Mindscapes and Individual Heterogeneity Within and Between Cultures

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Abstract

Most cross-cultural studies are sociologically based and assume intra-cultural homogeneity in mentality and logic among people. The application of cultural dimensions in many cross-cultural studies has inadvertently contributed to this oversight. Scores on these dimensions are supposed to indicate characteristics of national cultures. The apparent characteristics of cultures are extended to individuals as well. On that basis, we assume that all Americans are individualistic, ignoring those who might have more collectivist mentality and logic. Although some researchers have recognized the existence and importance of heterogeneity within cultures, these issues have not been fully addressed. Experience at the international level and research evidence indicates such a variation and heterogeneity. This research, conducted in four different countries, confirms the existence of individual heterogeneity in and among them.

Keywords: Mindscape, Epistemological Heterogeneity, Individual Heterogeneity Across Cultures, Pictorial/Geometric Pattern Tests.
Highlights

- Maruyama’s mindscape types were examined using 4-country data.
- The analysis indicated that there is individual mindscape heterogeneity in and across cultures, and these are transcultural.
- The study highlights an oversight in the assumption that there is cultural homogeneity where there is, in fact, heterogeneity in thinking, logic and behavior among members of cultures.
Mindscapes and Individual Heterogeneity Within and Across Cultures

1. Introduction

In the discussion of national culture or ethnic differences, we often talk about the differences by stereotyping each group and regarding the individual differences as variations due to “sub-cultural” peculiarities. For example, to construct a “heterogeneous” group we combine one black person, one woman, one senior, etc. as if each person “represents” a homogenous group. Mistakenly our “heterogeneization” could be a disguised “homogenization”.

Sociologically based research (e.g. Hofstede, 2001) has unintentionally contributed to this oversight. While the researchers have cautioned against the assumption of cultural homogeneity, many of the similar studies did not heed the advice. Most assumed that scores on those dimensions for a given country indicated cultural characteristics of people of that country (Venaik and Brewer, 2010). We assume on that basis, that all Americans are individualistic, ignoring those who might have more collectivist mentality and logic. International research evidence indicates that such an assumption is not correct. While the sociological approach has made significant contributions, it is not sufficient. While we recognize the differences among individuals intuitively, however, we need to augment the study of cultural differences with the inclusion of heterogeneity in and among cultures.

The purpose of this research is to demonstrate that there is individual heterogeneity in thinking, logic, and behavior (mindsscape) within and among cultures. Cross-cultural research, taking a sociological perspective, has told us a lot about national cultures. There are, however, many unexplained areas that we need to explore. This research is based on the theoretical foundation of Maruyama’s (e.g. 1980) writings on Mindscape. It is an empirical study that uses data from four countries, three of which until recently had very little contact with the outside world.
2. Assumption of Cultural Homogeneity vs. Individual Heterogeneity

Researchers have demonstrated that the behavior of individuals or small groups is best understood through the assessment of the individual or groups themselves and by taking into account their contextual characteristics (e.g. Gilovich, Keltner, and Nisbett, 2010). People vary on important psychological attributes, on both intra and inter-country bases (Brockner, 2005). In any country or culture we can find individuals who do not fit the norm, or we can find similarities in mentality and logic among individuals who originate from different cultures. There are indications that individually held values and beliefs influence employees’ reactions to different aspects of work (e.g. Tusi, Nifadkar, and Ou, 2007). In effect, individuals, regardless of the characteristics that are attributed to their culture, act as individuals. Homogeneity cannot be assumed within a culture (Tan, 2002). For example, Kirkman et al. (2009) found that in China and the U.S., individual employee-manager relationships were influenced by the power distance orientation of the employee. They asserted that the old-age advice “When in Rome do as Romans do”, should probably be modified to “When in Rome, get to know Romans as individuals”.

According to Smith (2006: 915), Hofstede’s (2001) study that applied cultural dimensions has served as a seminal work for subsequent investigators for two decades. Such assertion indicates the depth of influence of sociological perspective in shaping research trends and intellectual assumptions regarding cultural differences. Research studies that captured the essence of national cultures into a few dimensions (e.g. Hofstede, 2001, House, et al., 2004) were criticized for over simplification, generalization and theoretical grounding (e.g.McSweeney, 2002; Kirkman et al., 2006), nevertheless inspired a number of subsequent studies, some of which inadvertently contributed to the misconception of cultural homogeneity. Nonetheless, this line of research was and still is dominant in cross-cultural investigations.
The limitation of assuming the homogeneity of cultures was highlighted by Palich, Hom, and Griffeth (1995), who found that only 2.7% of the person-to-person variance in employee commitment could be attributed to Hofstede’s cultural dimensions. Also, Steel and Taras (2010) used a multi-level multivariate meta-analysis of 508 studies, and found that up to 90% of the variance in cultural values resided within the countries. On that basis, they stressed that national averages poorly represent specific individuals.

