Consumer Preferences in Urban Rail Carriage Design: Results of a Survey Conducted in Brisbane During May and June, 1973

Report

This Report presents the results of a consumer preference survey in urban rail carriage design. The survey was carried out by the BTE in Brisbane in May and June, 1973, with the cooperation of Queensland Railways.

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BUREAU OF TRANSPORT ECONOMICS

CONSUMER PREFERENCES

IN URBAN RAIL CARRIAGE DESIGN

Results of a Survey Conducted

in Brisbane during May and June, 1973

AUSTRALIAN GOVERNMENT PUBLISHING SERVICE

CANBERRA 1974

ISBN 0 642 00686 5

Printed by: Union Offset Co. Pty. Limited, Canberra

FOREWORD

This report presents the results of a consumer preference survey in urban rail carriage design. The survey was carried out by the BTE in Brisbane in May and June, 1973, with the cooperation of Queensland Railways.

The study was carried out by W.P. Egan of the Transport Engineering Branch, assisted by B.J. Wight.

J.H.E. TAPLIN
Director

Bureau of Transport Economics,
Canberra,
March 1974.

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SUMMARY

As part of a continuing program of research in the field of rail travel, the Bureau of Transport Economics undertook a survey of consumer preferences in some aspects of urban rail travel in Brisbane. The objective of the survey was to add to knowledge of consumer preferences in public transport in Australia, and specifically to provide information which might be of use in an expanded and accelerated program of urban rail carriage design and construction. The survey was carried out in May and June, 1973, and questionnaires were distributed to over 1,400 households in selected areas. Questions asked in the survey covered respondents' demographic, social and travel characteristics, and probed opinions of various aspects of rail travel (in particular, urban rail carriage design).

Results of the survey are presented in this report. In the main, they demonstrate that both current rail users and potential users hold strong opinions on matters relating to rail carriage design, and, in general, users and potential users have similar opinions. A feature of the results is that people care a great deal about factors bearing directly on comfort. In particular, questions affecting seat availability and design evoked strong responses; fare variations were considered relatively unimportant compared with seat availability and travel time.

Particular features of rail carriage design which elicited particularly favourable responses in the survey included the following:

- high performance (acceleration and top speed)
- improved suspension systems
- air conditioning
- automatically closing doors
- insulation
- divided seats
- waist-height bars for standees
- high ratio of seated to standing passengers

- advanced exterior styling
- space for strollers, wheel chairs and baggage
- restricted areas for smoking (or complete prohibition)
- unpainted stainless steel or aluminium exterior

At the other extreme, features which were regarded unfavourably included:

- bench seats (with individual pads)
- overhead bars for standees
- painted carriage exteriors
- standing-only carriages
- painting with warm colours
- piped music

ACKNOWLEDGEMENTS

Several organisations and individuals contributed to the performance of this study, and specific acknowledgements are due to the following for their courteous and valuable assistance:

Queensland Government Railways

Appointments Board, University of Queensland
(for assistance in recruiting students as interviewers)

Students of the University of Queensland, who acted as interviewers

Department of Sociology, Australian National University
(for comments on survey questionnaire design)

IBM (Australia), Canberra and Brisbane offices

In addition, acknowledgement is due to respondents to the survey, and tc individuals and organisations who provided unsolicited responses - in particular:

All Souls' School, Charters Towers, North Queensland

Australian Electric Traction Association - Queensland Division

CHAPTER 1 INTRODUCTION

ORIGIN OF THE STUDY

In June, 1972, the BTE issued a report on investment in Australian urban public transport[1]. In that report, the economic merits of public transport improvements involving expenditure of approximately $300m were evaluated. These projects were considered representative of proposals for expenditure totalling approximately $500m. While many of the projects examined in that study involved civil engineering works, it is significant that $187m (or approximately 60% of the expenditure considered in the study) was devoted to new and replacement rail carriages. In addition, many of the other projects included significant expenditure on carriages, associated with line extensions or growth in patronage due to improvements. In view of this proposed expenditure on rolling stock, rail carriage design assumes considerable importance.

As with any other mechanical equipment, design of rail carriages is a complex process aimed at producing an acceptable compromise between competing objectives. In many cases the objectives are not amenable to strict analytical appraisal, and design parameters are laid down as a result of the experience of those responsible for design, procurement and operation of the equipment. Similarly, various characteristics of an urban railway system may impose specific constraints on the designer. Nevertheless, the ultimate objective of such systems must be to serve their passengers with suitable levels of comfort, convenience and performance. From the passenger's point of view, the more obvious points of carriage design are in such things as seating and layout, lighting, ventilation and ride characteristics. While these factors are certainly considered in the design of current rail vehicles, knowledge of consumer preference in this field is limited.

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(1) Bureau of Transport Economics, Economic Evaluation of Capital Investment in Urban Public Transport, June 1972.

After examination of work in other countries, it was decided that the study should be centred on an intensive survey of people who are already rail users for their journey to work or who are potential users. Brisbane was chosen for two reasons:

- It is proposed that large sections of the Brisbane urban rail system should be electrified in the near future, and hence the opportunity exists for large-scale implementation of any useful results of the survey.
- The rolling stock situation in Brisbane has been static for some years, with no major changes in types of equipment.

The primary objective of the survey was to gauge reactions of current and potential rail users to various options available in the design of rail-cars. A secondary objective was to assess the importance of factors which might be affected by carriage design in relation to other characteristics of rail travel. Both of these objectives were fulfilled by means of a series of questions, to each of which respondents were requested to supply a score or ranking. In addition, certain information relating to respondents and their families was requested, together with trip details for respondents' usual and main alternative journeys to work.

The results of the survey are presented in this report. The responses to design option questions and rankings of rail travel characteristics have been analysed in some depth, while demographic and social details of the respondents and their families have been compared with those of the entire Brisbane metropolitan area. Trip-making characteristics, while collected in the survey, have not been considered in great detail since they do not bear directly on the analyses of design options and rail system characteristics.

CHAPTER 2 DETAILS OF THE SURVEY

BRISBANE CHARACTERISTICS

Many factors considered in a survey of this type are influenced by such characteristics of an area as its population, climate and transport system. Responses to questions relating to noise and reliability will, for instance, be conditioned by the noise level and reliability of the existing system. Similarly, responses to aspects of carriage design related to temperature control will be conditioned by the climate in which the carriages operate. Thus, any attempt to translate results of the survey to areas other than Brisbane must take due account of the differences. Accordingly, selected details of the Brisbane area are given below as a guide to interpretation of the results.

Brisbane (the capital of Queensland) is located at a latitude of $27^{o}28'$S and a longitude of $153^{o}2'$E. In 1971, the area of the Brisbane Statistical Division was approximately 2500 sq km(1), and its population was 867,784(2). The climate is sub-tropical, with an annual mean temperature of 20.4^{o}, and annual mean minimum and maximum temperatures of 15.5^{o} and 25.4^{o} respectively(3). The annual mean rainfall is 114cm.

Brisbane is served by extensive systems of roads, bus services and railways. The urban railway system comprises seven lines (as shown in Figure 1) with a combined route length of 161km. Most is dual track, the track length being 319km. There are 110 suburban stations. Trains are hauled by diesel locomotives. Plans for progressive electrification of sections of the system are well advanced. The present rolling stock consists of

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(1) Australian Bureau of Statistics, Queensland Office, Queensland Year Book, 1971 and 1972.

(2) 1971 Census - Population and Dwelling Characteristics.

(3) Australian Bureau of Statistics, Year Book - Australia 1972.

