Should ratings of the importance of personal values be centered?

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ABSTRACT

Research on personal values is based on persons' ratings of the importance of values. Typically, the means of these ratings are discarded as response style artifacts through centering the data, person by person. We show that centering leads to more circular value configurations with lower Stress in MDS than using raw data. For unfolding models, we show that using raw data avoids some special issues in unfolding; the model space requires one additional dimension; after appropriate rotations, the value circle emerges in a plane; the persons' scattering about this plane corresponds to their mean ratings. The mean ratings correspond to the first principal component of the value items. It is demonstrated that mean ratings can also be substantively meaningful.

KEYWORDS: Personal Values; Value Circle; Ipsatizing; Centering; Unfolding

1. Introduction

Personal values are broad trans-situational goals that serve as guiding principles in a person's life. According to Schwartz (1992), there are ten basic values (such as Power, Security, and Benevolence). The inter-correlations among items measuring persons' attitudes towards these values exhibit certain gradients that can be visualized as a circle of wedge-like regions ("circumplex") in 2-dimensional MDS space (e.g., Dobewall & Rudnev, 2014; Döring et al., 2015; Schwartz, 1992) or simply as a circle if one summarizes the items measuring each respective value type (Groenen & Borg, 2015). The values are typically ordered in a circular way as Power—Achievement—Hedonism—Stimulation—Self-Direction—Universalism—Benevolence—Tradition—Conformity—Security—Power.

Beginning with Schwartz & Bilsky's (1987, 1990) seminal articles, there has been a huge number of publications on personal values relying on questionnaire data. Most previous research used the Schwartz Value Survey (SVS) (Schwartz, Sagiv, & Boehnke, 2000) or the Portrait Value Questionnaire (PVQ40; Schwartz et. al, 1999) to measure the importance of different values. The ratings collected with such instruments are typically not used directly in subsequent analyses. Rather, they are first *centered,* person by person, on the individuals' mean value scores, or the means are partialled out statistically from the value scores (Sagiv & Schwartz, 2000; Schwartz, 1992; Sorthaix & Lönquist, 2014). Schwartz (2003, p. 275) argues that it is "critical to correct for individual differences in use of the response scale. It is the tradeoffs between relevant values that influence behavior and attitudes, so it is the relative importance of the ten values to an individual that should be measured". On the other hand, Schwartz (2009) recommends using uncorrected raw scores of value items or indexes in MDS, possibly because it does not matter much in MDS.

If value ratings are centered, each person's mean rating score is subtracted from his/her rating scores, yielding deviation scores as "corrected" data. The means themselves are usually interpreted as response style "artifacts" such as acquiescence, a tendency to "agree" with an item, whatever its content. Acquiescence generates a common source of variance in the items that inflates positive correlations and deflates negative correlations among a construct's items (Weijters, Geuens, & Schillewaert, 2010; Kam & Meyer, 2015). This can have major impact on the structure of the items. Rammstedt, Goldberg, & Borg (2010) have shown, for example, that using mean-corrected Big5 ratings for persons with low levels of formal education leads to factor-analytic solutions that support the Big5 model "with textbook-like clarity" while factor analyses based on raw ratings do not show the expected 5-factor structure. Yet, centering or, more generally, ipsatizing has its "pros and cons" (cf. D'Andrade, 2008). There are formal arguments and much discussion on whether mean ratings measure "substance" or "style" or a certain combination of both (MaCrae & Costa, 1983; Schwartz et al., 1997). Fischer (2004) in a review article of typical standardization methods in cross-cultural research writes that the results are "ambiguous", while He & van de Vijver (2010, p. 129) even conclude on the basis of a longitudinal study on response styles (acquiescence, social desirability, midpoint tendency and extreme response style), personality traits, and values that "score corrections to deal with response styles are not recommended". They also note that "response styles may have substantive meaning as they are found to share trait variance with personality and values". One such meaning is the person's communication or presentation style. Thus, rather than eliminating this information as a method artifact, one may want to integrate it into the model of interest.

In value research, centering or partialling out the individuals' mean ratings is common practice, but there are also studies on personal values that use the raw data directly (cf. Park-Leduc et al., 2015). Yet, there is a lack of studies that systematically investigate the effects of

centering value ratings on models of personal values or studies on the possible substantive meaning of the individuals' mean value rating.

When running the typical ordinal MDS analysis of the inter-correlations of value items or indexes, centering or not centering the data before computing correlations does not seem to make much difference. Either type of data allows representing the variables with acceptable Stress values in 2-dimensional space. Yet, value researchers sometimes claim that centering often results in MDS solutions where the value points exhibit a more perfectly circular configuration. Moreover, if centering does indeed control for irrelevant variance, then using centered data should lead to smaller Stress values.

