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Mapping the structure of human values through conceptual representations

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Abstract

The present research provides the first direct examination of human values through concept categorization tasks that entail judging the meaning of values. Seven studies containing data from nine samples ($N = 1,086$) in two countries (United Kingdom and Brazil) asked participants to compare the meaning of different values found within Schwartz's (1992; Schwartz et al., 2012) influential quasi-circumplex model of values. Different methods were used across experiments, including direct similarity judgment tasks, pile sorting, and spatial arrangement. The results of these diverse conceptual assessments corresponded to spatial configurations that are broadly convergent with Schwartz's model, both between and within participants.

Keywords: human values; schwartz; quasi-circumplex structure; similarities; multidimensional scaling.

Mapping the structure of human values through conceptual representations

Human values are desirable, trans-situational goals that vary in importance (Schwartz, 1992). Examples include abstract ideals such as freedom, creativity, equality, power, and freedom. As abstract concepts, values can be construed in diverse ways that have implications for how we use them as self-regulatory devices (see Maio, 2016) and as tools to justify or explain our behaviour (e.g., Kristiansen & Zanna, 1988; Eiser, 1987). To some extent, progress in understanding these meaning construals has been made by models that have distinguished among motives expressed by values (see e.g., Gouveia, Milfont, & Guerra, 2014; Hofstede, 1980; Inglehart, 1977; Rokeach, 1973; Schwartz et al., 2001), while articulating their connections to human attitudes (Maio, Olson, & Bernard, 2006) and actions (Hitlin & Piliavin, 2004). Research has also shown how value differences are related to idiosyncratic social experiences and the socio-cultural context of each person (Gouveia et al., 2014), in addition to biological and neurological factors (Leszkowicz, Linden, Maio, & Ihssen, 2016; Schermer, Vernon, Maio, & Jang, 2011; Zacharopoulos et al., 2016; Zahn et al., 2009). However, despite these advances, research has not examined the crucial question of how people *conceptually* map their values. As described below, research has focused on motivational representations of values and side-stepped the issue of conceptual similarity and diversity. The present research provides the first direct empirical examination of people's conceptual representations of values using tasks that explicitly ask about mental representations of values.

Schwartz's Theory of Basic Human Values

The most widely cited model of values is the Theory of Basic Human Values, developed by Schwartz (1992; Schwartz et al., 2012). Research has demonstrated its utility across personality, social, and cross-cultural psychology. The model postulates a

universal, circular organization of human values in a space defined by motivations (see Figure 1), and has emerged frequently as a powerful theoretical perspective that is empirically supported with data from 80 nations around the world (Schwartz et al., 2012).

[FIGURE 1 ABOUT HERE]

In its original version, 57 values (e.g., equality, wisdom) are spread across 10 value types (e.g., universalism, stimulation). As shown in Figure 1, these value types are positioned in relation to the two bipolar motivation dimensions, *openness to change versus conservation*, and *self-enhancement versus self-transcendence*. These four quadrants of the two dimensions are also known as higher-order values.

A crucial element of Schwartz's model is that values express different motivational synergies and conflicts. For example, achievement values (e.g., personal success) are adjacent to power values (e.g., dominance), because of a similar underlying motivation to self-enhance. Conversely, achievement is opposed to benevolence values (preserving and enhancing the welfare of the in-group), because the underlying motivations of these two sets of values (benefit the self-versus benefit others) are putatively in conflict. The model predicts that adjacent values are more likely to be similar in importance than orthogonal values, which may be less similar in importance than opposing values. However, it is not clear that this pattern should hold for every person. For example, for general practitioners of medicine to be successful, they presumably need to value the opposing values achievement and benevolence. Therefore, benevolence and achievement could be next to each other in the two-dimensional space within a sample of general practitioners. More relevant to the present research, an unanswered question has been whether the postulated relations are consistent with the structure of values as conceptual categories.

Conceptual Representations of Human Values

It is a natural human impulse, when facing something new, to interpret it as part of a category (Goldstone, Kersten, & Carvalho, 2012). Our cognitive system supports the classification of new objects in terms of concepts, placing them together with previously encountered items. In other words, we cognitively assess if the new object is similar to old ones (Hahn & Chater, 1997). These classifications in terms of concepts are important to provide "semantic knowledge" for words, giving them meaning and allowing the comprehension of verbal communication (Kiefer & Pulvermüller, 2012). For instance, in school, concepts help children to attribute a meaning to mathematical terms (e.g., adjacent angle, acute angle, obtuse angle), which they organize in a way that makes sense to them (e.g., geometry, trigonometry, "maths stuff").

A concept can be understood as a "mental representation of a class or individual and deals with what is being represented and how that information is typically used during the categorization" (Smith, 1989), p. 502). The process of how the categories are represented and organized by individuals is known as conceptual representation (Markman, 2006).

Assessing value concepts will allow us to understand how individuals categorize values based on their knowledge, coming from their past experience and given meaning. Also, Schwartz's model focuses on motivational contents in considering relations between values. Multidimensional Scaling (MDS) plots based on correlations between value importance ratings are crucial for tapping the motivational aspect of values, which is a key aspect of what is meant by values (because of their motivational significance to the self). Nonetheless, similarities and differences in motivational content among values are built on people's understanding of the values as concepts, but the conceptual representation of values has not been directly examined.

Ironically, a test that is frequently used to assess conceptual representations has instead been used to examine the motivational interrelations between values. Specifically, the motivational relations have been tested by subjecting correlations between ratings of value importance to MDS to test Schwartz's structure (e.g., Bilsky et al., 2011). Using MDS analysis of value correlations (see Figure 2 for an example), the quasi-circumplex structure of values has been found in common space plots of data from different samples (e.g., students, teachers, clinicians), for the perceived values of other people (e.g., perceived familial and societal values) and a variety of assessment techniques (e.g., self-reports, response latencies; Fontaine, Poortinga, Delbeke, & Schwartz, 2008; Hanel et al., 2018; Pakizeh, Gebauer, & Maio, 2007; Schwartz, 1992, 1994; Schwartz & Boehnke, 2004).

[FIGURE 2 ABOUT HERE]

Multidimensional Scaling is commonly used to analyse people's explicit judgments of the conceptual similarity of objects (Borg, Groenen, & Mair, 2012), with these judgments providing a spatial representation wherein item proximity can be interpreted as an indicator of conceptual similarity: similar items are positioned more closely together than dissimilar items (Hout, Papesh, & Goldinger, 2013). The focus on more direct comparisons of the abstract concepts enables a more direct probe of their role in human concept categorization, as the values arise from abstractions or generalisations from previous experiences. Similarity has been widely considered as a basic psychological property in the categorization literature, as can be seen in prototype and exemplar theories (Medin & Schaffer, 1978; Minda & Smith, 2001; Murphy, 2004). Although these two theories differ in how they represent categories, they both rely on similarity. When presented with a putative new instance of a category, the similarity of that instance to the relevant representations (e.g., a single prototype, a set of examples)

is used as a basis for assigning that instance to a category (Medin & Schaffer, 1978; Minda & Smith, 2001; Murphy, 2004). Thus, when presenting different pairs of value concepts to individuals, people are able to make categorizations based on their understanding of these values.

The results of people's conceptual comparisons of values may differ from the motivational interrelations between values. For instance, some individuals might think of wealth, a self-enhancement value, as similar to self-transcendence values (e.g., helpfulness, broadmindedness) because of past experiences that pair the values continuously (e.g., earning money to save lives as a doctor, saving money to work abroad as a volunteer), even though they might recognise conflicting motives between these values in many circumstances (e.g., decisions about whether to donate money to a beggar, spending time to help another with coursework). Therefore, values that have different underlying motives could nevertheless be similar, and thus correspond to a different spatial arrangement.

Assessing similarities affords a closer look at the conceptual representations of the meaning of the values, without scrutiny of the aforementioned motives. This analysis can be important for theory development, as was recently illustrated by Koch, Imhoff, Dotsch, Unkelbach, and Alves (2016). These investigators applied multidimensional scaling to similarity judgements in the context of Fiske, Glick, and Xu's (2002) highly influential model of stereotype content and found that the model can be improved with an added dimension. This ability to tap meaning is vital for models of values because of the *abstract* nature of value concepts. Many theories of values, including Schwartz's perspective, recognize the importance of diverse affective, cognitive, and behavioral components of values (see also Rokeach, 1973), which are also directly tied to specific contexts and actions that people use in mental

representations of values (Maio, 2010). A number of experiments have shown that the concrete content that people provide for values makes a difference in how values relate to subsequent action (e.g., Maio, Olson, Allen, & Bernard, 2001; Maio, Hahn, Frost, & Cheung, 2009). Therefore, it is possible that the relations between values as inferred from motive endorsement may be different from those inferred from other value-concept assessments, such as similarity ratings. For example, some values might be more conceptually related to opposing or adjacent value types, depending on individuals' mental representations. Indeed, prior research by Pakizeh et al. (2007) noted empirical differences between conceptual similarity and similarities in value importance judgements. These researchers found only a modest association between participants' judgments of the semantic similarity of pairs of values and discrepancies in value importance ($r = -.26$, $p. < .001$). However, Pakizeh et al. did not attempt to map conceptual representations of values using the similarity judgments and test whether the circular structure of values held in these representations.

Fortunately, the use of similarity and categorization judgments in MDS is well-suited to revealing these conceptual representations with relatively high precision. This precision arises because the MDS matrix provides similarities judgments for *all* pairs of items, generating a spatial map of values based on a more direct task. This approach allows a within-subject assessment of the value space, because participants directly compare the similarities between values. In contrast to reliance on between-subject covariance in value importance judgements, this approach generates a more valid plane because each participant provides more data, explicitly considering the relations of each item (e.g., value) to all other items, rather than merely using a single set of between-participant correlations to furnish the proximity data.

Prior research supports the utility of this within-person approach. Across 17 European countries, Gollan and Witte (2014) replicated the quasi-circumplex structure. The proposed structure was also found within-persons across countries (e.g., United Kingdom, United States, Iran), and across value measures (e.g., Schwartz values survey, portrait values questionnaire; Borg, Bardi & Schwartz, 2017). However, these studies relied on importance ratings to assess the motivational structure of Schwartz's model, while our studies assess the conceptual similarities through direct comparisons.

The Present Research

Previous research has assessed the quasi-circumplex structure of Schwartz model in the United Kingdom and in Brazil with scales that relied on importance ratings. In the UK, Bilsky et al. (2011) found support for the quasi-circumplex structure across three representative samples. In Brazil, the structure was also replicated (Sambiase, Teixeira, Bilsky, Felix, & Domenico, 2010; Tamayo & Porto, 2009; Tamayo & Schwartz, 1993), although some minor deviations emerged. For example, some value types merged (e.g., hedonism and stimulation, Tamayo & Schwartz, 1993; stimulation and self-direction, Sambiase et al., 2010), or swapped positions (e.g., stimulation and benevolence; Tamayo & Porto, 2009). Consistently, the value types universalism and benevolence tended to occupy the same region across studies in Brazil. Fontaine et al. (2008) point to several possible explanations for deviations in values structure, including sample differences (e.g., general population and student sample), the meaning attributed to values cross-culturally, and national development.

