Bias in Terms of Culture: Work Values Country-Clustering for 33 European Countries and Person-Job Fit Factor Equivalence Testing for Four European Countries

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Abstract

Bias in terms of culture has been posing threat to cross-cultural research since the very beginning of cross-cultural endeavor. Metric and statistical methods have been discussed in literature in order to deal with this type of bias; however, some of these methods show side-effects on the level of scale validity and some others with so stringent effects on the available information and allow for very limited variance to be interpreted.

The present twofold study describes yet another method, this time based on country clusters, following the idea introduced by Georgas & Berry (1995) of employing country sets based on their eco-cultural or psychological variables rather than single countries. In our study, the country clusters were derived from a different construct than the target one; the clusters of countries were formed using information from the European Value Survey Work Values, but the target construct in respect to bias reduction was the Person-Job Fit. Starting with 33 European countries and through trigonometrically transformed Multidimensional Scaling solutions, we arrived at a system of homogeneous clusters of countries in respect to their factor structure similarity. This similarity is not based on actual distribution resemblance levels, but on factor structure similarity as computed and utilized through the "hit" matrix. Testing for factor structure equivalence in the Person-Job Fit construct(s) for four European countries through covariance structure analysis, we contrasted two research methods, namely, the traditional across-countries approach and the method of aggregating some of the countries involved into clusters with a homogeneous factor structure. The findings showed that the aggregation technique reached acceptable levels of statistical support for the emerging factor structures, whereas the traditional approach did not statistically support the structures reached. Possible statistical artifacts were also tested through a third research condition, under a "homogeneity" rationale.
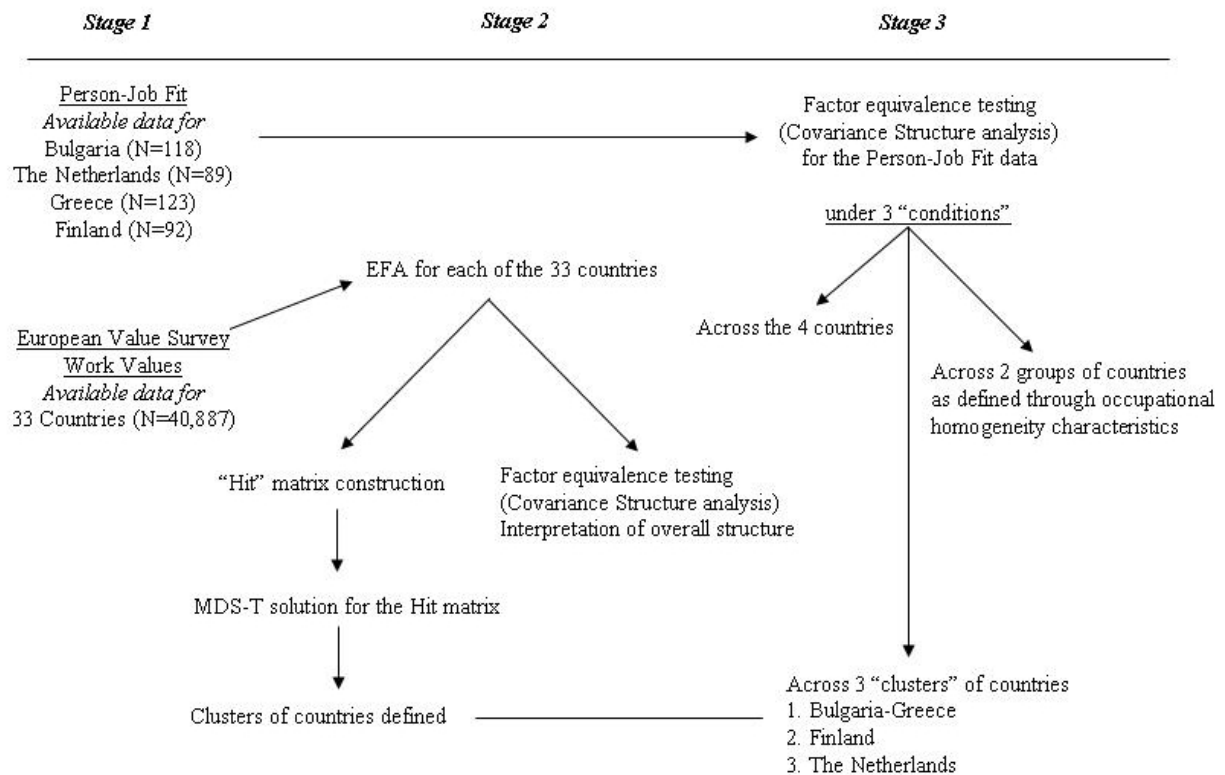
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This chapter[1] is a brief description of an attempt to address some methodological and statistical questions related to bias in terms of culture: Can we find alternative ways to reduce such a bias, instead of removing the suspect or biased items? Can we find a method to support clustering of countries in a cross-cultural study (with at least three countries under comparison) in respect to some – any, really – correlate measures and not the target one (i.e., the one in "need" of bias reduction)? Can this clustering method reduce bias in terms of culture for the target measure, since it will (in terms of factor similarity) arrive at comparisons of more homogeneous sets of countries, in contrast to comparing the countries on a one-to-one basis?

We attempted to answer these and other related questions by working on a twofold project: We first employed the European Value Survey and a set of 15 work value measures to test for factor congruence across 33 European countries and to arrive at homogeneous sets of countries according to their similarity in terms of factor structure equivalence levels. We then located the specific countries in these clusters, for which data had been already collected on the target measure, namely, Person-Job Fit, and we tested for factor equivalence through covariance structure analysis for a) an across countries comparison, b) an across clusters-of-countries comparison, and c) a homogeneity hypothesis comparison between two types of occupations, in order to account for possible statistical and methodological artifacts.