When studying the structure of personal values with the unfolding model, the effects of centering on the values' statistical structure are unknown. This is a serious lack of knowledge, since the unfolding model is a more fundamental model of personal values and judgments on personal values than correlation-based MDS or other approaches that study whether individuals can be fitted into the value circle (e.g., Gollan & Witte, 2014) . First, unfolding is the only model to date that represents both persons and values in a common space. The existence of a circle of values or, indeed, of a circle with a particular order of value points is not assumed in unfolding, but left open and therefore testable. Second, the rationale of the unfolding model corresponds directly to the rationale for the value circle as articulated in the original papers by Schwartz & Bilsky (1987, 1990), i.e. to a psychological theory on how the individual arrives at his/her judgments on the importance of personal values. Third, as Borg, Dobewall & Aavik (2016) have shown, the unfolding model for personal values formally *implies* the MDS model based on correlations across persons (but not vice versa, of course, as persons are not represented in the usual MDS approach).

When testing the unfolding model, one begins with a data matrix of dissimilarity scores, δ_{pv}, for n_p persons and n_v personal values. One aims at optimally representing each δ_{pv} by a distance d_{pv} between a point for person p and a point for value v in an m-dimensional configuration. The configuration one seeks should minimize (raw) Stress,

$$(1) \qquad \sigma = \sum_{p=1}^{n_p} \sum_{v=1}^{n_v} (\delta_{pv} - b \cdot d_{pv})^2, \ (b > 0) \ ,$$

where b is a substantively irrelevant overall scaling factor of the resulting MDS configuration. Dissimilarities are non-negative scores on a ratio scale, with zero indicating maximal proximity. They are either collected directly, or they are generated from importance ratings by scale reversal, i.e. by subtracting all rating scores from some constant k. The minimal k is equal to the greatest observed rating score (*max*). For an r-point rating scale, typically $max=r$. Using $k=r$ is optimal, because it means that the ratings are converted in a meaningful way, where "fully agree" is turned into "no dissimilarity" for all respondents[1].

In case of centered ratings, however, it is less clear how to pick k, because subtracting the rating scores from a constant k for all persons introduces a common origin for the dissimilarities. This leads to scores that may not be psychologically convincing. If, for example, person p uses only small ratings and some other person p' only large ratings, then subtracting the centered ratings of both persons from $k=r$ leads to dissimilarities that suggest that p is just as close to the various personal values as p' -- even though the labels of the rating scale said that low ratings mean low importance, and high ratings high importance. Moreover, even without verbal labels, the respondents can generally be expected to understand what the researcher wants to know from

[1] Larger k's also generate proper dissimilarities, but make them numerically more similar. This also makes the distances from each person point to the various value points more similar, and this ultimately leads to trivial unfolding solutions such as a circular configuration of value points and a compact cluster of person points at the center of the value points. Moreover, the larger k, the smaller the Stress in general, i.e. the better the fit of the model to the data. Indeed, very large k's *always* lead to zero Stress for *any* observed importance ratings, suggesting a perfect fit of the model to the data.

them, namely to what extent they support the items' statements (Tourangeau et al., 2000). Centering usually means that the researcher believes that the respondents cannot or do not handle the rating task properly. Yet, persons who assign low importance scores to all values may not care much about these values "as guiding principles in their life", while people who score at least some of these values as highly important may be more *value-guided* in general. This general value-guidedness of a person may be important for predicting certain dependent variables.

Numerous studies exist where value ratings are studied as predictors of other variables. Parks-LeDuc et al. (2015), for example, report a meta-analysis of 60 studies on the relationships between the Big5 personality traits and the ten basic Schwartz (1992) values. These studies use either centered value ratings or "uncorrected" ratings, but never both. Both types of data show similar positive correlations of Big5 factors to the values, but only the centered ratings exhibit consistent patterns of strong negative correlations to Big5 factors. Yet when comparing these two sets of correlations it is important to bear in mind that centering the data also impacts their interpretation. Finding that centered ratings on the value Power correlate with -.57 (meta-analytic Rho) with the Big5 factor Agreeableness and with +.59 with the value Benevolence, means that we are looking at the respondents' ratings on Power *relative to their ratings on all other values.* When looking at non-centered ratings, the correlations change to -.25 and .59, and the meaning of these correlations is direct, i.e. higher scores on Power go with lower scores on Benevolence, etc.

In some cases, such relative importance scores are of direct interest. For example, Bardi, Buchanan, Goodwin, Slabu, & Robinson (2014) show how values change relative to each other in self-chosen life-transitions such as migrating from one culture to another culture. In other cases, however, the absolute rating scores matter. For example, one may speculate that a core construct of well-being, a person's sense of meaning in life, is related to having strong notions about guiding principles in one's life (Heintzelman & King, 2014). That means that at least some

values should be rated as *absolutely*, not just *relatively* very important values. Individuals who attribute relatively high ratings to the basic values—and, thus, have higher mean value ratings--are more value-guided and should therefore score higher on measures of subjective well-being.

A number of hypotheses can be derived about using raw or centered (or partialled) ratings in value research:

PC hypothesis

The vector of the persons' mean ratings should correlate highly with the first principal component of their ratings on the various value items, because the inter-correlations of the items are typically non-negative, forming a "cone configuration" (Thurstone, 1947). Therefore, the simple unweighted mean of the item ratings is expected to correlate highly with the persons' scores on the first PC.