Even the pioneering sociologically based studies did not claim homogeneity in cultures. Bond, Hofstede and Luk (1993: 483), for example, used the Indian fable of 6 blind men examining an elephant to illustrate the need for choosing the proper level of analysis in cross-cultural studies. Scholars have acknowledged intra-cultural heterogeneity and its importance (e.g. Bock, 1988; Williams and O’Reily, 1988). However, many studies that were conducted in the tradition of Hofstede (2001), and GLOBE (House et al., 2004) committed “ecological fallacy” error, which is attributing cultural level characteristics and relationships to individuals within cultures (Robinson, 1950, House and Hanges, 2004). Brewer and Venaik (2012), in an extensive review of major articles published in top tier business administration journals found “ecological fallacy” error common not only among studies that used Hofstede and House et al.’s dimensions, but also by these authors themselves.

Kirkman et al. (2006) reviewed 180 studies that had applied Hofstede’s research framework between 1980 and 2002. They concluded that the Hofstede-inspired research “has said less about what his framework does not tell us. For example, ..... what cultural values might be unique to particular countries or regions, … and what individual attributes (e.g., cognition) might be more proximate to employee feelings or actions than cultural values?” (Kirkman et al., 2006: 313).
Notwithstanding these studies, a different stream of research that takes psychological perspective suggests that the epistemological types, which are the basis of individual heterogeneity, do exist in all cultures (e.g. Harvey, 1966; Hentschel and Sumbadze, 2002; Maruyama, 1961-2007; Maruyama, et al., 1998; Maruyama, et al. 2002). Intra-cultural heterogeneity was referred to by Au (2000) as intra-cultural variation (ICV). The reasons for the existence of ICV, according to him, are demographic, cultural values, and institutional explanations.

Some recent cross cultural studies have emphasized the importance of heterogeneity within cultures (e.g. Tung, 2008, Zaheer et. al, 2009). Also, in a study of intra-country cultural variation in Latin America, Lenartowicz, Johson, and White (2003, p. 1000) found that among “… Brazil and Uruguay, greater cultural similarity was found across national and linguistic boundaries than within Portuguese-speaking Brazil. Furthermore, in the case of Colombia and Venezuela, both Spanish-speaking regions, greater cultural similarity was found “… across political boundaries between Cartagena and Caracas than with Columbia itself.” Not only heterogeneity or intra-cultural variation exists in all cultures, research has demonstrated that individuals can possess dual cultural identities (Benet-Martinez, et al., 2002), and move between different cultural meaning systems (cultural frame switching) in response to situational cues. According to Hong et al. (2000), Chinese American biculturals possess both East Asian and Western cultural meaning systems that can be independently activated by culturally relevant icons or primes. Similarly, immigrants use certain strategies to manage their cultural identities (Benet-Martinez, et al., 2002; Hong, et al., 2000). These strategies are very similar to those suggested by epistemological heterogeneity. To cope with the reality of a dominant mindscape type, other mindscape types use various strategies such as find a niche, camouflage one’s own
type, switch back and forth between one’s own type and the dominant type, reversible repression of one’s own type, irreversible repression, become a reformer, a rebel, drop out or emigrate.

The present study considers four major mindscape types, the source of which could be innate or learned. It suggests that in each culture one type may become dominant and other types, to survive, behave as if they belong to the dominant type. Also, it uses a test with pictorial/geometric patterns to examine the hypothesis. The use of this method is unique among other studies that have addressed intra-cultural heterogeneity. Pictorial/geometric pattern tests of this type could be made to be free of cultural significance and shading that may complicate verbal tests. The original pictorial/geometric pattern tests were developed and tested by Maruyama (1961). Please, see Appendix B.

3. Mindscape Heterogeneity

The archetype method for thinking and discovering heterogeneity in a world of apparent homogeneity was introduced in a stream of studies by Maruyama (1961- 2007), and applied by others (e.g. Maruyama, et al. 1998; Caley and Sawada, 2000; Gammack, 2002; Hentschel and Sumbadze, 2002; Maruyama, et al., 2002; Noe and Alroe, 2005; Noe, et al., 2008; Fatehi and Tate, 2014). Maruyama and his colleagues used tests that consisted of 42 geometric patterns to identify individual mindscape variations in cultures. Mindscape is defined here as “…. a structure of reasoning, cognition, perception, conceptualization, design, planning, and decision making that may vary from one individual, profession, culture, or social group to another” (Maruyama, 1980: 591). The tests were referred to as the “TOB Tests” because they were first used in Tokyo, Brussels and Budapest to identify epistemological heterogeneity (EH), and individual heterogeneity across cultures (IHAC). According to EH and IHAC: (a) Individual heterogeneity exists in each culture; (b) any individual type found in a culture can be found in other cultures, i.e. the individual types exist across cultures and they are not confined within a
culture; and (c) cultural differences emerge in the way some type becomes dominant and suppresses, transforms, ignores or utilizes non-dominant types.