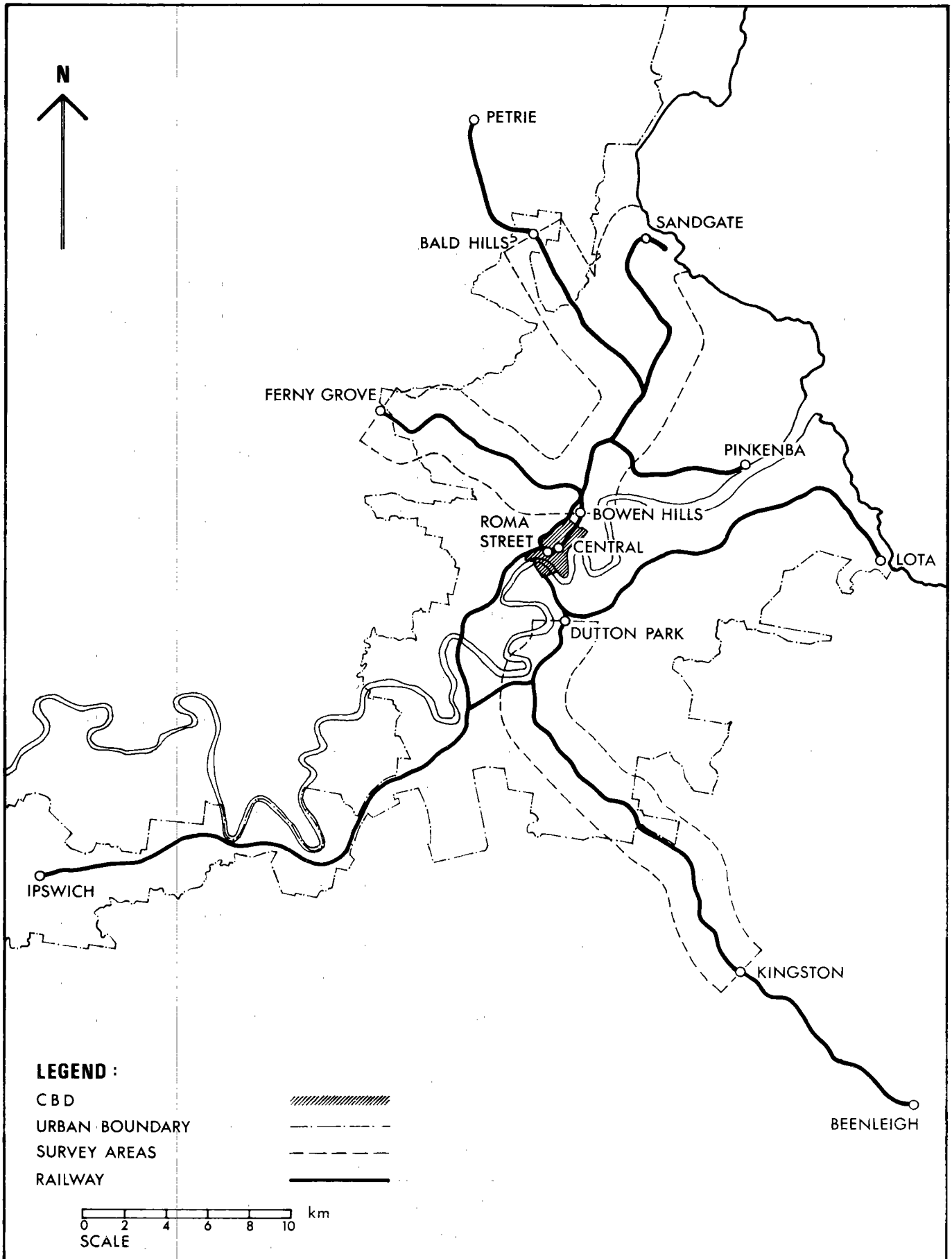

FIGURE 1 - BRISBANE URBAN RAILWAY SYSTEM

112 stainless-steel carriages with side seating and side doors, which came into service in the period 1961 to 1964, together with 213 carriages with cross-seating and side doors which were commissioned between 1913 and 1934[1].

In the 1971-72 financial year, the Brisbane urban rail system carried 30 million passengers[2].

SURVEY SAMPLE

Since the aim of the survey was to assess preferences of rail users and potential users, the survey area was limited to zones close tc railway lines. In view of the broad coverage of the Brisbane rail system, it was necessary to eliminate some lines from the survey, and the area selected covered the entire Ferny Grove and Sandgate lines, the Petrie line (as far as Bald Hills) and the Beenleigh line between Dutton Park and Kingston. The survey area is shown in Figure 1, and extends approximately 1.6km (1 mile) to each side of the designated lines.

The survey area contained 311 Census Collector Districts (CCD's), of which 75 were selected on a random basis. Within each CCD, a random starting point was determined and each fifth house, on a predetermined search pattern, was selected for inclusion in the survey. The approximate positions of the CCD's included in the sample are shown in Figure 2. One worker from each household selected was asked tc complete the questionnaire.

PILOT SURVEY

In order to test the questionnaire and the survey techniques, a pilot survey was conducted during the period 26th to 29th April, 1973 in the Brisbane suburbs of Mitchelton, Albion and Sunnybank. BTE officers acted as interviewers. As a result several modifications were made to the questionnaire and in the general form of the survey.

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(1) Information provided by Queensland Railways officials.

(2) Queensland Railways - Report 1972.

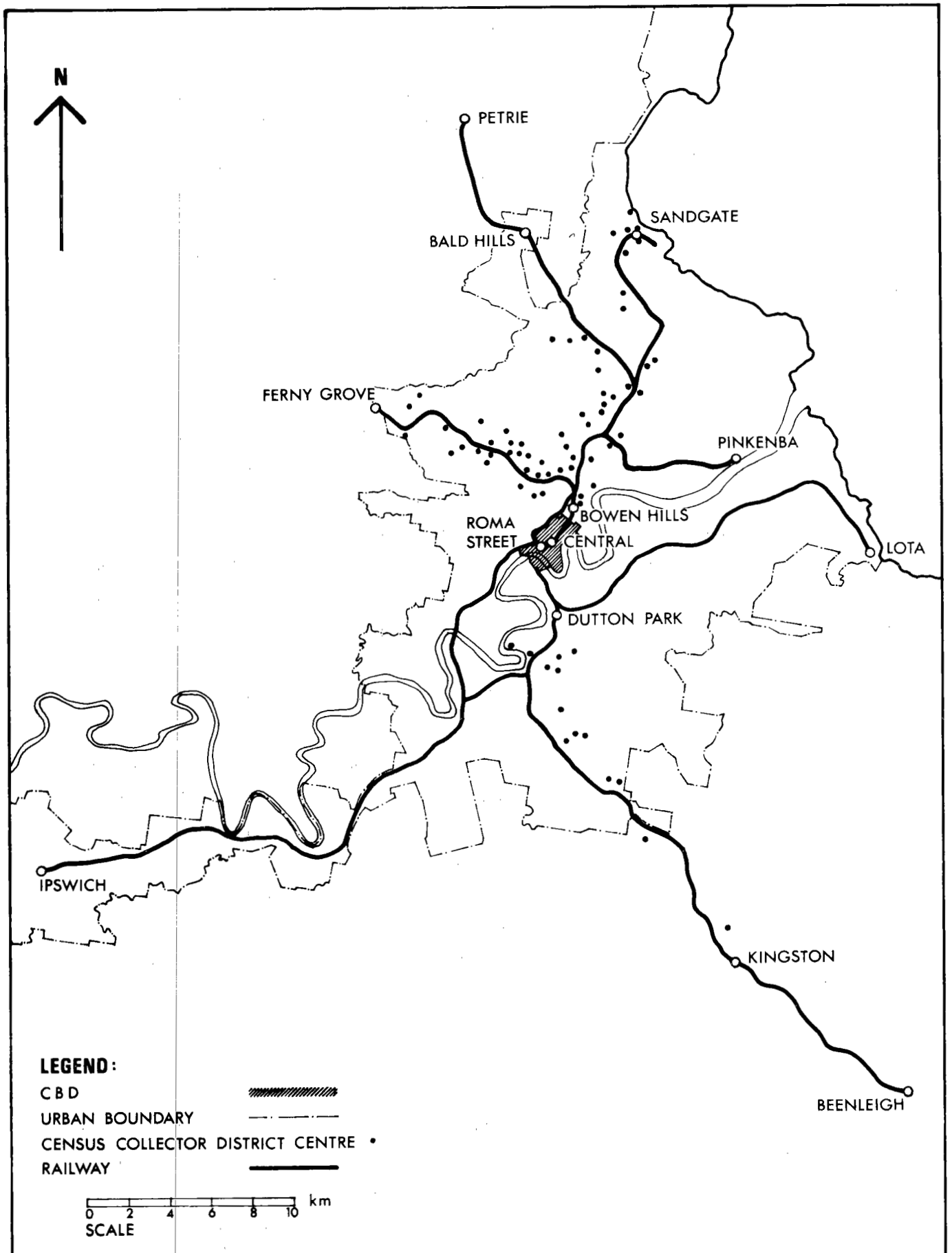

FIGURE 2 - CENSUS COLLECTOR DISTRICTS SELECTED FOR SURVEY

MAIN SURVEY

The full-scale survey was conducted during the three weeks between 12th May and 2nd June, 1973. A team of up to 13 interviewers, recruited from students at the University of Queensland, was involved in distribution and collection of questionnaires, under BTE supervision. The questionnaires were delivered to each selected household by the interviewers, and were collected from three to five days later. At the collection stage, interviewers checked the questionnaires and filled in any missing information. A summary of response to the survey is presented in Table 1.

TABLE 1 - RESPONSE TO THE SURVEY

Households in sample	1426
Vacant houses	38
No eligible respondent (occupied by pensioners, etc.)	271
No contact after 4 calls	75
Refusals	157
Completed but unusable	10
Satisfactorily completed	875

The overall response rate was 61%. However, if vacant houses and households with no eligible respondent are excluded, the rate was 78%. These rates are considered satisfactory in view of the length and complexity of the questionnaire. The good response may be partly attributable to the excellent local media coverage given to the survey.

In addition to results obtained from the survey, several interested individuals and groups provided unsolicited responses. While these responses have not been included in the tabulated results, they add to the overall appreciation of the results and indicate a substantial level of public interest in questions relating to provision of improved public transport services.

SURVEY QUESTIONNAIRE

A copy of the questionnaire used in the survey is shown in Annex A. The questionnaire consists basically of six sections, with the following broad functions:

Section 1 contains questions relating to the respondent's sex, marital status, age, income and occupation.

