SEGMENTATION FOR TRANSPORT IN MARKETS USING LATENT USER PSYCHOLOGICAL STRUCTURES
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(Segmentation for Transport In Markets Using Latent User psychological Structures)


*Using PCP to understand the validity or otherwise of conventional market segment boundaries and new boundaries defined by the construing processes of individuals and groups.*

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**Introduction**

The STIMULUS project was designed within the context of transport issues such as congestion and the failure of communications campaigns to change peoples’ behaviour. The European Commission realised the need to understand how people think and to determine whether there are natural attitudinal groups of people, or whether all Europeans think in the same way. For instance is a car driver psychologically different from a public transport user? Are their communications needs and styles the same or different? Do campaigns directed towards behaviour change fail because differences between user types are not recognised, or more likely are supposed differences manufactured for the convenience of advertisers? This project was designed to answer these questions and also sought to detect naturally occurring attitudinal clusters in society so that the tensions and anxieties caused by the actions of planners and policy makers could be lessened and the provision of transport modes and infrastructure be designed in a manner more harmonious to the citizen

A secondary objective was the development of research methods and software for analysis that could be extended for use in other and future road transport projects and even other areas of research.

Leaving aside the formal research objectives another very important objective (also achieved) was the breaking down of cultural barriers and generation of commonality of construing research methods across 5 consultancies and national boundaries, one government agency, four transport operators and one City Council. This is of course a major objectives of the European Commission in sponsoring such work.

The project has been successful in all areas, new market segments have been detected, attitudinal profiles defined and an analytical software tool developed. Some transport companies have taken delivery of the software and database and have commencing training and familiarisation. Since the end of the project in November 1999 the methodology and software have been used to address social and commercial problems involving transport in Dublin and Oslo and Financial services in Ireland. The system will also be used in a new EC 3.7M Euro project TAPESTRY which is about the effectiveness of communications campaigns spanning 15 countries.

**What differentiates the STIMULUS approach from conventional market research?**

Although the theory of market segmentation dates back to the 1960’s, its techniques have evolved over the years.
**General segmentation models today provide a thorough understanding of consumer values.** Values strongly influence consumer selection and use of products and services. Therefore, subscriptions to such models\(^1\) provide to most subscribers a considerable lift in their understanding of consumer behaviour. A limitation of most general models, however, is that the segmentation (i.e. the data on which basis respondents are classified into homogeneous groups, or segments, different to each other) is done on their *total system of values*, rather than on the basis of their *thinking in regards to a specific line of product or service*. The information deriving from such general studies, therefore, although rich, is not as specific and as pertinent to the industry or product category paying for the enquiry as an industry-specific study would be, in which the segmentation is derived directly from the respondents’ thinking in regards to that particular category.

In STIMULUS, of course, the segmentation is done on the basis of respondent thinking on transport problems and policies, and on how they affect the respondent and his or her fellow transport user.

Also, respondents if asked directly during interviewing about sensitive issues generally will portray a socially more acceptable view of themselves.

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### Limitations of most of today’s Market Segmentation studies:

- people have “hidden agendas”
  - *hidden by themselves to the outside world*
  - *hidden to themselves*
- neglect that consumers consider things differently depending on mode/situation, i.e. for train
  - *on business travel*
  - *commuting*
  - *on holidays*
  - *on night out*

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**Research approach**

The approach chosen for STIMULUS study is based on Personal Construct Psychology (PCP). It has a methodology especially suitable to the STIMULUS concept in that it allows the interests, attitudes, motivations, values and psychological variables of individuals and groups to be accessed through its data collection techniques.

Personal Construct Psychology also helps the researcher to understand the nature of change, resistance to change and how to overcome such resistance. This is particularly useful in the transport market where the public is often required to or forced to change its travelling behaviour by the policies, management schemes and communications of governments, policy makers and transport providers.

The framework and basic methodology of Personal Construct Theory was developed by George Kelly (1955). As a clinical psychologist, Kelly felt that science was standing in the way of understanding his clients. He encountered some problems, which are common to researchers today and developed Personal Construct Theory (PCT) to overcome these which are described below:

- **The role of the expert.** Kelly objected to scientists in white coats experimenting with and studying human beings as if they were another species. He believed we are all scientists trying to make sense of the world; we conduct our own experiments and test hypotheses.

- **Observer bias.** This can pose a serious obstacle to understanding someone else’s point of view. The elicitation techniques of personal construct psychology enables the researcher to interview someone in detail and elicit information with as little observer bias as possible.

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\(^1\) (one of the most highly recognised being «Norsk Monitor», a syndicated study conducted in Norway biannually since 1985 by Market Research institute MMI (Markeds- og Mediainstitutet as) in Oslo)
Kelly formulated PCT from the premise of ‘man the scientist’ who develops hypotheses, tests and modifies or discards them, developing a network of constructs or values along the way. This framework of personal constructs is what we use to construe events, situations and people (which Kelly called ‘elements’) and to make predictions about the future. Our constructs are so called because they have been built up or ‘constructed’ from experience, and also because we use them to ‘construe’ or interpret the world. We anticipate events using our construct systems and determine our behaviour accordingly. If our behaviour is invalidated our experiment has failed and so we experiment with new behaviour. The fundamental postulate of personal construct theory states that our psychological processes are influenced by the ways in which we anticipate events.

Stewart and Stewart (1981) have simplified personal construct theory as follows:

- Perceptions influence expectations and expectations influence perceptions
- This happens through our construct system
- Construct systems are unique to the individual and develop through life

Kelly developed the commonality corollary of the theory to describe the implications of similarities among people’s construct systems. This corollary states that people who have similar construct systems construe their experiences in a similar way. It is a measure of the extent to which they are like each other and the extent to which they are likely to understand each other.

