The Perception of Countries and Currencies Revisited: "Changing Places?"

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Abstract:
According to Wish, Deutsch & Biener (1972), the perceived similarities of familiar countries (large in size or in population and sampled from across the world) depend upon their respective similarities on political, economic, geographical and cultural attributes. They established this by using geometric modelling designed for multiple proximity matrices, viz., INDSCAL. In the present work, we attempted to extend such an approach to the perception of currencies including the euro, but we also aimed to revisit the perception of countries in a contemporary, European context. Given some initial doubt about the extent of people's knowledge of currencies as compared to countries, we undertook a simulation study making use of Latent Semantic Analysis. This involved simulating three semantic proximity matrices: for 21 countries (Ireland, Germany, Switzerland, UK, Belgium, Austria, Norway, Finland, Italy, Russia, Turkey, Spain, France, Denmark, Greece, Poland, Netherlands, Portugal, Luxembourg, Hungary, & Sweden) plus Europe; for 22 currencies represented by adjective noun phrases (e.g. British Pound); and for 22 nationality items. INDSCAL analysis suggested that in the case of nationality currency phrases the currency component contributed little if anything to the similarity of their meanings, since the semantic structure appeared to be indistinguishable from that obtained for nationalities. In second and third studies, we collected real proximity data for 21 countries and for 22 nationality currency phrases (including the European euro). Our aim in both studies was to assay the potential impact of changes associated with the arrival of the euro on the psychological representations for both the set of countries and the set of nationality currency phrases. Using fresh UK undergraduate samples each time and testing just after the New Year, we collected freesort proximity data at approximately two-yearly intervals for countries and annually for nationality currency phrases between 1999 and 2003, thereby covering the arrival of euro notes and coins in 12 of the nations in 2002. Our preliminary findings for countries appear to be consistent with Wish et al.'s (1972) work. However, the extension to the perception of currencies proved to be more problematic than anticipated, and the yield from attempting to track the impact of the arrival of the euro has been less rewarding than we hoped.

Keywords: Currencies, countries, nationalities, the euro, psychological representations

Introduction
The arrival of the euro has been a source of profound economic, political and psychological change. In the UK, geographically located on the relative periphery of Europe, it is a matter of "unfinished business". Increasingly, understanding of the economic development of nations has been fostered by the joint application of economic and geographical perspectives, perhaps realising a neglected aspect of Adam Smith's 18th century vision (Sachs, Mellinger & Gallup, 2001). However, it is arguable that the 'melting pot' of change should contain some psychology as well economics and geography. For present purposes, an important lead here arises from the multidimensional scaling (MDS) work of Wish, Deutsch & Biener (1972). These authors collected data from individual respondents on the psychological similarities (proximities) of all possible pairs of countries in a set of 15 (each of them familiar, large in size or in population, and sampled from across the world). By using a particular individual differences scaling (INDSCAL) model specialised for multiple proximity matrices (Carroll & Chang, 1970), they were able to uncover people's latent perceptual/conceptual dimensions for nations. Supplementary rating data supported the investigators' efforts to interpret the dimensions in terms of various political, economic, geographical and cultural attributes (see also, Kruskal & Wish, 1978).

In the present paper, we report selected details from a set of three studies that attempted to extend such work to the perception of currencies, but especially the euro, from the vantage point of the UK. Given that the issue of EU enlargement has appeared on the political agenda, we felt that it was also opportune to revisit the perception of countries in the narrower, contemporary context of Europe. Our work embraced the period 1999-2003, so that data were collected before, during and after the arrival of euro notes and coins on 1st January 2002. Instead of obtaining pairwise similarity judgements from individual respondents, we collected freesort data (Rosenberg, 1982) from multiple panels of around 30 or so comparable students. In the freesort task, respondents are permitted to sort items into as many or as few groups as they feel are necessary to reflect the similarities and differences they perceive amongst the items. By treating the aggregate sorting data from different panels as data
source we were able to use an INDSCAL approach to infer something about the latent dimensions most commonly used in the sorting (Arabie, Carroll & DeSarbo, 1987).