Section 2 contains provision for entering details of the respondent's usual journey to work. Details requested include the mode, fare or cost, and time for each stage of the journey.

Section 3 is identical to Section 2, except that it relates to a respondent's main alternative method of making a journey to work.

Section 4 contains characteristics of rail travel, to each of which respondents were asked to assign a ranking relative to the other characteristics. This section was limited to respondents who usually travelled to work by rail. Section 4 of the questionnaire also contains space for additional characteristics considered important by respondents.

Section 5 was completed by respondents who did not usually travel to work by rail, and contained a question relating to frequency of urban rail travel.

Section 6 contained thirteen sets of design options which might be available as methods of achieving specific design objectives. For each option, respondents were requested to provide a 'score', ranking from -3 (most undesirable) to +3 (very desirable). A score of zero was intended to indicate indifference or uncertainty. Where necessary, pictures were used to show the options.

In addition to the questions set out in the questionnaire, the interviewers who conducted the survey obtained certain details of other members of respondents' households.

Section 4 (ranking rail travel characteristics) was the most difficult to formulate. An alternative would have been to present the characteristics as a series of 'paired-comparison' questions. The latter method has been used in some overseas work of this nature[1], and has the advantage that the respondent can provide 'inconsistent' answers, which may reflect multi-dimensionality in his assessment of the characteristics. However, the Brisbane survey confronted the respondent with a large number of design option questions, and this made a large set of paired-comparison questions undesirable on the grounds of possible respondent fatigue. In order to explore the possibility of assigning monetary values to some of the intangible characteristics of rail travel, fare reduction and time reduction characteristics were included in this section of the questionnaire.

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(1) T.F. Golob, E.T. Canty, R.L. Gustafson and J.E. Vitt, 'An Analysis of Consumer Preferences for a Public Transportation System', Transportation Research Journal, Vol 6, 1972.

CHAPTER 3 RESULTS

PRELIMINARY PROCESSING

The basic results of the survey were first transcribed from questionnaires to card punching forms. At this stage, obvious discrepancies in the information were corrected, and data collected at the interviews, but not recorded on the questionnaires, were added. The information was then punched on cards, and processed by means of a series of editing programs. Finally, a fully-edited magnetic-tape file of the data was created. Preliminary processing and editing consisted largely of correction of transcription errors, while non-numeric results, such as colours, were coded in a numeric system.

For the benefit of researchers who might be interested in further processing of the survey results, a complete description of the tape records, together with associated notes on coding conventions used in the records, is given in Annex B.

DETAILED RESULTS AND ANALYSES

The results of the survey presented in this report are the end product of a series of processing stages. In general, the results fall into four categories:

- Analysis of sample characteristics, including age distributions, occupational status and household size; these results are reported in Annex C.
- Analysis of travel characteristics, including methods of making the work journey and reasons for using the usual method instead of the main alternative method; the results of this analysis appear in Annex D.
- Analysis of the manner in which the ten characteristics of rail travel (section 4 of the questionnaire) were ranked; this analysis is presented in Annex E.

. Analysis of scores assigned to the design options avaliable for each of the thirteen design objectives (section 6 of the questionnaire); these results are presented in Annex F.

In addition, a brief analysis of preferences for interior and exterior colour schemes is presented in Annex G.

Where appropriate, details of statistical methods used in analysing the results are given. Similarly, characteristics of larger sections of the Brisbane population are used for comparison in some cases.

It is important to note that some results of the survey (particularly those relating to modes of travel) are conditioned by the fact that the sample was selected from areas close to railway lines. These results are therefore not necessarily of general application to the Brisbane area.

RAIL TRAVEL CHARACTERISTICS

Of the ten characteristics presented for ranking, the one most clearly considered important was availability of a seat. This was followed, at a distance, by travel time reduction, in turn followed by a variety of comfort features. Fare reductions were placed well down the list; the comparative lack of importance attached to fares is demonstrated by the fact that a 40% fare reduction was ranked less important than a 20% reduction. Questioning of respondents after the main survey established that this apparent anomaly was due to a view that reductions in fares would be associated with highly undesirable reductions in service standards.

Table 2 shows the ranking for the ten characteristics presented in the survey questionnaire. The rank total for each characteristic is also given, and is inversely proportional to the importance of the characteristic.

TABLE 2 - CHARACTERISTIC RANKING

Characteristic	Rank Order	Rank Total (a)
Seat availability	1	758.0
20% travel time reduction	2	959.0
Controlled light, temperature, etc.	3	1068.5
Improved cleanliness	4	1069.5
Space between passengers	5	1209.0
Smoother ride	6	1214.5
20% fare reduction	7	1292.5
40% fare reduction	8	1340.5
Reduced noise	9	1341.5
Carriage interior styling	10	1407.0

(a) The lower the rank total the higher the ranking.

The figures presented in Table 2 are plotted in Figure 3 for ease of interpretation.

The importance attached to comfort characteristics (especially seat availability) is clear, and there may be possibilities for significant trade-offs between increased fares and improved comfort. However, any increases in fares which were justified on grounds of improved rail-car design would require a very real improvement in comfort (particularly in availability and quality of seating). Conversely, any reduction in comfort standards is clearly considered wholly unacceptable. These conclusions are reinforced by results of the design option analysis, which are discussed below.

DESIGN OPTIONS

As fifty-six separate design options were presented for assessment in the survey questionnaire, it is difficult to draw general conclusions. In Table 3, the methods of achieving