MDS hypotheses

Using centered data or raw data in correlation-based MDS does not have much effect on the resulting solutions, because MDS optimizes the distances among the item vectors, not the angles among them. This reduces the dimensionality of the representation space in case of a cone configuration. Hence, the MDS solutions should all be 2-dimensional and show the Schwartz value circle or at least the duplex of higher-order values. However, centered data are expected to lead to solutions with a somewhat lower Stress and also to solutions where the points that represent the personal values approximate a perfect circle more closely.

Unfolding hypotheses

U1 (dimensionality): Using raw ratings, we expect to find unfolding solutions with acceptable fit only in a space with three dimensions.

U2 (value circle): We expect that the typical value circle will also be found with raw data in 3-dimensional space. Certain values are incompatible and give rise to opposite positions of the

respective value points in space: This allows predicting a value sphere. The sphere is turned into a disk by the compatibilities among the values: Values should be the closer in space, the larger the intersections of their mental representations (Borg, 2010; Restle, 1959).

U3 (means in space): We expect that the person points scatter about the plane of the value points in 3-dimensional unfolding space. Solutions for centered ratings are presented in Borg et al. (in preess): They are all 2-dimensional, with value points on circles and with person points scattered within the value circles. In these studies, the dissimilarities are all generated by the transformation $\delta_{pv} = max - (s_{pv} - mean_p)$, where s_{pv} is the observed rating score of person p for value v, and $mean_p$ is the mean rating scores of person p. Without centering, each δ_{pv} contains the person-specific term $mean_p$. If U2 holds, then the simplest model prediction is that the distance of each person from the plane of the values corresponds to $mean_p$.

U4 (value-guidedness): We claim that the mean rating $mean_p$ is not just a response style artifact. Rather, if U3 holds, then each person's distance from the value plane expresses the person's closeness to the ten values and this distance should correspond, in part, to his/her value-guidedness. Value-guidedness should be a good predictor of variables where the person's general closeness to values matters.

2. Method

2.1 Samples and procedures

We here analyze six samples. The first five samples have been studied before by Borg et al. (in press) using centered data throughout in their unfolding analyses. We here use raw scores so that the effects of the two types of data can be compared sample by sample. The samples vary, in particular, in terms of their populations (a representative sample in Britain, a general population sample in the USA, and university students in Britain and Iran) and the value questionnaires they

use (SVS, PVQ40, PVQ21). This allows checking the replicability and robustness of the scaling solutions under vastly different conditions.

Study 1 is a sample of 327 British psychology students who filled out the 57-item version of the Schwartz Value Survey (SVS; Schwartz, Sagiv, & Boehnke, 2000). Study 2 is a sample of 69 university students of various subjects and levels in Britain; they completed the 40-item Portrait Value Questionnaire (PVQ40; Schwartz et. al, 1999). Study 3 is a a representative sample of 2261 British residents who filled out the ESS Human Values Scale or PVQ21, an adaptation of the PVQ40 intended for use in large surveys (Schwartz, 2003). Study 4 is a convenience sample of 151 adults from various states in the USA; the participants completed the PVQ40 online as part of a larger study. Study 5 is a sample of 75 university students in Iran who completed the PVQ40 in their native language, Farsi.

Sample 6 is the ESS 2012 study (European Social Survey, 2014; Study 3 is a sub-sample of this survey), a representative sample of 54,673 adult residents of 29 European countries who completed the PVQ21 and a collection of other items on various attitudes and opinions that we can used here as dependent variables[2].

The SVS asks the respondents to assess various values (e.g., "PLEASURE (gratification of desires)") as a guiding principle in their life on a scale from *"not important"* (0) to *"of extreme importance"* (7), with an additional category *"opposed to my values"* (-1). The scores of the ten basic values are computed as the average score across all items that belong to a particular value.

The PVQ uses various short portraits that describe a person's goals, aspirations, and desires. Participants rate the extent to which each person portrayed is similar to themselves, using

[2] The data can be downloaded from the internet (Studies 3 and 6: "http://www.europeansocialsurvey.org"), they are included in the smacof R-package (Study 4), or they can be obtained from the second author (Studies 1, 2, and 5). The R scripts used for the analyses are available from the first author.

a 6-point response scale from *"not like me at all"* (1) to *"very much like me"* (6). The participants' ratings are then averaged to yield a global score for each basic value.

2.2 Statistical methods

We first computed the mean rating score for each person, leading to the vector M. Similarly, the factor score of each person on the first principal component of the ten basic values is computed, leading to the vector P.

To test the MDS hypotheses, we analyzed the inter-correlations of the raw scores and the centered scores for the basic personal values, respectively, with both exploratory ordinal MDS and with spherical ordinal MDS. The scalings were done by the R-functions smacofSym and smacofSphere, respectively (De Leeuw & Mair, 2009, R Core Team, 2015). Spherical MDS in two dimensions forces all value points onto perfect circles.

