person's "dynamic capacity to contextually modify one's level of ego-control in response to situational affordances" (Letzring, Block, & Funder, 2005, p. 395). ER is positively associated with IQ (Funder & Block, 1989).

Thus, it is plausible that a national proclivity toward categorical (either-or) responding reflects the existence of many individuals in that nation who are unable to adjust to diverse environments or act in accordance with novel situations because of their relatively low cognitive abilities. Vice-versa, a tendency to prefer middle-responding (the "in-between" option) may reflect a high percentage of people who are neither usually bold, nor usually shy, but sometimes bold and sometimes shy as demanded by the situation. Of course, to confirm this hypothesis, it is necessary to refute an alternative hypothesis: that preference for the middle option does not reflect situational adaptability but a perception that one is somewhat bold and somewhat shy across all situations.

2. Materials and methods

This study is part of a larger study of personality and culture, organized and sponsored by MediaCom, a leading multinational media agency, and the Hofstede Center at Itim International, a cross-cultural management consultancy. The MediaCom-Itim project provided data from nearly 53,000 respondents from 56 countries. For this study, there are reliable data from 44,096 respondents from 52 countries.

Most samples consist of consumer panels, regularly used for marketing research by Lightspeed GMI, a research agency. The panelists are probabilistically chosen among adults in each country and their structure approximates the national census in economically developed countries. University-educated individuals are overrepresented in developing countries as less educated ones were hard to reach. The data were collected online between October 2015 and May 2016. Detailed data about the samples used in this study, as well as the questionnaire, are available from Itim International (www.itim.org).

The samples are more or less nationally representative of the populations of developed countries, especially large ones, represented by at least 1000 respondents. As the samples from developing countries are skewed

Table 1
Middle responding factor scores for 52 countries.

Country	Middle responding factor scores, 52 personality items		Middle responding factor scores, 20 parental advice items	
	National samples without higher education	National samples with higher education	National samples without higher education	National samples with higher education
Argentina	−0.30	−0.02	0.24	0.20
Australia	0.93	0.90	1.03	1.00
Austria	−0.36	0.04	−0.07	−0.14
Belgium	0.49	0.58	0.66	0.80
Brazil	−0.67	−0.76	−0.61	−0.64
Canada	1.07	1.19	1.22	1.01
Chile	−0.93	−0.99	0.39	0.12
China	0.97	0.69	−0.59	−0.63
Colombia	−1.03	−0.81	−1.41	−1.09
Czech Republic	−0.21	0.34	−0.24	0.48
Denmark	0.96	1.04	0.60	0.88
Egypt	−1.04	−0.95	−1.02	−0.87
Finland	0.76	1.14	0.28	0.86
France	0.33	0.08	0.16	0.10
Germany	0.66	0.65	0.72	0.91
Greece	0.14	0.47	−0.03	0.40
Hong Kong	1.69	0.96	1.39	0.61
Hungary	−0.12	0.47	−0.12	0.87
India	−0.81	−1.02	−1.24	−1.62
Indonesia	−0.86	−1.94	−0.83	−2.09
Ireland	0.08	0.29	−0.28	0.29
Israel	−0.45	−0.13	−0.01	0.33
Italy	0.25	0.41	0.41	0.29
Japan	2.07	1.79	2.24	1.49
Kenya	−2.68	−2.34	−2.42	−2.15
Malaysia	0.33	−0.81	0.86	0.00
Mexico	−0.08	−0.16	−0.23	−0.38
Netherlands	0.88	0.95	1.08	1.10
New Zealand	0.31	0.63	0.67	0.80
Nigeria	−2.33	−2.32	−2.17	−2.16
Norway	0.40	1.13	0.70	1.34
Peru	−0.68	−0.87	−0.27	−0.26
Philippines	−0.08	−0.69	−0.55	−1.09
Poland	0.38	0.09	−0.04	0.45
Portugal	0.08	0.23	0.57	0.33
Romania	−0.16	−0.10	−1.04	−0.81
Russia	0.18	0.19	−0.17	0.12
Serbia	−1.08	−0.25	−1.34	−0.25
Singapore	1.45	1.08	1.57	0.96
South Africa	−1.73	−2.15	−1.70	−2.09
Korea	0.44	−0.10	0.74	−0.10
Spain	0.48	0.88	0.30	0.65
Sweden	0.50	1.14	0.90	1.05
Switzerland	−0.04	0.22	−0.32	0.26
Taiwan	2.12	1.32	1.22	1.25
Thailand	0.83	0.21	1.54	0.60
Turkey	−0.40	−0.38	−0.25	−0.22
Ukraine	−1.29	−1.27	−1.06	−1.20
UK	0.72	0.93	0.72	0.84
US	0.57	0.64	0.52	0.62
Venezuela	−1.18	−0.83	−1.51	−1.29
Vietnam	−1.59	−1.82	−1.21	−1.93