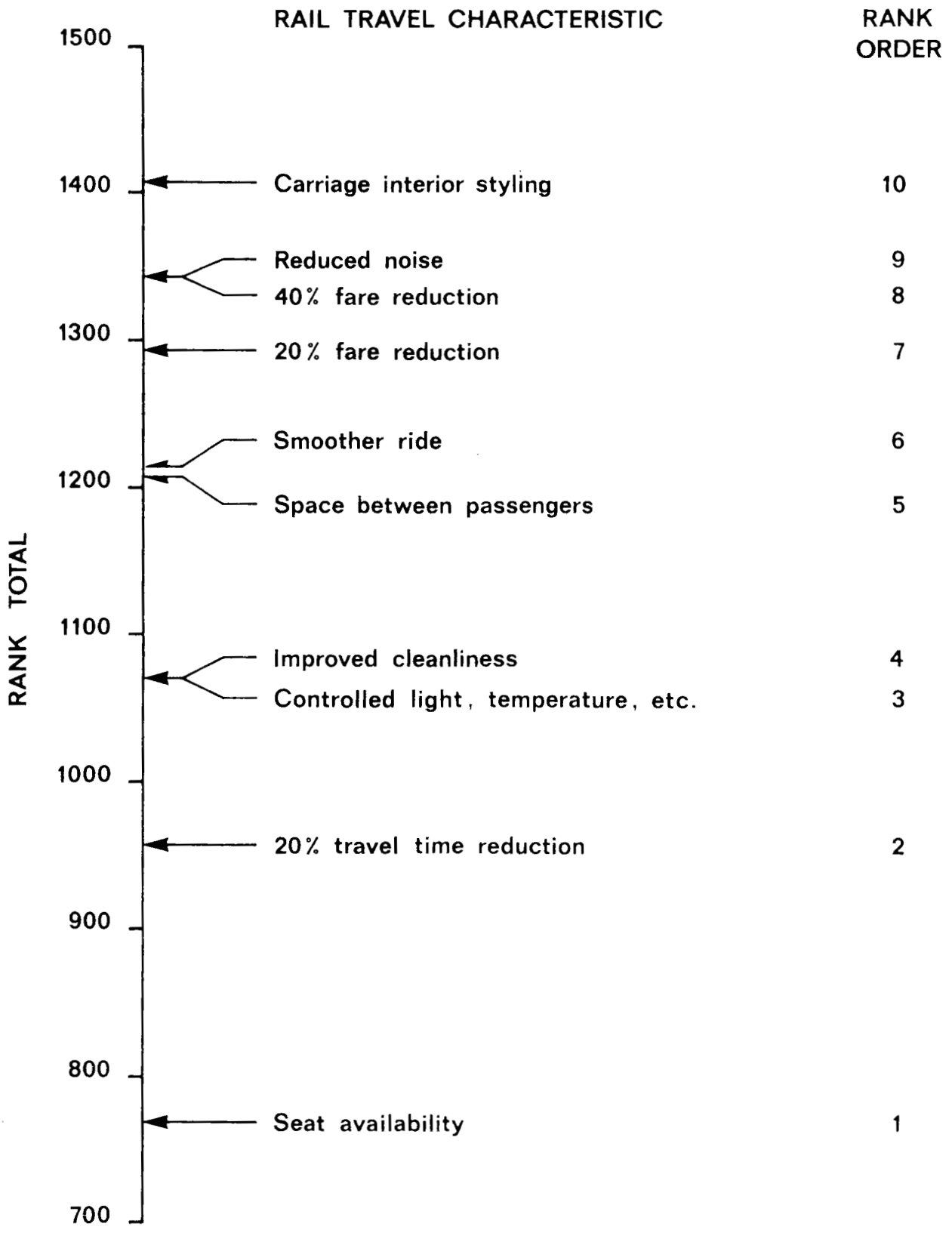

FIGURE 3 – ORDER OF IMPORTANCE OF RAIL TRAVEL CHARACTERISTICS

TABLE 3 - RESPONSE TO DESIGN OPTIONS

Objective	Method	Order	Mean Response
CONTROL OF TEMPERATURE AND VENTILATION	Air conditioning	1	1.77
	Insulation	2	1.61
	Heating in winter	3	1.16
	Paint with cooler colours	4	0.91
	Forced air circulation (fans)	5	0.76
	Paint with warmer colours	6	-0.31
	Small windows	7	-1.16
LESS NOISE INSIDE THE RAIL CARRIAGE	Regular attention to rattles and squeaks	1	2.38
	Automatically closing doors	2	2.29
	Wall and floor insulation	3	1.82
	Control of noisy passengers	4	1.37
	Windows which cannot be opened	5	0.02
	Piped music	6	-0.43
A SMOOTH RIDE	Comfortable seats	1	2.63
	Smooth starting and stopping	2	2.42
	Smooth travel around curves	3	2.06
	Smooth travel along straight track	3	2.06
MORE SPACE BETWEEN PASSENGERS	More trains in the peak period	1	2.46
	Divided seats instead of bench type seats	2	1.53
	More carriages on each train	3	1.49

Objective	Method	Order	Mean Response
MORE SPACE BETWEEN PASSENGERS	Restrict the number of standing passengers	4	1.47
	More space for each seated passenger	5	1.34
	One standing-only carriage per train	6	-0.52
A HIGH LEVEL OF DAYTIME LIGHT	Large windows	1	2.20
	High level of artificial lighting	2	1.25
	Tinted window glass	3	1.23
	Use of blinds	4	0.80
	Transparent roof panels	5	0.12
A SEAT FOR EACH PASSENGER	Run additional trains in the peak periods	1	2.45
	Utilize carriage standing space to provide more seats	2	1.11
A HIGH STANDARD OF CARRIAGE CLEANLINESS	Daily internal cleaning service	1	2.62
	Frequent attention to minor damage	2	2.30
	Use of stain resistant materials	3	2.14
	Weekly external cleaning service	4	1.78
	Frequent internal painting	5	1.71
	Collection of papers etc. between trips	6	1.50
	Frequent external painting	7	1.35
	Use of colours which do not show the dirt	8	1.27
EXTERNAL APPEARANCE	State-of-the-Art car (SOAC)	1	1.47
	Bay Area Rapid Transit (BART) car	2	1.10

Objective	Method	Order	Mean Response
EXTERNAL APPEARANCE	Queensland inter-urban rail-car	3	0.77
SEATING LAYOUT	High seating capacity	1	1.37
	Medium seating capacity	2	1.29
	Low seating capacity	3	0.57
SEAT DESIGN	Divided seats	1	1.91
	Bench seat	2	0.40
	Bench seat (individual pads)	3	-0.20
SUPPORT FOR STANDING PASSENGERS	Waist-height bars	1	1.75
	Overhead straps	2	0.42
	Overhead bars	3	-0.67
IMPROVE RAIL TRAVEL	Space on each train for strollers and wheel chairs	1	2.39
	Wall racks or space under seats for baggage	2	2.25
	Railway staff on trains to control vandals	3	2.03
	Restricted areas in carriages for smoking	4	1.80
A MODERN, STYLISH CARRIAGE EXTERIOR	Aluminium or stainless steel outside finish	1	2.46
	Painted carriage exterior	2	-0.22

specific design objectives are presented in order of the mean response to their desirability or effectiveness in fulfilling the objectives. In this context, it should be pointed out that mean responses are not considered by any means the ultimate measure of desirability, and a fuller appreciation of respondents' feelings on each option may be obtained by reference to the response distributions shown in Annex F. A further point is that a 'vertical' comparison between methods presented for each objective leaves something to be desired, in the statistical sense, and is only used here as a convenient way of presenting a large amount of information.

Again, it is clear that respondents expressed strong feelings on matters of comfort (especially seating and availability of seats) and reduced travel time. It must be concluded that further attention should be given to these aspects of design and performance in procuring new urban rail-cars.

In the following paragraphs, the six characteristics of rail travel considered most important by the respondents are treated in order of importance, and the methods of achieving them which elicited the highest responses are discussed.

Seat Availability

The preferred method of improving seat availability was to run additional trains in the peak period. Other options which contributed to this characteristic and which were rated highly included divided seats and additional carriages on each train. The option of standing-only carriages (for short-trip passengers) was not received favourably.

Travel Time Reduction

No options relating specifically to this characteristic were presented, but the methods normally used to achieve this objective are improved signalling and track systems, improved rail-car bogies, higher acceleration and deceleration rates, increased service speeds and efficient access at stations.

Controlled Light, Temperature and Ventilation

Many options presented in the questionnaire bore directly or indirectly on these characteristics, and some options which elicited favourable responses in this regard are:

- automatically closing doors
- large windows
- restricted areas for smoking
- air conditioning
- insulation
- high-level artificial lighting
- tinted glass
- heating in winter

These options are ordered by their mean responses, but the warning previously given about vertical comparisons of responses must be repeated here. In particular, the list given above is drawn from the response to these methods in relation to several different objectives, and may be biased accordingly.

Options which were considered undesirable or ineffective in relation to these characteristics included painting with warmer colours and small windows.

In addition, stainless steel or aluminium exteriors were considered very desirable compared to painted exteriors, and this may bear on the question of carriage temperature, in particular.

Improved Cleanliness

All the options presented as methods of improving carriage cleanliness achieved responses of desirable or better. In general, active measures (collection of waste, frequent cleaning and the like) were preferred to passive measures (use of colours which do not show the dirt, etc). The most highly rated options were daily internal cleaning and frequent attention to minor damage, followed by use of stain resistant materials.

Space Between Passengers

Again, many options presented in the survey related to this characteristic, and those methods which resulted in less passengers per carriage were preferred to those which provided more space for each seated passenger. In particular, more trains in the peak period were considered highly desirable.

Smoother Ride

Although smooth riding qualities ranked only sixth in the list of characteristics, methods of obtaining them elicited strong responses. It is clear that methods of obtaining smooth riding qualities must be considered, and foremost among these would be improved, lightweight bogie designs and advanced control systems (e.g. thyristor control). Improved track maintenance and construction standards may also be required.

SPECIFIC RAIL CARRIAGE DESIGN

While it is outside the scope of this report to lay down firm guidelines on carriage design, it is worthwhile to enumerate specific design features found desirable in the survey. Some of these features are given below:

- high performance (acceleration and maximum speed)
- improved suspension systems
- air conditioning
- automatically closing doors
- insulation
- divided seats (of aircraft type)
- waist-height bars for standees
- high seated to standing passenger ratio
- styling along the lines of the State-of-the-Art[1] car
- space for strollers, wheel chairs and baggage (the latter close to the seats)

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(1) The State-of-the-Art car is a U.S. Government-funded development project aimed at producing an advanced carriage of essentially current technology.

- restricted areas for smoking (or complete prohibition)
- unpainted stainless steel or aluminium exterior

While there are many other considerations which confront the rail carriage designer, those features outlined above stand out as desirable from the passenger's viewpoint, and should be given due consideration. In addition, certain operational practices (such as frequent patrolling of trains and longer[1] train sets) might be well worth consideration.

(1) Longer trains are one way of increasing seating. However, frequent short trains can satisfy the same objective and have the important advantage of reducing travel time.

ANNEX A

SAMPLE SURVEY QUESTIONNAIRE

BUREAU OF TRANSPORT ECONOMICS

QUEENSLAND RAILWAYS

CONSUMER PREFERENCE SURVEY - 1973

WORK JOURNEY

To meet the requirements of authorities and organisations engaged in operating and constructing suburban rail carriages, the Queensland Railways and the Bureau of Transport Economics are undertaking a survey of consumer preferences in Brisbane suburban rail travel.

We would be grateful if one member of the household who regularly travels from home to work (not necessarily by train) would supply, to the best of his or her ability, the information requested. The completed questionnaire will be collected in the next 3 days; if it is on a weekday it will be collected between 6.00pm and 9.30pm and if on a weekend it will be collected between 10.00am and 3.00pm.

If you experience difficulties in answering the questions, the person collecting the questionnaire will assist when he calls to collect the questionnaire.

A.C.LEE
Commissioner
Queensland Railways

J.H.E. TAPLIN
Director
Bureau of Transport Economics

SECTION 1 - GENERAL INFORMATION

Q.1 Please tick the appropriate box :

(a) Are you Male [1] Female [2]

(b) Are you Married [1] Not married [2]

(c) To which age group do you belong?

15-21 years [1] 22-34 years [2] 35-45 years [3] Over 45 years [4]

(d) To which income group do you belong?