For all unfolding analyses, we first subtracted the observed importance ratings from the maximum value of the response scale to generate dissimilarities[3]. This leads to a dissimilarity value of zero for those persons who fully endorsed an item. The dissimilarities were then scaled in 2- and 3-dimensional space using the R-function smacofRect (De Leeuw & Mair, 2009; R Core Team, 2015). In order to be able to visually inspect the unfolding solutions, the resulting configurations of person points and value points are rotated to an orientation where the first two dimensions coincide with the first two principal components of the points representing the ten basic values[4] .

[3] In Study 1 a special problem exists, because of the SVS's peculiar response scale that admits a score of -1 ("opposed to my values") in addition to the 7-point "not important" to "of extreme importance" scale. Fortunately, no respondent in this study ever chose the "-1" category.

[4] This rotation is accomplished as follows. Let X be the coordinate matrix of the value points in the unfolding solution, and Y the coordinates of the person points. We compute the singular value decomposition X=PDQ', and

As dependent variables, the ESS 2012 (Study 6) offers a number of items for assessing subjective well-being[5]. We used the items "To what extent do you feel you have a sense of direction in your life?", "I am always optimistic about my future", "In general I feel very positive about myself", and "How much of the time during the past week you had a lot of energy?" from the ESS rotating module on personal and social well-being. We also used an item "How is your health in general?", an ESS core item. In addition, we used three items that focus on specific attitudes and behavior where general value-guidedness is expected to matter less: "How religious are you?", "How often do you attend religious services?", and "How often do you socially meet with friends?" These dependent variables were correlated with each of the ten basic values and with the vector of mean value ratings (M) for (1) raw scores, for (2) centered scores, and for (3) scores partialled on M for both predictors and dependent variables (as in Sagiv & Schwartz, 2000), respectively.

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then use Q to rotate both X and Y to XQ and YQ. XQ yields a principal axes orientation of X, because XQ=PD has orthogonal columns of maximal norm (Borg & Groenen, 2005, p. 162).

[5] See http://www.europeansocialsurvey.org/methodology/questionnaire/core_questionnaire.html

3. Results

3.1 Mean importance scores and the first principal component

The scores for the ten basic values are mostly positively inter-correlated in all studies, with a range of 100% positive in Study 1 to 76% in Study 4 (see Table 1). Therefore, the loadings of the values on the first principle component, P, are almost all positive. P extracts 46% to 27% of the variance of the dissimilarities in the five studies. The scores of the respondents on the first principal component correlate almost perfectly with the mean importance scores of the respondents (M): The correlations range from .978 in Study 2 and Study 4, to .995 in Study 1 (see Table 1). Hence, in case of the ten basic values, centering is almost the same as removing the first principal component. Conversely, not centering the data definitely requires a higher-dimensional model space to adequately represent them.

3.2 Ordinal and spherical MDS for raw and for centered ratings

Table 2 shows the Stress values for 2-dimensional ordinal MDS solutions of the inter-correlations of raw and centered importance ratings using ordinal exploratory MDS and ordinal spherical MDS, respectively. The Stress-1 values of all solutions ares acceptably small and significant on the basis of permutation tests. All configurations also support the Schwartz value circle. Moreover, the Stress values of perfectly circular MDS configurations are always clearly smaller for centered than for raw ratings. Finally, the increment in Stress when comparing an exploratory MDS solution with a perfectly circular MDS solution is always smaller when using centered ratings rather than raw ratings. Thus, the MDS hypotheses are all supported.

3.3 Unfolding

For unfolding, we first look at Study 2 because this is the smallest sample and, therefore, it allows us to actually explore the resulting unfolding solutions visually. The 3-dimensional unfolding solution for this sample is shown in Figure 1. It has a (normalized) Stress value (which corresponds to "Stress-1" in MDS, see Borg & Groenen, 2005) of .137, indicating a good fit of the model to the dissimilarities. The permutation test of smacofRect finds that this Stress value has a *p*-value of .00. Hence, the solution is "significant".

Unfolding in only two dimensions yields a solution with a Stress of .170. This is a significant fit too, but the configuration is uninterpretable. The value circle, in particular, does not emerge at all in this solution. Hence, using raw scores does not lead to the value circle in 2-dimensional unfolding space.

The configuration in Figure 1 has been rotated to an orientation that corresponds to the principal axes of the value points. Hence, the plane spanned by Dimension 1 and Dimension 2 is the plane of the first two principal axes of the value points. The value points are almost fully contained in the Dimension 1—Dimension 2 plane: The plane explains 97.4% of the value points' variance in the 3-dimensional unfolding space. One also notes in Figure 2 that the value points exhibit a circular configuration with the values nearly ordered as predicted by the Schwartz theory. This becomes even clearer when looking at this space from above along the 3rd dimension (Figure 2). The configuration of the value points in this plane is also very similar to the configuration of the value points in the 2-dimensional unfolding solution for centered ratings shown in Borg et al. (in press): After Procrustean rotation, the corresponding point coordinates correlate with r=.964, a highly significant congruence (Borg & Leutner, 1985).