Perception of currencies

Without too much thought, it quickly became apparent that the move from countries to currencies might be fraught with some difficulties. The problem is at least two-fold. First, unless one is a nerdy numismatist or a foreign exchange dealer (Oberlechner, 2001), one's knowledge of and familiarity with an extensive range of currencies is likely to be relatively sparse. It follows that the main basis of similarity judgements in a freesort task could well be ignorance, at least some of the time. Second, in reasonably large sets of currencies, it becomes necessary to use nationality adjectives as qualifiers in the currency names, e.g. Swiss Franc vs. French Franc or Italian Lira vs. Turkish Lira. Of course, the basic problem here is that a respondent might sort such nationality currency phrases solely on the basis of knowledge about nationalities, relying very little if at all on knowledge about currencies per se.

Study I: Simulation and analysis of proximity matrices

Our initial response to these dilemmas was to simulate semantic similarity matrices for the following three situations: (i) for a set of 22 relevant nationality-currency (adjective-noun) phrases; (ii) for the corresponding nationality adjectives alone; and (iii) for the corresponding country names. These 3 proximity matrices were then submitted to an INDSCAL analysis so as to determine whether or not the currency names added anything to the semantic information carried by the nationality adjectives alone. In other words, we anticipated that a comparison between the matrix-specific source weights resulting from the INDSCAL analysis should enable us to decide the extent to which people's freesort judgements of "currency" similarities might be based on different dimensions to those used for nationality adjectives. The weights (or rather their square roots) represent stretching and shrinking factors that can be applied to the dimensions of the so-called group space - a composite, geometric, psychological representation of the relevant set of items (Arabie et al., 1987).

In our approach to the simulation we were influenced by developments in work on latent semantic analysis (LSA). This is a useful statistical technique for thinking about the extraction and representation of the similarity of meaning between words, phrases, etc. Singular value decomposition is used to reduce very large, sparse word-by-context matrices (corpora) to a suitable, though still high-dimensional representation (cf. the use of principal component analysis as a data-reduction tool with case-by-variable matrices). Essentially, each word meaning is represented by a long string or vector of associations. The cosine of the angle between two such vectors can be used to measure the similarity of a pair of words, and there is evidence that such measures successfully mimic human judgements in certain semantic memory tasks (Landauer & Dumais, 1997; Landauer, Foltz & Laham, 1998; Landauer, 2002; cf. Murphy, 2002). The important implication for our work was that we were able to simulate the above three types of proximity matrix using the general knowledge space available at the LSA website developed by Darrell Laham (http://lsa.colorado.edu). (The matrix comparison procedure was used with the 'general reading up to 1st year college (300 factors) topic space.)

Our INDSCAL analysis was carried out by means of the SPSS for Windows implementation of ALSCAL (Takane,Young & de Leeuw, 1977). (An ordinal level of measurement was used and with ties being broken, and with matrix conditionality of the cosine measures being retained). From the point of view of goodness of fit, it was evident that the (root mean square) average $r^2 = .81$ obtained for the 3-dimensional solution had reached an asymptote. The group space is shown in Figure 1, using a draughtsman's plot and 3-letter labels derived from the (English) nationality names (Austrian, Belgian, British, Danish, Dutch, European, Finnish, French, German, Greek, Hungarian, Irish, Italian, Luxembourg, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Swiss, Turkish). Note that in dealing with the case of countries, it was necessary make some substitutions to comply with common nomenclature, viz., UK for British and Holland for Dutch. We shall postpone the issue of how to interpret the dimensions until we have reported our findings from two further studies. Regarding the source (dimension) weights, it is worth noting that the nationality-currency and nationality sources had closely similar weights for the three dimensions. However, the country source had a differing pattern for dimensions 2 and 3, a divergence that also remained when we examined the weights for 4- and 5-dimensional solutions. Our conclusion was that nationality currency phrases had behaved just like the nationality items, but differently from the country items. Thus, it appeared that the currency component of the nationality currency phrases contributed little or no additional information. The simulation was based on the knowledge base of a 1st-year US college student. Consequently it remained an empirical issue whether or not the same finding would emerge with data from real respondents. Eventually, such a study was carried out and confirmed the simulated result for nationalities and nationality currency phrases (Routh, Burgoyne, Blandford, de Jager, Jolly, & Osborne, 2001).
The results of the simulations suggested that country items and nationality currency items might be expected to behave differently with real respondents. Moreover, it was conceivable that euro-related political and economic changes over time might have detectable influences on the ways in which these collections of items were perceived. Of course other changes could be a major source of confounding here. Suffice it to say that Europe and the euro have rarely been out of the media spotlight during the period of our study, viz., 1999-2003.