The geometric patterns of TOB Tests were based was “non-redundant complexity” (Maruyama, 1980, 1992a, 1995), which means absence of repetition and several types of symmetry, vertical, horizontal, diagonal symmetry and rotational “isomorphy”. Unlike shapes and images, geometric designs could be made lacking cultural significance. Please, see Figure 1.

The mindscape is not a classification typology, but rather a way to relate many aspects of thoughts and activities such as management principles, aesthetic principles, design principles, social organization, cosmology, politics, and cognitive patterns among other things. It covers a much wider range of thoughts and actions than psychological, social or political structure typologies. It is not a classification scheme nor does it seek universality or ‘one truth’. It does not seek mutually exclusive and exhaustive categories. In fact, with the exception of the H-type (explained below), for all other mindscape types concepts like “mutual exclusivity” and “one truth” are irrelevant. Also, except for the H-type, it does not rest on the straight line cause and effect relationship that formulates a hypothesis to prove “A” causing “B” to occur. Instead it focuses on “causal loop characteristics of deviation-counteracting and difference-amplifying.” Finally, it is a real rather than imaginary construct (Maruyama, 1994a: xvi-xviii).

Below the surface of homogenous culture, there are all types of logics with which individuals could be identified. However, for convenience, expedience, and simple personal benefits, individual logical types are camouflaged, hidden or transformed to conform with the dominant type. Those with non-dominant mindscape types have to conform to the cultural practices of a dominant mindscape and undergo hypocrisy, strain, underdevelopment and subservient behavior in order to survive. Otherwise, they are considered the “black sheep of the family” or they are forced to emigrate.
Mindscape types are partly innate and partly learned (Maruyama, 1995: 221). In the process of acculturation, different cultures and professions apply different pressures for or against some types. They may use socialization, recognition, ostracism, marginalization, etc. to encourage one type or discourage other types. Cultural differences exist as some logical type becomes dominant and influences individuals of other types. Each culture contains epistemological types found in others, though the percentage distribution of types varies (Maruyama, 1980: 589). “For example, H-type dominates in Sweden, while a mixture of S-type and I-type is dominant in Denmark. In Asia, Koreans show strong H-type characteristics, while Indonesia is strongly of S-type. In Japan, SH type is dominant, while in the United States, HI type is dominant” (Maruyama, 1996: 37). The apparent cultural differences are due to the presence of dominant mindscape types, causing us to ignore heterogeneity of mindscapes within cultures.

In general and for practical purposes, we can identify four major mindscape types. These types are H, I, S, and G. Table 1 summarizes characteristics of the four types.

We should add here that from extensive theoretical and empirical research, Harvey (1966) independently deduced four systems (levels of concreteness-abstractness) that evolve in individuals through the experience and socialization process. Three of these systems are identical to those proposed by Maruyama (1995: 223). A detailed discussion of these systems and their relations with Maruyama’s mindscape is offered by Fatehi and Tate (2014).

| Table 1 about here |

H stands for “hierarchy and homogeneity”. I, stands for “isolationism, individualism, and “independence”. S, stands for “stabilizing”. G, stands for “generating”. The H type predominates in cultures that emphasize order, procedure and method. This type is classifying, competitive, zero-sum, and sequential. The I type might be considered typical of “alternative” modes of
behavior and idiosyncratic attitudes to work, especially among creative individuals and artists. S type might be considered typical of recreational and “partying” modes of behavior in which interactivity is primary. The G type can be considered inspirational mode (Gammack, 2002).

The preceding mindscape discussion points out that there are epistemological heterogeneity and individual heterogeneity across cultures. The existence of mindscape types in the countries in which data were collected could provide support for this assertion. However, there are more than just 4 major types in each culture (other types are not labeled). The following hypothesis is formed on that basis.

Hypothesis: Transcultural mindscape types exist among cultures.

Although from the previous discussion the meaning of “transcultural mindscape type” might be intuitively clear. However, at the risk of being redundant but for the sake of clarity the following explanation could be useful. “Transcultural mindscape types” means that various individual mindscape types exist in all cultures, and any mindscape type found in a given culture can be found in other cultures.

4. Method and Data Analysis

Mindscape (TOB Tests) survey data were collected from countries of Azerbaijan, Kazakhstan, Turkmenistan, and Mexico (See Figure 1). The instrument – consisting of 42 geometric patterns explained earlier - was the same one that had been used by Maruyama and others. The selection of these countries was due to the fact that all the republics of the former Soviet Union, including, Azerbaijan, Turkmenistan, and Kazakhstan had been relatively isolated from the rest of the world. Only in the last two decades, has it become possible to travel to these countries almost freely. The interaction between these people and the rest of the world had been very much restricted. We could assume that individuals in these countries have maintained most
of their traditional cultural characteristics. Also, Mexico, until the implementation of NAFTA, had remained mostly unto itself.