Table 2
Correlations between different measures of middle responding (first factors) across 52 countries.

Type of factor scores	1)	2)	3)	4)
1) Across 52 personality items, respondents without higher education	1.00	0.91	0.90	0.84
2) Across 20 parental advice items, respondents without higher education		1.00	0.82	0.93
3) Across 52 personality items, respondents with higher education			1.00	0.88
4) Across 20 parental advice items, respondents with higher education				1.00

Note: All correlations are significant at 0.001.

toward the educated part of the population, it was necessary to correct this inconsistency. All national samples were split in two: respondents without higher education and respondents with higher education. All analyses were carried out twice, across these two types of samples.

As the sample composition in South Africa does not reflect the actual racial and ethnic composition of that country, only the Black sample was used as Blacks account for >80% of South Africa's population.

The original MediaCom-Itim questionnaire targeted diverse personality constructs, such as the Big Five, locus of control, life history strategy, and more. It also targeted Hofstede's dimensions of national culture and other cultural measures. The original English language questionnaire was translated into native local languages and back-translated into English for verification. An exception was made for countries where English is not necessarily a predominant native language but is an official language of instruction at school and is sufficiently well spoken by educated citizens who constitute the majority of the samples: India, Kenya, Nigeria, Singapore, and South Africa. The main parts of the questionnaire used in this study - personality items and parental advice to children - are freely available upon request from Itim International (info@itim.org).

The section in which respondents are asked what advice they would give to their children provides an opportunity to test the hypothesis that societies where people avoid categorical self-descriptions are also societies where people avoid giving their children categorical advice, but advise them to be “in the middle” or, in other words, to act in accordance with the situation.

As it is customary in nation-level analyses to control for the potentially confounding effect of national wealth (GDP per person), World Bank (2016) GDP-per-person data from 2014, the year before the MediaCom-Itim study, were used as a control variable. However, if national wealth has a statistical effect on response style, that effect is unlikely to be direct. More plausibly, one can hypothesize that differences in national wealth account for cultural differences that are closely associated with them, such as national differences in individualism-collectivism (Hofstede, 2001).

Schwartz (1990, 1994) has criticized the individualism-collectivism construct for being too broad and has provided a number of more refined and closely related measures of cultural differences between wealthy countries and developing countries, such as “intellectual autonomy” versus “embeddedness” (Schwartz's term for “conservatism”). Schwartz's latest scores (provided personally by Schwartz in 2016) on intellectual autonomy and embeddedness were used as independent variables.

Harzing, Brown, Koster, and Zhao (2012) studied national differences in middle versus extreme response style on items that are not scored on Likert scales. They found that demographic variables, such as age and gender, did not have any effect on response style. As there is a lack of empirical evidence or theoretical justification that demographic variables may affect the specific response patterns in this study, and because the samples are fairly well matched for gender and age, demographic variables were not considered in the analysis.

3. Results

The first analyses were carried out across national samples of respondents without higher education.

As response style is a tendency to answer questions in a uniform manner, regardless of their content, it is first of all necessary to ascertain that the questionnaire captures more than one or two constructs (factors). If it yields a single construct, or only a couple of constructs, response style would be undistinguishable from substantive responding.