Under $2000 [1] $2000-$2999 [2] $3000-$3999 [3] $4000-$4999 [4] $5000-$7000 [5] Over $70 [6]

(e) Please describe your occupation in a few words (e.g. clerk in insurance office)

. . . . . .

SECTION 2 - DETAILS OF YOUR USUAL JOURNEY TO WORK

Q.2 Work place (address) . . . . . .

(a) Please place a tick opposite the method of transport used for EACH STAGE of your USUAL journey to work (Stages are, for example, 1 walk from home to bus, 2 travel on bus to railway station, 3 travel on train to city, 4 walk from train to work)

Method of transport	Stages of journey to work				
	1	2	3	4	5
Walk	☐	☐	☐	☐	☐
Motor cycle	☐	☐	☐	☐	☐
Taxi	☐	☐	☐	☐	☐
Private car - passenger	☐	☐	☐	☐	☐
Private car - driver	☐	☐	☐	☐	☐
Bus	☐	☐	☐	☐	☐
Train	☐	☐	☐	☐	☐
Other (Specify . . . .)	☐	☐	☐	☐	☐

(b) Please make estimates of the following items for EACH STAGE of your USUAL journey to work.

	Stages of journey to work				
	1	2	3	4	5
COSTS (cents)					
Single journey fare	☐	☐	☐	☐	☐
Running cost (cars,motorcycles)	☐	☐	☐	☐	☐
Parking cost (cars,motorcycles)	☐	☐	☐	☐	☐
TIMES (minutes)					
Travelling time	☐	☐	☐	☐	☐
Waiting time	☐	☐	☐	☐	

(c) Please list the main reasons for using your USUAL method of transport for the journey to work in preference to your MAIN ALTERNATIVE journey to work

. . . . . .

. . . . . .

SECTION 3 - DETAILS OF YOUR MAIN ALTERNATIVE JOURNEY TO WORK

Q.3 (a) Please place a tick opposite the method of transport which would be used for EACH STAGE of your MAIN ALTERNATIVE journey to work (For example, the trip may be by train if you usually travel by car).

Method of transport	Stages of journey to work				
	1	2	3	4	5
Walk	☐	☐	☐	☐	☐
Motor cycle	☐	☐	☐	☐	☐
Taxi	☐	☐	☐	☐	☐
Private car - passenger	☐	☐	☐	☐	☐
Private car - driver	☐	☐	☐	☐	☐
Bus	☐	☐	☐	☐	☐
Train	☐	☐	☐	☐	☐
Other (specify . . . .)	☐	☐	☐	☐	☐

(b) Please make estimates of the following items for EACH STAGE of your MAIN ALTERNATIVE journey to work

	Stages of journey to work				
	1	2	3	4	5
COSTS (cents)					
Single journey fare	☐	☐	☐	☐	☐
Running cost (Car,motorcycle)	☐	☐	☐	☐	☐
Parking cost (Car,motorcycle)	☐	☐	☐	☐	☐
TIME (minutes)					
Travelling time	☐	☐	☐	☐	☐
Waiting time	☐	☐	☐	☐	

NOTE - If your USUAL journey to work (Section 2) did not include a train ride leave out Section 4 and go to Section 5.

SECTION 4 - RANKING OF SUBURBAN RAIL TRAVEL CHARACTERISTICS

This section is designed to rank characteristics of suburban rail travel in order of preference.

Before answering this question please add to the list provided any other characteristics you consider important.

Q.4 Please rank the following characteristics using numbers 1,2,3 ...etc commencing with No.1 for the most important characteristic. If two or more characteristics are considered equal in importance give each the same number. Do not omit numbering any characteristic.

	CHARACTERISTICS	ORDER
(a)	A 20% reduction in train travelling time (e.g. 5 mins off 25 mins trip)	☐
(b)	A higher standard of cleanliness inside the carriage	☐
(c)	Less noise inside the carriage	☐
(d)	A 20% reduction in train fare (for example, 10c off a 50c fare)	☐
(e)	A smoother ride	☐
(f)	A seat for the train journey	☐
(g)	More room between passengers	☐
(h)	A modern, stylish carriage interior	☐
(i)	A 40% reduction in train fare (for example, 20c off a 50c fare)	☐
(j)	A carriage in which lighting is improved and temperature and ventilation are controlled	☐
(k)	. . . . .	☐
(l)	. . . . .	☐
(m)	. . . . .	☐

NOTE - If you have completed Section 4 (above) omit Section 5 and go to Section 6.

SECTION 5 - TRAIN TRAVEL FREQUENCY

Q.5 On average, how many trips (one-way) do you make on a suburban train each week?
(If none, write 0) ☐

SECTION 6 - DESIRABILITY OF ALTERNATIVE WAYS OF IMPROVING CARRIAGE DESIGN

In this section you are asked for your assessment of the alternative ways of achieving specific improvements in the comfort and convenience of rail travel.

The numerical scale has the following meaning :

-3 - Most undesirable
-2 - Undesirable
-1 - Moderately undesirable
0 - Indifferent (uncertain)
1 - Moderately desirable
2 - Desirable
3 - Very desirable

Q.6 Please indicate your assessment of each alternative listed under each item by circling the number which reflects your assessment of the effectiveness of each method in achieving the specified objective.

EXAMPLE

(c) To achieve LESS NOISE INSIDE A RAIL CARRIAGE

Alternative ways:	Most undesirable						Very desirable
Automatically opening doors	-3	-2	-1	0	1	2	(3)
Windows which cannot be opened	-3	-2	-1	0	(1)	2	3
Wall and floor insulation	-3	-2	-1	0	(1)	2	3
Regular attention to rattles and squeaks	-3	-2	-1	0	1	(2)	3
Piped music	-3	(-2)	-1	0	1	2	3
Control of noisy passengers	-3	-2	-1	(0)	1	2	3

The example illustrates a ranking of the alternative ways of achieving less noise inside a rail carriage and indicates how the numerical scale can be used.

Q.6. (a) To achieve CONTROL OF CARRIAGE TEMPERATURE AND VENTILATION

Alternative ways :	Most undesirable						Very desirable
Forced air circulation	-3	-2	-1	0	1	2	3
Heating in winter	-3	-2	-1	0	1	2	3
Insulation	-3	-2	-1	0	1	2	3
Small windows	-3	-2	-1	0	1	2	3
Air conditioning	-3	-2	-1	0	1	2	3
Paint with warmer colours	-3	-2	-1	0	1	2	3
Paint with cooler colours	-3	-2	-1	0	1	2	3

Your preferred colour of carriage interior . . . . . .

(b) To achieve LESS NOISE INSIDE THE RAIL CARRIAGE

Alternative ways :	Most undesirable						Very desirable
Automatically closing doors	-3	-2	-1	0	1	2	3
Windows which cannot be opened	-3	-2	-1	0	1	2	3
Wall and floor insulation	-3	-2	-1	0	1	2	3
Regular attention to rattles and squeaks	-3	-2	-1	0	1	2	3
Piped music	-3	-2	-1	0	1	2	3
Control of noisy passengers	-3	-2	-1	0	1	2	3

(c) To achieve A SMOOTH RIDE

Alternative ways:	Most undesirable						Very desirable
Comfortable seats	-3	-2	-1	0	1	2	3
Smooth starting and stopping	-3	-2	-1	0	1	2	3
Smooth travel around curves	-3	-2	-1	0	1	2	3
Smooth travel along straight track	-3	-2	-1	0	1	2	3

(d) To achieve MORE SPACE BETWEEN PASSENGERS

Alternative ways :	Most undesirable						Very desirable
Divided seats instead of bench type seats	-3	-2	-1	0	1	2	3
Restrict the number of standing passengers	-3	-2	-1	0	1	2	3
More trains in the peak period	-3	-2	-1	0	1	2	3
Carriages with standing space only	-3	-2	-1	0	1	2	3
More carriages on each train	-3	-2	-1	0	1	2	3
Larger seats	-3	-2	-1	0	1	2	3

(e) To achieve A HIGH LEVEL OF DAYTIME LIGHT INSIDE THE CARRIAGE

Alternative ways :	Most undesirable						Very desirable
Large windows	-3	-2	-1	0	1	2	3
Use of blinds	-3	-2	-1	0	1	2	3
High level of artifical lighting	-3	-2	-1	0	1	2	3
Transparent roof panels	-3	-2	-1	0	1	2	3
Tinted window glass	-3	-2	-1	0	1	2	3

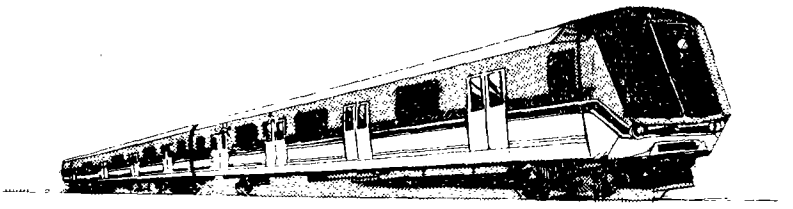
(f) To achieve A SEAT FOR EACH PASSENGER