Unlike these studies, the aim of our research was to provide a direct analysis of conceptual representations of values by applying MDS analyses (Studies 1, 2, 3, 4, 6, and 7) and common space plots (Study 5) to different categorization tasks. These methods were applied to similarity judgements of values through seven studies and nine

samples across two countries (seven samples from UK, two from Brazil). Further we assessed all three conceptual levels in Schwartz's model of values. That is, we asked participants to make comparisons involving specific values, value types, and value dimensions (cf. Figure 1). In Study 1, participants judged the similarity between specific values from Schwartz's model. In Study 2, participants judged the similarities of the ten value types, and, in Study 3, participants were asked to compare all 57 values from Schwartz's theory to the 10 value types. In Study 4, participants compared how similar the value items are to the four higher order values. Study 5 elicited judgments of the meaning of values by asking participants to position the human values along Schwartz's two motivational dimensions. To provide an even more diverse assessment, Studies 6 and 7 assessed the structure of all value items with a pile sorting task and a spatial arrangement task. These methods allow us to introduce the first assessment of the structure of values based on their perceived similarities.

Methodologically, we assessed the fit between the data from experiment and the locations in Schwartz's model using a Procrustean superimposing approach (Peres-Neto & Jackson, 2001). This method can be applied to the outcome of a MDS, such as the axes of spatial configuration, but also on an individual level, as we demonstrate in Study 7. Study 1 describes how this analysis works.

The combined sample size across all nine samples is 1,086 participants. Our research questions were of an exploratory nature. All data, statistical code, instructions, tasks, and Online Supplementary Material (OSM) are available through the link https://goo.gl/Vutc5K . In the OSM, you can also find task examples, Sheppard Plots, Stress-per-point tables, and Procrustes rotation figures for Study 7.

Study 1

The purpose of this study was to use similarity judgments between values to derive a MDS spatial arrange that can describe conceptual representations of the values. Specifically, evaluated whether our approach would reproduce the quasi-circumplex structure, using a subset of all 57 values of Schwartz's model. Comparing all 57 values from Schwartz's model would yield 1,596 comparisons, which would require a long period of time, leading to boredom or loss of concentration. Consequently, our first study asked participants to consider only 16 values, which were selected as covering a good range from all the quadrants from Schwartz's (1992) theory. The relations of all value items were investigated using different methods in Studies 6 and 7.

Method

Participants. Participants were 109 psychology students ($n = 93$ women; $n = 16$ men; $M_{age} = 19.78$; $SD = 3.05$), who took part in exchange for course credit.

Materials and procedure. Participants were asked to rate the similarity of 16 values (e.g., social order), sampled from the Schwartz Value Survey (SVS, 1992). Specifically, they were presented with one value and then asked to rate how similar they personally thought this value was to a list of others. For that, they used a slider scale from 0 (*completely different*) to 100 (*extremely similar*) to make 120 comparisons between values. They were instructed to click on the slider and move it towards the rating that best described the similarity between the pair of values. Participants began by comparing one value with the other 15 values on one screen, and then a new screen appeared. The new screen asked participants to compare another of the 15 values with the other 14 values, and so on until just two values were remaining for comparison. To see the full instructions and the complete tasks, for this and the next studies, please access https://goo.gl/Vutc5K.

The values in the self-enhancement quadrant were wealth, ambition, intelligent, and preserving my public image; the values in the self-transcendence quadrant were social justice, helpful, and equality; the values in the conservation quadrant were obedient, respect for tradition, national security, and social order; the values in the openness to change quadrant were independent, self-respect, exciting life, pleasure, and freedom.

Results and Discussion

MDS methodology. The means of all 120 comparisons were calculated, creating a half-matrix dataset, also known as a triangular matrix. Next, an ordinal MDS on the half-matrix was performed using the PROXSCAL algorithm. This algorithm creates a geometric representation of the data, respecting the proximity of the items (Hout et al., 2013). The Torgerson configuration was selected as the initial configuration. This configuration is also known as classical MDS and aims to create a two-dimensional representation of high-dimensional data (Brandes & Pich, 2007). Stress-I was used to indicate the model's goodness of fit, considering the difference between the input proximities and output distances in the Cartesian plane (Jaworska & Chupetlovska-Anastasova, 2009). Lower values indicate a better model fit. In all of our studies using MDS, we employed the cut-off values proposed by Sturrock and Rocha (2000); these cut-offs consider the number of points and dimensions presented in the analyses. For this study, with 16 values in two dimensions, a Stress-I lower than .24 is recommended. Therefore, our results indicate a good model fit using this criterion (Stress-I = .14; cf. Figure 3). We also tested the stress-per-point of the model – the extent each one of the values contributes to the total stress. That is, we considered the normalized raw stress ($\sqrt{n.r.s}$ = Stress-I) scores. In this study, self-respect and wealth were the values with

higher individually stress. The full stress-per-point table for this and further studies are available on the OSM (https://goo.gl/Vutc5K).

However, these indices indicate only how well the data can be characterized in a two-dimensional space and not whether the data are consistent with the specific two-dimensional space in Schwartz's proposed structure. The data could fit into a two-dimensional space with values positioned very differently from Schwartz's model. To assess this, we used Procrustes analysis ("protest"; Peres-Neto & Jackson, 2001), which tests the degree to which two sets of points align. Specifically, protest "compares two ordinations using symmetric Procrustes analysis" (Oksanen, 2015) by minimizing the sum-of-squared differences through re-scaling the configurations to a common size, mirror reflecting (if necessary), and rotating (Peres-Neto & Jackson, 2001). Protest is therefore also known as an analysis of congruence (Oksanen, 2015).

To perform the analysis, we needed two configurations whose congruence we assessed through superimposition. The data were one configuration, and hypothetical coordinates for Schwartz's (1992) model were the other configuration. We specified the coordinates of Schwartz's model by approximating them through visual inspections to the MDS output coordinates from Schwartz (1992). For example, the four self-enhancement values were expected to be on x (axis) = 0 and y (axis) = 0.5, and the four conservation values on x = 0.5, and y = 0, as shown in Figure 3. For a better visualization, we also used the convex hull (the dashed lines connecting the values) in Figure 3, which provides the smallest convex set of values to each higher order value. This was also applied to the spatial planes from the other studies. Note that it is not necessary to match the starting coordinates to the model fit, because the protest function rotates and mirror reflects the coordinates if necessary, but some starting configurations that are in line with Schwartz's model are needed. Further, we used the four higher

order values rather than breaking it down to the 10 value types because we were only interested in a fit to the overall model rather than small deviations within each value type.

Data were analysed with the R package "vegan" (version 2.5-1; Oksanen et al., 2018), whose protest function is based on Peres-Neto and Jackson (2001). The protest returns a correlation-like effect size and estimates its statistical significance. Although the correlation-like effect size, which is called "correlation in a symmetric Procrustes rotation", is often labelled as r (e.g., Oksanen, 2015), we will refer to it as r_m to avoid confusion with the Pearson's correlation coefficient r. Larger correlations imply a better fit, and significant results indicate a match between the two sets of points. Procrustes Rotation assumes that two different configurations with the same number of points are being compared. In our case, however, these points are from different levels: Our data is from the value item level, while the hypothetical configurations use coordinates from the four higher order values. This difference regarding the nature of the points means that we do not expect to find a perfect fit, because the values items of one higher order value are not all expected to be in the same position. For Study 1, the fit of the data to the model was significant: $r_m = .86$, $p \leq .001$.

[FIGURE 3 ABOUT HERE]

The conceptual spatial arrangement of human values from the similarity judgment task (Figure 3) resembled the one found in Schwartz's (1992) analysis of value importance ratings. The values that were predicted to be on opposing sides of the value circle were in opposition in all cases, and most of the values serving related motives appeared near each other in the plots. Overall, then, the application of MDS to the similarity ratings revealed a conceptual representation matching the motivational patterns elucidated in Schwartz's model.

Nonetheless, a few exceptions were noted. First, if we compare the distribution displayed in Figure 1 to the one from Schwartz (1992) studies, it can be noticed that some values changed position with other values that belong to the same higher-order value type, resulting in minor deviations: pleasure (a hedonism value) switched places with independent and self-respect (self-direction values). In addition, there was an alteration in adjacent motivational value types: the security values changed position with tradition\conformity. Again, this change occurred in the same higher order values. Thus, the conceptual map does not differ substantially from the motivational patterns in in Schwartz's model at the level of values. This conclusion is further assessed in Studies 6 and 7 using different methods. In the next study, we aim to check these patterns at the level of lower-order value types.

Study 2

The aim of Study 2 was to evaluate conceptual representations of values using similarity judgments between each of the model's 10 value types, resulting in a total of 45 comparisons. This was a smaller set of comparisons than in Study 1, but it enabled examination of the conceptual representation of values at the level of value type, instead of focusing only on a small number of specific values in each type. This study also evaluated culturally distinct samples, one in in United Kingdom and the other in Brazil.

Method

Participants. British participants included individuals from a community research panel who took part in exchange for a prize draw and undergraduate psychology students who took part for course credit. They responded to an Instructional Manipulation Check (IMC; Oppenheimer, Meyvis, & Davidenko, 2009), a task created to see if they spend time reading instructions, and two "test items" (e.g., "please, rate everything 'extremely'") within the study. In total, 11 participants failed (four students

and seven from general population) the IMC twice and were excluded[1] from the analysis, leaving 111 participants in the sample (n = 84 women; n = 27 men), with a mean age of 23.54 (SD = 8.99). Brazilian participants were recruited from the general population, with nine of them failing the IMC twice and/or test items, resulting in a final sample of 69 (n = 34 women; n = 34 men; 1 missing; M_{age} = 32.15, SD = 13.39).

     Materials and procedure. In this task, participants were instructed to rate the similarities between the ten value types (e.g., benevolence, achievement) taken from Schwartz's (1992). Specifically, they rated how similar they personally thought two value types were, using a slider scale, ranging from 0 (*not at all*) to 100 (*extremely*), one pair at a time and in a random order. They had to click on the slider and move it towards the rating that best indicated their opinion regarding the similarity of the items. All the value types were followed by a short definition (e.g., *Universalism* [*Understanding, appreciation, tolerance, and protection for the welfare of all people and for nature*]), to make all value types clear to participants.

Results and Discussion

     As in Study 1, two half-matrix datasets containing the means of all comparisons were created. Again, ordinal MDSs were performed on each half-matrix, using PROXSCAL algorithm with Torgerson configuration. With 10 values, a Stress lower than .13 is recommended (Sturrock & Rocha, 2000), with results indicating a good fit in both samples (UK, Stress-I = .04, r_m = .89, $p \leq$ .001; BR, Stress-I = .05, r_m = .92, $p \leq$ .001). The values types that contributed most to the model stress were conformity and security in UK, and security and hedonism in Brazil.

[FIGURE 4 ABOUT HERE]

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[1] These exclusions did not affect the findings, neither in this study or the others.