>Figure 1 about here <

Extensive theoretical and conceptual writings of Maruyama spans several decades (1961-2007). These writings have established a very solid foundation supporting mindscape theory. Mindscape theory has been applied to diverse fields, such as communication and social psychology (Boje, 2004), psychology (Hentschel and Sambadze, 2002; Yolles & Fink, 2009), internet mediated communication (Gammack, 2002), management (Noe, et al. 2005), and multifunctional farming and rural development (Noe et al., 2005, 2008). Maruyama’s empirical research employs small sample sizes that deal with European and industrialized countries. The present study collected data from developing countries that, until recently, had limited contact with the outside world. Similar to other previous studies respondents were asked to rate 42 patterns (Figure 1) on a Likert scale range from 1 (ugly) to 7 (beautiful). There were 168 useable questionnaires, from the total of 203 individuals who responded to the survey, 38 from Azerbaijan, 22 from Kazakhstan, 55 from Mexico, and 53 from Turkmenistan. The questionnaire was in simple English and short phrases. All respondents were graduate and undergraduate college students who were proficient in English language. Table 2 contains demographic data of the sample.

>Table 2 about here <

Care was taken to assure that the sequencing of the questionnaire pages did not create a set response. Therefore, for pagination, instead of numbers, symbols such as @, #, &, %, ^, &, and * were used. The pages were stapled according to a pre-determined pattern (Please, see Table 3). This was to allow (1) non-sequential page order, (2) enable the final collating of pages, on the same sequence similarly, and (3) permit standardized tabulation of the data.
Based on Maruyama’s (1995, 1999b) suggestion, heterogram analysis (factor analysis and cluster analysis combined) was performed on the data. This procedure is somewhat different than conventional method. The specific procedure is described in the Appendix A.

5. Statistical Analysis

In the first step of the heterogram analysis, individual responses on the ugly-beauty scale for each of the 42 geometric patterns were subjected to an exploratory factor analysis procedure to determine if representative mindscape types were present among the 42 patterns. Three meaningful factors with large, positive eigenvalues (14.75, 3.60 and 1.95, respectively) were extracted and together accounted for over 67% of the total variance among the responses (after a “varimax” or orthogonal rotation). While a total of 6 factors had eigenvalues greater than one, factors 4, 5 and 6 had eigenvalues of 1.07, 1.05 and 1.03, respectively. A six factor solution accounted for little incremental variance over the three factor solution, and led to the geometric patterns loading on multiple factors. Therefore the three factor solution was retained. When interpreting the retained three-factor solution, each individual geometric pattern was uniquely attributed to one of three factors, with most patterns loading with values exceeding 0.4. The factor loading results are provided in Table 4, with the final loading result for each pattern in bold. Using this criterion, a total of 23 patterns loaded on Factor 1, 13 patterns loaded on Factor 2 and 6 patterns loaded on Factor 3. The Pearson correlation matrix for the three factor solution is provided in Table 5, confirming that there were no statistical inter-correlations present amongst the three distinct factors. The factor patterns described above are consistent with the
assertions by Maruyama (e.g. 1995: 220), indicating individual heterogeneity across cultures (IHAC). According to Maruyama (1982, 1992c, 1995), about one third of the people in many countries are H type, and a third are I, S, and G types and a mixture of these. The rest belong to types other than these. Our findings of the three major and 3 other minor factors corroborate his assertion.

Continuing with the heterogram analysis outlined by Maruyama (1995, 1999b), the second step of the process required the grouping of the patterns across the rotated factors into clusters. Cluster analysis is a procedure used to group individuals or objects based upon some measure of similarity in such a way that the observations within a cluster are more like each other than they are to observations in other clusters. In the current study, the three factors represent the measures of similarity upon which the 168 respondents were clustered. It is important to note that since the three factors were extracted simultaneously, they were effectively standardized during the extraction process, therefore, no additional data standardization in advance of clustering was necessary. Of the many methods available for observation grouping (e.g., Centroid, Complete, Density, Median, Single, etc), the method selected was Ward’s method, which performs particularly well when the data does not contain outliers, and tends to generate more easily interpretable, similarly sized clusters (Punj and Stewart, 1983; Blashfield, 1976; Morey, et al., 1983). Using a hierarchical clustering approach, a three cluster solution was generated. When applying cluster analysis, the selection of the final number of clusters can be somewhat interpretive. In the current context, the dendrogram (tree diagram) showed a significant jump in the fusion after the three cluster solution. This visualization was consistent with the primary assessment metrics of the Cubic Clustering Criterion (11) and the Pseudo $t^2$ statistic (27.7), which both indicated the presence of a three cluster solution. The distribution of responses for this solution can be seen in Table 6 below.
When the distribution of the clusters is evaluated by country, heterogeneity becomes evident. If cultural homogeneity was present, we would expect to see the clusters, which were generated from the rotated factors, closely aligned with the individual countries. However, as can be seen in Table 7 below, this is not the case. The number of observations in each cluster is well distributed across the individual countries. A Chi Square analysis further indicated that cluster membership is not related to the country of the respondent ($\chi^2 = .4524, p = .7975$).