Study 2: Perceptions of country names

In this study, we sampled first-year British and dual-nationality British undergraduates studying in a Psychology laboratory class at Exeter University in 1999, 2001 and 2003 (in February). Participants received the names of 21 countries on slips of paper (once again the UK and Holland were preferred versions of country names, and Europe was omitted). They were requested to think of everything that they knew about these countries and then to sort them on the basis of overall similarity, into a freely-chosen number of groups so as to reflect the perceived similarities and differences. A co-occurrence matrix was constructed for each year showing the proportion of time each country was sorted with every other country. The complement of this measure was used as a dissimilarity measure. A further detail is that in 2003, one third of our respondents had to sort on the basis of geographical similarity and another third on political similarity, rather than overall similarity.

The five proximity matrices were submitted to an INDSCAL analysis. Once again this revealed that a 3-dimensional solution attained an asymptote in terms of a (root mean square) average $r^2 = .73$. The group space is shown in Figure 2, using a draughtsman plot and 3-letter labels derived from the (English) country names. The pattern of source weights for overall similarity remained fairly stable over the years. However, the weights for economic and political similarity suggest that it is possible to change the importance attached to particular attributes by means of instruction. Again we shall postpone the issue of interpreting the dimensions until we have reported our findings from Study 3.
Figure 2: Matrix scatterplot for 3-dimensional INDSCAL object-space for countries (Study 2)

Study 3: Perceptions of nationality-currency items ("currencies")

Again, we sampled first-year, British and dual nationality British undergraduates studying in a Psychology laboratory class at Exeter University in 1999, 2000, 2001, 2002 and 2003 (in February). Participants received 22 nationality-currency items on slips of paper (once again British, Dutch and European were preferred nationality adjectives). They were described as 22 types of currency and requested to think of everything that they knew about the items and then to sort them into a freely-chosen number of groups, so as to reflect the perceived similarities and differences. A co-occurrence matrix was constructed for each year, showing the proportion of time each item was sorted with every other item. The complement of this measure was used as a dissimilarity measure. A further detail is that in 2003, it was possible to distinguish participants in terms of whether or not they had experienced using the euro.

The six proximity matrices were submitted to an INDSCAL analysis, which revealed that a 3-dimensional solution attained an asymptote in terms of a (root mean square) average $r^2 = .75$. The group space is shown in Figure 3, using a draughtsman's plot and 3-letter labels derived from the (English) nationality names. Here the weights did appear to show systematic trends over the years: weights tended to increase between 1999 and 2003 for dimension 1, to decrease for dimensions 2 and 3, being more marked for the group who had experienced using the euro.
Figure 3: Matrix scatterplot for 3-dimensional INDSCAL object-space for "currencies" (Study 3)

Associations between the dimensions found in Studies 1 to 3

Table I shows the Pearson correlations between the coordinates for the test items on the 9 dimensions uncovered in the three INDSCAL analyses conducted separately on the LSA, country & "currency" datasets. Quite strong tieups may be observed between certain country and currency dimensions, suggesting that they may have related meanings (e.g. for CURRDIM1 and COUNDIM2 $r = .91$, and for CURRDIM2 and COUNDIM3 $r = .80$).

In order to address such issues, we first need to understand the meanings of the various dimensions. One well-known method is to regress ratings of various potentially pertinent attributes on the coordinates obtained for a particular solution. The regression coefficients can then be normalised so that their sum of squares is unity, which yields direction cosines useful in interpreting the meaning of particular dimensions (cf. Kruskal & Wish, 1978). To this end, we have collected supplementary rating data for the countries on a number of attributes, including the following: standard of living; level of industrialisation; level of self-confidence; level of nationalism; level of economic pride; and level of cultural pride. Some of these were suggested by the dimensions reported in an MDS analysis of country differences in attitudes to the euro, using data aggregated within countries (Pepermans & Verleye, 1998). It is also possible to make use of external sources of data such as a country’s latitude and longitude and GDP per capita. In general, our aim is to explore the extent to which the psychological spaces reflect a mixture of psychological, economic and geographical information.
At the time of writing, most of this extensive work is still in progress, so we shall have to rely upon a few illustrative correlations (cf. Wish et al., 1972). For example, we can make use of the latitudes and longitudes (except Russia’s which creates a bias) of the centres of relevant countries obtained from the CIA’s publication - *The World Factbook 2002* ([http://www.cia/publications/factbook/fields/2011.html](http://www.cia/publications/factbook/fields/2011.html)). We then find that COUNDIM3, CURRDIM2 and LSA3 are each negatively correlated with latitude, respectively, -.74, -.75, -.50. Whilst, CURRDIM2, CURRDIM1 and LSA1 are each negatively correlated with longitude, respectively, -.72, -.64, -.71. Moreover, COUNDIM2, CURRDIM1 and LSA3 are correlated with GDP per capita, respectively, .69, .55, -.49. The first two also correlate with rated standard of living, .86 and .74, whilst GDP per capita and standard of living correlate at .79.