Alternative ways :	Most undesirable						Very desirable
Utilize carriage standing space to provide more seats	-3	-2	-1	0	1	2	3
Run additional trains in the peak periods	-3	-2	-1	0	1	2	3

(g) To achieve A HIGH STANDARD OF CARRIAGE CLEANLINESS

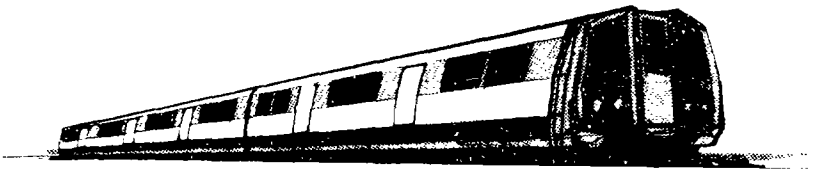
Alternative ways :	Most undesirable						Very desirable
Daily internal cleaning service	-3	-2	-1	0	1	2	3
Collection of papers etc. between trips	-3	-2	-1	0	1	2	3
Weekly external cleaning service	-3	-2	-1	0	1	2	3
Use of stain resistant materials	-3	-2	-1	0	1	2	3
Use of colours which do not show the dirt	-3	-2	-1	0	1	2	3
Frequent external painting	-3	-2	-1	0	1	2	3
Frequent internal painting	-3	-2	-1	0	1	2	3
Frequent attention to minor damage	-3	-2	-1	0	1	2	3

(h) Alternative EXTERNAL APPEARANCES



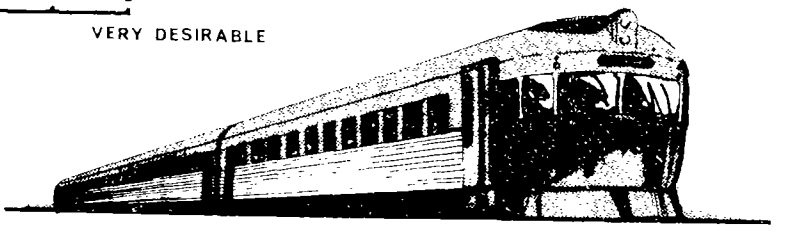
-3 -2 -1 0 1 2 3

MOST UNDESIRABLE — VERY DESIRABLE



-3 -2 -1 0 1 2 3

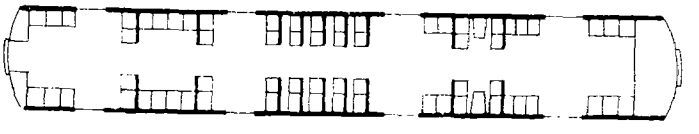
MOST UNDESIRABLE — VERY DESIRABLE



-3 -2 -1 0 1 2 3

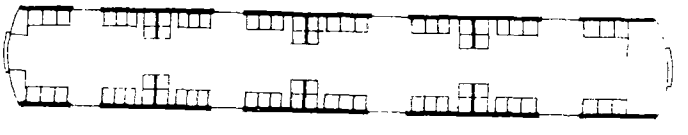
MOST UNDESIRABLE — VERY DESIRABLE

(i) Alternative SEATING LAYOUTS



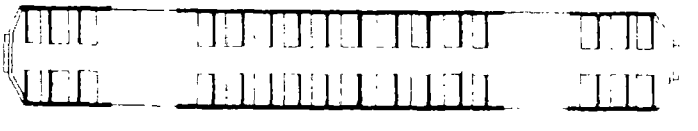
-3 -2 -1 0 1 2 3

MOST UNDESIRABLE — VERY DESIRABLE



-3 -2 -1 0 1 2 3

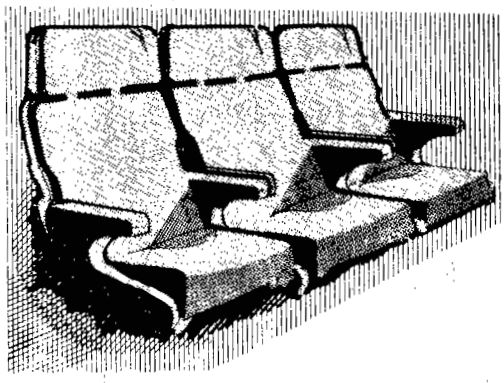
MOST UNDESIRABLE — VERY DESIRABLE



-3 -2 -1 0 1 2 3

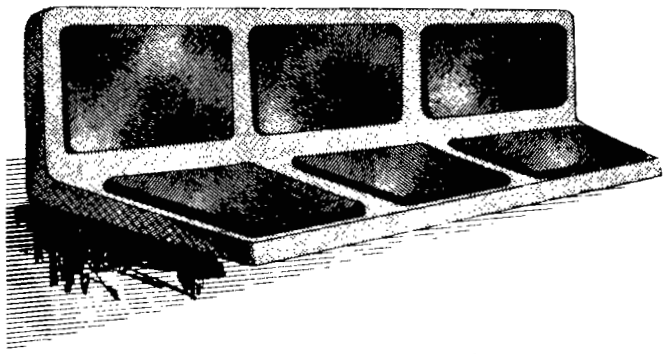
MOST UNDESIRABLE — VERY DESIRABLE

(j) Alternative SEAT DESIGNS



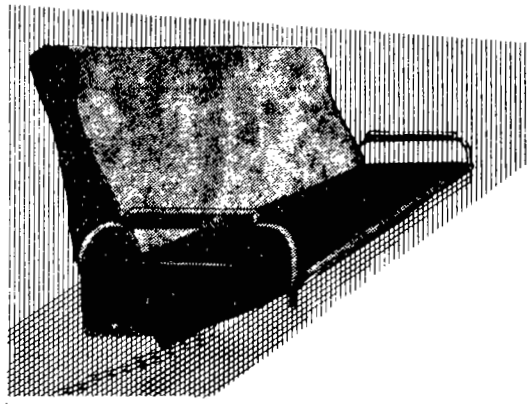
-3 -2 -1 0 1 2 3

MOST UNDESIRABLE VERY DESIRABLE



-3 -2 -1 0 1 2 3

MOST UNDESIRABLE VERY DESIRABLE



-3 -2 -1 0 1 2 3

MOST UNDESIRABLE VERY DESIRABLE

(k) Alternative SUPPORT FOR STANDING PASSENGERS

Overhead Straps

-3 -2 -1 0 1 2 3

MOST UNDESIRABLE VERY DESIRABLE

Waist-height bars

-3 -2 -1 0 1 2 3

MOST UNDESIRABLE VERY DESIRABLE

Overhead bars

-3 -2 -1 0 1 2 3

MOST UNDESIRABLE VERY DESIRABLE

(l) To IMPROVE RAIL TRAVEL

Alternative ways :	Most undesirable						Very desirable
Restricted areas in carriages for smoking	-3	-2	-1	0	1	2	3
Railway staff on trains to control vandals	-3	-2	-1	0	1	2	3
Wall racks or space under seats for baggage	-3	-2	-1	0	1	2	3
Space on each train for strollers and wheel chairs	-3	-2	-1	0	1	2	3

(m) To achieve A MODERN,STYLISH CARRIAGE EXTERIOR

Alternative ways :	Most undesirable						Very desirable
Aluminium or stainless steel outside finish	-3	-2	-1	0	1	2	3
Painted carriage exterior	-3	-2	-1	0	1	2	3

Your preferred colour of carriage exterior . . . . . .

THANK YOU FOR YOUR ASSISTANCE

ANNEX B

SURVEY DATA FILE FORMAT

This Annex contains details of the manner in which the edited survey records are stored on magnetic tape. Notes referred to in the record listing are presented at the end of this Annex.

The general characteristics of the data file are as follows:

BTE tape reference ..... DEVS06 (Minitape)
Data set name (DSN) ..... BRISBANE.SURVEY.FINAL.MASTER
File number (label) 1
Recording density ..... 1600 bpi
Logical record length ... 347 bytes
Physical block size ..... 17350 bytes
Number of records 875
Approximate length ..... 10 metres
General format ..... All numeric

SURVEY RECORD FORMAT

The format of each record in the file is shown in the following list.

Field	Bytes	Contents of Field	Notes
001	001 002 003 004	Sample number for each household surveyed (0300-2600)	
002	005 006	Delivery day (01-31)	
003	007	Delivery month (5-6)	
004	008 009	Collection day (01-31)	
005	010	Collection month (5-6)	
006	011 012 013	Local Government Area (LGA) of home address	1

Field	Bytes	Contents of Field	Notes
007	014 015	Statistical Area (SA) of home address(1)	
008	016 017	Collector District (CD) of home address(1)	
009	018 019 020	Local Government Area (LGA) of workplace	2
010	021 022	Interviewer's identification number	
011	023	Respondent's sex	3
012	024	Respondent's marital status	4
013	025	Respondent's age group	5
014	026	Respondent's income group	6
015	027 028	Respondent's occupation group	7
016	029 030	Relationship to head ... 1st member	8
017	031	Sex ... 1st member	3
018	032	Age group ... 1st member	5
019	033 034	Occupation group ... 1st member	7
020	035 036	Main transport mode ... 1st member	9
021	037 038	Relationship to head ... 2nd member	8
022	039	Sex ... 2nd member	3
023	040	Age group ... 2nd member	5
024	041 042	Occupation group ... 2nd member	7
025	043 044	Main transport mode ... 2nd member	9

(1) In order to preserve the anonymity of respondents, these items will <u>not</u> be provided in any copies of the survey data.