The perpendicular distances of the person points from the plane of the value points correlate with the corresponding mean ratings of the persons with r = -0.84. Thus, persons with

high mean value ratings are close to the plane of the value circle, and persons with low mean ratings far away from this plane.

Using the same method to generate dissimilarities (i.e., subtracting the ratings from the maximum scale score) in all other studies, we find high correlations of the person's mean ratings scores and their displacements from the plane spanned by the principal axes of the value points in 3-dimensional unfolding space, ranging from r=-0.76 (Study 1) to r=-.87 (Study 3).

Moreover, in each study the value points are almost fully contained in the plane of the value circle: The variance of the points in unfolding space that is not explained by this plane is at most 6% (Study 4) and only 3.46% on average. Also, in each study, the value circle clearly emerges, with the values largely ordered as predicted by Schwartz (1992), but always perfectly exhibiting the pattern of higher-order basic values self-transcendence vs. self-enhancement (combining Universalism and Benevolence vs. Power and Achievement) and openness to change vs. conservation (combining Self-direction and Stimulation vs. Conformity, Tradition, and Security).

3.4 Values as predictors of external variables

The correlations of the PVQ21 (raw, centered, or mean-partialled) scores of the ESS sample (Study 6) with eight dependent variables are shown in Table 3. For each dependent variable, the largest correlations are found when using raw scores. Centering or partialling out the mean ratings has substantial effects on the correlations: Positive correlations are generally reduced, and negative correlations are increased (as statistically expected, see Dunlap & Cornwell, 1994; Fischer, 2004). Mean value ratings (M) are found to be good predictors for all items that measure well-being. For items that measure specific attitudes or behaviors (often meet socially, religiousness, attending religious services), using raw, centered, or partialled value ratings as

predictors does not affect the correlations very much. Moreover, the mean ratings in these cases are only poor predictors of the dependent variables, and certainly much poorer than some of the basic values.

4. Discussion

Using raw ratings (converted into dissimilarities by reversing the rating scale) rather than person-wise centered ratings (converted into dissimilarities by subtracting them from the maximum observed rating score) in unfolding leads to essentially the same configuration of values as previous research based on correlations or on unfolding individual data. However, one needs an extra dimension for the representation space[6], and one must rotate this space properly to see the value circle. Interestingly, this circle is almost fully contained in a flat plane. Moreover, the points that represent the values on the circle are ordered as predicted by Schwartz (1992). The additional third dimension is, therefore, almost only needed to represent the person's mean rating scores.

Since the magnitudes of the displacements of person points from the value disk closely correspond to the persons' mean rating scores, one could consider reflecting all person points to one side of the value disk to generate a cone structure. If all value points would fall onto a perfect plane, this would not change the distances between person points and value points, but it would position persons with similar value ratings into similar neighborhoods in space. The slightly more Stress-optimal representation in Figure 3 is somewhat misleading, because it places persons with similar value profiles into virtually opposite positions. However, the reduction of Stress over

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[6] A similar extra dimension representing "response style" for raw data is also reported by Hinz et al. (2005) and by Verkasalo et al. (2009) using factor analysis of the value items. According to Schwartz (2006), "exploratory factor analysis is not recommended to search for factors underlying the value items. EFA is not suitable for discovering a set of relations among variables that form a circumplex, as the values data do. The first unrotated factor represents scale use or acquiescence. It is not a substantive common factor. You can obtain a crude representation of the circular structure of values using EFA by plotting the locations of the value items on factors 2 x 3 of the unrotated solution" (p. 6).

a solution where all person points are reflected onto the same side of the value disk is quite small, and so one might consider to enforce such a reflection-to-one side as an external side constraint—or develop an unfolding algorithm that forces all value points into a perfectly flat plane in 3d space.

Using raw ratings rather than first centering or partialling the persons' mean ratings offers the user a chance to avoid untested decisions and assumptions about the data. With raw ratings, the conversion of importance ratings to dissimilarities is psychologically clear and formally unique if one always subtracts the importance ratings from the upper-end category of the rating scale. This category usually has a clear label such as "*of extreme importance*" in case of the SVS or "*very much like me*" in case of the PVQ. It should also be clear to the respondent that this category represents the maximum possible rating of importance or similarity.

Using raw rather than centered or otherwise "corrected" ratings is also a good choice when it comes to predicting external variables. We found that the raw value ratings correlate highest with all external variables. Centering or partialling mean value ratings has major effects on the correlations. In case of the item "Have a sense of direction in my life", the correlations are reduced to a size of practical insignificance, similar to (although slightly higher) than the correlations reported by Sagiv & Schwartz (2000) for mean-partialled value ratings with Bradburn's (1969) Positive/Negative Affect Scale and with the Satisfaction-With-Life Scale (Diener, Emmons, Larsen & Griffin, 1985). This is just as expected, because feeling that one has a sense of direction in one's life is similar to saying that one is *strongly guided by some values*, in particular by the value Self-Direction. If Self-Direction is found to be just a *relatively* strong value, then it ceases to be a good predictor.