Schein (1985) studied a number of work groups across industries. He came to the conclusion that cultural groups (segments in our terms) may not be defined by who the people are, where they work, their age or skill level for instance, but rather by they way they think and solve problems:

“I will mean by “culture”: a pattern of basic assumptions - invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration - that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.”

Kelly believed that our constructs (assumptions) are arranged in a pattern. We systematise our constructs by arranging them in hierarchies. This helps us to avoid making contradictory predictions. Constructs may be seen as organised into a hierarchy with subordinate constructs at the bottom, linking with superordinate constructs above which link in turn with core beliefs about the self. People differ, however, in the way they organise their construction of events.

Dalton and Dunnet (1992) compare the construct system to scaffolding. Constructs are linked together in ordinal relationships, like the spars of the scaffolding. Porter (in Dalton and Dunnet, 1992) likens the structure to a pyramid with a large base of subordinate constructs ‘supporting’ fewer superordinate constructs and a very few core constructs.
comprehensive and central to the individual’s view of self and his/her social roles. Kelly developed his personal construct theory to inquire into this pattern of constructs or cognitive processes.

Unique to the STIMULUS research process is the ability to progress from the level of the individual to whole groups of people.

**Standardised data acquisition**

The STIMULUS project required rigorous standardisation of research methods across all sites. This was agreed by the partners in consortium meetings as was content and structure of questionnaires. These planning sessions were particularly important in highlighting and demonstrating different approaches to research and participation in research in different cultures. The differences in perceptions about proposed content of the research also helped to demonstrate cultural differences and promote designs to overcome them.

**Survey of city and environmental variables**

The sites chosen for the STIMULUS project were chosen to reflect different city size, climate and topography and varying national or local urban transport and planning policies. In order to categorise these environments a standard questionnaire form was sent to the most appropriate official(s) in each city.

**Demographic variables & Lifestyle descriptors**

Demographic variables and lifestyle descriptors were gleaned from three sources:
- Partners’ experience in other transport projects
- Partners’ experience in non-transport studies
- The specifications provided by the European Commission.

**Identification of constructs for questionnaire (repertory grids) attitudinal scales**

Topics for inclusion in the questionnaire were initially informed by the requirements of the E.C. the returns from the policy-makers and Partners’ experiences. Additional input was also provided by transport operators and interested authorities in participating cities.
In order to determine whether there were other relevant topics and to turn these items and topics into meaningful questions for members of the public a qualitative research approach was specified. The conceptual and methodological framework of Personal Construct Psychology (PCP) was used for all qualitative and quantitative attitudinal data gathering. The key features of PCP that led to this choice were:

- Non-directive and non-contaminating eliciting techniques
- Seamless interface between qualitative data and quantitative assessment
- Overarching philosophy, theory and integrated diagnostic tools.

Qualitative interviews (total n = 74) with road transport users were carried out at all sites. Respondents were recruited to ensure representation of age (15-29, 30-44, 45-64, 65+) and gender groups as well as usage of cars, bicycles and the most common means of public transport in each location. The constructs gathered from these interviews were collated into a database using an Excel spreadsheet which is available for use in other questionnaires and projects (thus reducing the cost of primary research).

**Questionnaire design**

Questionnaire design was carried out by the members of the consortium working together in workshop formats in Bucharest, Oslo and Dublin. With only a small number of site-specific variations a standard format was developed allowing comparisons to be drawn between sites.

Having carried out the qualitative research it was necessary to compress the rich language of individuals into a less rich but common language of the sample group. One construct is selected (or derived using the language of the respondents) to reflect the overall meaning of that construct group. This categorisation of constructs is described by Fransella, Jones and Watson in Experimenting with Personal Construct Psychology (1988). They describe how personal constructs come to be shared by groups of people and Porter and Tschudi (1994) demonstrate how Personal Construct methodology can be used across representative samples of the population as a whole to analyse similarities and differences of psychological structures.

The process of categorisation and identification of topic areas led to development of a questionnaire with the following structure:

```
Structure of questionnaire

Perception of Transport Policies

Prioritisation of Transport Problems

Perception of Transport Modes

Suitability of Policies for Problems

Perception of self and other transport users

Relative Importance of Personal Characteristics

Relative Importance Grids

Personal details/demographics/behaviour/lifestyle
```

The questionnaire also measured the relative importance of each construct relating to the 'self' and to transport problems. This identifies the constructs most resistant to change and those most likely to be threatened when people are asked to change their behaviour. Segmentation is also possible by choosing members of the sample who recorded an item as being one of the most important, one of the least important, or neither important nor unimportant.

**Grouping variables**
Conventional market research uses traditional social and demographic variables to segment the market. The partners drew on their various experiences in research, the results of the city environment survey and items specified by the E.C., to identify as large a range as possible of these traditional variables. In total, 121 such variables were identified (a further 32 variables were used for specific topics in Dublin and Belfast only) and incorporated into the main survey questionnaire. These covered, among others, age, gender, occupation, education, type of residence, household composition, use of private or public transport, purpose and frequency of travel, use of travel information.

A quota sampling strategy for the quantitative study was arrived at as follows - to ensure adequate representation of the most important groups of transport users in each market. Each group was split evenly by gender.

<table>
<thead>
<tr>
<th>Age</th>
<th>Regular users of Public Transport</th>
<th>Non regular travellers</th>
<th>Regular users of cars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>21-40</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>41-60</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>60+</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

Age bands can be changed as necessary to suit local requirements.

This gave a target of 240 respondents for each city. In Oslo, a random population sample was used so a target of 500 respondents was specified. In all, 1826 fully completed valid questionnaires were returned.

Questionnaires were administered in ‘hall test’ environments using quotas to ensure a cross section of the population (in Dublin, Belfast, Bristol, Merseyside, Turin and Bucharest. In Oslo the questionnaires were completed by respondents at home – a larger sample being gathered to ensure a cross section of the public.