The results of applying the Factor Analysis procedure to the 42 geometric patterns, generating three dominant types, supports the presence of at least three of four of the mindscape types hypothesized by Maruyama. Here, we should add that Maruyama before settling on the 4 types, sometimes had used 3 and some other times 5 types (Maruyama, 1985). Please, see Appendix B for details. These factors were then used to cluster the individual respondents where cluster membership indicates similarity against the factors or mindscape types. There was no consistency in mindscape types by country, the mindscape types were transcultural. This research provided evidence that indeed there are different mindscape types within and between cultures.

This research was based on the theoretical foundation of Maruyama’s writings on Mindscape. It was an empirical study that used a large sample size from four developing countries. The results demonstrated that there is individual heterogeneity in thinking, logic, and behavior (mindscape) within and among cultures. It, therefore, highlights an oversight in the assumption that there is cultural homogeneity where there is, in fact, heterogeneity in thinking, logic and behavior among members of cultures. Cross-cultural research, taking a sociological perspective, so far, has told us a lot about national cultures, but there are many unexplained areas
that needed further exploration, such as the existence of heterogeneity in otherwise assumed homogeneous cultures. This study was designed to do so. As Kirkman et al. (2006) noted, such efforts will move us to a new ‘paradigm’ in cross-cultural research.

6. Implications for International Business Research

This research illustrates that there is individual mindscape heterogeneity in and across cultures, and these are transcultural. According to Maruyama (1980), the H type is dominant in the Western cultures. This domination prevents society’s realization of benefits from, and contributions by those with different types of mindscales. The epistemological heterogeneity (EH) and individual heterogeneity across cultures (IHAC) has profound implication for the management of organizations especially for international management. We know various benefits of diversity. Also, from ecology and biology we have learned that homogeneity creates many problems. Heterogeneity and multiculturalism’s many benefits are also known, therefore, to increase diversity in organizations through the selection process, we may consider different mindscape types.

Let us consider a few areas of interest. First, mindscape should be studied to flesh out some of the cause of inconsistencies in international business research. Heterogeneity within and between cultures may explain some of these inconsistencies. Second, and very closely related to the above, is the impact of cultural heterogeneity on a number of organizational factors such as motivation, conflict resolution, and productivity, just to name a few. If members of minority cultures, who may not belong to the dominant mindscape-type are marginalized, the negative effect on these factors would not be surprising. By definition, multinational companies (MNCs) may contain various non-dominant mindscape types. Since, much of global trade is conducted via internal markets of MNCs, the inclusion of various mindscape types by the MNCs could positively impact these internal market transactions. Third, when institutions do not leave
sufficient room for non-conformity and dissent through policies that suppress certain mindscape
types, the marginalized or ostracized ones loose the desire for full participation. The end result is
the loss of the creative abilities of these individuals.

Fourth, in labor-management relations, the traditional H-type concept is the homogenistic
notion of majority or consensus rule, This view considers labor as something to be purchased,
management as a control mechanism, and labor-management relations as contracts to be
negotiated. Management strives to keep labor costs at a minimum and labor seeks the highest
wages and fringe benefits possible. The other mindscape types, however, have different
perspectives. For example, in the early 1980s, and again, recently in 2013, while the Japanese
labor could ask and receive a higher pay raise opted for a smaller one, in favor of bigger bonuses.
This was due to the realization that an earlier demand had slowed the industry. We could
attribute this to their predominant mindscape-type, as this paper suggests. In a group decision
making, the H-type rule by majority or consensus making seems very desirable. The majority
rule, however, means domination by quantity, and very seldom if ever, all people involved in a
decision have the same position. Regardless of their position, they are obliged to agree for the
sake of maintaining consensus. Consensus is often gained at the cost of peer-imposed and self-
imposed acquiescence. The S or G-types do not discard the differences, which is done in
producing consensus. This is a zero sum game, or sometimes, a negative sum game. Any
decision could be more beneficial to some and less to others. In a positive sum perspective, those
who benefit less or do not benefit at all are kept in mind for future considerations, so that in the
long run, all involved come out, more or less, benefiting similarly. An example of this
perspective is the practice, among Asian-Americans in San Francisco area to help each other.
Sometimes, they set up savings and loan agreement with friends and relatives to get start-up
capital or a loan to expand businesses. They pool small, personal resources (money) to create a
large sum of money. Each time, one person receives the money. The sequence of receiving the money is not important to them. When the group is large, some of the participants may not live long enough to get their turn. They would not worry about such a case knowing that their children will.

Fifth, some people equate economic prosperity and growth only with private business activities, and advocate for a smaller government. This is based on the assumption by the H type mindscape that a smaller government is a better government. This perspective does not take into account the fact the certain services could not be offered if size is the only criterion under consideration. The S or G type, however, have a different and, in this particular case, a more realistic view. It is possible to have a better government without reducing the services that should be offered by a good government. In the same vein, environmentalists following the H-type mindscape, assume that the nature should not be changed and industrial activities increase the deterioration of the ecosystem. Yet, if we follow the S or G type position, nature keeps changing even without human activities, which is the case regardless of the particular perspective. Positive-sum relations are the basis of the ecosystem, and industrial activities could be ingeniously designed in a way that may not necessarily be harmful to the environment.