In more detail (Figure 1), the aims of the first study in this project were a) to describe the data at the item-level for each of the 33 countries separately in order to identify any common patterns or variability of work values across countries, b) to describe the factor structure for each of the 33 countries for these 15 work values and compare them on a one-to-one basis, c) to test for factor structure equivalence across the countries using Multilevel Covariance Structure Analysis (Muthén, 1994) in order to combine all necessary information to arrive at a factor equivalence structure or a statistically universal structure within the sample units involved, and d) to combine information on the factor similarity levels in order to compute specific clusters/sets of countries based on the factor similarity derived from these 15 measures.

The second study[2] addressed the Person-Job Fit target measure, as assessed through a nine-item scale created by Brkich in 2002 (Brkich, Jeffs, & Carless, 2002). This study was conducted in four European countries which were located within broader specific clusters of countries as defined in Study #1 through the statistical methods employed[3]. We could then test a) for factor structure equivalence across all four countries for the Person-Job Fit measure, b) for factor structure across clustered countries, provided such clusters would have been identified on correlate measures through Study #1, and c) for factor structure across two types of occupations (homogenous *vs.* non-homogeneous groups) to test for a possible inflation of equivalence effect, attributed solely to data aggregation.

Stage 1   Stage 2   Stage 3

Person-Job Fit
Available data for
Bulgaria (N=118)
The Netherlands (N=89)
Greece (N=123)
Finland (N=92)

Factor equivalence testing
(Covariance Structure analysis)
for the Person-Job Fit data

under 3 "conditions"

EFA for each of the 33 countries

European Value Survey
Work Values
Available data for
33 Countries (N=40,887)

Across the 4 countries

Across 2 groups of countries
as defined through occupational
homogeneity characteristics

"Hit" matrix construction

Factor equivalence testing
(Covariance Structure analysis)
Interpretation of overall structure

MDS-T solution for the Hit matrix

Clusters of countries defined ──────

Across 3 "clusters" of countries
1. Bulgaria-Greece
2. Finland
3. The Netherlands

Figure 1. *Overview of the methods employed in both studies*

Study #1. The European Value Survey Work Values: Factor Structure, Homogeneous Subsets and Their Use in Country-Clustering Methods

Work Values

The European Values Study (EVS), a well established network of social and political scientists, gathered at the end of the seventies, aimed at empirically uncovering basic values, attitudes, and preferences of the European population and exploring similarities, differences, and changes in these orientations. Three waves of data have been collected (1981, 1990, 1999-2000) with a main goal to attain a better insight into fundamental values and value similarities in Europe. The total number of countries participating consisted of just 10 in the first wave, climbed to 26 in the second wave, and reached 33 in the third wave. Uniformly structured questionnaires have been administered in each and every wave, enabling generalizations and allowing for comparability. The third wave EVS questionnaire addressed domains of religion/morality, society/politics, primary relations, and work/leisure.

The concept of work values, as defined and measured according to research objectives and theoretical background (Dose, 1997; Roe & Ester, 1999), may lack some clarity, causing debates and controversy. For instance, work values are defined as desirable modes of behavior in work environment and work-oriented or work-related processes and outcomes (Meglino & Ravlin, 1998) or as broad tendencies to prefer certain job characteristics, outcomes or features of work environments (Furnham, Forde, & Ferrari, 1999; Hofstede, 1998; Lofquist & Dawins, 1971; Pryor, 1982; Super, 1973). Alternatively, work values are conceptualized as systems of ethics, ideologies or philosophies (Jones, 1991; Trevino, 1986). A summarized definition of this controversy defines work values as standards or criteria, relatively enduring and stable over time, that focus on specific work-related features that are perceived as important and,

consequently, guide the selection of goals or actions in work or work environment (Furnham, Petrides, Tsaousis, Pappas, & Garrod, 2005).

Theoretically, work values can be described through a bipolar dimension (Dose, 1997), contrasting *personal* to *social consensus* values. This means, work values can be conceptualized as personal characteristics that may explain individual differences in vocational or organizational behavior and value conflicts *vs.* values which, in turn, are shared and integrated principles in a national or in an organizational setting (Hofstede, 1980, 1998; Meglino & Ravlin, 1998; Pryor, 1982). However, such a distinction is difficult to comprehend, as the personal perspective of values is often employed to explore cross-cultural differences or differences across organizations (Berings, De Fruyt, & Bowen, 2004).

For the description of work value variability among individuals, attention has been drawn to the extent to which work values contain moral elements as well as the extent to which they are associated with the Protestant Work Ethic (PWE). The traditional form of PWE, expressed through the Calvinistic approach, encourages respect, admiration, and willingness to work hard as well as to display productivity, industriousness, negative attitudes to leisure activities, and internal locus of control (Aygün, Arslan, & Güney, 2008; Furnham, 1989, 1990). For the assessment of work values variability across countries, the Hofstede's well-known bipolar dimensions of values (Hofstede, 1980, 1998) offer a basis of cross-cultural interpretation, through "power distance", "uncertainty avoidance", "individualism", "masculinity", and "values of long-term orientation" (Hofstede, 2001). Other research findings, exploring the work values on which managers rely, resulted in two contrasting managerial value dimensions: a) "egalitarian commitment" *vs.* "conservatism". According to them, managers might *either* endorse values of what is right and just on the basis of impersonal criteria and objective qualifications *or* values that are based on the loyalty to one's boss and family-relationship connections; b) "utilitarian involvement" *vs.* "loyal involvement", a selection between organization involvement that meets an individual's goals *vs.* the long-term identification of an individual's goals with the organization's ones (Smith, 2004; Smith, Peterson, & Schwartz, 2002).