**Actual sample sizes were as follows:**

<table>
<thead>
<tr>
<th>Location</th>
<th>Sample size</th>
<th>Proportion of overall sample</th>
<th>Location</th>
<th>Sample size</th>
<th>Proportion of overall sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dublin</td>
<td>233</td>
<td>12.8</td>
<td>Oslo</td>
<td>446</td>
<td>24.4</td>
</tr>
<tr>
<td>Belfast</td>
<td>188</td>
<td>10.3</td>
<td>Turin</td>
<td>238</td>
<td>13</td>
</tr>
<tr>
<td>Bristol</td>
<td>250</td>
<td>13.7</td>
<td>Bucharest</td>
<td>240</td>
<td>13.1</td>
</tr>
<tr>
<td>Merseyside</td>
<td>231</td>
<td>12.7</td>
<td>Total</td>
<td>1826</td>
<td></td>
</tr>
</tbody>
</table>

**Software development**

A number of software options were reviewed. The key requirements were:

- Open and capable of being upgraded/extended
- Resilient to missing / dirty data
- Data format compatible with standard Microsoft programs
- Output compatible with standard Microsoft programs
- Ability to handle qualitative and quantitative variables in very large 2 dimensional matrices
- Usual range of conventional statistics and cross-tabulations
- Ability to categorise data using naturally occurring patterns of construing.

The following programs were evaluated; SPSS, SPSS Chaid, Sphinx, Surveycraft, ESPRI and SPAD-N. Although all are good programs, none of them met all the above requirements. Two core program groups ‘GPR’ written by John Porter and MULTIGRID by Finn Tschudi were evaluated and as a result of the findings further developed into an integrated STIMULUS package that meets all requirements.

**Types of analysis**

The STIMULUS computer package segments and processes data in five ways:

- Demographics and Lifestyle
- Attitudes towards ‘elements’ such as modes of transport, ‘management measures’ and ‘transport users’.
- Importance or relevance of issues, measures, media and personal qualities
Psychographic segmentation of attitudinal data sets; modes, management measures and people.
Multi-dimensional analyses using Multigrid and Flexigrid (For copyright reasons Flexigrid is not included by default in the STIMULUS package.)

Results of analyses

Acceptance and rejection of road transport policies at the European level and at each site was assessed. The needs, concerns and attitudes of conventional market segments were defined. These segments, such as car users and public transport users, are traditionally regarded as different target audiences with differing preferences and requiring different communication and marketing campaigns. The results of the survey showed, however, that very few differences exist between these groups.

The sample was segmented according to psychological make-up rather than pre-determined demographic, behavioural or attitudinal variables. This method of segmentation involving the generation of natural groupings of people revealed more differences between the segments than conventional segmentation. These naturally occurring groups within the population have different psychological structures from each other, hence their outlook on the world is different thus requiring different methods of communication.

The management measures most likely to be acceptable to respondents throughout the participating cities are the use of speed cameras, bus lanes and restrictions on freight delivery times. The least popular measure is parking pricing. Congestion and air pollution seem to be recognised as the most obvious problems related to transport. In general, the results showed that the car remains the most attractive mode although the train is a clear second option. Car users seem to be much more in favour of their mode over bus transport than public transport users. Evidence suggests that bus transport needs to offer more of the service attributes (speed, comfort, ease of use, freedom, flexibility) required by customers in order to become more attractive and influence a modal shift.

The results also show that while on some occasions people in all cities can be treated as if they were similar in their thinking this is not always so. Differences (often unexpected) can occur and have important implications for the planning process.
Rationale for the STIMULUS software package and analytical approach

Psychographic segmentation

The challenge set by the segmentation task in this project was to find a method of identifying centroids of attitudes from an apparent continuum of attitudinal data. Having reviewed other approaches we decided to use Principal Components Analysis. By using the whole data set from a repertory grid the total content of the attitudinal scales (within a given data set) is used to generate natural associations between the people in the sample.

The psychographic segmentation software used in STIMULUS is a development of MULTIGRID. For a full explanation of the functioning of MULTIGRID please see the User Manual and Notes on MULTIGRID (Tschudi 1999) The following is simplified account of the rationale.

MULTIGRID can employ a number of analytical approaches:

- Principal Components Clustering
- Focus Hierarchical Clustering
- Cliff rotational configuration correlations

In the STIMULUS version only the Principal Components Analysis option is used. In this type of analysis there is no dependent variable (as in SPSS Chaid). Instead the data themselves define the criteria on which segmentation takes place:

1. Data are prepared in the form of a matrix in which ELEMENTS (for example, self, ideal self, car users, etc.) are assessed or rated on a numeric scale of 1-5 by the respondents according to a set of attitudinal scales or CONSTRUCTS, (e.g. trustworthy, wealthy, hard working, off-hand, not caring about the environment).

Matrix format:

```
ELEMENTS

CONSTRUCTS
```

2. A set of matrix data are collected for each topic area for each respondent in the sample.

3. There are a number of ways in which data from several individuals can be combined. In STIMULUS the analysis was performed using simple strung out raw data as shown below.

4. Each person’s two dimensional ‘grid’ matrix is strung out so that the person’s data is represented as a single vector, e.g.

```
ELEMENTS

CONSTRUCTS
```

5. Finally the strung out matrices for all people in the sample are assembled into one ‘super matrix’ and the whole data set subjected to analysis. i.e.

```
ELEMENTS

CONSTRUCTS
```

```
ELEMENTS

CONSTRUCTS
```

```
ELEMENTS

CONSTRUCTS
```

```
ELEMENTS

CONSTRUCTS
```

6. Segmentation is derived from the way in which the people are plotted spatially in element-construct space. The software allows for the creation of specified sets of segments of equal size, or of segments of pre-determined configuration and unequal size. A further analysis is then made of within and between segment variance in order to determine the statistical validity (within and between segment variance or homogeneity) or otherwise of the new segments.