Sixth, if the present pattern of international immigration continues, before long, many countries would have a diverse population composition consisting of various mindscape types; more prevalent than the present patterns. Increasing migration and cross border marriages is altering the uniformity of ethnicity that is characteristics of many countries. Dealing with, and benefitting from this diversity without recognizing its essence would be problematic.

While this study made certain contributions to our understanding of cultural differences, it left unexplored some relevant areas. To improve our understanding of mindscapes, future research could explore them. We know very little about the origin of mindscapes, for example. It
is not clear which aspects of mindscapes are innate and which ones are learned. Put it differently, which aspects are physiological and which aspects and how much of them are psychological. Clarification of these aspects would go a long way in improving our understanding of epistemological heterogeneity and heterogeneity across cultures. Also, can the learned (adopted) mindscape types be unlearned? While there are solid theoretical foundation and empirical data upon which rests the logic of mindscape types, and while geometric/pictorial tests may reveal epistemological heterogeneity and individual heterogeneity across cultures, we have not developed a way of identifying the four major types with the use of TOB Tests. In other words, which of the 42 patterns of TOB Test are associated with which of the four mindscape types? Also, we may consider finding the frequency distribution of various mindscape types among different occupations and professions, different disciplines in academia, and different industries. Additionally, future research could uncover the dominant type of mindscape in various cultures and construct an index for proportion of the population that belongs to that type. The development of a verbal test, similar to what Boje (2004) has prepared, could be useful for advancing our understanding of the mindscape concept.
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Note: H stands for hierarchy and homogeneity; I stands for isolationism, individualism, and independence; S stands for stabilizing; and G stands for generating.

Caution: (1) There are more than 4 types; (2) There are mixtures between types; (3) The 4 types do not fit in a 2 by 2 table. They are more like the four corners of a tetrahedron (a pyramid shape with a triangular bottom); and (4) S and G are not between H and I. Positive-sum cannot be between zero-sum and negative-sum.

Figure 1. TOB Test Patterns
Table 2. Demographic Distribution by Age and Gender.

<table>
<thead>
<tr>
<th></th>
<th>17-24</th>
<th>25-29</th>
<th>30-34</th>
<th>&gt;35</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azerbaijan</td>
<td>27</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>16</td>
<td>22</td>
<td>38</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>16</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>Mexico</td>
<td>38</td>
<td>12</td>
<td>3</td>
<td>2</td>
<td>26</td>
<td>29</td>
<td>55</td>
</tr>
<tr>
<td>Turkmenistan</td>
<td>48</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>19</td>
<td>33</td>
<td>53</td>
</tr>
<tr>
<td>Total</td>
<td>129</td>
<td>25</td>
<td>8</td>
<td>6</td>
<td>65</td>
<td>102</td>
<td>168</td>
</tr>
</tbody>
</table>

Note: One individual specified age but not gender

Table 3. Pagination Sequences of TOB Tests

Pagination Sequence for Batch of 10

1. @#$%^&*
2. #$%^&*@#
3. $%^&*@#
4. %&*@#$%
5. ^&*@#$%
6. &*@#$%^&
7. *@#$%^&
8. @#$%^&*@
9. #%^&*$@
10. ^&*$@#$
Table 4. Factor Loadings for the Geometric Patterns Mindscapes.