Tentatively, it seems clear that the interpretation of the various INDSCAL configurations using geographical, economic and psychological information will be viable. An important task for the future is to explore and clarify what geographical and economic knowledge people do acquire. The psychological stretching of CURRDIM1 and shrinking of CURRDIM2 and CURRDIM3 apparently associated with the arrival of the euro requires further elucidation and may be worth investigation. Nonetheless, we have to conclude that our search for a "litmus test" of the impact of the euro on our UK respondents was less fruitful than we had hoped.

### Table I. Correlations between the coordinates of items in the 3 Studies

<table>
<thead>
<tr>
<th></th>
<th>LSA1</th>
<th>LSA2</th>
<th>LSA3</th>
<th>COUNDIM1</th>
<th>COUNDIM2</th>
<th>COUNDIM3</th>
<th>CURRDIM1</th>
<th>CURRDIM2</th>
<th>CURRDIM3</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSA1</td>
<td>1.000</td>
<td>0.012</td>
<td>0.037</td>
<td>0.090</td>
<td>0.488*</td>
<td>0.615*</td>
<td>0.334</td>
<td>0.254</td>
<td>-0.419</td>
</tr>
<tr>
<td>LSA2</td>
<td>-0.012</td>
<td>1.000</td>
<td>0.046</td>
<td>-0.361</td>
<td>-0.480*</td>
<td>0.265</td>
<td>-0.594*</td>
<td>0.033</td>
<td>0.203</td>
</tr>
<tr>
<td>LSA3</td>
<td>0.037</td>
<td>0.046</td>
<td>1.000</td>
<td>0.482*</td>
<td>-0.232</td>
<td>0.493*</td>
<td>-0.009</td>
<td>0.655*</td>
<td>-0.030</td>
</tr>
<tr>
<td>COUNDIM1</td>
<td>-0.090</td>
<td>-0.361</td>
<td>1.000</td>
<td>-0.005</td>
<td>0.260</td>
<td>0.279</td>
<td>0.678**</td>
<td>0.406</td>
<td></td>
</tr>
<tr>
<td>COUNDIM2</td>
<td>0.488*</td>
<td>-0.480*</td>
<td>-0.232</td>
<td>1.000</td>
<td>0.029</td>
<td>0.907**</td>
<td>-0.205</td>
<td>-0.416</td>
<td></td>
</tr>
<tr>
<td>COUNDIM3</td>
<td>0.613*</td>
<td>0.265</td>
<td>0.493*</td>
<td>-0.009</td>
<td>0.279</td>
<td>0.907**</td>
<td>0.043</td>
<td>1.000</td>
<td>-0.006</td>
</tr>
<tr>
<td>CURRDIM1</td>
<td>0.334</td>
<td>0.594**</td>
<td>-0.009</td>
<td>0.279</td>
<td>0.907**</td>
<td>0.043</td>
<td>1.000</td>
<td>-0.006</td>
<td>1.000</td>
</tr>
<tr>
<td>CURRDIM2</td>
<td>0.254</td>
<td>0.033</td>
<td>0.655**</td>
<td>0.678**</td>
<td>-0.205</td>
<td>0.801**</td>
<td>0.021</td>
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<td>-0.416</td>
<td>-0.317</td>
<td>-0.181</td>
<td>-0.006</td>
<td>1.000</td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.05 level (2-tailed).**Correlation is significant at the 0.01 level (2-tailed).

### References