**How the Segments are Identified**

Imagine that the data have been amalgamated and the persons (cases) in the study analysed as construing vectors. (Note that the STIMULUS approach is not to seek out clusters – but rather to identify attitudinal centroids.) Their positions in a principal components analysis may appear as follows:

![Diagram showing how segments are identified](image)

The positions which they occupy are governed by the totality of the construing within and between cases. If we now overlay on this plot a series of arcs and segments it is possible to allocate, by virtue of their position, the various cases.

![Diagram showing the overlay of arcs and segments](image)

In the example above we have specified two sectors and two arcs. However MULTIGRID allows user control of the following parameters:

- Number of sectors
- Number of arcs
- Equal numbers of cases per sector (i.e. vary the sector angle so as to encompass equal numbers of cases)
- Equal sector size (i.e. fixed angle) allowing the number of cases per sector to vary

The diagram below summarises the whole data manipulation process. The final stage being the amalgamation of the cases occurring in each segment and treating them as a construing whole. This construing whole is then converted into a new element vector and positioned within the construct space of the grid. In this way the relative positions of the segments is derived and the key construct(s) that define this positioning defined. By studying the resultant plot the user can easily determine key points about the attitudinal make up of the segment relative to the others.
In addition to the attitudinal profile of these new natural segments their demographic composition is also determined and the key descriptive data that differentiate them from other segments are automatically identified and relevant statistics computed.

Further development of the program may be possible to maximise the within arc/sector variance and minimise the corresponding between them. Further discussion is required on the nature of cases occupying the inner arcs. Experience has shown that these cases comprise a great deal of random noise. However, one should not lose sight of the possibility of a three (or more) dimensional solution.

Importance Measurement

Resistance to change may be better understood when taking into account the relative importance of the constructs on which change is required. (See also construct hierarchy (Porter in Dunnett and Dalton above.)) Hinkle (1965) developed the Resistance-to-Change grid to test the hypothesis that superordinate constructs would be more resistant to change than subordinate ones. Respondents are presented with every possible pair of constructs used in the repertory grid (see above) and asked to consider a situation in which they would have to move from their preferred pole to the unpreferred pole on one of the constructs in the pair, e.g.:

1. able to achieve - lack of achievement
2. environmentally friendly - environmentally unfriendly

The respondent may choose number 2 as the one on which he/she would be prepared to change, i.e., to give up *environmental friendliness* and be *able to achieve* rather than give up the ability to achieve and remain environmentally friendly.

This process is repeated comparing all possible pairs of constructs. The more a construct resists change the more superordinate it is likely to be.
This procedure whilst very stable and informative to the individual (especially in therapy) is cumbersome and tedious to use in a market research environment. In order to overcome this problem Interactions has developed an importance questionnaire (and appropriate software) in which respondents are asked to choose the ‘n’ most important and ‘n’ least important constructs to them personally. T-tests and correlation analyses between this method and Hinkle’s resistance to change grid show that this method is reliable when dealing with large sample sizes. (Sub-samples as small as 20 will yield results but should be used with caution.) Rogers and Bruen (1998) have evaluated this technique in The European Journal of Operational Research.

This procedure is used to measure importance of criteria, the extent to which issues are relevant in a particular location, the suitability of a particular policy or management measure for dealing with problems and communications needs and preferences.

The STIMULUS Software

STIMULUS software runs in a DOS window under Windows 95 (or later) (32 bit environment). The diagram below shows the structure of the STIMULUS software menu.

The menu offers 4 (or 5) options.

1. Psychographic segmentation
2. Conventional analyses
3. Multi-Dimensional analyses
4. Data and file preparation
5. (Flexigrid is also available and can be integrated with the menu structure)

The program suite comprises 4 main modules:
Analysis of a data set can start in any of the four modules, use only that module, or continue in any or all of the other modules in any order the user wishes.

Data Type

Demographic / Life Style / Behavioural / Quantitative and Qualitative.

Attitudinal Rating Data

Importance and Relevance Data

Sample Selection and Cross Tabulation

Analysis of Significant Differences

Sample Selection and Cross Tabulation

Analysis of Sample Differences

Mean Scores

Graphics

Score Frequency Profiles

2 Dimensional Principal Components Analysis

Profiles of Importance and Needs

Homogeneity Test

Sample Selection and Cross - Tabulation.

Summary Tables

Identification of Key Sample Variables

3 Dimensional Matrix Analysis for Psychographic Segmentation (Natural Categories).

Using this data structure and software, enquiries can take an hierarchical format through either the conventional 'dichotomous' sample division tree or the psychometric tree. The Demographic tree retains sample homogeneity from the point of view of demographics - but soon degrades the sample size to a low value coupled with attitudinal heterogeneity. The psychographic route makes demographic interpretation more difficult, but retains greater attitudinal homogeneity and larger sample size.

Specimen outputs from the software are available as a separate document and may be ordered by email requesting the document **EPCA Specimen** from office@interactions.ie
The Outputs Generated by STIMULUS

- Tables of mean scores for elements, constructs, element overall means
- Tables of score distributions
- Test for random scoring
- T tests for differences between elements within samples
- T tests for differences between sample groups
- Tables of socio-demographic variables
- Construct relative importance scores and graphs
- Segmentation by demographic variable, rating score, importance score and psychographic construing structure
- Homogeneity test for psychographic segments
- Tests for significance of demographic data for psychographic segments.

Results

Demonstration Approach

With so many scales and variables and choice of possible analyses, the lack of a definitive enquiry question presents a problem, since any one of the thousands of possible routes through the data can produce hundreds of pages of output. In order therefore to provide a comparative demonstration, and assess attitudinal profiles across the sites within a manageable document size we chose to use section 3 of the questionnaire, ‘Management schemes and Policies’ as our starting point. The objective of the test was to gain an understanding of the acceptance or rejection of these schemes.