Multilevel Covariance Structure Analysis (As Expanded To Exploratory Factor Analysis)

One of the conclusions that EVS waves had to offer was that Europe is far from unity when it comes to work orientations (Zanders, 1994). In an effort to show to what extent European citizens still differ or resemble each other, the third wave EVS questions on work focused on rating the important aspects of a job, job security, freedom to make decisions, work-money relationship, ethics in the workplace, work-gender relation, and work and minorities (Halman, 2001). In total, 33 European countries participated in this third wave with N = 41,125 adults of 18 to 65 years of age at the individual level of aggregation (valid N in our analysis = 40,887, as parts of the data were missing for 238 cases). Each country contributed with a large sample of at least 1,000 participants (Halman, 2001). The 15 items employed to assess work values focused on important work aspects in life: good pay, pleasant people to work with, good job security, etc. (see also Table 1). Participants responded on a binary scale ("yes" = 1, "no" = 0). When we plotted their means (with the majority of them between .36 and .66 for all countries collapsed[4]), clear differences emerged across countries, as these were largely variant in respect to the assigned levels of importance within each country. Some patterns were also visible. For instance, for the Greek participants the highest means were for "good pay" and "respected job", depicting the most important aspects of work; the least two important values were "good hours" and "generous holidays". For the Finnish participants, however, the mean score for "interesting job" was the highest, but the values for "generous holidays", "chances for promotion" and "respected job" were assigned the lowest mean.

The next step was to employ exploratory factor analysis for the 15 Work Value items. We retrieved a two-factor structure (based on preliminary attempts), allowing for items to possibly cross-load on both factors across the 33 countries. This was a first indication that a rather limited level of factor equivalence was present, as the majority of the items did not "behave" the same way throughout these 33 countries. For instance, for the Greek factor structure, the "good

pay" item loaded on the second factor and the "chances for promotion" item loaded on the first factor, but for Hungary both items loaded on the first factor. Such discrepancies were scattered around in the results. Nevertheless, statistically universal items for the majority of the countries were not apparent at this stage – possibly due to bias in terms of culture suppressing equivalence. Therefore, the general outcome was to be further explored.

Our second goal was to depict discrepant items while further testing for factor equivalence through multilevel covariance structure analysis (Muthén, 1994), as extended to factor analysis by Van de Vijver and Poortinga (2002). This method is an extension of the confirmatory factor analysis approach to equivalence testing – as proposed by Muthén – into exploratory factor analysis methods. Certainly, several other methods exist in addressing factor equivalence, such as in the recent study by König, Steinmetz, Frese, et al. (2007). Many of these other methods employ hypothesis testing Structural Equation Modeling methods and use multi-group comparisons to test for factor equivalence across cultures. In this study, however, we employed Muthén's method as we can only explore and describe correlations, because the whole study is itself of an exploratory nature. The acquired intraclass correlation coefficients, ranged from .05 to .11, with an average of .10; this was rather high and not very promising (an upper limit of .06 has been suggested by van de Vijver and Poortinga, 2002, for invariance across "classes" to be attainable). Further exploration of item discrepancies was performed through the computation of the square root of the mean squared difference indices for the loadings before and after Procrustean rotation (van de Vijver & Leung, 1997; van de Vijver & Poortinga, 2002); reaching an average of .25, these indices revealed discrepancies for some of the items, but an initially acceptable factor structure emerged (Table 1).

Table 1

Procrustean Solutions for the EVS Work Values Individual Level (Estimated Between Groups Correlation Matrix Target-Rotated on the Pooled-Within) and Country Level Factor Structures

Covariance structure analysis - Target rotated solutions
(40,887 cases for 33 countries for 15 items)

Extent of importance in work	Individual level solution		Country-level solution	
good pay	-.08	**.94**	-.06	**.94**
pleasant people	**.88**	.07	**.88**	.05
not too much pressure	**.71**	.56	**.71**	.57
job security	.34	**.69**	.38	**.68**
chances for promotion	**.66**	**.68**	**.65**	**.69**
respected job	**.61**	**.63**	**.62**	**.63**
good hours	.51	**.67**	.47	**.68**
use initiative	**.94**	.25	**.95**	.25
useful for society	**.75**	.56	**.71**	.60
generous holidays	.44	**.68**	.42	**.67**
meeting people	**.87**	.32	**.84**	.35
achieving something	**.86**	.34	**.86**	.32
responsible job	**.92**	.17	**.90**	.19
interesting job	**.45**	.22	**.52**	.15
meeting my abilities	**.68**	.57	**.69**	.56
Proportionality index	**.96**	**.90**	**.96**	**.90**

Employing the set of vectors corresponding to the "estimated between-groups correlation matrix" as computed through the Muthén algorithm, and the pooled within-groups solution, we performed a Procrustean rotation (which is the last stage of the overall procedure as described by van de Vijver and Poortinga, 2002). We followed the same procedure for the set of vectors as computed for the "country-level solution" (aggregated mean scores for all countries and all items, directly factor analyzed for reference and comparability reasons), and as target rotated (Procrustean rotation) on the pooled-within individual level solution. A cutoff loading score of .60 was employed for both solution sets and both target rotations, allowing for as little cross-loadings as possible.