All 52 personality and self-construal items in the questionnaire were aggregated to the national level and subjected to a principal components analysis. The result was 11 components with eigenvalues over 1.00. The first component had an eigenvalue of 16.25 and explained 31.25% of variance. The next two components had eigenvalues of 6.18 and 5.21, explaining 11.88 and 10.02% of variance. The eigenvalues and variance explained of the next components declined gradually. The eigenvalue of the sixth component still exceeded 2.00. This suggests that the 52 items capture a wide variety of constructs.

The 20 items in the parental advice section yielded five components with eigenvalues gradually decreasing from 5.62 to 1.13. Obviously, that section does not target a single construct, either.

Next, all individual-level scores were converted into 0 for either of the two categorical response options, and 1 for the middle response option (“in-between”). Then, they were aggregated to the national level. These national aggregates reveal each nation's propensity toward middle responding on diverse items.

When the middle-response national aggregates of the 52 personality items were factor-analyzed, using the principal components method, they yielded six components with eigenvalues over 1.00. However, the first one had an eigenvalue of 32.23 and explained 61.99% of variance, whereas the second had an eigenvalue of 3.40 and explained only 6.53% of variance. Only three items loaded <0.55 on the first unrotated component, whereas 46 items loaded >0.70. Clearly, there is evidence of very strong and uniform national middle-responding style across

Table 3
Correlations between middle responding (factor scores) and items measuring self-consistency across 52 personality items.

	PT 26: would feel bad pretending or can pretend	PT29: same person at home and outside or different	PT30: behavior depends on strong values or on the situation
Correlations across all 40,922 respondents who have answered all 52 personality items.			
Middle responding: total score on all 52 personality items	0.292 ($p < 0.001$)	0.168 ($p < 0.001$)	0.188 ($p < 0.001$)
Correlations between nation-level aggregates across 52 countries.			
1) Middle responding factor: 52 personality items, respondents without higher education	0.76 ($p < 0.001$)	0.41 ($p = 0.003$)	0.71 ($p < 0.001$)
2) Middle responding factor: 52 personality items, respondents with higher education	0.72 ($p < 0.001$)	0.48 ($p < 0.001$)	0.64 ($p < 0.001$)

Table 4
Correlations between national IQ and national middle responding measures across 52 countries.

Middle responding measure (factor scores)	Type of national sample	Correlation with national IQ
Across 52 personality items and self-construals	Without higher education	0.81
	With higher education	0.76
Across 20 items: parental advice to children	Without higher education	0.85
	With higher education	0.81

Note: All correlations are significant at the 0.001 level.

nearly all of the 52 items despite the fact that they capture a variety of unrelated psychological constructs.

The 20 middle response national aggregates of parental advice to children yielded three factors with eigenvalues over 1.00. Yet, the first factor again had a disproportionately large eigenvalue - 11.57 versus 3.01 for the second - and explained a disproportionate amount of variance: 57.83. Two items loaded 0.54 on that component, whereas all the remaining 18 items loaded at least 0.61. This means that we have clear evidence for uniform middle responding across the 20 parental advice items.

These analyses were repeated across national samples of respondents who have university education. The results were not substantially different. Middle responding factor scores are provided in Table 1. Correlations between all measures of response style are presented in Table 2.

The high correlations in Table 2 unequivocally prove that different measures, based on different items and samples with different education levels, yield very similar results. There is strong evidence for the existence of national response style: preference for categorical responses versus preference for middle responding. But what is behind this style? Does middle responding really reveal a fluid and dynamic personality that adapts to situational pressure?

Questionnaire items PT26, PT29, and PT30 directly address the concept of self-consistency by asking whether the respondents would feel bad pretending that they were somebody else or not, whether they are the same person at home and outside, and whether they have strong values that guide their behaviors in most situations or their behavior depends on the situation, not on values. Table 3 provides two types of correlations between these items and middle responding. First, it provides correlations at the individual level, across all 40,922 respondents who have answered all 52 personality items. Then, it provides nation-level correlations: between nation-level aggregates (mean national scores) of these items and middle responding tendencies (factor scores in Table 1).