Four analytical approaches were adopted:

1. Segmentation according to behaviour (car driver or public transport user)
2. Segmentation according to attitudes (acceptance or rejection of policies)
3. Segmentation according to importance or relevance (this accesses the structure of peoples’ construing processes)
4. Non-directed psychographic segmentation to test for the existence of naturally occurring categories of people

Behavioural segmentation

Car Drivers vs. Public Transport Users

In order to polarise the viewpoints as much as possible the sub-samples were selected using a positive response to questions 115 and 118:

When do you use a car (weekdays?) (Q. 115) (codebook var. 105) - car users
When do you use Public Transport (weekdays?) (Q. 118) (codebook var 108)

Perceptions of Bus Transport by Car and Public Transport Users
The following table shows the statistical significance at the 5% level (unpaired t test) of the differences in scores between the two samples. In other tables that appear in this report the same test has been applied. (Sample groups - car = car user, PTU = Public transport user)

<table>
<thead>
<tr>
<th>Construct</th>
<th>Statistical sig.</th>
<th>Construct</th>
<th>Statistical sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxing</td>
<td>NS</td>
<td>To dest. on time</td>
<td>$p \leq 0.05$</td>
</tr>
<tr>
<td>Inexpensive</td>
<td>$p \leq 0.05$</td>
<td>Sense of freedom</td>
<td>$p \leq 0.05$</td>
</tr>
<tr>
<td>Fast</td>
<td>$p \leq 0.05$</td>
<td>Flexible</td>
<td>$p \leq 0.05$</td>
</tr>
<tr>
<td>Env. Friendly</td>
<td>NS</td>
<td>Personally safe</td>
<td>NS</td>
</tr>
<tr>
<td>Comfortable</td>
<td>$p \leq 0.05$</td>
<td>Safe in traffic</td>
<td>NS</td>
</tr>
<tr>
<td>Easy to use</td>
<td>$p \leq 0.05$</td>
<td>Good value</td>
<td>$p \leq 0.05$</td>
</tr>
<tr>
<td>Regular departures</td>
<td>$p \leq 0.05$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Although most of the differences between the sample groups are statistically significant they are still small and show general agreement between groups as to their perceptions of the transport mode.

Ease of use, flexibility and giving a sense of freedom are important criteria and it is on these that car users perceive the bus in a much less favourable light than public transport users.

Car users see many advantages in their mode of transport. Both groups are more generally in favour of the car over bus and agree to some extent about the environmental and cost disadvantages of the car - however the car users are much more in overall favour of their mode over bus transport than the PT users. Their resistance to modal shift is understandable. The challenge is for the bus to adopt some of the key service attributes exhibited by the car. (Speed, comfort, ease of use, freedom, flexibility).
The graph above shows very clearly the leading position of the car. In recent initiatives in Dublin involving the introduction of Quality Bus Corridors the key attributes of ‘speed, frequency and ease of use’ have featured highly in the communications to the public. In a survey conducted in September 1999, one week after introduction of a Quality Bus Corridor, the number of new customers amounted to 27% of passengers and of these 60% previously used a car for the same journey. Dublin Bus has used a STIMULUS type construct–based approach to brand design and marketing for many years.

Transport and Traffic problems - Issues of concern

The following graph shows the relative importance or weight given to each of the issues by the two sample groups. As can be seen they are similar in their outlook. Only the criteria marked * seem to be different in weighting. The overall correlation between results is high at 0.92 thus indicating that there is probably little or no significant difference between car and PT users in their outlook.
Management Schemes and Policies

Differences of perceptions of management schemes have been calculated between the two groups. The statistically significant differences are shown below. Apart from a general trend for car users to be less in favour the differences are small. The high number of statistically significant differences arises because of the large sample size. Nevertheless we see a consistent trend of resistance to control from car users. Not surprisingly there is little resistance to restriction of goods deliveries by members of the general population.
Perceptions of Speed Cameras by Car and Public Transport Users

Suitability of management measures (also referred to as Policies)

The following graph shows the suitability weighting given to each management measure for dealing with problems of Congestion, Pollution and Road Safety. The samples are as before, car users and public transport users. The figures can be viewed as ‘perceptions of suitability or perhaps more correctly as suitability weightings.'
There are only minor differences between the sample groups. Bus Lanes together with lower fares on P.T. seem to be most relevant.

Car drivers recognise the relevance of bus lanes for dealing with congestion in the same way as public transport users.

**Perceptions of suitability of ‘Measures’ for dealing with Pollution by Car and Public Transport Users**

Restriction of Freight delivery times and car free residential zones play an increasingly important role together with Bus Lanes in reduction of pollution.

There are only two slight differences between the groups in relation to the use of parking pricing as a mechanism for dealing with Pollution and Road safety.

**Perceptions of suitability of ‘Measures’ for dealing with Road Safety by Car and Public Transport Users**
Speed cameras are perceived to be most effective in dealing with issues of road safety.

**Perceptions of Self and Others**

Principal components analyses (shown simplified below) do not reveal any significant differences between the orientations of car users and P.T users. Both groups see P.T. users as opposite to their desired selves, and see motorists as materialistic. Motorists are slightly more prepared to see themselves as materialistic than P.T Users. A clinical psychology interpretation of these findings demonstrates clearly an underlying resistance of people to move from private to public transport.
Summary

These results show quite clearly that other than through a behavioural artefact there is no market segmental difference between car and public transport users. Each is as likely to accept or reject a policy as the other and the data gives no insight into how they might be better communicated with. This finding is important since a number of campaigns seem to be targeted at motorist or bus users as if they are different market segments. In this as well as other studies we can find no evidence to support a significantly different orientation between car and P.T. users.

Attitudinal Segmentation Rejecters vs. Acceptors

A second example of the use of the STIMULUS software is to select cases based on some attitudinal response. As before we have chosen the transport policies or measures area of the data.