Using raw ratings also allows for simpler interpretations of the correlations of a value with an external variable. For centered and mean-partialled ratings, in contrast, we observe, for

example, that persons with *relatively* high ratings on Tradition consider themselves as not so healthy (r=-.22), while the absolute rating for Tradition is correlated with subjective health with only r=-.10. Yet, in the first case, high ratings on Tradition cannot be interpreted directly since they imply low ratings on other values, whereas in the latter case, no such relations to other values are enforced statistically.

We conclude that routinely discarding the respondents' mean value ratings as response style artifacts is premature. They may contain valuable substantive information in the sense of value-guidedness, and even when they seem to represent more style than substance, it may be worthwhile to study whether style is really that artifactual (cf. He & van den Vijver, 2015). We recommend to consider including the data into the scaling model *as they come*—without any transformations. Making such a recommendation also implies that we propose using metric rather than ordinal scaling methods (at least in addition), because ordinal scaling involves optimization methods that transform the data in formally admissible (but not content-based) ways in order to minimize an overall loss function. This makes it more difficult to see what the scaling results tell us about the observations and about how they were possibly generated by the respondents. Moreover, we also suggest that more emphasis should be given to models that preserve the individuals rather than always using correlation-based models that aggregate across individuals (with implicit standardization transformations). The final question, therefore, whether one "should" nor "should not" center, remains open here. It does not have an easy answer but at least the reader can tell more clearly now what to expect when centering or when using the raw data.

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Table 1

Some properties of the inter-correlations of value importance ratings and of the ratings' loadings on their first principal component.

		Inter-correlations				Loadings P				
Study	Instru-ment	*%pos*	*min*	*max*	*mean*	*min*	*max*	*mean*	*%P*	*r(M,P)*
1	SVS	100	.05	.66	.39	.55	.90	.67	46	.995
2	PVQ40	89	-.16	.60	.24	.29	.74	.55	33	.978
3	PVQ21	96	-.03	.53	.24	.49	.63	.56	32	.994
4	PVQ40	76	-.24	.71	.20	.24	.72	.51	29	.978
5	PVQ40	89	-.33	.50	.16	-.01	.75	.46	27	.992
6	PVQ21	98	-.04	.57	.27	.47	.68	.58	34	.994

Note. SVS=Schwartz value survey; PVQ40 and PVQ21 = Portrait Value Questionnaire with 40 or with 21 items, resp.; *%pos* = percentage of positive correlations; min/max/mean = smallest/largest/average correlation; *%P* = percent variance explained by first principal component P; *r*(M,P) = correlation of persons' mean ratings (M) with factor scores of first principal component.

Table 2

Normalized Stress ("Stress-1") values for exploratory and circular (ordinal) MDS solutions of the inter-correlations of raw and centered data, respectively.

	Exploratory MDS		Circular MDS	
Study	raw	centered	raw	centered
1	.078	.128	.195	.155
2	.074	.086	.165	.106
3	.053	.059	.082	.070
4	.039	.046	.076	.059
5	.096	.139	.229	.153
6	.038	.039	.101	.045

Table 3

Correlations of importance ratings for ten personal values and of mean rating of each person with eight external variables in Study 6.