At the individual level of analysis, it was somewhat problematic to arrive at the set of vectors, as a number of item discrepancies existed (according to the square root of the mean squared difference before and after target rotation). However, according to proportionality indices (Tucker φ), rotation was successful as the similarity before and after the rotation exceeded .90. Thus, we decided to further study this specific factor structure that might at least *suggest* statistical universality across these 33 countries. The first factor was named "Achievement parameters and social status" including items such as "not too much pressure", "use initiative", "meeting people", and "chances for promotion". These items are mostly personal goals and subjective well-being values *vs.* the values of a "respected job", a "responsible job", and a job that is "useful for society", as these refer to social values, in accordance to the bipolar dimension of personal *vs.* social consensus values supported by Dose (1997). Overall, this factor resembles the Protestant Work Ethic theory in its contemporary form (Furnham, 1989, 1990), as it stresses need for achievement, personal responsibility for success-failure, and independent decision-making according to one's abilities and initiative. It may also depict Hofstede's individualism value dimension (Hofstede, 1980, 1998) emphasizing a combination of personal motivation and achievement with a social parameter of work status, responsibility, and social offer. The second factor, "Utilitarian involvement to work", included traditional work values of "good pay" and "job security" along with the less traditional ones of "good hours" and "generous holidays". This factor may possibly be interpreted under Hofstede's values (Hofstede, 1980, 1998) of "uncertainty avoidance" in terms of planning, profits and stability on the one hand, and also with a contemporary aspect of Work Ethics that is closely associated with personal handling of time.
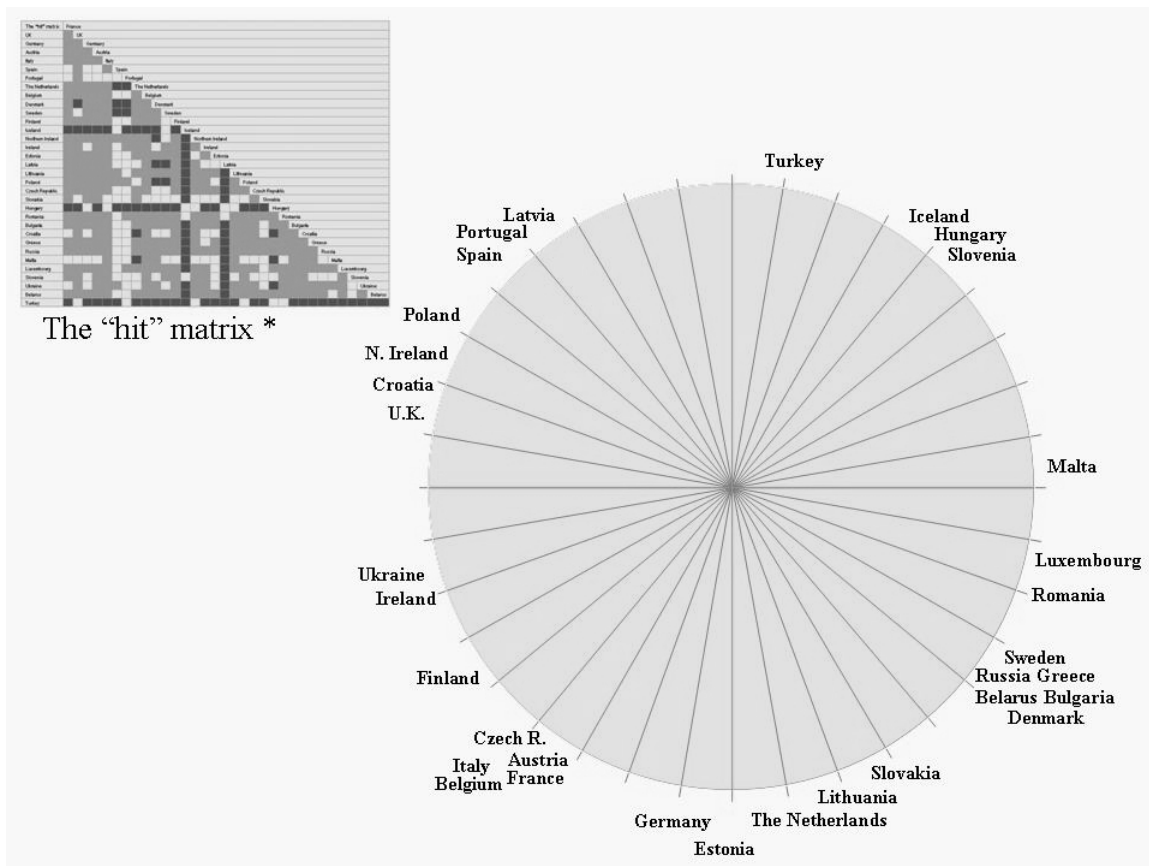
Homogeneous Subsets and Country-Clusters Extraction

Having arrived at a possible set of two factors exhibiting at least some acceptable levels of equivalence across the 33 countries, we were now eligible to describe these levels of equivalence for pairs of countries. The overall method in this stage was theoretically based on the eco-cultural taxonomy as proposed by Georgas and Berry (1995) through their six eco-social factors (ecology, education, economic, mass communications, population, and religion) and their suggestion of a way to avoid the "Onomastic Fallacy" (Georgas, Van de Vijver, & Berry, 2004). Other studies have attempted to form country clusters through alternative methods. Such is the Ronen and Shenkar study (1985), in which meta-analytic techniques were employed, setting an early scene for multilevel cross-cultural modeling as the authors contend that a number of studies are important as they support the importance of individual differences "… without negating the contribution of variance that can be explained by cultural differences." (p. 448). The supportive stance Ronen and Shenkar take towards MDS methods is similar to our study. Such methods have also been employed by other researchers in their quest for country clusters (e.g., Brodbeck, Frese, Akerblom, et al., 2000). However, a large difference is that all studies reviewed by Ronen and Shenkar, as well as the Brodbeck et al. study, have analyzed raw data (either at the individual or at the country level) to classify into country clusters; we, however, have employed factor structure similarities across countries instead.