Conventional analyses were conducted to select those who accepted or rejected each policy. (Question 14 of questionnaire section 3.) It was found that there was a large group of acceptors who accepted the Measures generally, while rejecters feel into two smaller groups - those who rejected bus lanes and freight restrictions on the one hand and those who rejected car-free zones and increased parking pricing on the other hand. (Those who rejected speed cameras did not form a distinct group but rather overlapped with the other 2 groups of rejecters.)

The demographic variables and travel patterns of these 3 groups (1 group of acceptors and 2 groups of rejecters) were compared and it was found that the acceptors were those who used public transport while the two groups of rejecters were car users.

However, those who rejected bus lanes and freight restrictions appeared to be those who needed to use their cars (as opposed to having a choice). Those who rejected increased parking pricing and car-free zones seem to use a car because they want to, not because they have to.

The former group of rejecters travel more for business purposes and more of them have company cars. They reject the kind of Measures (freight restrictions and bus lanes) that would make it difficult for them to do business. The latter group reject the kind of Measures that penalise car-users.
Further analyses were conducted to determine how they perceive the different modes of transport, how these people see themselves in comparison with other road users and how they want to be. The following bullet points and table summarise the main differences between the groups.

- Acceptors - Use Public Transport
- Rejecters 1 - Have to use car
- Rejecters 2 - Want to use car

**Concern with Transport Problems**

<table>
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<tr>
<th>Transport Problems</th>
<th>Rejecters</th>
<th>Acceptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Peak congestion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Lack of parking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Noise pollution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Road safety</td>
<td></td>
<td></td>
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<tr>
<td>5. Air pollution</td>
<td></td>
<td></td>
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<tr>
<td>6. Lack integration Public Transport</td>
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<tr>
<td>7. Peak capacity of Public Transport</td>
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<tr>
<td>8. Capacity of roads</td>
<td></td>
<td></td>
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<tr>
<td>9. Public Transport reliability</td>
<td></td>
<td></td>
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<tr>
<td>10. Cost of Public Transport to pass</td>
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</table>

In this further analysis of those who generally tend to be rejecters we can see that they are more concerned by lack of P.T. reliability, lack of parking space and road capacity and less concerned by noise pollution than acceptors. These findings could indicate opportunities for educational communication in the market place. They also indicate that these people are less personally aware of the need to change behaviour in order to protect the urban environment.

In this section we have shown that segmentation may be carried out using attitudinal scales. There is some evidence from the findings that this attitudinal segmentation may be of greater value in predicting behaviour and designing communications than other more conventional approaches.
Psychographic segmentation

Analyses using the Policies or Measures data set

As before, analysis was carried out on the policy acceptance area of the questionnaire (section 3). This process could be repeated for sections 1 and 5 as well as for each site.

Psychographic segmentation was based on a 5 x 2 structure:

Individuals whose questionnaires are plotted towards the outer margins are those who hold the strongest and most consistent views. Those positioned in the region of A1 and E1 sectors also hold stronger and more extreme views. These people could be the sort of people who lead pressure groups and command greater ‘air time’ than their proportion in the population would appear to warrant.

Those positioned in the outer regions of B1, C1, and D1 could be regarded as the opinion-formers. By varying the number of arcs and segments the STIMULUS software provides an opportunity for further investigation of these topics.

In this report we have concentrated only on the outer arcs. Research into specific topics often requires consideration of the inner arcs as they reveal information of a different quality and content.

It should also be noted that the analyses in this section are for the sample as a whole. Individual sites and further analyses of revealed segments would also reveal wider differences and more easily identifiable segmentation.

The acceptance or otherwise of the policies by members of these naturally occurring segments is shown below.
Acceptance and Rejection

Sample sizes in the A1 and F1 segments were only 5 and 6 respectively. They have therefore been omitted from the graph.

These different segments are not clearly defined by demographic differences but rather by the sum total of the way the members of the segments view the policies in the light of their total existence.

The differing degrees of acceptance between the segments can now be seen more clearly.
### Importance of Personal Characteristics

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<th>Seg. B1</th>
<th>Seg. C1</th>
<th>Seg. D1</th>
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<tbody>
<tr>
<td>Capable efficient</td>
<td>59</td>
<td>61</td>
<td>68</td>
</tr>
<tr>
<td>Carefree</td>
<td>38</td>
<td>37</td>
<td>44</td>
</tr>
<tr>
<td>Relaxed easygoing</td>
<td>52</td>
<td>58</td>
<td>60</td>
</tr>
<tr>
<td>Outgoing sociable</td>
<td>58</td>
<td>61</td>
<td>56</td>
</tr>
<tr>
<td>Confident</td>
<td>61</td>
<td>62</td>
<td>69</td>
</tr>
<tr>
<td>Conc w health &amp; env</td>
<td>59</td>
<td>55</td>
<td>48</td>
</tr>
<tr>
<td>Reliable plan</td>
<td>60</td>
<td>62</td>
<td>60</td>
</tr>
<tr>
<td>Materialistic</td>
<td>14</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Enjoy new tech</td>
<td>29</td>
<td>24</td>
<td>35</td>
</tr>
<tr>
<td>Adventurous</td>
<td>32</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>Open honest</td>
<td>84</td>
<td>82</td>
<td>84</td>
</tr>
<tr>
<td>Flexible open mind</td>
<td>57</td>
<td>63</td>
<td>55</td>
</tr>
<tr>
<td>Impulsive</td>
<td>25</td>
<td>21</td>
<td>22</td>
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<tr>
<td>Kind helpful</td>
<td>77</td>
<td>78</td>
<td>69</td>
</tr>
<tr>
<td>Down to earth</td>
<td>58</td>
<td>58</td>
<td>55</td>
</tr>
<tr>
<td>Trusting</td>
<td>59</td>
<td>54</td>
<td>45</td>
</tr>
<tr>
<td>Accept authority</td>
<td>41</td>
<td>39</td>
<td>36</td>
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Segment B1 is 'softer' in its outlook (highlighted in red shading), as expected from a younger, more female audience. Segment D1 (richer, more experienced and established people) is 'harder' (blue shading). They want more for themselves; and to be capable, efficient, carefree, confident, adventurous and liking new technology.