As can be seen in Figure 4, some small deviations were noted. For instance, security positioned adjacent to power, instead of proximal to self-transcendence value types. These deviations do not affect the overall structure, with the value types from the same higher-order value positioned broadly in the same space (e.g., self-transcendence values: universalism and benevolence). Also, the opposing higher-order values were again in opposite positions (self-enhancement\self-transcendence and conservation\openness to change), supporting Schwartz's model. Thus, the two-dimensional arrangement retained the separation and ordering of the higher-order value types (Bilsky et al., 2011). In the next study, we mixed the levels of abstraction in values considered in Studies 1 and 2, performing direct similarity judgments tasks between value items and value types.

Study 3

The prior studies used a limited number of value comparisons (up to 120) per participant to prevent participant fatigue. Study 3 examined similarity judgments between all 57 values and the 10 value types. This required 570 comparisons, which is far in excess of the number of comparisons made in the prior studies and therefore impractical. Thus, to attenuate participant fatigue, these comparisons were divided into two blocks, with each participant to respond to half of the randomly selected items, resulting in a total of 285 comparisons. The answers were further aggregated across participants, forming a single matrix based on the means between each pair of items.

Method

Participants. Participants were 181 psychology students, who took part in exchange for course credits. Participants answered the IMC (Oppenheimer et al., 2009) and five "test items" (e.g., "*please, rate everything extremely*"), which were added in a random location among the other items. Again, participants who failed the IMC twice

and/or two or more test items were excluded from the analyses. In total, twenty-five participants were excluded from the analyses. The remaining sample contained 156 participants ($n = 144$ women; $n = 12$ men), and the sample's mean age was 19.59 years ($SD = 2.38$).

Materials and procedure. Participants were asked to rate the similarity between each of the 57 human values (e.g., *equality*, *freedom*) and the 10 value types (e.g., stimulation, conformity) from Schwartz's (1992) theory. In this study, participants were presented with all 57 values, one by one, and compared each one of them to five randomly selected value types. Participants rated the similarity of each pair using a slider scale, ranging from 0 (*not at all*) to 100 (*extremely*). They moved a slider towards the score that best represents the extent that they personally think each pair is similar.

Results and Discussion

First, the means of all comparisons were calculated, creating a full matrix (*value items* x *value types*). Next, an ordinal MDS (PROXSCAL) was performed, using the Torgerson configuration. Stress-I of .10 indicate a good model fit (recommended lower than .37, for 57 objects; Sturrock & Rocha, 2000). Privacy and sense of belonging contributed most to the stress. Protest indicate a good fit to Schwartz model: $r_m = .80$, $p \leq .001$. Figure 5 shows the spatial arrangement of the human values according to their similarities to the value types. Overall, there were high similarities between the value items and their expected or adjacent value types. As in the prior studies, the circular arrangement still retained the correct separation and ordering of the higher-order value types (Bilsky et al., 2011).

[FIGURE 5 ABOUT HERE]

Of importance, three of the 57 values were positioned in unexpected places: healthy, privacy, and responsible. In previous research, these values also presented inconsistent positions (e.g., Schwartz et al., 2012; Schwartz & Sagiv, 1995). For example, healthy can be often found next to hedonism, achievement, self-direction and, as in this case, benevolence (Schwartz, 1992). In the next study, participants performed similarity judgments between value items and the four higher order values from Schwartz's model.

Study 4

The results to this point yielded support for a model of values' semantic meaning that closely matches Schwartz's model. Specifically, this study asked participants to rate the similarities between Schwartz's (1992) 57 values and the four higher order values. As in Study 3, we attempted to attenuate participant fatigue by presenting them with a subsample composed of 30 of the 57 human values. These were randomly presented to each participant.

Method

Participants. Participants were 126 individuals who were recruited online through Prolific Academic. However, 19 of these participants failed the IMC (Oppenheimer et al., 2009) twice and\or three test items, which were added in random parts of the main task. The remaining sample contained 107 participants ($n = 57$ women; $n = 50$ men), with a mean age of 37.11 years (SD = 12.56).

Materials and procedure. Participants were instructed to rate the similarities between Schwartz's human values (e.g., *authority*, *loyal*), and the four higher order values (e.g., *self-enhancement, conservation*). Participants were presented with one main value on the top of the screen, and then asked to rate the extent to which this value is similar to each of the four higher order values, using a slider scale from 0 (*not at all*)

to 100 (*extremely*). Participants clicked and moved the slider towards the response

option that best indicated their personal answer regarding the similarity of each pair.

Results and Discussion

The matrix was created using the means from all comparisons from this study

(*value items* x *higher order values*). Once again, an ordinal MDS (PROXSCAL;

Torgerson configuration) indicated good model fit (Stress-I = .05; recommended lower

than .37; Sturrock & Rocha, 2000). Accepting my portion in life and sense of belonging

contributed most to the total stress. The final spatial arrangement can be seen in Figure

6. Protest analysis indicated a good fit to Schwartz's model, r_m = .68, $p ≤ .001$.

Notwithstanding this replication, the distribution indicates that openness and

self-enhancement values exhibited better fit to their respective higher order values,

being more clustered together, whereas self-transcendence and conservation values were

more widely separated in the space. One possible explanation for these findings was

provided in Schwartz's refined theory (Schwartz et al., 2012), in which the authors

divided the 10 value types of the original model into 19 value types. Both self-

transcendence and conservation were more divided than the other two higher order

values, indicating higher diversity. Therefore, their spread of positions in our results

might indicate a composition of more diverse concepts in these higher order values. In

the next study, participants positioned the value items along the two dimensions from

Schwartz's model.

[FIGURE 6 ABOUT HERE]

Study 5

Studies 5 asked participants to use the dimensions from Schwartz's theory to

plot the values. Unlike the prior studies, this method did not ask participants to rate

similarities between items, but rather to pin their location onto the self-enhancement vs

self-transcendence and the openness vs conservation dimensions. If a value is placed closer to one end in either or both dimensions, this end would be considered more characteristic or similar to the value. This method enabled us to examine the conceptual map when participants think about the dimensions themselves. The method was useful because the dimensions are important core features of the model, as it relies on a two-dimensional space that implicitly contrasting motives. In addition, the method is more direct insofar as it plots participants' responses without any further transformation, unlike MDS. Study 5 also probed whether the findings can be replicated in Brazil.

Method

   Participants. In the United Kingdom, participants were 180 psychology students, who took part for course credit. Thirteen participants were excluded from the analyses: participants who failed the IMC (Oppenheimer et al., 2009) twice and/or two or more of four test items (e.g., "*please, select the first option in the scale*") that were added in random parts of the study. The remaining sample contained 167 participants ($n = 150$ women; $n = 17$ men) and the mean age was 19.82 ($SD = 3.12$). In Brazil, participants were 94 individuals from the general population. Those who failed the IMC twice and/or the test items were excluded from the analysis. The remaining sample was constituted of 86 Brazilians ($n = 40$ women; $n = 46$ men) and the mean age was 27.21 ($SD = 9.08$).

   Materials and procedure. Participants read a brief summary of Schwartz's (1992) theory to ensure they understood the dimensions described in the model. Next, they were instructed to position the human values (e.g., an exciting life) on each dimension of Schwartz's model (e.g., *self-enhancement vs self-transcendence*), based on their personal understanding of these dimensions. Participants used a 9-point bipolar scale, with the opposing higher order value domains identified at each end. Values

placed closer to one end of the dimension should be more representative of that end, while values placed in the middle should share information from both ends. The values were presented one at a time.

Results and Discussion

In this study, the spatial arrangement was specified directly from the means of the values for both dimensions, with *self-enhancement versus self-transcendence* as the X axis and *openness to change versus conservation* as the Y axis. This method allowed us to check the coordinates directly in the respective quadrants without needing an optimization function. Self-enhancement values should be located in one half of the X axis, while self-transcendence values should be located in the other half. Similarly, openness to change values should be located in one half of the Y axis, while conservation values should be located in the other half. Due to the nature of this task, we expected the values to be positioned in their half of their respective axes, but not necessarily in specific quadrants – which visually would not represent the quasi-circumplex structure. For example, some self-enhancement values may be more related to values of openness to change than to conservation, causing these self-enhancement values to fall outside of their putative quadrant.

United Kingdom

We present the findings for the UK and Brazil separately because they were somewhat different. In the UK, the fit was acceptable, $r_m = .73$, $p \leq .001$. However, as noted in Study 1, the r_m does not replace a qualitative assessment of the common space plot, as is commonly used in the literature (e.g., Bilsky et al., 2011, Schwartz, 1992). Figure 7 shows all 57 human values from Schwartz (1992) theory positioned along the two dimensions in the model. Eight (ST: Inner Harmony, Meaning in Life, Mature Love, A Spiritual Life, Wisdom, True Friendship; CO: Sense of Belonging; OP:

Privacy) of the 57 values were positioned in the opposite half of the higher-order value dimension. Of importance, in Schwartz and Sagiv's (1995) research assessing value structure cross-culturally, six of these eight values were highlighted as presenting an inconsistent position across the spatial maps. Therefore, some of the deviations were replicated in our study.

Of interest, six of the eight shifts in location occurred for self-transcendence values, while one was a conservation value, and one openness to change. Although some of these eight exceptions were near the middle of the scale (*sense of belonging, true friendship, a spiritual life, privacy*), indicating only small deviations, many of the self-transcendence values were much further from their predicted side of the dimension. This finding may indicate more conceptual variability in self-transcendence values.

[FIGURE 7 ABOUT HERE]

Brazil

Once again, the fit was acceptable, $r_m = .72$, $p \leq .001$. As Figure 8 reveals, nine (ST: Inner Harmony, Meaning in Life; CO: Healthy, Sense of Belonging, Humble, Reciprocation of Favors, Politeness; OP: Privacy, Self-respect) of the 57 values were positioned in the opposite of the predicted side of the high-order value dimension. Five of these values were also considered inconsistent in Schwartz and Sagiv (1995) cross-cultural research. Four of the nine mispositioned values were also misplaced in the British sample (*sense of belonging, inner harmony, meaning in life* and *privacy*).

[FIGURE 8 ABOUT HERE]

The findings revealed clusters of the four higher order values, but with some of their items spread to unexpected positions in the UK and Brazil. As a result, the oppositions between the higher order values were not clearly supported, perhaps because participants positioned the values along both dimensions simultaneously and

had therefore potentially made a trade-off, if they saw a value to be fitting equally well to both opposing higher order value types. For example, the value pleasure (openness to change value), might be considered by some participants to be more closely related to self-enhancement, while for others it was more closely related to self-transcendence (e.g., some might associate pleasure as as something personal, as others might see it as something social). Thus, the location depends of their individual knowledge and interpretation regarding the dimensions and values, which might differ when making the associations. In the remaining two studies, we assessed the relations between all 57-value items using two methods that have not been used in value research: pile sorting and spatial arrangement.

Study 6

In Study 6, we investigated the structure of all 57 values (Schwartz, 1992) with *Pile Sorting*, a method that has not been used before in value research. Pile Sorting (also known as card sorting) is a powerful technique to assess relations between items (Yeh et al., 2014). In our study, participants sorted the values into a number of piles\groups chosen by each participant individually, based on how similar they judged the values to be. Through the piles\groups, a distance\proximity matrix can be created, allowing us to perform a MDS to assess the structure of conceptual relations between values.