In our attempt, we were neither interested in describing which of the 33 countries presents similar work values with other countries or not, nor in explaining these similarities and differences in terms of cultural variables. At this stage, we were simply aiming to describe factor equivalence levels for the above two factors across the countries in pairs (528 pairs of

countries). Thus, for the purposes of the present study, we employed a "hit" matrix –a method proposed by the first author – that contains information on which pairs of countries presented one, two, or no identical factors (Gari, Panagiotopoulou, & Mylonas, 2008; Georgas & Mylonas, 2006; Mylonas, 2009). This "hit" matrix (shown in Figure 2) is then considered being the basis for computing a similarity/dissimilarity Euclidean distance matrix to be analyzed through multidimensional scaling, trigonometrically transforming the coordinates to arrive at a circular continuum, a method also proposed by the first author (Mylonas, 2009; Sidiropoulou-Dimakakou, Mylonas, & Argyropoulou, 2008; Veligekas, Mylonas, & Zervas, 2007). In such a solution, the levels of factor equivalence across countries are used to portray (Figure 2) larger homogeneous sets of countries, which are formed in respect to their similarity in factor structures and can then be used as a point of reference (i.e., in a new study where some of these countries are involved).

The circumplex in Figure 2 is used to present levels of equivalence among the countries through clusters of similar country sets in respect to their factor equivalence and not in respect to their similarity in mean values or distributions. For this solution, $STRESS$ = .30 was quite high and not very promising, as values of less than .11 are required in order to achieve statistical power (Davison & Sireci, 2000, pp. 335 & 337), while R^2 = .75 was also not satisfactory (Davison & Sireci, 2000, p. 336), accounting for less than the desired variance of the estimated proximity measures. However, the reason we employed this MDS-T solution was to compute homogeneous sets of countries among the 33 initial country units, not to support or refute a theory. Therefore, for reasons of interpretability (Everitt, 1996), two dimensions were retained. Thus, one cluster was comprised by UK, Croatia, Poland and Northern Ireland, along with Portugal, Spain and Latvia, as all these countries present similar levels of factor congruence in contrast to another country cluster (Iceland, Hungary, Slovenia, and possibly Turkey); in turn, this cluster was different in its factor similarities from the cluster of Denmark, Russia, Belarus, Sweden, Bulgaria, and Greece. For the second study in this project, data were already available for Greece, Bulgaria, Finland, and the Netherlands. Through the solution above, Greece and Bulgaria seemed to belong to the same homogeneous set of factorially similar countries in respect to Work Values, and could thus be aggregated in our second study and in respect to the Person-Job Fit measures; however, Finland did not seem to belong to the same country-cluster with the Netherlands, thus these two countries would not form a homogeneous set, and they should be treated as separate units during Study #2.

The "hit" matrix *

* *The actual computations for the MDS-T solution are performed on the dissimilarity matrix*

Figure 2. *Multidimensional scaling solution (trigonometric transformation) for the factor equivalence levels across the 33 countries as computed through the hit matrix.*

Study #2. Person-Job Fit and Covariance Structure Analysis for Four European Countries: Reducing Bias In Terms Of Culture through Country-Clustering Methods

Bias in Terms of Culture

The term "bias in terms of culture" is not new in the literature. It has been systematically addressed by theorists and researchers in the field, with Poortinga setting the scene back in 1989, arguing on several ways of dealing with the artifacts caused by the specific type of bias. Other theorists have addressed this bias issue since then, proposing more methods of detecting and possibly eliminating it from cross-cultural comparisons. Following an initial thesis that there is no variance left to be explained in terms of culture in a satisfactory cross-cultural study (Poortinga & Van de Vijver, 1987) and that cultural variance should be reduced to zero to derive comparable measures and cross-culturally meaningful structures; the "comparison scale" *vs.* "measurement scale" differentiation was also described by Poortinga (1989). In a cross-cultural comparison with respect to some variable, differences in scores between cultural groups can reflect valid differences in the construct measured. They can also result from measurement artifacts or bias. Valid differences can be generalized outside the testing situation, in the domain of behavior, or in the underlying construct measured. If we had a criterion or common scale that is identical in the different cultural groups, like the "comparison scale", valid differences between the groups on the measurement scale which is used to gather data would correspond to equal differences on the comparison scale. In a comparison affected by bias, the relation of the measurement scale and the comparison scale is not the same for the different groups. This is, for

example, when differences between two cultural groups on an IQ-test (measurement scale) do not correspond to equal differences in the level of intelligence (comparison scale) (Poortinga, 1989).