These characteristic profiles are graphed below.

There are also significant differences between the segments in how people see themselves and how they would like to be.

Compared with segment B1, segment D1 is less carefree and relaxed and wants to be more carefree and relaxed, they are less concerned about the environment and are more technology oriented.
Transport Problems

Having seen that there are differences in psychological orientation between segments we can now determine whether there are differences in perceptions of policies for dealing with these problems. For example consider the case of 'congestion'.
As can be seen there are major differences between segments in relation to the usefulness of freight restriction and car free residential zones. Segment B1 comprising a higher proportion of urban dwellers is also more in favour of car free residential zones. Segment D1 would rather restrict freight delivery times to ease congestion (and since they are mostly car drivers – to save their time when travelling).

**Summary of Segments**

In this table we have attempted to provide an 'interpreted' overview of the latent segments revealed through the analyses.

<table>
<thead>
<tr>
<th>Seg. B1</th>
<th>Seg. C1</th>
<th>Seg. D1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Young soft non-motorists</strong></td>
<td><strong>Young flexible 'workers' modern outlook - not rich</strong></td>
<td><strong>Hard motorists - concerned for themselves</strong></td>
</tr>
<tr>
<td>Public transport users</td>
<td>Car owners &amp; car users</td>
<td></td>
</tr>
<tr>
<td>Younger</td>
<td>Older</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>Female</td>
<td>Equal male population</td>
</tr>
<tr>
<td>Low car ownership</td>
<td></td>
<td>Married</td>
</tr>
<tr>
<td>Concerned by noise pollution and ticket fraud</td>
<td>Believe in the right to roads and parking</td>
<td></td>
</tr>
<tr>
<td>Oriented towards environment and relationships</td>
<td>Flexible in outlook</td>
<td>Oriented towards themselves</td>
</tr>
<tr>
<td>Greater information needs - ease and visibility</td>
<td>Information needs - ease, speed and before travel</td>
<td>Want relevant information</td>
</tr>
<tr>
<td>Moderate acceptors of bus lanes</td>
<td>Strongly favour bus lanes</td>
<td>Moderate acceptors of bus lanes</td>
</tr>
<tr>
<td>Reject goods vehicle delivery restriction</td>
<td>Moderately favour goods vehicle restriction</td>
<td>Strongly favour goods vehicle restriction</td>
</tr>
<tr>
<td>Moderately in favour of parking pricing</td>
<td>Against parking pricing</td>
<td>Somewhat accept parking pricing</td>
</tr>
<tr>
<td>Favour car free zones</td>
<td>Somewhat in favour of car free zones</td>
<td>Reject car free zones</td>
</tr>
<tr>
<td>Strongly favour speed cameras</td>
<td>Favour speed cameras</td>
<td>Somewhat accept speed cameras</td>
</tr>
</tbody>
</table>

These results demonstrate how STIMULUS enables psychographic segmentation to be carried out within one context and the results applied to other contexts. By using this approach the researcher can build a total understanding of the members of the segments and work towards better brand and communications design that will have immediate appeal to its intended audience.
**Individual Site Results**

**Bucharest**

**Perception of Transport**

The main aims of the next period in Bucharest policy are:

- to devote Public Transport as a social service
- to prioritise the Public Transport
- the privatisation, contracting and competition in Public Transport
- to integrate the Public Transport
- to develop the sustainable transport through land use planning
- the mobility management

An overall conclusion regarding the transport modes perception devolved from the STIMULUS survey, is that the public transport modes are determining less interest in public opinion comparing with the personal transport modes:

![Transport Perception Chart]

Some conclusions can be drawn from the general transport perception:

- strong need for adequate roads (90%)
- good satisfaction with journey time (70%)
- need for right to park in city centre (64% Yes, 5% No)
- right to fewer cars on road (48%)

These conclusions shown some lack of information within the population, especially on sustainable transport issues. This lack of information is mainly synthesised by two ideas:

- “car is freedom” (car ownership means freedom, but car exploitation means luxury)
- insufficient transport perception (20% not decided), but an evident preference for metro and train (fast, safe and environmental friendly)

**Communication**
Beside the technical and economical issues concerning the success of these aims, the social aspect is most important. It is not good enough to simply offer a new or improved solution or service, even that is indeed the optimal one technically and economical, without a good knowledge within the target group of the solution/service, of its advantages. It was seen many times before that a good technical – economical solution could have a bad result (low impact of the measure) because of poor communication with its end-users.

For having a good communication with the target audience means more than simply launching information. That information must be first prepared in a form that could be suitable to be rapidly and fully received and understand then launched using the most suitable communication channel. This process is completed only after the feedback is received, analysed and the needed corrections are made.

In Bucharest, according to the opinions received, good information must fulfil the following needs:

The special attention give to those characteristics related to the consuming of the end-user time are showing that there are a lot of problems in this field.

The main communication problems in Bucharest are caused especially by:

- weak public consultation
- lack of useful and reliable sources - means of information
- lack of opinion surveys and market research in transport
- poor legal and institutional reform to support integration of policies and strategies and support consensus
- poor lobbying activity

Most of the present causes for this situation are situated in the decision-makers field. According to the Bucharest inhabitant’s opinion, the efficiency of the main decision-making groups is seen as adequate, except the national authorities and the civil society. Looking at the very low role that Bucharest population is considering that these
actors in the decision process should have, we can say one more time that the level of information is one particular low regarding the general community functions.

It can be easily observed the very low influence of lobby activists, but visible as well is the lack of knowledge within the population of the role that those groups should have. A very important issue is the significant differences between the actual role played by the European Union bodies and the role that the population is considering that should be played.