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Factor1</th>
<th>Factor2</th>
<th>Factor3</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>.19</td>
<td>.34</td>
<td>.45</td>
</tr>
<tr>
<td>B2</td>
<td>.35</td>
<td>.04</td>
<td>.21</td>
</tr>
<tr>
<td>B3</td>
<td>.35</td>
<td>.28</td>
<td>.6</td>
</tr>
<tr>
<td>B4</td>
<td>.08</td>
<td>.42</td>
<td>.19</td>
</tr>
<tr>
<td>B5</td>
<td>.27</td>
<td>.17</td>
<td>.37</td>
</tr>
<tr>
<td>B6</td>
<td>.42</td>
<td>.30</td>
<td>.17</td>
</tr>
<tr>
<td>B7</td>
<td>.38</td>
<td>-.04</td>
<td>.27</td>
</tr>
<tr>
<td>B8</td>
<td>.09</td>
<td>.35</td>
<td>.26</td>
</tr>
<tr>
<td>B9</td>
<td>.42</td>
<td>-.03</td>
<td>.27</td>
</tr>
<tr>
<td>B10</td>
<td>.18</td>
<td>.46</td>
<td>-.11</td>
</tr>
<tr>
<td>B11</td>
<td>.39</td>
<td>.13</td>
<td>.34</td>
</tr>
<tr>
<td>B12</td>
<td>.42</td>
<td>.23</td>
<td>.30</td>
</tr>
<tr>
<td>B13</td>
<td>.12</td>
<td>.45</td>
<td>.52</td>
</tr>
<tr>
<td>B14</td>
<td>.64</td>
<td>.16</td>
<td>-.1</td>
</tr>
<tr>
<td>B15</td>
<td>.15</td>
<td>.61</td>
<td>.11</td>
</tr>
<tr>
<td>B16</td>
<td>.39</td>
<td>.18</td>
<td>.32</td>
</tr>
<tr>
<td>B17</td>
<td>.50</td>
<td>.36</td>
<td>-.4</td>
</tr>
<tr>
<td>B18</td>
<td>.42</td>
<td>.02</td>
<td>.32</td>
</tr>
<tr>
<td>B19</td>
<td>.13</td>
<td>.25</td>
<td>.58</td>
</tr>
<tr>
<td>B20</td>
<td>.19</td>
<td>.45</td>
<td>.17</td>
</tr>
<tr>
<td>B21</td>
<td>.46</td>
<td>.07</td>
<td>.29</td>
</tr>
<tr>
<td>B22</td>
<td>.49</td>
<td>.22</td>
<td>.01</td>
</tr>
<tr>
<td>B23</td>
<td>.49</td>
<td>.14</td>
<td>.24</td>
</tr>
<tr>
<td>B24</td>
<td>.06</td>
<td>.54</td>
<td>.28</td>
</tr>
<tr>
<td>B25</td>
<td>.33</td>
<td>.39</td>
<td>.22</td>
</tr>
<tr>
<td>B26</td>
<td>.02</td>
<td>.66</td>
<td>.21</td>
</tr>
<tr>
<td>B27</td>
<td>.38</td>
<td>.17</td>
<td>.25</td>
</tr>
<tr>
<td>B28</td>
<td>.50</td>
<td>-.15</td>
<td>.20</td>
</tr>
<tr>
<td>B29</td>
<td>.20</td>
<td>.53</td>
<td>.15</td>
</tr>
<tr>
<td>B30</td>
<td>.51</td>
<td>.15</td>
<td>.19</td>
</tr>
<tr>
<td>B31</td>
<td>.55</td>
<td>.13</td>
<td>.09</td>
</tr>
<tr>
<td>B32</td>
<td>.11</td>
<td>.45</td>
<td>.18</td>
</tr>
<tr>
<td>B33</td>
<td>.06</td>
<td>.63</td>
<td>.21</td>
</tr>
<tr>
<td>B34</td>
<td>.49</td>
<td>.31</td>
<td>.12</td>
</tr>
<tr>
<td>B35</td>
<td>.41</td>
<td>.30</td>
<td>-.11</td>
</tr>
<tr>
<td>B36</td>
<td>.23</td>
<td>.47</td>
<td>.30</td>
</tr>
<tr>
<td>B37</td>
<td>.51</td>
<td>.7</td>
<td>.12</td>
</tr>
<tr>
<td>B38</td>
<td>.14</td>
<td>.28</td>
<td>.49</td>
</tr>
<tr>
<td>B39</td>
<td>.57</td>
<td>.34</td>
<td>-.5</td>
</tr>
<tr>
<td>B40</td>
<td>.49</td>
<td>.30</td>
<td>.21</td>
</tr>
<tr>
<td>B41</td>
<td>.09</td>
<td>.56</td>
<td>.3</td>
</tr>
<tr>
<td>B42</td>
<td>.21</td>
<td>.28</td>
<td>.43</td>
</tr>
</tbody>
</table>

Note: Bold fonts indicate loading results for each pattern.
Table 5. Correlation Matrix of Extracted Mindscape Factors.

<table>
<thead>
<tr>
<th></th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1</td>
<td>1.00000</td>
<td>0.06204</td>
<td>0.08613</td>
</tr>
<tr>
<td>Factor 2</td>
<td>0.06204</td>
<td>1.00000</td>
<td>0.11168</td>
</tr>
<tr>
<td>Factor 3</td>
<td>0.08613</td>
<td>0.11168</td>
<td>1.00000</td>
</tr>
</tbody>
</table>

Table 6. Frequency Distribution for Clusters.

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Frequency</th>
<th>Percent</th>
<th>RMS Std Deviation</th>
<th>Nearest Cluster</th>
<th>Distance Between Cluster Centroids</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>93</td>
<td>55%</td>
<td>0.6546</td>
<td>3</td>
<td>1.5034</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>15%</td>
<td>0.6658</td>
<td>3</td>
<td>1.9924</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>30%</td>
<td>0.7408</td>
<td>1</td>
<td>1.5034</td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 7. Distribution for Clusters by Country.