It has been supported that removal of item bias does not necessarily lead to scalar equivalence and that bias, in general, cannot be merely reduced to item bias, but a biased item can be treated as a disturbance at the item level that has to be removed (Van de Vijver & Leung, 1997). However, removal of items can easily affect the validity levels of a scale (i.e., if too many items are removed, how can content validity of the comparison or measurement scale be preserved?). In order to circumvent such a problem, a number of statistical methods have focused on bias detection and on bias elimination, in order to achieve invariant scales across cultures. Psychometric-statistical methods may be used, e.g., including confounding variables in the design of the study (Poortinga & Van de Vijver, 1987) which is followed by a covariance or hierarchical regression analysis. Valencia, Rankin, and Livingston (1995) tried to account for cultural variance by controlling for age, gender and ability for an intelligence test through partial correlation coefficients; they found more than 50% of the items to be biased. Other approaches have focused on reducing bias by aggregating countries in terms of their common characteristics, such as eco-social indices (Georgas & Berry, 1995). Yet another approach might be to account for cultural variance by estimating the amount of variance caused by "culture" for a set of items, using the information contained in these same items and not by using external measures (such as control variables). Along these lines, an earlier attempt (Mylonas, 2003, symposium presentation in Budapest) focused on MDS solutions (Individual Differences, Euclidean Models, Weirdness indices) to account for bias in terms of culture, although it entailed some possibility of zero variance situations (according to Ype Poortinga, Discussant in the respective Symposium).

Person-Job Fit

For our present study we selected – and not without cause – Person-Job Fit as the construct of interest. Person-Job Fit is one several distinct constructs of Fit and contrasts with other constructs such Person-Organisation Fit, Person-Vocation Fit, Person-Preferences for Culture Fit, and Person-Team Fit (Kristof-Brown, Zimmerman, & Johnson, 2005). The construct of Person-Job Fit has been studied extensively and underlies research in many areas of organizational behavior, industrial/organizational psychology and vocational behavior. While most developments in these fields have occurred independently, for the large part they have all focused on "..the fit, congruence, matching, contingency or joint influence of the person and job in the prediction of individual and organizational outcomes" (Edwards, 1991, p. 284). There is general agreement (Holland, 1973; Klein & Wiener, 1977; Super, 1973) in respect to the importance of a person's fit with his/her job which, in turn, is likely to result in occupational satisfaction and success. Klein and Wiener (1977) specifically support that the better the fit of the personal traits to the job requirements, the larger the probability of success in this job in respect to productivity and personal occupational satisfaction.

One construct definition of Person-Job Fit would be the level to which a person's knowledge, skills and competence, as well as needs and values correspond to job demands. This would, however, have nothing to do with the specific employer (company/firm), as "job" refers to the line of occupation and not to the specific firm offering it (Brkich et al., 2002). While some features or requirements of a job may be more enduring (e.g. type of skills required) than others (e.g. current projects), workplaces are characterized by less stable contexts than in previous years, therefore Person-Job Fit is likely to reflect current experiences and work attitudes. Employers need to consider the dynamic nature of matching individual and organizational needs for their people management systems to be effective. When employees experience a strong sense of Person-Job Fit they tend to express a strong affective orientation to the organization. This feeling of wanting to belong to an organization appears to enhance the likelihood of positive organizational citizenship behaviours (Brkich, 1997, 2002). Employers and employees are to gain from the knowledge of this construct, as employees may enhance the likelihood of positive organizational citizenship behaviors, and as employers can greatly benefit in terms of improved

organizational performance and adaptability from employees who contribute through making extra efforts and express a willingness to participate, change and innovate.

A Person-Job Fit Scale has been introduced by Brkich in 2002[5] (initially constructed in 1997; Brkich, 1997) as a nine-item unifactorial instrument assessing an individual's perceptions of the match between his/her knowledge, skills, abilities, values and needs, and the job requirements. Construct and criterion-related validity have been demonstrated by correlating the Person-Job Fit Scale with empowerment, job satisfaction and organizational commitment. Brkich, the originator of the Person-Job Fit Scale, states that the reliability of the scale is successfully supported by the nine items of the scale and that the construct itself has a convergent relation with the prediction of future occupational satisfaction and with the emotional devotion to the job and the firm offering it. Person-Job Fit is then a global measure, overcoming the "matching along the same dimensions" problem of two scores: one on personal characteristics and the other on the work environment. Thus, personal dispositions and situational or organizational characteristics are addressed at the same time as a whole and not as a sum of the parts. The scale items focus on the "match" and "suitability" of an individual's current job. Employers and employees are to gain from the knowledge of this construct: employees may enhance the likelihood of positive organizational citizenship behaviors; employers may benefit in terms of improved organizational performance achieved through understanding the dynamic nature of matching individual and organizational needs.

Linking our two studies

The Person-Job Fit unifactorial structure has been supported by its creator for a number of samples. Although the scale was created for the Australian population, under the high levels of the Australian cultural diversity (more than 40 main ancestries and more than 110 less prominent ones), it has not yet been tested cross-culturally. According to Kline (1993), exploratory factor analyses for less than ten items is not suggested, thus the Person-Job Fit structure might preferably remain unifactorial in such a study to achieve maximum stability levels in the analysis. However, this, along with the country-clustering solution, would also remain to be tested in this study.

For this study and in relation to Study #1, if we could employ relevant data (i.e., EVS Work Values) referring to psychological correlates of the construct under investigation (that is, Person-Job Fit) and then gain information from the correlate data in order to form broader and more homogeneous subsets of countries (in terms of culture), we might be in a position to at least reduce bias in terms of culture for the target measure (Person-Job Fit). Thus, the main question in this study is whether these psychological variables (EVS work values) could define clusters for a broader set of countries (n = 33, Study #1) for us to be able to identify the cluster each available country in the Person-Job Fit sample belongs to. We could, thus, group these available countries to larger sets and then possibly achieve lower levels of bias in terms of culture.