Policy acceptance

The need for changes is obvious for the Bucharest population, even if it is not very well conceptualised and outlined. For each of the 8 policies studied in Bucharest site the response is positive, the differences being sought only in the scale of acceptance:

- most desired:
  - more bus lanes (0,99)
  - Speed cameras (0,87)
  - Freight delivery time restrictions (0,87)

less desired:
  - parking pricing (0,65)
  - car-free zones (0,64)

There is a response that is worth being especially outlined, the one on information systems in public transport stations. Not just because the result is placing this particular policy scheme as the most desired one among the all eight, but especially because this policy scheme was studied in Bucharest on the special request of RATB, the main public transport operator of the city.

Another policy which gets a good response is one-way streets, a scheme implemented in Bucharest within the CAPTURE Project (EC 4th Framework Programme). A particular example for Bucharest test site is the reaction to the second policy asked to be studied by RATB: Different pricing of Public Transport varied by distance of trip. The results are showing one more time that the understanding of the need for changes in Bucharest within the population opinion is in the right direction.
Bucharest Psychographic Segmentation

A 4 x 2 segmentation analysis was performed on area 3 of the data (acceptance of policies). This produced 8 segments as shown below. Segment D1 contained too few cases (n = 2) to analyse. The inner arcs (A2 - D2) are relatively heterogeneous in structure and require greater efforts of interpretation and further analysis. In this report we concentrate therefore on outer arcs A1 - C1, with particular emphasis on B1 and C1 since A1 represents only a small proportion of the sample.

The following series of graphs are of Principal Components analyses in which the segments themselves are the ELEMENTS positioned in 'psychological construct space'.
The first significant aspect of this plot is the separation of construing involved with 'financial' matters from 'controlling' and 'acceptable'. It is also significant to note the strong relationship between 'controlling' and 'acceptable'. In other words a measure that is seen as controlling is also likely to be seen as acceptable.

In this case PARKING PRICING is rightly seen as lying along the financial dimension. It is seen positively by segment A1 and relatively negatively by B1 and C1.

BUS LANES lie in the controlling dimension and are very acceptable to C1 with A1 being more negative.
SPEED CAMERAS are also seen in the controlling/acceptable dimension by C1 and B1.

Opinion about CAR FREE ZONES is divided with B1 being particularly negative.
Restricting FREIGHT DELIVERY is both a financial and controlling measure. It is more acceptable to C1 and B1.
PRICING BY TRIP LENGTH is seen as a financial measure and is not really well differentiated in acceptability between the segments. This result at first sight seems to contradict the more straightforward attitudinal response seen earlier. In fact it is pointing to a more complex picture than first revealed. It shows that the measure is acceptable to A1 and B1 but resistance could be expected from a substantial number of people in C1. The use of STIMULUS here is to alert the planner to the need for greater understanding of the people and their needs and a carefully crafted implementation plan. The STIMULUS data base should be used as the first resource in gaining the necessary further understanding.

ONE WAY STREETS being a controlling measure are once again acceptable to segment C1 with A1 and B1 tending to reject.
Conclusion

The conclusion for the Bucharest market place therefore is that the two segments B1 and C1 represent:

B1 - more freedom loving extrovert people;
C1 - the more compliant population.

Communications to these two groups will have to be quite different.

Further analyses of the data base could be carried out to determine in more detail the needs, preferences and ways of communicating with each segment.

In the case of Bucharest the STIMULUS approach has demonstrated the possibility for detection of latent psychological structures within the population. An unexpected structure - ‘control’ as a vector distinct from financial and enabling has emerged. It is not seen elsewhere, was not anticipated and not directly addressed by the questionnaire. In this way repertory grid analyses often reveal answers to questions that have not been directly posed by the researcher simply because they could not have been previously anticipated.

Summary

An initial inspection of the results in this section might lead the reader to come to a false assumption that there is broad agreement across Europe. This is not the case. The results reported in the previous sections show that in relation to Management Measures when there is apparent agreement or acceptance the reasons for this may differ between sites. In addition there may be segments within each site that require special consideration.

Concern with peak time congestion and acceptance of bus lanes are perhaps the only two factors common to all sites. In most other respects each site should be treated individually. There is no evidence for a ‘European’ perspective.

The graphs below give the results for the whole sample and for each site.

Conclusions

1. Consensus at a European level is not to be taken for granted. It may be achieved in certain cases provided policy makers, service providers and ‘designers’ take account of the perspectives of people in their countries.

2. Attitudinal and latent psychological structure segmentation leads to better understanding and prediction of the target audience than behavioural segmentation.

3. The initial hypotheses concerning the existence and importance of attitudinal segmentation has been demonstrated.

4. A design for a research database has been developed and demonstrated.

5. Software for analysis of the database has been developed and is capable of segmentation and analyses in four ways:
   - Lifestyle, behaviours and demographics
   - Attitudes
   - Importance of criteria
   - Latent psychological structures common to groups or segments of the population.

6. The products and services developed in this project are ready for extension to other transport projects and capable of adaptation to other markets.
References


Applications of the STIMULUS system

The data set associated with this project was derived broadly within the traffic and transport arena. The research methodology and software on the other hand are suitable for use in any area where there is a service or product interface with users. This can even extend to internal relationships within organisations. Stimulus-type methodologies have been used extensively in Public Transport in Dublin to define service quality and develop brands. In the same city a completely new brand and style of Banking Service has been developed and launched using the same methodology. New market segments have been identified, their needs determined and appropriate brand image and communications devised.

‘Products’ offered by the STIMULUS Consortium and other dissemination activities

- Training in research methods, analyses and interpretation
- Software analytical package
- File preparation
- Consultancy in research design and interpretation
- Research project design, execution and management

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<th>Acronym</th>
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<th>Contact(s)</th>
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Associated Contractors and Sub Contractors

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