Table 3 demonstrates that respondents who tend to choose middle responses also have a tendency to describe themselves as flexible and adaptable individuals. By the respondents' own reports, countries characterized by categorical rather than middle responding are countries whose inhabitants are far more likely to describe themselves as possessing rigid personalities that do not adapt to situational pressure than respondents in countries where middle responding is more prevalent. Thus, middle responding reflects a dynamic personality rather than a personality that is consistently situated in more or less the same place between two extremes.

The correlations between middle-responding tendencies and national IQ are presented in Table 4.

Table 4 demonstrates that the correlations between middle responding and national IQ are as strong as between math achievement in TIMSS and math achievement in PISA OECD. This means that middle-responding is a highly reliable indirect measure, or proxy, of national cognitive ability.

A series of regression analyses were performed across the two types of 52 national samples of respondents. In the first one, across samples without higher education, the dependent variable was middle responding on personality items, whereas the independent variables were IQ and GDP per person. Only IQ was a statistically significant predictor ($p < 0.0001$), and produced a high beta value (0.759) whereas GDP was far from statistical significance ($p = 0.549$) and produced a

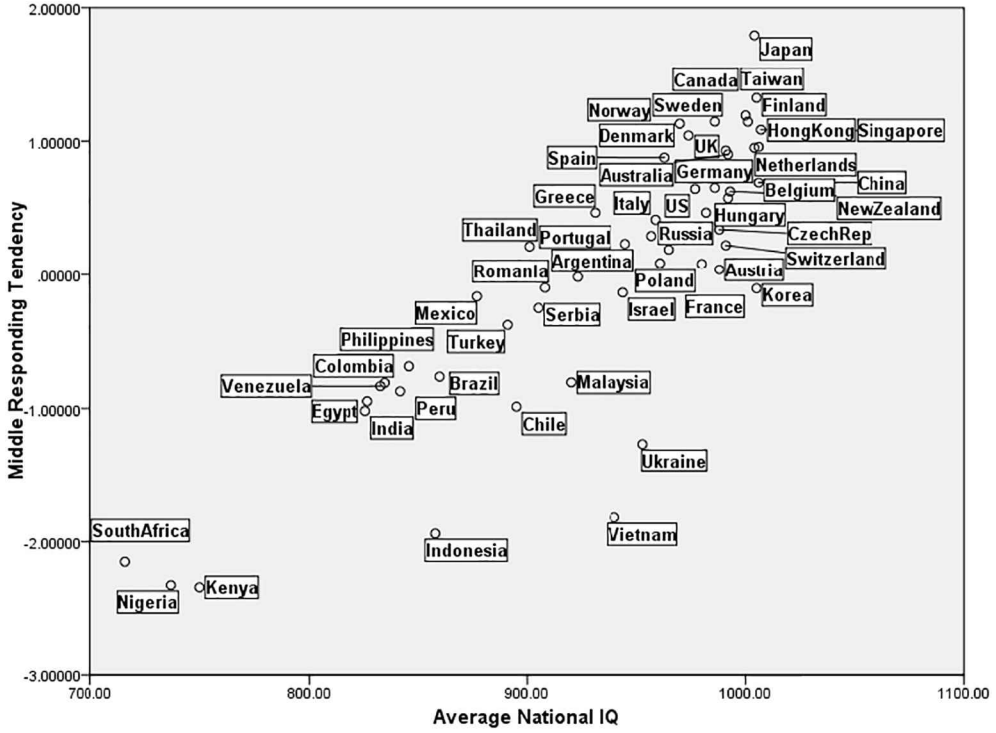

Fig. 1. Visualization of the relationship between national IQ and middle responding tendency on parental advice to children (respondents without higher education, 52 countries).

Table 5
Correlations between national IQ and national middle responding measures across 42 countries.