			Predictors										
	Dependent Variable	Data	SE	CO	TR	BE	UN	SD	ST	HE	AC	PO	M
1	Have a sense of direction	raw	.07	.08	.06	**.19**	**.16**	**.23**	**.15**	**.15**	.14	.07	**.22**
	in my life	cent	-.08	-.05	-.07	.04	-.02	.11	.05	.05	.04	-.06	
	(not at all… completely)	p.M	-.08	-.04	-.05	.07	.03	.12	.03	.04	-.01	-.07	
2	Always optimistic about	raw	.02	.04	.02	**.15**	.11	**.22**	**.22**	**.20**	**.16**	.08	**.21**
	my future	cent	-.13	-.09	-.11	-.01	-.06	.10	.14	.12	.07	-.04	
	(disagree…agree)	p.M	-.13	-.09	-.09	.02	-.02	.11	.12	.10	.02	-.05	
3	Generally feel very	raw	.08	.06	.04	**.17**	.13	**.23**	**.20**	**.20**	**.19**	.11	**.24**
	positive about myself	cent	-.08	-.09	-.12	-.02	-.07	.09	.10	.09	.09	-.02	
	(disagree…agree)	p.M	-.08	-.08	-.09	.02	-.02	.11	.08	.07	.03	-.04	
4	Had lots of energy past	raw	.02	.02	-.01	.10	.06	**.18**	**.21**	**.17**	**.15**	.09	**.17**
	week	cent	-.11	-.09	-.13	-.04	-.08	.09	**.15**	.10	.08	-.01	
	(almost none of the time …	p.M	-.11	-.09	-.11	-.01	-.05	.10	.13	.10	.04	-.01	
5	My health in general	raw	-.06	-.06	-.10	.08	.03	**.18**	**.25**	**.24**	**.15**	.09	.14
	(very bad…very good)	cent	**-.18**	-.16	**-.22**	-.03	-.10	.11	**.21**	**.20**	.10	.01	
		p.M	**-.18**	**-.16**	**-.20**	-.01	-.07	.12	**.20**	**.19**	.07	.01	
6	Often meet socially with	raw	-.09	-.05	-.07	.11	.03	.11	**.17**	**.21**	.07	.00	.09
	friends, relatives, or	cent	**-.17**	-.12	-.14	.06	-.04	.07	**.16**	**.20**	.03	-.06	
	colleagues	p.M	**-.17**	-.12	-.13	.08	-.03	.08	**.15**	**.19**	.01	-.07	
7	How religious are you?	raw	**.15**	**.16**	**.33**	.09	.09	-.03	-.07	-.10	.02	.02	.11
	(not at all…very religious)	cent	.11	.12	**.30**	.02	.01	-.13	-.14	**-.18**	-.04	-.04	
		p.M	.11	.12	**.31**	.04	.03	-.12	**-.16**	**-.19**	-.08	-.05	
8	How often attend religious	raw	.12	**.16**	**.27**	.03	.04	-.06	-.07	-.14	.02	.05	.07
	services?	cent	.10	.14	**.26**	-.02	-.02	-.13	-.12	**-.21**	-.02	.02	
	(never..daily)	p.M	.10	.14	**.27**	-.01	-.01	-.12	-.13	**-.21**	-.04	.01	
	Mean		2.22	2.81	2.63	2.01	2.15	2.34	3.35	2.95	2.98	3.50	2.70
	SD		0.99	1.08	1.02	0.81	0.77	0.93	1.20	1.17	1.18	1.11	1.14

Note. $|r|>.14$ bold; largest r for each dependent variable underlined; raw=zero-order correlations; cent=centered ratings; p.M=value ratings and external variables partialled on mean ratings (M); SE=security, CO=conformity, TR=tradition, BE=benevolence, UN=universalism, SD=self-direction, HE=hedonism, AC=achievement, PO=power; M=mean value ratings.