Method

Participants. Participants were 129 individuals ($M_{age} = 37.85$; $SD = 12.80$), who were recruited online through Prolific Academic ($n = 64$ women; $n = 56$ men; 9 missing), and from Great Britain ($n = 118$). All participants passed the IMC (Oppenheimer et al., 2009).

Materials and procedure. Participants were presented a list of all 57 values (e.g., responsible, moderate) from Schwartz's (1992) value model, and were asked to arrange these values into categories, based on how similar they personally think the values are. Participants arranged the values using a drag-and-drop method, freely creating as many groups\piles as they saw fit to place the values, in a way that made most sense to them. Participants were asked to place the values that they judged to be more similar in the same group\pile, and they could also move values between groups, if necessary. This was done through the website https://www.usabilitest.com/ .

Results and Discussion

First, a matrix was created based on how many times the values were grouped\piled together by the participants. For instance, if two values were placed into different groups\piles by one participant, it would be represented by adding one point to the total score into the matrix. If they were placed together, no point would be added. In sum, lower scores indicate higher similarities (or a higher number of times placed together). Based on this similarity matrix, an interval MDS (PROXSCAL; Torgerson configuration) was performed. Results indicated a moderately good model fit (Stress-I = .27; recommended lower than .37; Sturrock & Rocha, 2000). Accepting my portion in life and reciprocation of favors contributed most to the total stress. Protest revealed a relatively poor fit $r_m = .49$, $p \leq .001$, because openness and self-enhancement values, and conservation and self-transcendence values were mixed. The final spatial arrangement of values can be seen in Figure 9.

[FIGURE 9 ABOUT HERE]

This study was the first to assess the structure of all 57 values simultaneously using a method that has not been used in values research before. Instead of using direct similarity judgments between all 57 values, we asked participants to group\pile the

values based on their perception of how similar they are. The MDS distribution indicates an interesting structure. Instead of the two dimensions spread across the four quadrants, values were grouped into a single wide dimension. Self-transcendence and conservation values were positioned together into one end, with self-enhancement and openness to change values in the other. Although the findings support Schwartz's model less than the previous studies, the grouping of values is still meaningful: Self-transcendence and conservation have a social focus, relating to how individuals socially relate to and affect others; self-enhancement and openness to change have a more personal focus, regulating how the individuals express their personal interests and characteristics (e.g., Schwartz et al., 2012).

One possible explanation for this clustering in two groups is the Luster-Splitter Problem (Weller & Romney, 1988). This is a problem (or finding, to phrase it more neutral) commonly seen in a free pile sorting method, where participants are asked to create as many piles as they want, as long as the groups have more than one item. Some participants create just a few groups\piles, while others create many.

Study 7

In Study 7, we investigated the structure of all 57 values (Schwartz, 1992) with the spatial arrangement method (SpAM), another method that has not been used before in value research. Participants were asked to arranged the values in a spatial plan using a technique developed by Goldstone (1994) to measure similarity between items. This efficient technique was also used in previous social psychological research, where it provided innovative results, such as a substantial modification of the stereotype content model (Koch, Imhoff et al., 2016). The method has been used in several other studies (Koch, Alves, Kniger, & Unkelbach, 2016; Koch, Kervyn, Kervyn, & Imhoff, in press; Lammers, Koch, Conway, & Brandt, in press)

Method

     Participants. Participants were 154 individuals recruited online through Prolific Academic. Two of them were excluded because they failed the IMC (Oppenheimer et al., 2009) and\or test items, resulting in a total of 152 participants (M_{age} = 37.93; SD = 11.15; n = 105 women; n = 47 men), mostly from Great Britain (n = 146).

     Materials and procedure. Participants were instructed to arrange the 57 values (e.g., honest, influential) of Schwartz's (1992) model based on their similarities in a two-dimensional space. The values were positioned together in the centre of an otherwise black screen. The participants' task was to spatially arrange the values using drag-and-drop. Specifically, the task was to draw a value map where a greater proximity would indicate a greater similarity and greater distance would show greater dissimilarity, in a way that makes most sense to them. Thus, each participant drew their own value model in a two-dimensional space. All values had to be moved at least once to finish the task. A screenshot of the starting screen can be found online (https://goo.gl/Vutc5K).

     Participants also answered the Schwartz Value Survey (SVS; Schwartz, 1992), containing all 57 value items from Schwartz's theory. Participants rated the importance of each value using a 9-point scale (-1 = *opposed to my values*; 0 = *not important*; 3 = *important*; 6 = *very important*; 7 = *of supreme importance*).

Results and Discussion

Spatial Arrangement

     To analyse the data, we followed Koch et al.'s (2016) script for SpAM. Several steps were necessary before proceeding to the MDS. First, the Euclidian distance between the values were calculated - that is, the distance between all the pairs of stimuli were considered. As participants have different screen resolutions, we also divided

pairwise sorting distance by the greatest possible distance (the diagonal of the screen).

Thus, this division relates actual distance to available distance to account for screen size

varying between participants. Then, we averaged sorting distance separately for each

stimulus pair across all participants who sorted that pair, resulting in an N*N (i.e.,

stimuli) matrix that we then subjected to MDS. The results indicated a good model fit

(Stress-I = .20; recommended lower than .37; Sturrock & Rocha, 2000), and an

acceptable protest value, $r_m = .71$, $p \leq .001$. The final structure can be seen in Figure

10.

[FIGURE 10 ABOUT HERE]

The spatial structure (Figure 11) resembled the quasi-circumplex structure from

Schwartz's (1992) model: The opposing positions of the two dimensions across the four

quadrants emerged clearly. Of importance, openness to change values were more

clustered, while conservation values were more spread across the spatial map, merging

partly with self-transcendence values. This mix might have occurred due to the social

focus in these values, as also happened in Study 6.

Finally, we assessed the structure for each participant individually. For 90 out

of the 152 participants (59.21%), the Protest was significant; that is, the majority of

participants were able to create Schwartz's structure at least partly. Examples for a very

good, a medium (i.e., just about significant), and a very poor fit can be found in the

Online Supplemental Materials. Following Gollan and Witte (2004), who found that

"persons whose value profiles show a poor fit to the model are (a) younger than the

majority and (b) endorse values that are usually considered less important" (p. 1), we

also tested for moderators. Specifically, we correlated the model fit index r_m with the

10 value types as measured by the SVS, age, gender, and level of education. Of these

correlates, only education significantly predicted model fit, $r(150) = .28$, $p < .001$.

Higher educated participants placed the values more in a way that followed Schwartz's structure. This interesting finding is broadly in line with the reasons for Schwartz's development of the PVQ (Schwartz et al., 2001), an alternative and more comprehensible measure of values as compared to the SVS (Schwartz, 1992). Use of the PVQ has replicated the proposed structure better in less developed (and hence less educated in a Western sense) countries (Schwartz et al., 2001).

Schwartz Value Survey

The spatial arrangement was also assessed using value importance ratings as typically used in prior research. We followed the syntax provided by Bilski et al. (2011), in which the MDS (PROXSCAL) is performed using a matrix of correlations between the value items, together with a restrictions file. Results indicated a good model fit (Stress-I = .22; recommended lower than .37; Sturrock & Rocha, 2000). Its distribution can be seen in Figure 11. Finally, we assessed the fit between the similarity judgments and importance ratings distributions, with results showing good correspondence ($r_m = .74$, $p \leq .001$). This Procrustes plot can be seen in the Online Supplemental Materials.

[FIGURE 11 ABOUT HERE]

General Discussion

This research provided the first direct examination of the conceptual representation of values using similarity judgements using a diverse range of methods. We asked participants to judge the similarity between value items, value types, and value dimensions through direct comparisons (Studies 1- 4), to position the values among the two dimensions using a bipolar scale (Study 5), and to provide similarity judgments of all 57 values through two different methods – pile sorting (Study 6) and spatial arrangement (Study 7). Additionally, in Study 7 we found that 59 percent of the

participants replicated Schwartz's structure when asked to arrange the values based on their similarities, similar to previous research that used importance ratings (Borg et al., 2017; Gollan & Witte, 2014).

It was an empirical question whether these new tasks would generate the same circular structure as previously yielded by correlations between value importance given the difference in theoretical basis between the two. Our tasks asked for judgments of concepts, which should be less influenced by social desirability than personal value importance ratings. Despite these differences, the results of our concept-focused tasks generally resembled the results of the motivation-focused tasks (e.g., Schwartz, 1992; Bilsky et al., 2011). When assessing how our value spaces match a hypothetical configuration of Schwartz's model using Procrustes rotation, results showed significant congruence across all studies. Also, across two cultures (United Kingdom and Brazil), we obtained a two–dimensional spatial arrangement that resembled the Schwartz's model, and which accentuate the assumptions of synergies and conflict between the values. These consistent findings indicate that conceptual representations of the values within Schwartz's (1992) model align with the past evidence of their motivational interconnections, suggesting deep underlying connections between the two.

It is important to highlight that our research utilized a range of methods to directly map the meaning of values. When making similarity judgements, people are required to think beyond the motivational importance of each value and to explicitly compare their understanding of the meaning of the values. We asked participants to make explicit comparisons at different levels (values, value types, and value dimensions), to group values according to their understanding, or to freely position the values across a spatial plane. Thus, we were able to introduce different judgmental reference points, which is important for diverse social constructs. For instance, many

decades ago, Asch (1946) observed how social traits like "cold" could take on new meaning depending on the traits presented alongside them. Also, when presenting different and new stimuli to individuals, concepts are triggered in memory, allowing people to draw conclusions about similarity between the items (Medin & Schaffer, 1978; Minda & Smith, 2001; Murphy, 2004). This concept mapping exercise explicitly builds these shifting perspectives into the derivation of the conceptual model.

Cross-cultural Comparisons: Importance Ratings x Similarities

Although we replicated Schwartz's structure across a range of methods, there are some differences between our findings and previous research that investigated value structure in the United Kingdom and in Brazil. In the United Kingdom, using importance ratings, the quasi-circumplex structure was consistently replicated across three samples, without deviations (Bilski et al., 2011). For Brazil, previous research showed only minor deviations (value types merging or swapping positions; Sambiase et al., 2010; Tamayo & Porto, 2009; Tamayo & Schwartz, 1993). The structure was similar in most of our studies, with the two opposing bipolar dimensions clearly arising. However, some structural differences were found. For instance, in our Study 2, the self-transcendence value types emerged closer to each other than the value types of the other higher order values. This is in line with previous findings based on importance ratings, which also found that universalism and benevolence tended to occupy the same region (e.g., Sambiase et al., 2010; Tamayo & Porto, 2009). Also, in Study 4, self-enhancement and openness values were more tightly clustered than the other two higher order values. This finding might indicate that self-enhancement and openness values are composed by less diverse concepts. Indeed, Study 6 found that self-enhancement and openness values were mixed together, opposing the self-transcendence and conservation values, which were also intermixed. In this case, the structure indicated an

organization based on the personal and social focus of the values. Together, these comparisons show that the conceptual clustering of values can differ from their motivational clustering, despite broad alignments between the conceptual and motivational structure of values.