Middle responding measure (factor scores)	Type of national sample	Correlation with national IQ*
Across 52 personality items and self-construals	Without higher education	0.87
	With higher education	0.80
Across 20 items: parental advice to children	Without higher education	0.91
	With higher education	0.87

* All correlations are significant at the 0.001 level.

very low beta (0.067). When the dependent variable was middle responding on parental advice items, both independent variables reached statistical significance and reasonably high betas ($p < 0.0001$, $b = 0.693$ for IQ; $p = 0.011$, $b = 0.243$ for GDP). There were no collinearity problems in either case (VIF = 1.70 for both independent variables in both models).

The results of the analyses across samples with higher education produced very similar results.

These analyses were repeated after entering Schwartz's intellectual autonomy and embeddedness indices, one by one. They could not be entered together as the result was unacceptably high collinearity (VIF > 5.00).

Across 49 countries, neither of Schwartz's measures produced a significant effect when the dependent was middle responding on personality items. However each of them (entered separately) produced a small, yet significant effect on middle responding in addition to the effect of IQ ($p = 0.011$, $b = 0.211$ for intellectual autonomy; $p = 0.024$, $b = -0.222$ for embeddedness). GDP was not a significant predictor in either of the models. This confirms the hypothesis that GDP has no direct effect on middle responding but it contributes to it by contributing to the existence of cultural differences.

We can conclude that IQ differences are by far the main contributor to national differences in middle responding (avoidance of categorical opposites) whereas Schwartz's measures of strongly and negatively correlated measures of intellectual autonomy versus embeddedness also make a small contribution on middle responding in the parental advice section but not on middle responding in the personality section.

Fig. 1 visualizes the relationship between middle responding on parental advice to children and national IQ across 52 countries based on samples without higher education.

The MediaCom-Itim database contains some national samples whose ethnic and regional composition is unknown: we do not know either the ethnicity of the respondents, or the country region that they come from. Those countries are Argentina, Chile, Hungary, New Zealand, Romania, Serbia, Taiwan, Ukraine, Venezuela, and Vietnam. After excluding these countries, all correlations between national IQ and the different types of middle responding rose. One even exceeded the 0.90 threshold. The results are presented in Table 5.

Fig. 2 visualizes the relationship between middle responding on parental advice to children and national IQ across 42 countries (excluding those whose samples have an unknown regional and ethnic composition) based on samples without higher education.

4. Discussion

The findings of this study suggest that a particular type of responding - middle responding measured as a national tendency to avoid categorical opposites and prefer an "in-between" option - reveals a nation-wide prevalence of a fluid and dynamic personality that adapts its behaviors to situational demands. Nations where this personality is more common are also nations whose members are more likely to teach fluid and dynamic values and behaviors to their children rather than give them rigid, one-size-fits-all advice.

At the national level, prevalence of a fluid personality and advising children to be flexible in their values and behaviors is strongly and