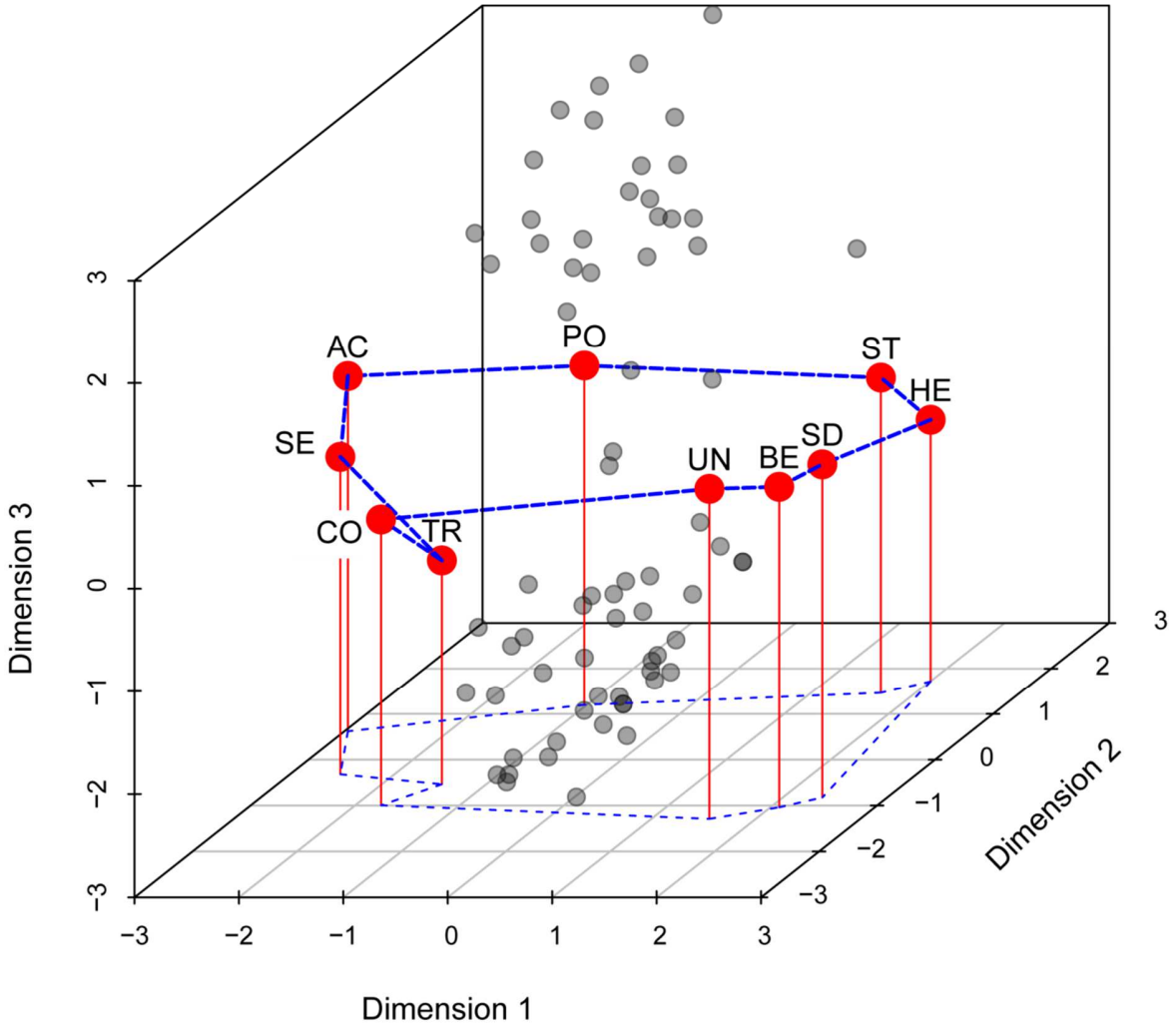

Figure 1. Unfolding configuration for importance ratings (reversed, subtracted from max scale value); 69 British psych students; person points unlabeled; value points labeled as PO, AC, …, SE and connected in the order of the Schwartz value circle; Stress-1=.137; configuration rotated in space so that Dimension 1 and Dimension 2 correspond to the first principal components of the value points.

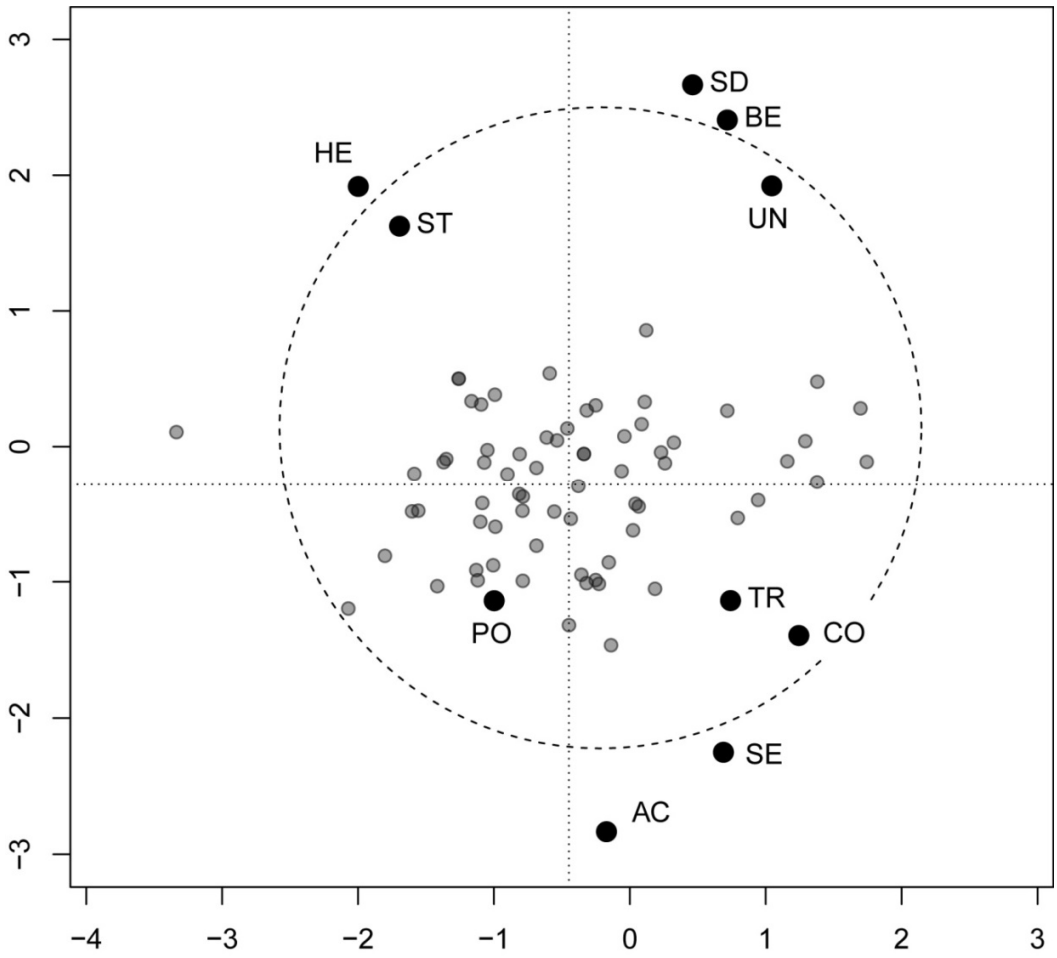

Figure 2. Planar subspace of unfolding space of Figure 1, spanned by the principal components of the value points PO, AC, …, SE; circle optimally fitted to value points.