Deviations

Notwithstanding the support for the quasi-circumplex structure across the seven studies, we also observed small deviations that warrant consideration. For example, some values swapped positions with adjacent values (Studies 1, 2, and 3), some values clustered more than others (Study 4), some were grouped based on their focus (personal and social; Study 6), and some values were categorised differently in different nations (Study 5). These swapping and fluctuations in values positions have also been shown in previous research that assessed the quasi-circumplex structure (e.g., Bilsky et al., 2011; Fontaine et al., 2008; Schwartz et al., 2012; Schwartz & Sagiv, 1995). For example, in the UK sample of Study 5, six of the eight values positioned in the unexpected end of the dimension are known for their inconsistency across cultures (Schwartz & Sagiv, 1995). Nonetheless, it is worth emphasising that our designs are better suited to drawing conclusions about the broad patterns of relations between values than about specific deviations, because we would need larger samples to provide powerful conclusions about the reliability of specific deviations. In this respect, the consistency of support for the circular model across all seven studies is more noteworthy.

It may nevertheless be useful to consider whether there are patterns in deviations that reflect inherent properties of the values. Consider the findings in Study 5. In the British sample, six self-transcendence values were positioned closer to the opposite end of the dimension. Specifically, *inner harmony*, *meaning in life*, *mature love*, *wisdom*, *true friendship*, and *a spiritual life* appeared in the self-enhancement side, even though

the last value was next to the centre of the scale. In the Brazilian sample, there were similar deviations for two self-transcendence values, and five conservation values (*healthy*, *humble*, *reciprocation of favors*, *politeness*, *sense of belonging*) were found in the wrong end of the conservation-to-openness dimension. These exceptions might have been more evident in Study 5 because of the way its task was structured. While Studies 1 to 4 asked participants to rate similarities between the items, Study 5 asked participants to place the values inside the two-dimensional space proposed by Schwartz. By asking participants to make a choice inside the two-dimensions, they might have been more likely to notice instances where the values can serve varied motives. In this respect, it is interesting that the six self-transcendence values may be relatively broad, inward facing, and focused on balance (e.g., *inner harmony*, *true friendship*, *meaning in life*, *mature love*, *wisdom*, *a spiritual life*) compared to other self-transcendence values, such as *equality*, *honesty*, *forgiving*, and *loyalty*. The relative focus on inward insight and balance may help to explain their flexibility in motivational construals. For example, *wisdom* can be useful for one's own career. Similarly, the conservation values that deviated in the Brazilian sample may be relatively broad, indicating personal characteristics that are considered important to individuals, especially when compared to more concrete values from this higher order value (e.g., *family security*, *national security*, *social order*, *respect for tradition*). Despite being exceptions and not the rule, these values reveal interesting ways in which particular values may readily encompass behaviors that simultaneously map onto opposing values.

Limitations and Future Directions

Although some of our samples were skewed towards women, research has shown across cultures that both men and women perceive the values in the same way, reproducing the quasi-circumplex model and its ideas of congruence and conflict of

values (Struch, Schwartz, & Kloot, 2002). Furthermore, three of our studies (4, 6, and 7) recruited from more general populations with more gender balance in the samples, revealed no significant departures from our other results.

Overall, the multiple structure assessment methods used across our studies indicate that the conceptual interrelations between values and the motivational interrelations currently embodied in Schwartz's model are closely aligned. We recognize the importance of motivational relations between values and their role in understanding relations between values and other psychological variables (e.g., political attitudes, personality traits; Caprara, Schwartz, Capanna, Vecchione, & Barbaranelli, 2006; Parks-Leduc, Feldman, & Bardi, 2015). For instance, why would universalism and benevolence both positively predict altruism when they are only conceptually similar (Hanel, Litzellachner, & Maio, 2018)? We expect that they both predict altruism because of similar underlying motivation. Also, as can be seen in Study 7, results indicate a correlation (using Procrustes rotation) between the distributions provided through similarity judgments and importance ratings. Thus, our findings do not undermine the importance of the motivational interrelations. Instead, they show for the first time that the conceptual and motivational aspects of value interrelations are both distinct and convergent.

The variability in conceptual locations of values across methods and cultures provides clues about their potential for variation in application to attitudes and behaviors. Knowing how similar values are to each other might help to delineate future studies that focus on understanding their predictive power. This has been a difficult task so far, because any particular attitude or behavior can express different values at time (Bardi & Schwartz, 2003; Schwartz, 2013). For instance, one might think of influential, a self-enhancement value, as relevant to some self-transcendence values

(e.g., protecting the environment, equality), because the values may be interconnected in real-world contexts (e.g., using one's influence to promote recycling, making public speeches to end the gender pay gap). Therefore, the investigation of these mental representations can help us not only to better understand the value relations based on their content, but also their association to attitude and behavior in the real world.

Also, assessing values through their conceptual representations can aid theory development. Because people understand and interpret values in different ways, based on their personal categorizations, our research might also help to identify values that are less or more variable in representation across methods or countries. In fact, the methodology can be applied not only using Schwartz's value model, but also other (circumplex) models, such as the circumplex model of goal content (Grouzet et al., 2005), the interpersonal circumplex (Wiggins & Pincus, 1989), or the circumplex model of affect (Posner, Russell, & Peterson, 2005). It might also lead to the identification of a new dimension, as previously done by Koch et al. (2016), who modified the stereotype content model also using SPaM.

Conclusion

The motivational aspects of human values are central to understanding their implications, but conceptual representations of values are equally fundamental. The present research addresses a longstanding deficit in our knowledge of the conceptual representation of values. By examining how these values are organised as concepts, we learned about how people categorize and interpret values. This novel analysis found that the conceptual links between values are broadly consistent with the motivational relations predicted by Schwartz's model, alongside small differences that warrant further investigation.

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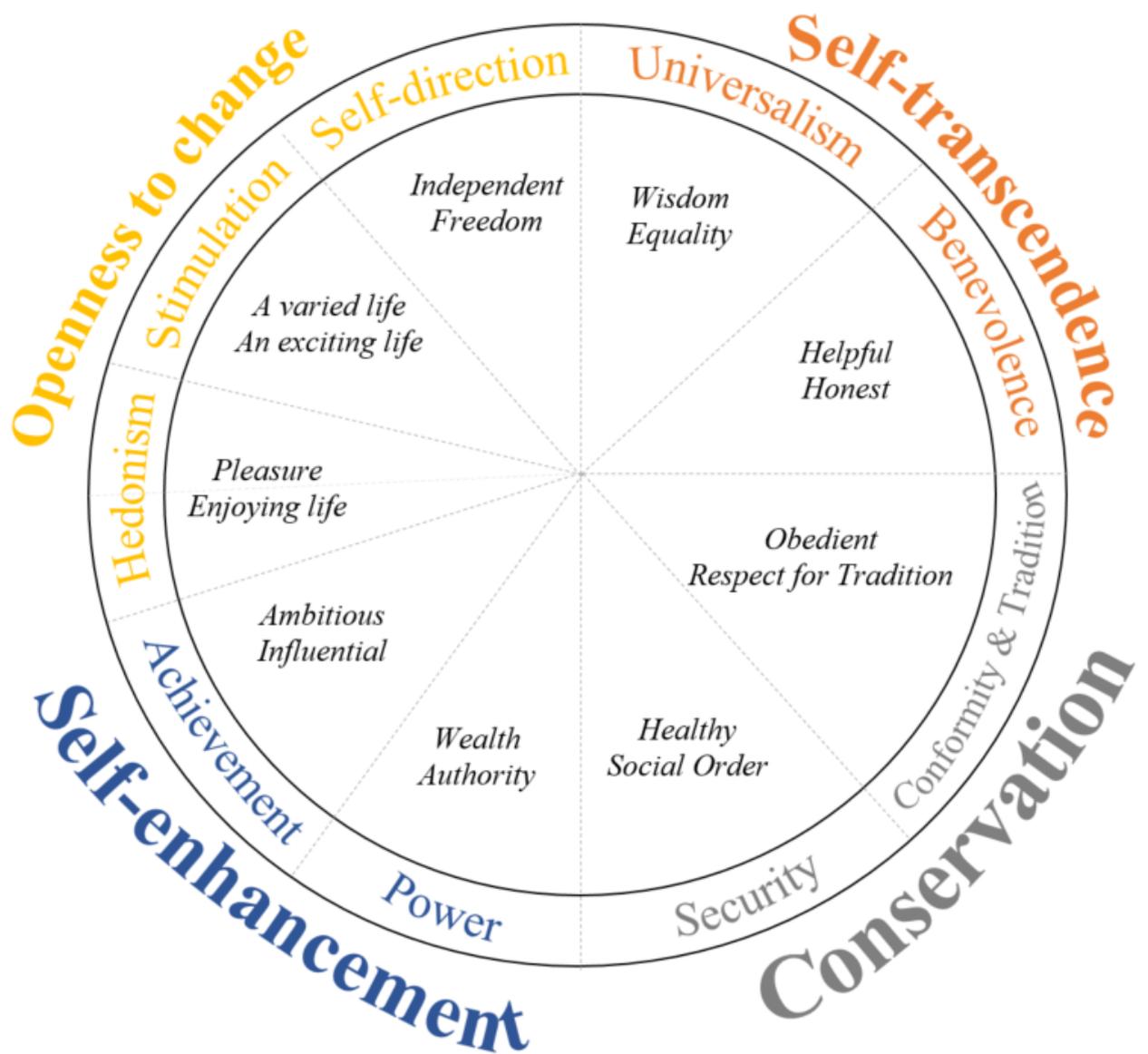
Figure 1. Schwartz's quasi-circumplex model of human values (in *italic*, examples of