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Azerbaijan</th>
<th>Kazakhstan</th>
<th>Mexico</th>
<th>Turkmenistan</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>9</td>
<td>30</td>
<td>29</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>26.88%</td>
<td>9.68%</td>
<td>32.26%</td>
<td>31.18%</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>9</td>
<td>7</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>20.00%</td>
<td>36.00%</td>
<td>28.00%</td>
<td>16.00%</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>4</td>
<td>18</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>16.00%</td>
<td>8.00%</td>
<td>36.00%</td>
<td>40.00%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>22</td>
<td>55</td>
<td>53</td>
<td>168</td>
</tr>
</tbody>
</table>
Appendix A

The steps for heterogram analysis:

1. Input the raw scores of all individuals of countries together.
2. Make the correlation matrix of the items using all countries together (not country by country as in the conventional methodology). In our case, the stimuli were pictorial patterns. The individuals rated each of the patterns on a seven-point scale between ugly beautiful, between boring and interesting, and between complex and simple. Make a correlation matrix of the stimuli (patterns) using one rating criterion (ugly/beautiful).
3. From the correlation matrix, make a factor analysis of the items (patterns). You probably end up with two, three, or four factors most of times, but sometimes more than ten.
4. Place all individuals of all countries in the factor space: each individual is a point in the factor space.
5. Make a cluster analysis of individuals. There may be or may not be clusters.
   a. If clusters are found, each cluster makes a type of individuals. Some types may be transcultural, i.e. consist of individuals of many countries. Make a heterogram (graphic way of presenting mindscape data).
   b. There may be no clusters. Two main reasons for absence of clusters are:
      i. Individuals are distributed continuously in the factor space.
      ii. The number of factors is very large and consequently the factor space consist of too many dimensions, with the result that the individuals are scattered too thinly to form any clusters.
      In both cases, take two factors at a time and plot out distribution of individuals on a two-dimensional sheet, and inspect the situation. If individuals are distributed continuously, you have to divide the factor space into sections somewhat arbitrarily to see whether each section is transcultural, i.e. contains individuals of many countries. If the individuals are distributed too thinly, collapse the number of factors by combining several factors as a new factor.
6. Also, to keep in mind is the consideration that individuals of non-dominant types who are using strategies of camouflaging, switching, reversible repression and irreversible repression appear in statistics as belonging to dominant type, making the dominant type look bigger in the heterogram than it actually is.

Appendix B

Mindscapes and TOB Tests

During 1960s and 1970s, Maruyama conducted in-depth case studies in Europe, Asia and Africa among scientists and professionals, and in urban planning arguments in public hearings. In these case studies, he identified some frequently found epistemological types. While there could be as many epistemological types as there are individuals, earlier, he identified 5 types. Then reduced this to 3 types, and finally settled on four types. He found that four types and ad-mixture of them accounted for two-thirds of the population of most cultures. The four types were labeled H, I, S, and G. Please, see Table 1 for characteristics of the four types. In 1976, when he attended a conference at the University of Colorado, he learned that O. J. Harvey had conducted large-scale statistical testing of students and had identified four main epistemological types. Comparing the types, both were pleasantly surprised that the H, I and G of Maruyama’s were identical to Types I, II and IV of Harvey’s, while Harvey’s Type III and Maruyama’s S type were different. Even, the frequency distribution of the three types, Maruyama’s case studies, and Harvey’s statistical analyses, were similar. With the new information, Maruyama was encouraged to devise pictorial tests which could be used for cross-cultural studies as well as with children for developmental studies to learn which aspects of the individual epistemological types are learned or innate. (These aspects are yet to be determined).

These tests were designed around the concept of non-redundant complexity (which corresponds to S and G types) versus symmetries and/or repetitions (which correspond to H-type). We expect H-type person to find beauty in symmetry and redundancy, and G-type person to prefer non redundant complexity. The final version included 42 geometric patterns and were called TOB Tests because they were first used in Tokyo, Brussels and Budapest.

Geometric/pictorial patterns were selected to form the basis for these patterns because they could be made free of cultural significance and shades that may complicate verbal tests. These patterns were based on the following rationale. Aesthetic designs, architecture and landscape architecture are expressions of mindscape types. For example, Gothic architecture, baroque music, Forbidden City in Beijing and Versailles Garden are of H-type. Paintings of Picasso, compositions by Stravinsky, traditional Japanese gardens and floral Ikebana, and Pergamon in Greece are of G-type and S-type. In the Japanese traditional garden design, heterogeneous elements interact to enhance the individuality of each element. In contrast, in Dutch tulip gardens, flowers are used as color carpets, in which the individuality of each flower is lost. In the 42 patterns of TOB Tests, non-redundant complexity, repetitions, symmetry (horizontal, vertical, diagonal, and color reversal) can be quantified. Before settling on 42 geometric patterns of TOB Tests, a number of other patterns that were determined to have specific meanings (folkloric, cultural, or religious) other than aesthetics and preference for non-redundant complexity, repetition and symmetry, were excluded. The refinement of the TOB Tests was through its use with individuals in Japan, Brussels, and Budapest. Additional tests were run using data from Aachen, Moscow, Baku (Azerbaijan), Mexico, and Croatia.