To test for the above question, we followed a three-fold design: a) we first tested for factor equivalence levels across the four countries (Bulgaria, the Netherlands, Finland, and Greece) for which there was Person-Job Fit data availability; b) based on the EVS clustering on Work Values, three "clusters" or groups of countries were visible, as Bulgaria and Greece were forming a separate cluster, so we tested for factor equivalence across these three groups (the Netherlands, Finland, and Bulgaria-Greece aggregated) in an attempt to compare across units that are more culture-homogeneous; c) we finally tested for a possible inflation effect, in terms of group-homogeneity artifact, through factor equivalence across two occupational groups (regardless of culture), one consisting of participants with the same occupation (university staff members), and the other group consisting of all other occupations present in our data.

Method - Study #2

Samples. In total, 422 adults participated in this study. Of them, 118 were Bulgarian, 123 were Greek, 89 were Dutch, and 92 were Finnish. Age varied from 20 to 70 and the sex

distributions were slightly skewed in favor of females, with the opposite being the case in the Netherlands. In respect to occupation, all respondents were university staff members in the Bulgarian and Dutch samples; in the Greek sample, 39 respondents were university staff members, 39 were taxation officers, and 45 were computer data-bank operators. Finally, in the Finnish sample, most respondents were employed in the health sector, but many other occupations were present (such as education professionals and office workers).

Measures. The nine-item questionnaire, as it has been proposed by Brkich, consists of short statements such as "I feel that my goals and needs are met in this job" or "My current job is not really me" (for the scale items, see also Brkich et al., 2002). These are evaluated by the respondents on a seven-point Likert-type scale[6]. Although the author of the scale has supported unidimensionality of the construct, there were strong indications in the present data for two-factor structures, which were the ones we pursued in the analysis. A final note is that the averaged (across items) mean response for each of the four countries studied ranged from .52 to .56, with a variance for the aggregate measure being close to maximum.

Design. Three separate sets of analysis were carried out. All were conducted using the same statistical rationale under different research conditions. We tested **i)** across all four countries separately, **ii)** across three "clusters" of countries (Bulgaria and Greece being clustered through the EVS Work Values analysis in study #1), and **iii)** across two occupational groups, a homogeneous one (university staff members only) and a non-homogeneous one (any other occupation), irrespective to country. The methods of statistical analysis were based on multilevel covariance structure analysis, employing the Muthén methods (1994) as extended to factor analysis by Van de Vijver and Poortinga (2002). For each of the three research conditions, we calculated the between-groups correlation matrix along with the pooled-within groups correlation matrix and we factor analyzed each of them separately, forcing a two-factor solution. We then performed a Procrustean rotation to arrive at the final solution, describing a statistically universal structure for the groups in the analysis. We then examined the plausibility of such a "statistical universality" by means of the intraclass correlation coefficients accompanying each analysis, again as given through the Muthén algorithms. We were then able to suggest which of the "statistically universal" factor structures, as well as under which research condition, was less affected by bias due to the groups involved in the analysis. The criterion of a maximum average intraclass correlation coefficient of .05 should be met to support absence of bias in terms of the three groups (countries, clusters of countries, occupations).

Results - Study #2

i. In this attempt, all four countries were treated as separate groups, and the analysis was applied across all four sampling units. This is the traditional way of conducting cross-cultural comparisons in terms of factorial structure equivalence. Hence, each country in the study is treated separately under the assumption that its culture is not similar to the culture of any other country studied. In such a way, the null hypothesis in respect to factor equivalence is that countries are *a-priori* entirely different in respect to their factor structures. Accordingly, the covariance structure analysis that follows is based on this hypothesis, calculating estimates based on this maximal divergence.

Following estimations of the between-groups and pooled-within groups correlation matrices, the intraclass correlation coefficients for this analysis across all four countries were computed. Then, the statistically "universal" factor structure was calculated (Table 2). Although this structure seemed rather acceptable hermeneutically, the intraclass correlation coefficients suggested that its "statistical universality" could not indeed be supported. The average intraclass index was .13, with the second, third, fifth and ninth items being the most discrepant ones. As for the factor solution itself, three of the nine items were cross-loading (with a cutoff score criterion of |.40|), obscuring factor identification.

ii. In this attempt, we aggregated the Bulgarian and the Greek data, as if they were collected from the same culture, according to the membership of both these countries in the

same cluster defined by the EVS Work Values. We then contrasted this aggregate to the Finnish and Dutch data, as if there were three and not four countries in our original pool of samples. The rationale is exactly the same with (i). The only difference is that, in this case, higher levels of culture homogeneity may have been achieved, as the possible *a-priori* similarity between two or more countries has been accounted for. However, the most important gain goes beyond that: by clustering *a-priori* similar countries (according to the correlate measures), we juxtapose them to the rest of the countries, which in turn may be clustered along with other countries. Thus, it is not the similarity gain which matters most, but the ability to distinguish more clearly amidst clusters formed by homogeneous units, those computed via correlate measures.

We repeated the statistical analysis and arrived at a two-factor structure as shown in Table 2. The cross-loading items (with the same cutoff score criterion as above) were now two, instead of three. Even though this still poses a problem in factor identification, it was clearly better than the solution in (i), at least by 11% (one out of nine items). The important profit surpassed the structure gains, since the plausibility of this structure as a statistically universal one was supported. Indeed, the average intraclass correlation index was now only .04, with the second and the ninth items being the most discrepant ones, although these discrepancies did not exceed .08. It was then evident that the aggregation of the two countries into one cluster enhanced our levels of achieving better statistical factor universality across all compared units.