Field	Bytes	Contents of Field	Notes
026	045 046	Relationship to head ... 3rd member	8
027	047	Sex ... 3rd member	3
028	048	Age group ... 3rd member	5
029	049 050	Occupation group ... 3rd member	7
030	051 052	Main transport mode ... 3rd member	9
031	053 054	Relationship to head ... 4th member	8
032	055	Sex ... 4th member	3
033	056	Age group ... 4th member	5
034	057 058	Occupation group ... 4th member	7
035	059 060	Main transport mode ... 4th member	9
036	061 062	Relationship to head ... 5th member	8
037	063	Sex ... 5th member	3
038	064	Age group ... 5th member	5
039	065 066	Occupation group ... 5th member	7
040	067 068	Main transport mode ... 5th member	9
041	069 070	Relationship to head ... 6th member	8
042	071	Sex ... 6th member	3
043	072	Age group ... 6th member	5
044	073 074	Occupation group ... 6th member	7
045	075 076	Main transport mode ... 6th member	9
046	077 078	Relationship to head ... 7th member	8

Field	Bytes	Contents of Field	Notes
047	079	Sex ... 7th member	3
048	080	Age group ... 7th member	5
049	081 082	Occupation group ... 7th member	7
050	083 084	Main transport mode ... 7th member	9
051	085 086	Relationship to head ... 8th member	8
052	087	Sex ... 8th member	3
053	088	Age group ... 8th member	5
054	089 090	Occupation group ... 8th member	7
055	091 092	Main transport mode ... 8th member	9
056	093 094	Relationship to head ... 9th member	8
057	095	Sex ... 9th member	3
058	096	Age group ... 9th member	5
059	097 098	Occupation group ... 9th member	7
060	099 100	Main transport mode ... 9th member	9
061	101 102	Usual journey ... 1st stage mode	9
062	103 104 105	Usual journey ... 1st stage fare	10
063	106 107 108	Usual journey ... 1st stage vehicle running cost	11
064	109 110 111	Usual journey ... 1st stage parking cost	12
065	112 113	Usual journey ... 1st stage travelling time	13

Field	Bytes	Contents of Field	Notes
066	114 115	Usual journey ... 1st waiting time	14
067	116 117	Usual journey ... 2nd stage mode	9
068	118 119 120	Usual journey ... 2nd stage fare	10
069	121 122 123	Usual journey ... 2nd stage vehicle running cost	11
070	124 125 126	Usual journey ... 2nd stage parking cost	12
071	127 128	Usual journey ... 2nd stage travelling time	13
072	129 130	Usual journey ... 2nd stage waiting time	14
073	131 132	Usual journey ... 3rd stage mode	9
074	133 134 135	Usual journey ... 3rd stage fare	10
075	136 137 138	Usual journey ... 3rd stage vehicle running cost	11
076	139 140 141	Usual journey ... 3rd stage parking cost	12
077	142 143	Usual journey ... 3rd stage travelling time	13
078	144 145	Usual journey ... 3rd stage waiting time	14
079	146 147	Usual journey ... 4th stage mode	9
080	148 149 150	Usual journey ... 4th stage fare	10
081	151 152 153	Usual journey ... 4th stage vehicle running cost	11

Field	Bytes	Contents of Field	Notes
082	154 155 156	Usual journey ... 4th stage parking cost	12
083	157 158	Usual journey ... 4th stage travelling time	13
084	159 160	Usual journey ... 4th stage waiting time	14
085	161 162	Usual journey ... 5th stage mode	9
086	163 164 165	Usual journey ... 5th stage fare	10
087	166 167 168	Usual journey ... 5th stage vehicle running cost	11
088	169 170 171	Usual journey ... 5th stage parking cost	12
089	172 173	Usual journey ... 5th stage travelling time	13
090	174 175	Usual journey ... 5th stage waiting time	14
091	176 177	Alternative journey ... 1st stage mode	9
092	178 179 180	Alternative journey ... 1st stage fare	10
093	181 182 183	Alternative journey ... 1st stage vehicle running cost	11
094	184 185 186	Alternative journey ... 1st stage parking cost	12
095	187 188	Alternative journey ... 1st stage travelling time	13
096	189 190	Alternative journey ... 1st stage waiting time	14
097	191 192	Alternative journey ... 2nd stage mode	9

Field	Bytes	Contents of Field	Notes
098	193 194 195	Alternative journey ... 2nd stage fare	10
099	196 197 198	Alternative journey ... 2nd stage vehicle running cost	11
100	199 200 201	Alternative journey ... 2nd stage parking cost	12
101	202 203	Alternative journey ... 2nd stage travelling time	13
102	204 205	Alternative journey ... 2nd stage waiting time	14
103	206 207	Alternative journey ... 3rd stage mode	9
104	208 209 210	Alternative journey ... 3rd stage fare	10
105	211 212 213	Alternative journey ... 3rd stage vehicle running cost	11
106	214 215 216	Alternative journey ... 3rd stage parking cost	12
107	217 218	Alternative journey ... 3rd stage travelling time	13
108	219 220	Alternative journey ... 3rd stage waiting time	14
109	221 222	Alternative journey ... 4th stage mode	9
110	223 224 225	Alternative journey ... 4th stage fare	10
111	226 227 228	Alternative journey ... 4th stage vehicle running cost	11
112	229 230 231	Alternative journey ... 4th stage parking cost	12

Field	Bytes	Contents of Field	Notes
113	232 233	Alternative journey ... 4th stage travelling time	13
114	234 235	Alternative journey ... 4th stage waiting time	14
115	236 237	Alternative journey ... 5th stage mode	9
116	238 239 240	Alternative journey ... 5th stage fare	10
117	241 242 243	Alternative journey ... 5th stage vehicle running cost	11
118	244 245 246	Alternative journey ... 5th stage parking cost	12
119	247 248	Alternative journey ... 5th stage travelling time	13
120	249 250	Alternative journey ... 5th stage waiting time	14
121	251	Train user key	15
122	252 253	Rank order for characteristic (a)	16
123	254 255	Rank order for characteristic (b)	16
124	256 257	Rank order for characteristic (c)	16
125	258 259	Rank order for characteristic (d)	16
126	260 261	Rank order for characteristic (e)	16
127	262 263	Rank order for characteristic (f)	16
128	264 265	Rank order for characteristic (g)	16
129	266 267	Rank order for characteristic (h)	16

Field	Bytes	Contents of Field	Notes
130	268 269	Rank order for characteristic (i)	16
131	270 271	Rank order for characteristic (j)	16
132	272 273	Suburban train trips per week	17
133	274	Response to Q6(a) ... option 1	18
134	275	Response to Q6(a) ... option 2	18
135	276	Response to Q6(a) ... option 3	18
136	277	Response to Q6(a) ... option 4	18
137	278	Response to Q6(a) ... option 5	18
138	279	Response to Q6(a) ... option 6	18
139	280	Response to Q6(a) ... option 7	18
140	281	Response to Q6(b) ... option 1	18
141	282	Response to Q6(b) ... option 2	18
142	283	Response to Q6(b) ... option 3	18
143	284	Response to Q6(b) ... option 4	18
144	285	Response to Q6(b) ... option 5	18
145	286	Response to Q6(b) ... option 6	18
146	287	Response to Q6(c) ... option 1	18
147	288	Response to Q6(c) ... option 2	18
148	289	Response to Q6(c) ... option 3	18
149	290	Response to Q6(c) ... option 4	18
150	291	Response to Q6(d) ... option 1	18
151	292	Response to Q6(d) ... option 2	18
152	293	Response to Q6(d) ... option 3	18
153	294	Response to Q6(d) ... option 4	18
154	295	Response to Q6(d) ... option 5	18

Field	Bytes	Contents of Field	Notes
155	296	Response to Q6(d) ... option 6	18
156	297	Response to Q6(e) ... option 1	18
157	298	Response to Q6(e) ... option 2	18
158	299	Response to Q6(e) ... option 3	18
159	300	Response to Q6(e) ... option 4	18
160	301	Response to Q6(e) ... option 5	18
161	302	Response to Q6(f) ... option 1	18
162	303	Response to Q6(f) ... option 2	18
163	304	Response to Q6(g) ... option 1	18
164	305	Response to Q6(g) ... option 2	18
165	306	Response to Q6(g) ... option 3	18
166	307	Response to Q6(g) ... option 4	18
167	308	Response to Q6(g) ... option 5	18
168	309	Response to Q6(g) ... option 6	18
169	310	Response to Q6(g) ... option 7	18
170	311	Response to Q6(g) ... option 8	18
171	312	Response to Q6(h) ... option 1	18
172	313	Response to Q6(h) ... option 2	18
173	314	Response to Q6(h) ... option 3	18
174	315	Response to Q6(i) ... option 1	18
175	316	Response to Q6(i) ... option 2	18
176	317	Response to Q6(i) ... option 3	18
177	318	Response to Q6(j) ... option 1	18
178	319	Response to Q6(j) ... option 2	18
179	320	Response to Q6(j) ... option 3	18
180	321	Response to Q6(k) ... option 1	18