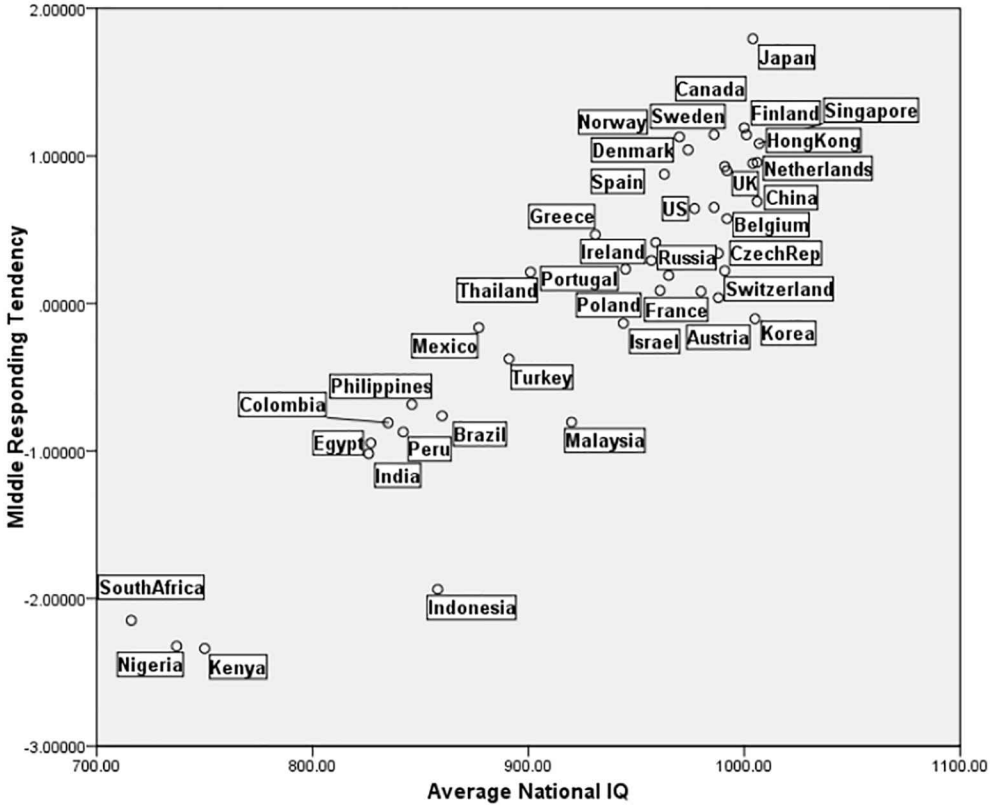

Fig. 2. Visualization of the relationship between national IQ and middle responding tendency on parental advice to children (respondents without higher education, 42 countries).

positively correlated with national cognitive achievement. The reason for this seems clear. More intelligent individuals have a better ability to adapt to changing circumstances and behave accordingly. They are also better able to adapt their values, ideologies, and attitudes to environmental changes. Vice-versa, countries with lower cognitive achievement are much more likely to have high percentages of individuals with rigid or static personalities that maintain some consistency across situations. The reason for that may be either a direct inability to adapt to change or a cognitive inability to understand the benefits of adaptation. It is not surprising then that countries where rigid personalities are more common are also countries where parents tend to give more rigid advice to their children as well.

This study also finds that nations that score high on Schwartz's "embeddedness" and low on "intellectual autonomy" are more likely to prefer categorical responses on items about advice to children, even though the effect of these variables is relatively small compared to that of cognitive achievement. In other words, categorical advice to children, rather than socialization for dialecticism and adaptability, is preferred in conservative and religious societies, where the world is more likely to be seen in mutually exclusive categories, such as "good" and "right" versus "bad" and "wrong".

This study has important implications for cross-cultural comparisons as it highlights a hitherto neglected challenge. If culturally different populations exhibit differences in personal rigidity versus dynamism, are we not fooling ourselves by believing that we can make valid cross-cultural comparisons of modal personality? Figuratively speaking, how can we compare the shape, size, or weight of a solid rock with the shape, size, or weight of a cloud in windy weather? Should we compare only snapshots - that is, people's self-descriptions in very specific situations - and abandon comparative studies of typical or modal personalities? Or should cross-cultural psychology and related fields give up comparisons of self-descriptions altogether and rely exclusively on observations, laboratory experiments, or tests that score people on task performance?

The exceptionally high correlation between national middle-responding tendency and national cognitive achievement suggests that the former is an excellent proxy for the latter. This strong validation suggests that if any information from self-descriptions can be measured reliably across cultures it is differences in what middle-responding reflects: personal rigidity versus fluidity or dynamism.

The findings of this study have implications that reach far beyond research methodology. Many countries at the personal rigidity extreme - those in Africa, Latin America, and the Middle East - are plagued by formidable social problems, such as rampant criminal or political violence, poverty and excessive social inequality, a lack of rule of law, uncontrolled population growth, and traditional economies that are struggling to integrate in the digital world that is looming increasingly large. The countries at the personal fluidity extreme - East Asia, Northwest Europe, and the Anglo world - have essentially overcome these problems and are confidently leading the world into a new era where cognitive ability and adaptability will be increasingly important.

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