values). Adapted from Schwartz (1992).
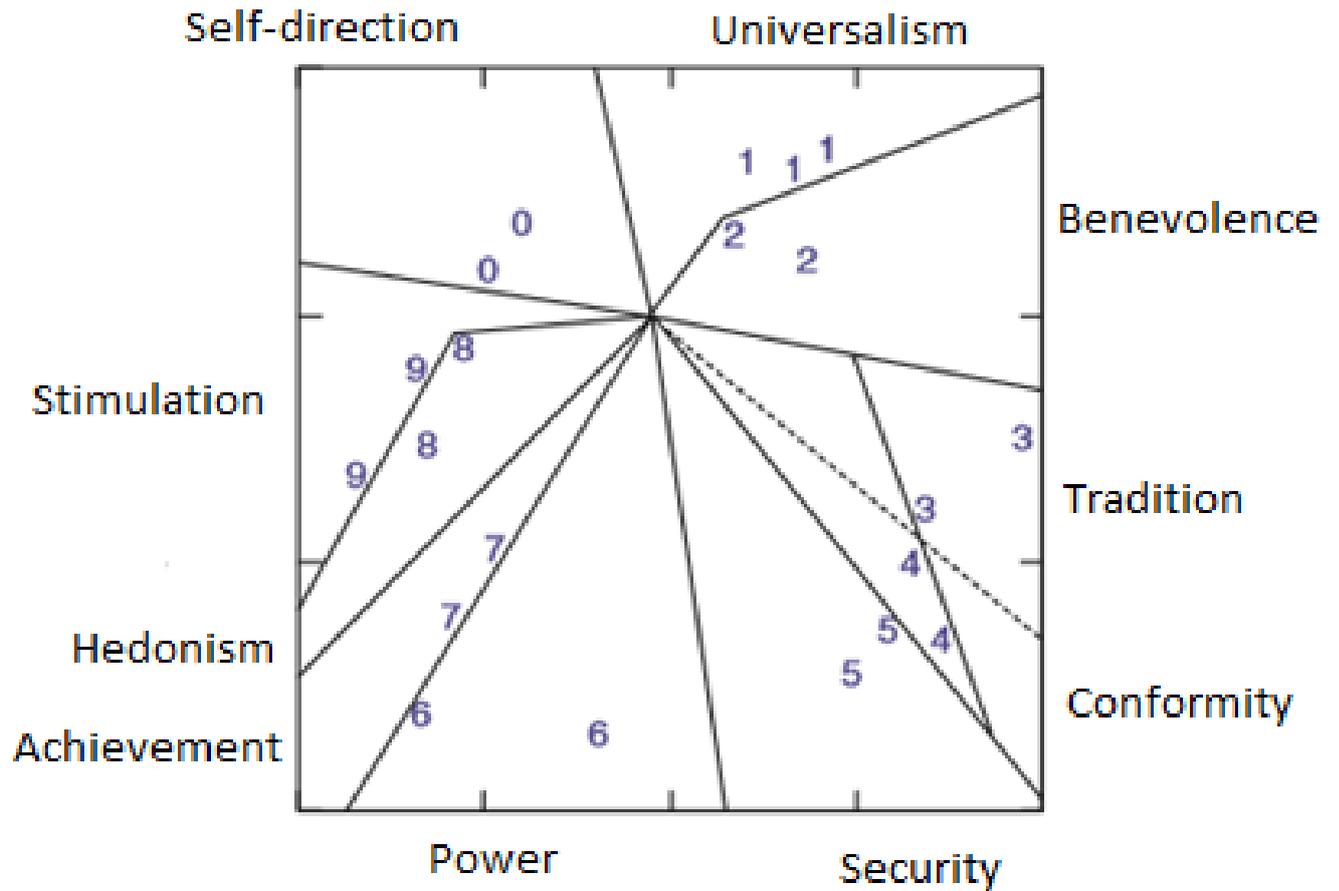
Figure 2. An example of MDS applied to human values (Bilsky et al., 2011). Each number indicates the positions of the values in their respective value type.
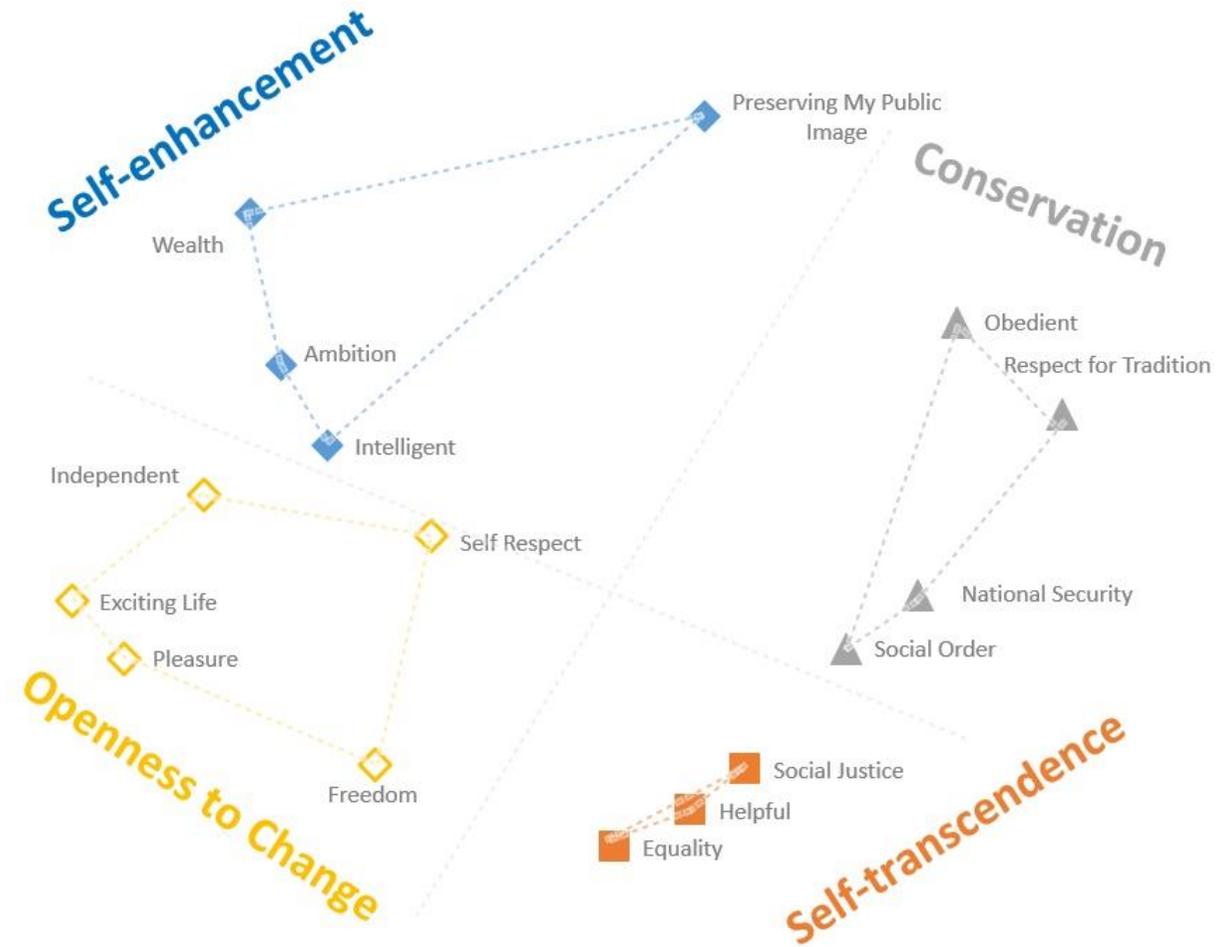
Figure 3. Structure based on similarity judgements between value items (Study 1). Self-enhancement (filled diamonds), self-transcendence
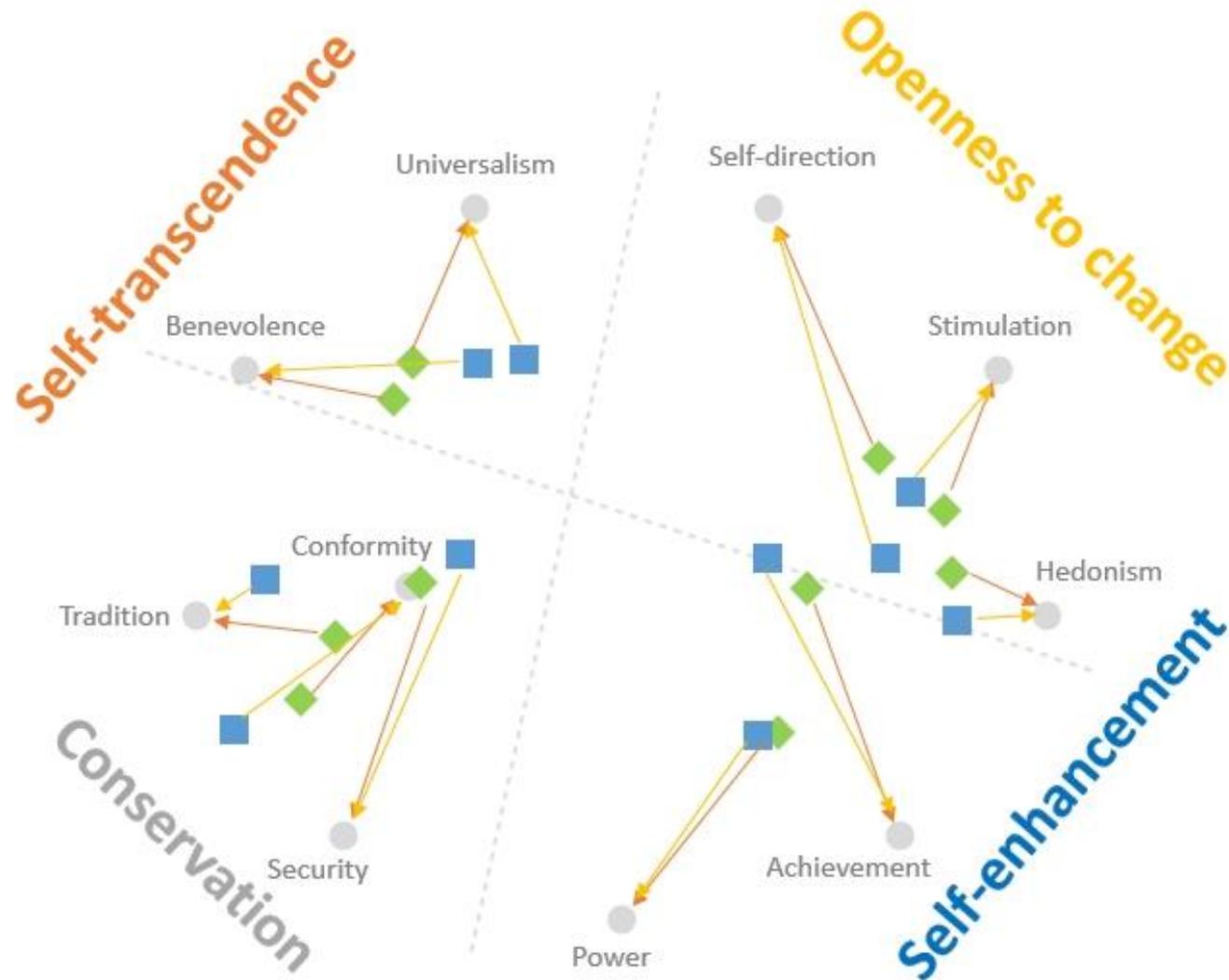
(squares), openness to change (hollow diamonds), and conservation (triangles).