Nevertheless, an objection might be that the aggregation itself created this outcome simply by homogenizing one of the compared units. This allowed for artificial inflation of concordance among raters, resulting into better intraclass correlation coefficients. In line with this, however, any homogenizing procedure would have created the same effect, which was to be tested in the next and final attempt of our analysis.

iii. According to Guilford (1954), population sampling is important for factor analysis and certain controls can facilitate bringing out a factor structure more clearly. The population should be homogeneous in respect to variables which the investigator does not want to appear as common factors. The variables that will be included in the factor analysis should have substantial variances. If some common variables like age, sex, educational level or intelligence are not controlled, some factors may appear to be correlated with each other because of their correlation with these variables, even if they are actually uncorrelated. Second-order factors can appear that represent only characteristics of the population sampled and not psychological relationships between the factors. Such theoretical lines emphasize the need for homogeneous sets to be analyzed and imply the possibility of the homogeneity itself, thus artificially inflating the results. Such an "overshooting" cannot be ruled out unless tested for. For this reason, we re-analyzed the data by forming two separate groups of respondents, one consisting of university staff members only (an occupationally homogeneous subgroup) and the other consisting of any other occupation present in the data (non-homogeneous subgroup). By repeating the analysis, we would be able to re-enact condition (ii) without involving countries in the homogenization procedure (homogeneous cluster *vs.* countries remaining inhomogeneous in the comparison), but taking types of occupation into consideration.

The results reached in (iii) through the same methods as employed in the previous two attempts did not support a clear factor structure (Table 2), although we must admit that the constructs are the same with the solution in (ii). This means that the structure itself is not vastly affected – as the current solution bore exactly the same cross-loadings with solution (ii) and was very close to solution (i) as well – and that in its interpretation, each factor would yield approximately the same constructs in any of the three attempts. However, it is the intraclass correlation indices which are vastly different, especially in this last attempt (iii). The average intraclass index at (iii) reached .22, with many items exhibiting large discrepancies. Thus, although the factor structure, as reached under all conditions of analysis, is the same in terms of interpretation, *the levels of statistical support in each case are not the same, with acceptable levels only under the clustering research condition*.

Table 2

Person-Job Fit: Procrustean Factor Solutions for Each of the Three Research Conditions

	Across all 4 countries		Across 3 "clusters" of countries		Across 2 types of occupation	
	Factor 1	Factor 2	*Factor 1*	*Factor 2*	Factor 1	Factor 2
Item 1	.71	-.07	.75	-.05	.70	-.05
Item 2 *	.01	.76	.11	.75	.03	.73
Item 3 *	.55	.51	.57	.54	.55	.49
Item 4 *	.73	.29	.74	.30	.73	.27
Item 5	.64	.24	.65	.30	.64	.21
Item 6	.67	.44	.68	.47	.68	.42
Item 7 *	.08	.76	.06	.77	.03	.76
Item 8	.40	.51	.37	.49	.37	.52
Item 9	.31	.59	.37	.60	.32	.58

* Recoded items

Summarizing briefly, our Person-Job Fit data, as available for four countries, and as factor analyzed under three conditions, satisfied the cross-cultural statistical assumption of minimal bias in terms of culture only when the clusters of countries were formed and compared. Having arrived at those clusters through our correlate measures, we can suggest that our methods can be employed whenever a researcher is interested in clustering the countries under comparison on the basis of a correlate to his/her own target measure. Such correlate measures are usually available through other independent studies, such as the EVS. Enhancing statistical support in any cross-cultural comparison cannot be overlooked, but can only be tackled.

General Conclusion

Many ways of handling bias in terms of culture have been proposed, some of methodological nature and others of statistical intervention. However, it is also a fact that such methods of bias in terms of culture elimination are not the mainstream in cross-cultural studies; this might be due to many reasons such as the focus of the study, its complexity, its research questions, other bias control methods applied, etc. Attempting to describe more possible ways of addressing the same "bias issue" could enhance cross-cultural research. The method proposed in the current study followed an alternative path, in the sense that the intervention proposed is not a methodological one (i.e., controlling for bias anterior to the final analysis) but a statistical one, which can be carried out during covariance structure analysis, without eliminating any of the items employed. A necessary prerequisite is, however, that clusters of countries should be possible to attain through correlate measures, gained from other research efforts. In line with Georgas and Berry (1995), the quest for such clusters of countries on different psychological constructs might give rise to new waves of research in cross-cultural psychology.

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Footnotes

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[2] The Person-Job Fit research project was partially supported by the University of Athens Special Research Funds (ELKE), through "Kapodistrias" grant KA 6437.

[3] The four countries were employed (before even computing the clustering solution and before available data for the Person-Job Fit) as we were not aiming at showing similarities or differences across specific countries or clusters of countries, but rather were we trying to test our method of country-clustering on the basis of the already available data of these four countries.

[4] with this mean being equal to p, accompanied by a $p(1-p)$ variance for each item.

[5] Mariana Brkich is the author and copyright owner of the Person-Job Fit Scale; her permission is required for use or adaptation of the Person-Job Fit Scale.

[6] In this study, a binary ("yes-no") response scale was adopted, as *Pearson r* indices computed at the ordinal level of measurement would not be ideal for covariance structure analysis that would follow; in contrast, *Phi* correlation coefficients (as computed between binary measures) are arithmetically the same with the respective *Pearson r* indices which are by default assumed and employed in factor analysis by popular packages such as SPSS. At the same time, these *Phi* indices are suppressed by the very fact that they are constructed not to misuse ordinal data; they are also theoretically eligible for factor analysis (Kline, 1993, pp. 137-138). Thus, no statistical assumptions were violated and the data were factor analyzed under even more stringent conditions than the usual ones, as the *Phi* matrix is prone to low inter-item correlations and low variance, and as the alteration of the original response scale might lead to uniform inflation of bias in terms of culture to be dealt with through our methods.