Figure 4. Value types along two dimensions (Study 2). *Note*: Green diamonds represent our UK sample; blue squares represent our Brazilian sample; Grey circles represent value type positions expected from Schwartz's model.
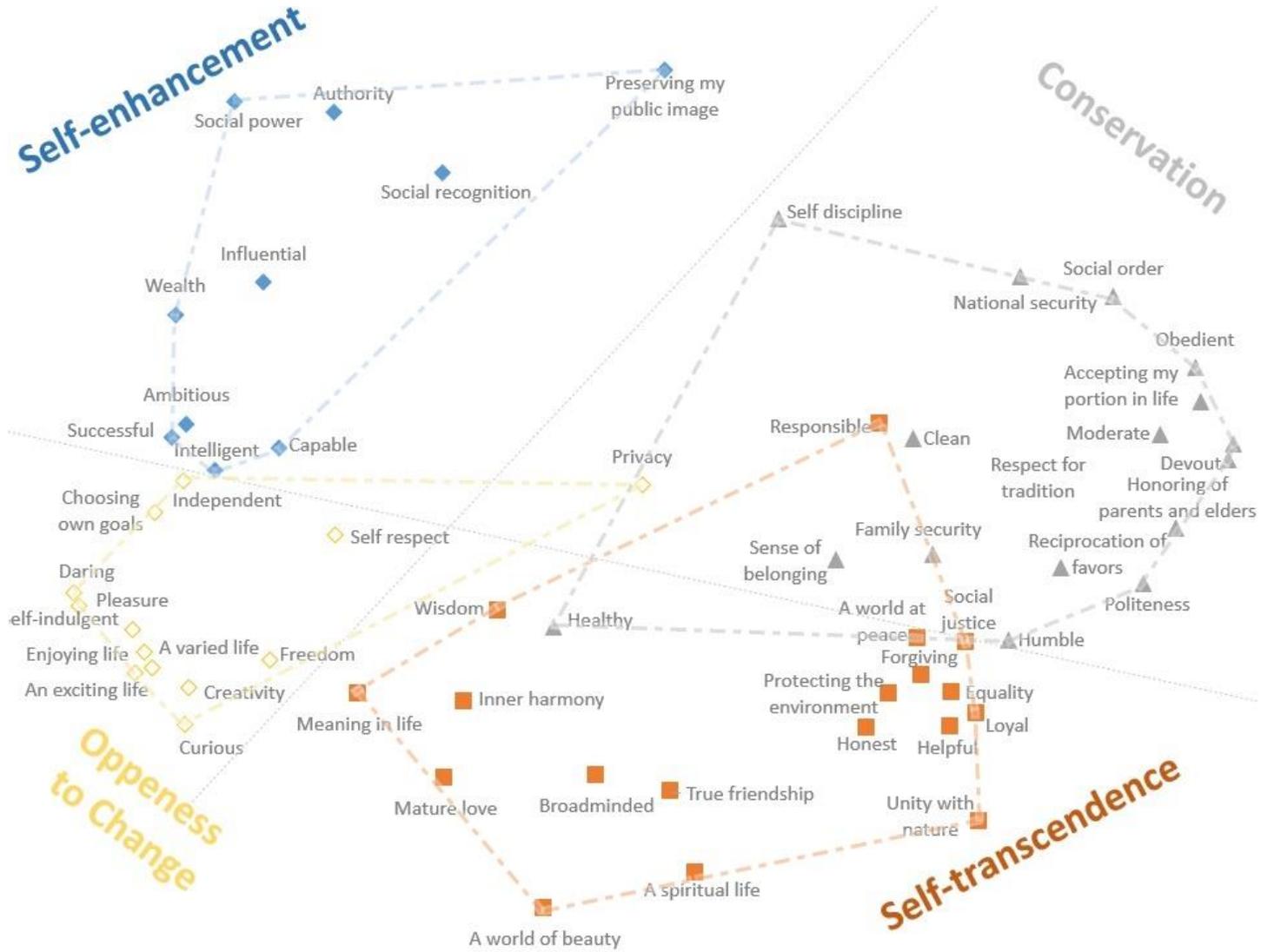
Figure 5. Value positions according to their similarities to the value types (Study 3).
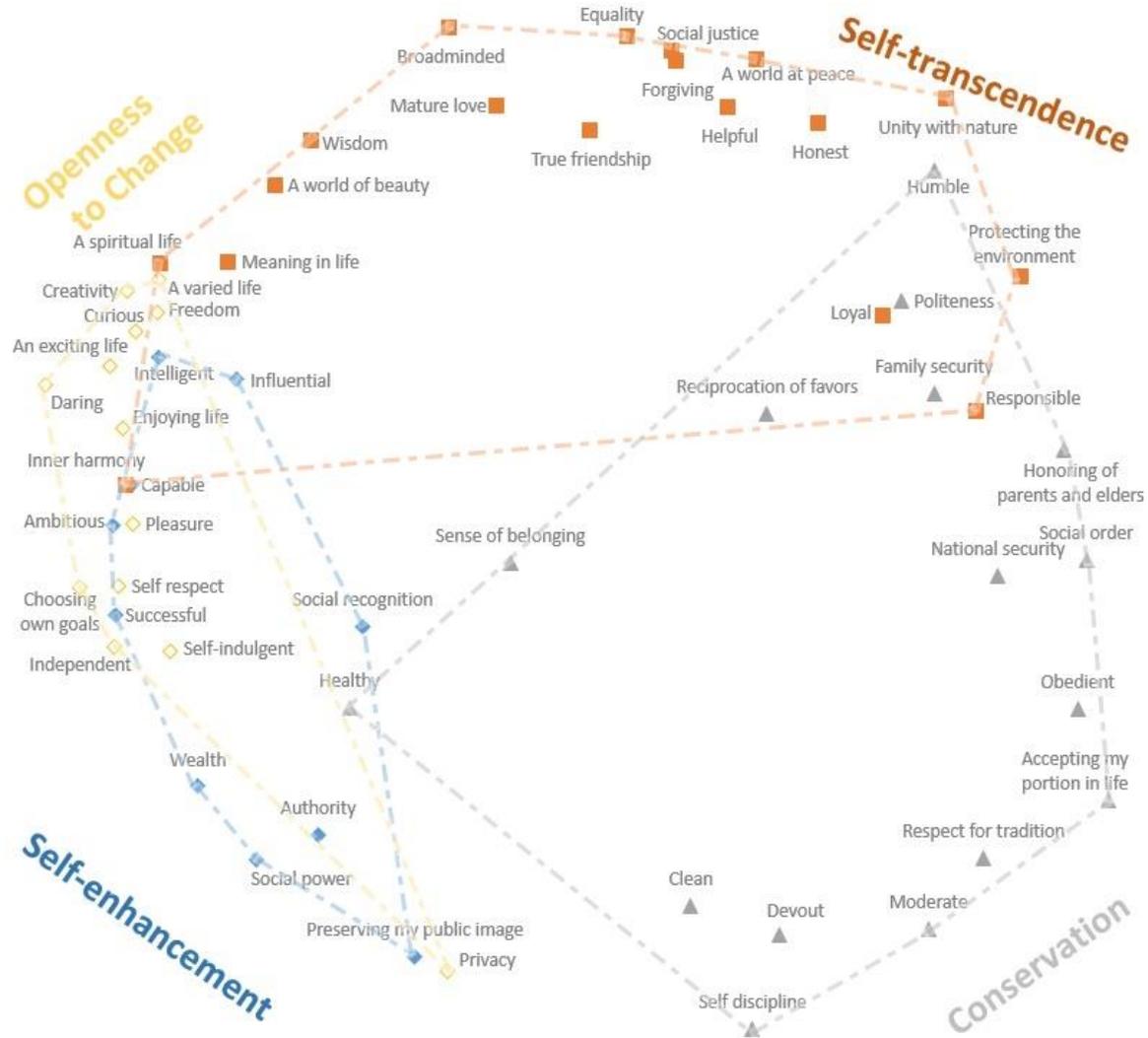
Figure 6. Value positions according to their similarities to the value types (Study 4).
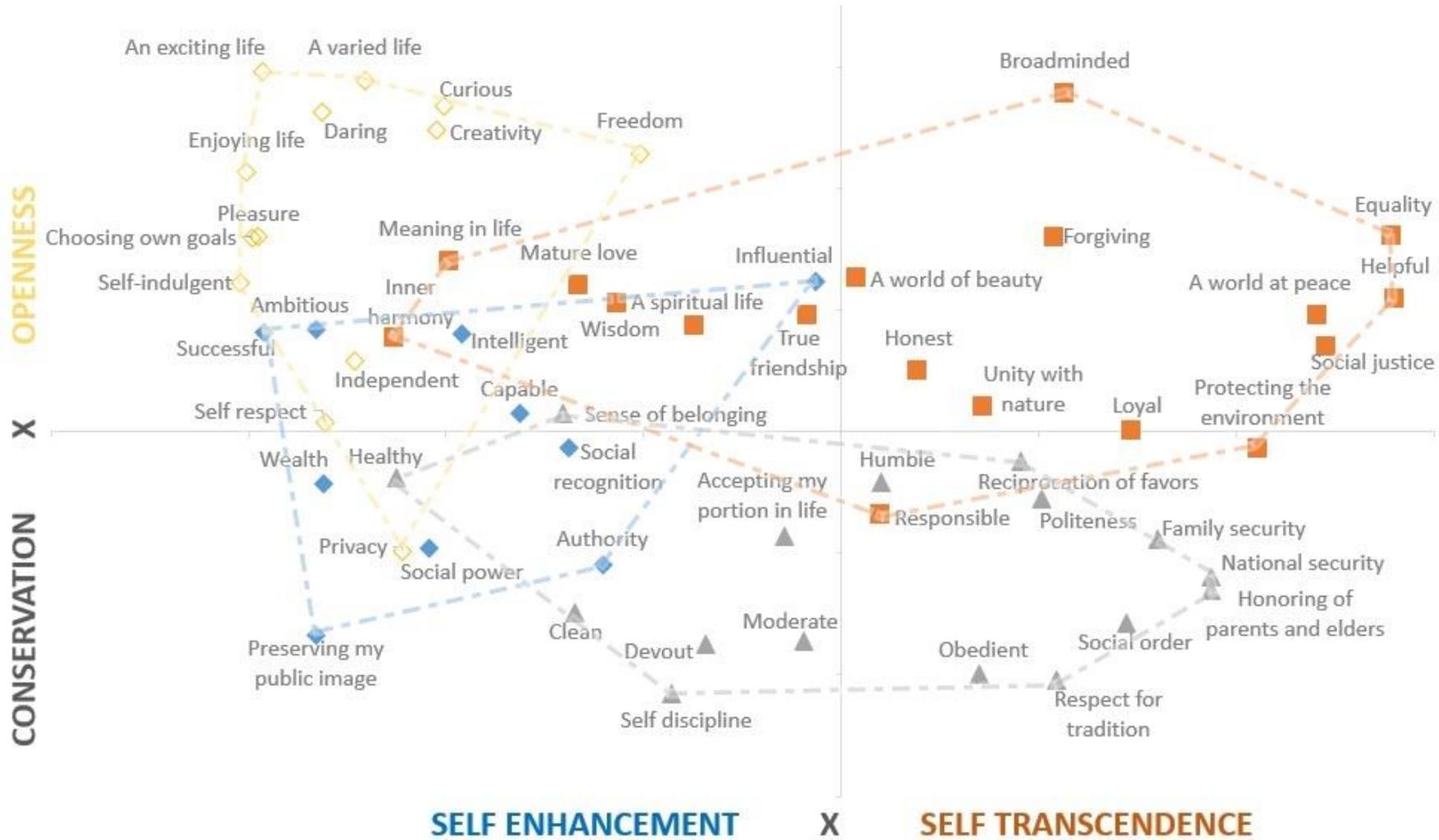
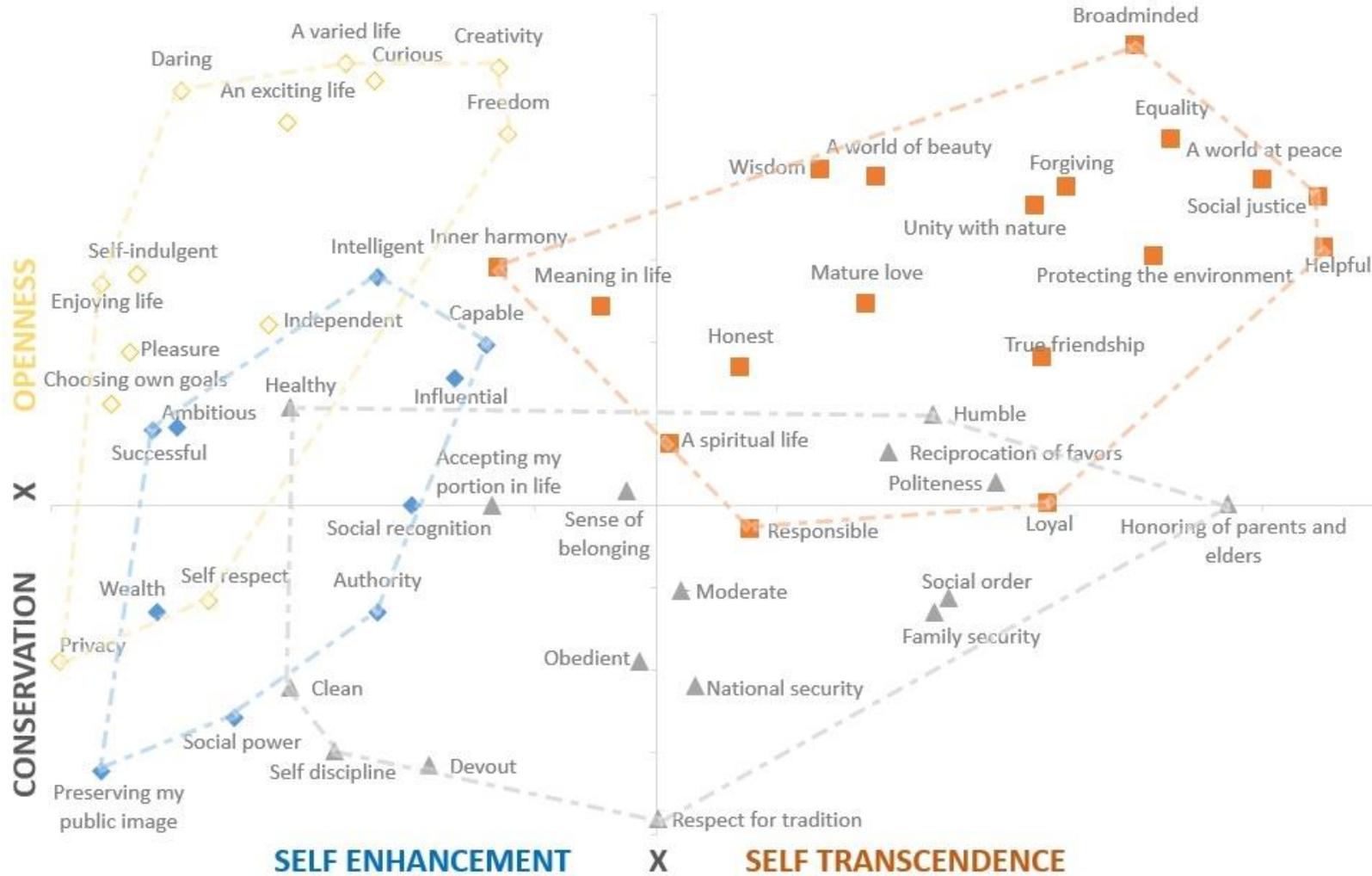*Figure 7.* Values placed along Schwartz's value dimensions (UK; Study 5).

Figure 8. Values placed along Schwartz's value dimensions (BR; Study 5).

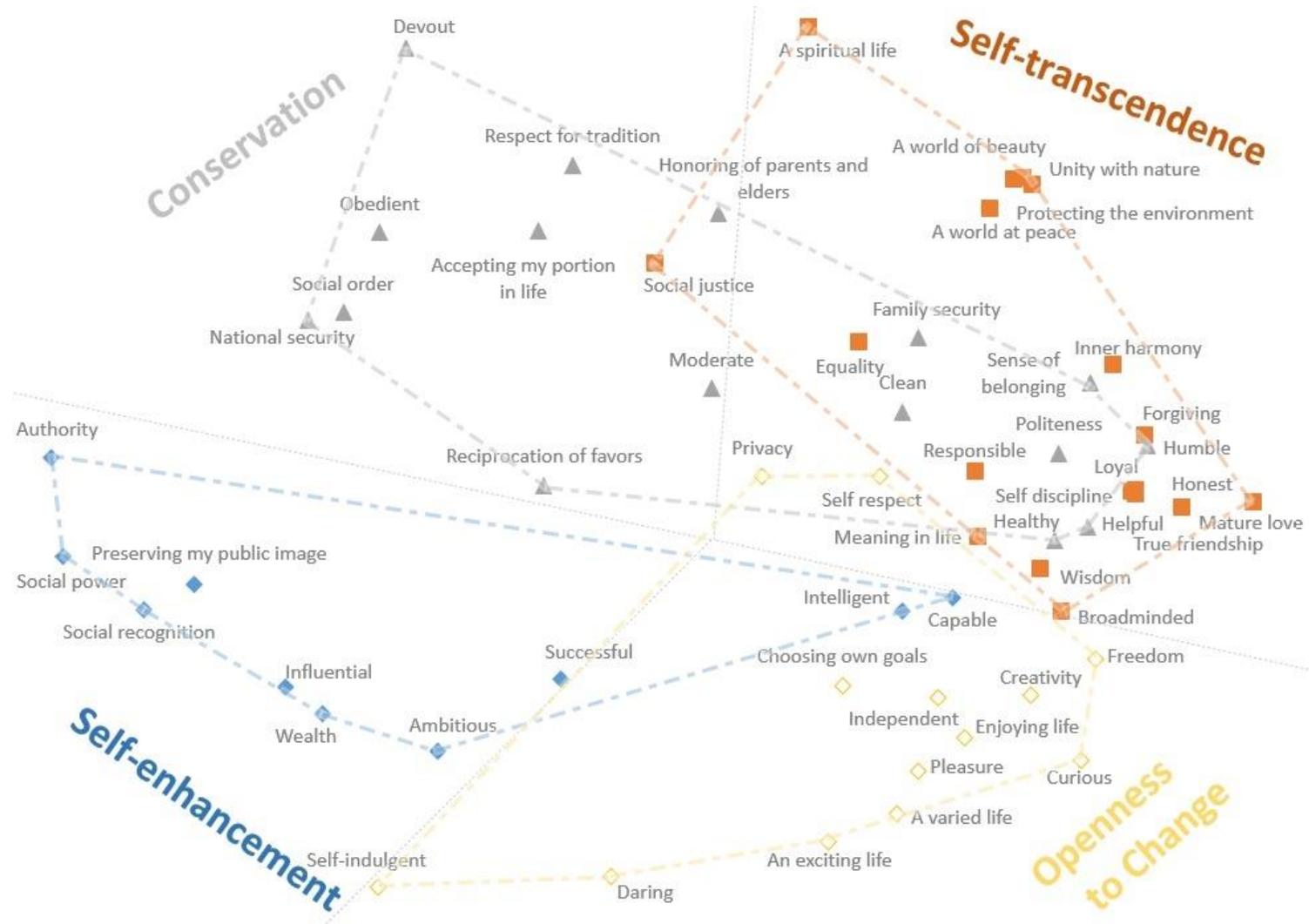*Figure 9.* Value positions according to value similarities (Study 6).

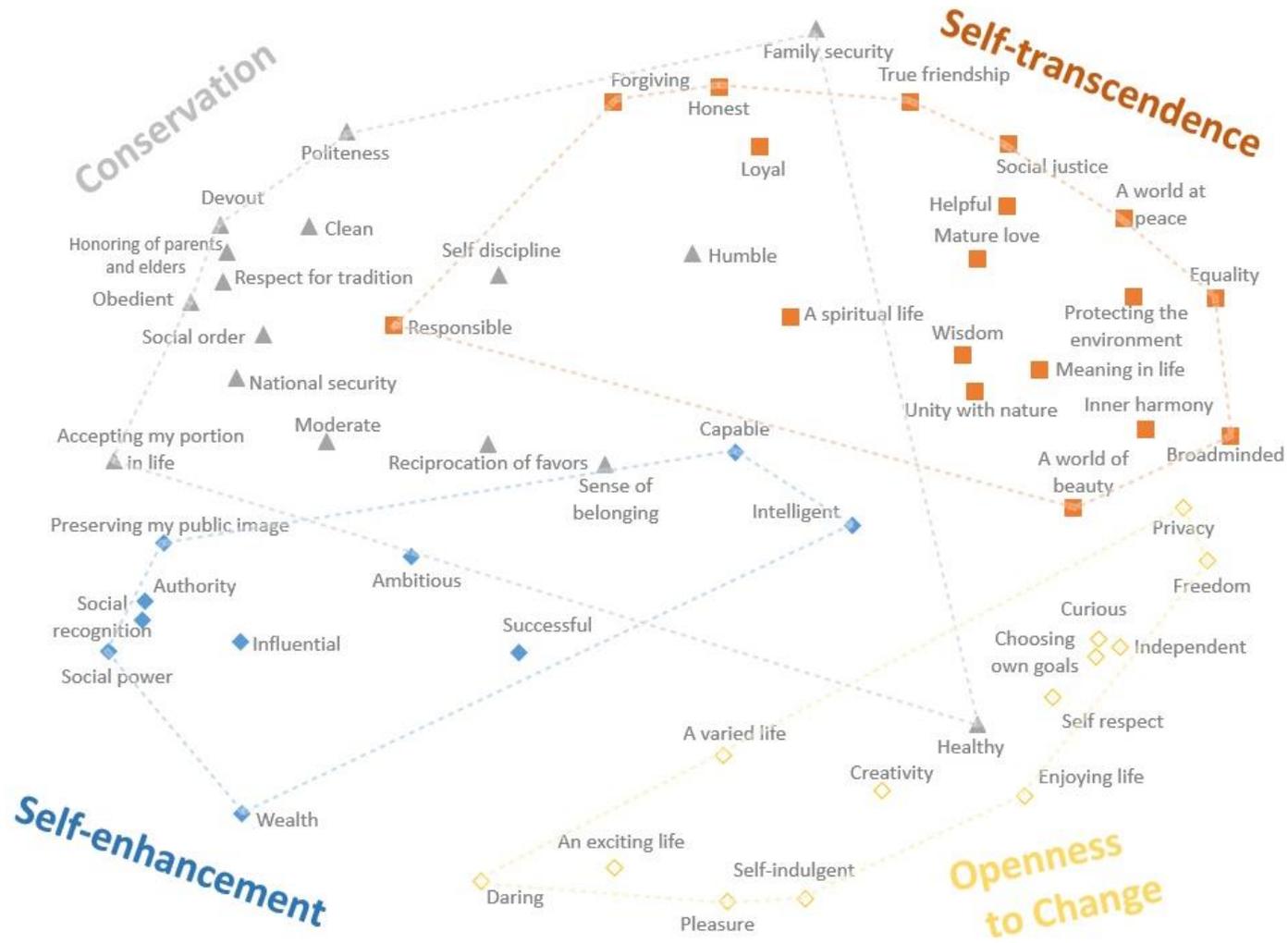*Figure 10.* Value positions according to value similarities (Study 7).

Figure 11. Value positions according to participants' value importance ratings (Study 7).