Field	Bytes	Contents of Field	Notes
181	322	Response to Q6(k) ... option 2	18
182	323	Response to Q6(k) ... option 3	18
183	324	Response to Q6(l) ... option 1	18
184	325	Response to Q6(l) ... option 2	18
185	326	Response to Q6(l) ... option 3	18
186	327	Response to Q6(l) ... option 4	18
187	328	Response to Q6(m) ... option 1	18
188	329	Response to Q6(m) ... option 2	18
189	330 331	Modal choice ... reason 1	19
190	332 333	Modal choice ... reason 2	19
191	334 335	Modal choice ... reason 3	19
192	336 337	Modal choice ... reason 4	19
193	338 339	Modal choice ... reason 5	19
194	340 341	Carriage interior colour 1st choice	20
195	342 343	Carriage interior colour 2nd choice	20
196	344 345	Carriage exterior colour 1st choice	21
197	346 347	Carriage exterior colour 2nd choice	21

GENERAL NOTES

The following general notes outline data value conventions used throughout the survey records.

(a) A field completely filled with zeroes usually implies that there is no relevant information required (exceptions are cases such as parking costs, where a zero value is permissible).

(b) Omissions are indicated by fields completely filled with 7's (i.e. 7,77 or 777).

(c) Information which was required but not known by the respondent is indicated by fields completely filled with 8's (i.e. 8,88 or 888).

(d) Refusals are indicated by fields completely filled with 9's (9,99 or 999).

(e) Where information for all non-responding members of the household has been omitted, fields (016 to 020) relating to the first non-responding member are set to 7's.

SPECIFIC NOTES

The following specific notes correspond to note references given in the survey record format listing.

Note 1 — Details

The sample included respondents whose homes were located in the following LGA's[1]:

LGA	Name	Railway Line
002	North City	Sandgate/Ferny Grove
005	Ascot	Sandgate
009	Newmarket	Ferny Grove
011	Windsor	Sandgate/Ferny Grove
017	Banyo	Sandgate
018	Chermside	Petrie
019	Enoggera	Ferny Grove
020	Geebung	Petrie
021	Hendra	Sandgate
022	Kalinga	Sandgate

(1) A full list of place-names corresponding to LGA codes may be found in: Australian Bureau of Statistics, Code List - Local Government Areas in Statistical Divisions - Census 71.

Note Details

1

LGA	Name	Railway Line
023	Kedron	Sandgate
024	Mitchelton	Ferny Grove
025	Nundah	Sandgate
026	Stafford	Ferny Grove
048	Coopers Plains	Beenleigh
049	Ekibin	Beenleigh
050	Fruitgrove	Beenleigh
053	Moorooka	Beenleigh
056	Tarragindi	Beenleigh
058	Yeronga	Beenleigh
061	Boondall	Sandgate
063	Sandgate	Sandgate
071	Albert	Beenleigh
076	Pine Rivers	Ferny Grove

2 Workplace LGA's are coded according to the standard Code List(1) and range from 001 to 078. The code 094 is also used for unincorporated LGA's.

3 The sex of the person interviewed is recorded according to the following codes:

Code	Sex
1	Male
2	Female

4 The marital status of the person interviewed is recorded according to the following codes:

Code	Marital Status
1	Married
2	Not Married

(1) Op.cit.

Note | Details

5 Ages are recorded in the age groups shown in the following list:

Code	Age Group
0	Under 15 years
1	15-21 years
2	22-34 years
3	35-45 years
4	Over 45 years

6 Respondents' annual incomes are recorded in the income groups shown in the following list:

Code	Annual Income
1	Under $2000
2	$2000-$2999
3	$3000-$3999
4	$4000-$4999
5	$5000-$7000
6	Over $7000

7 Occupations are recorded in the following major groups:

Code	Occupation
00	Professional, technical and related
01	Administrative, executive and managerial
02	Clerical
03	Sales workers
04	Farmers, fishermen, hunters, timber getters and related
05	Miners, quarrymen and related
06	Workers in transport and communications
07	Craftsmen, production workers and labourers
08	Service, sport and recreation workers
09	Armed forces members
10	Inadequately described or not stated
11	Not in work force

Note	Details

8 Relationship tc the head-cf-household is recorded according to the following codes:

Code	Relationship tc Head
01	Head
02	Wife
03	Son
04	Daughter
05	Parent
06	Parent-in-law
07	Flatmate (friend)
08	Boarder
09	Other

9 Modes of transport are recorded throughout the records according to the following system:

Code	Mode of Transport
01	Walk
02	Motor cycle
03	Taxi
04	Car (passenger)
05	Car (driver)
06	Bus
07	Train
08	Other

10 One-way fare (if any) for each stage of the work journey is recorded in cents (permissible values range from 000 tc 776 cents).

11 One-way vehicle running cost (if any) for each stage of the work journey is recorded in cents (permissible values range from 000 to 776 cents).

12 Parking cost (if any) incurred at each stage of the work journey is recorded in cents (permissible values range from 000 to 776 cents).

Note	Details
13	Travel time (in-vehicle) for each stage of the journey is recorded in minutes (permissible values range from 00 to 76 minutes).
14	Waiting time (if any) for each stage of the journey is recorded in minutes (permissible values range from 00 to 76 minutes).
15	The train user key is included for computational convenience, and is coded as 1 if the respondent's usual journey to work included a train journey. Otherwise, the value is zero.
16	These fields contain rank orders which the respondent applied to each of the ten specified rail travel characteristics. Permissible values range from 01 to 10. These fields are not used if the respondent's usual journey to work did not include a train trip.
17	This field provides a measure of urban rail travel frequency for respondents whose usual journey did not include a train journey. Permissible values range from 00 to 76 journeys per week.
18	Design option responses are recorded in these fields. In order to compress the record, values are scaled as follows:

Original Response	Recorded Value
-3	0
-2	1
-1	2
0	3
+1	4
+2	5
+3	6

Note	Details

19 The reasons given for use of the usual method of travel to work instead of the main alternative are coded in the following manner:

Code	Reason
00	None given
01	Convenience
02	Less time
03	Less cost
04	Convenient to home
05	Convenient to workplace
06	Door-to-door service
07	Unacceptable timetable or frequency of service
08	Alternative does not adhere to timetable
09	Alternative involves mode change
10	Road congestion
11	Parking ease or difficulty
12	No viable alternative
13	Car required for work
14	Less crowded
15	More comfortable
16	More enjoyable or relaxing
17	No waiting, independence, flexibility
18	Quieter
19	Not used
20	Other

20 Interior colour preferences are coded according to the following system:

Code	Colour
00	No preference expressed
01	Cream and white
02	Red

Note	Details

20

Code	Colour
03	Maroon
04	Gold and yellow
05	Green
06	Blue
07	Grey
08	Neutral (fawn, beige, etc.)
09	Pastel shades
10	Others and 'don't care'

21 Exterior colour preferences are coded according to the following system:

Code	Colour
00	No preferences expressed
01	Cream and white
02	Red
03	Maroon
04	Green
05	Blue
06	Grey
07	Brown
08	Silver, aluminium, stainless steel
09	Pastel shades
10	Others and 'don't care'

ANNEX C

SAMPLE CHARACTERISTICS AND COMPARISONS

In Section 1 of the survey questionnaire, respondents were asked to provide particulars of their sex, marital status, age, annual income and occupation. In addition, interviewers used a separate form to record similar details for other members of the respondents' households. In this Annex, tabulated details of this information are presented, together with comparisons with similar results for the entire Brisbane Statistical Division. Some comments on the significance of differences between results for these two sets of data are also given.

In this survey, respondents (i.e. those who actually completed the questionnaire) were all members of the workforce, by definition. The term 'all occupants' is used to describe all members of respondents' households (including the respondent).

SAMPLE CHARACTERISTICS

The major sample characteristics tabulated in the analysis of survey results were as follows:

- Age distributions (respondents and all occupants)
- Occupation distributions (respondents and all occupants)
- Marital status distribution (respondents only)
- Income distribution (respondents only)
- Household size distribution.

Details of these distributions are presented in the following sub-sections.

Age Distributions

The ages of respondents and all occupants were collected in five groups:

Group	Age Range
1	00-14 years
2	15-21 years
3	22-34 years
4	35-45 years
5	Over 45 years

Group 1 (00-14 years) is not used for respondents' age distributions, since respondents were members of the workforce, and hence at least 15 years old.

Age distributions for respondents (males, females and total) are given in Table C.1, while corresponding distributions for all occupants are given in Table C.2.

TABLE C.1 - AGE DISTRIBUTIONS (RESPONDENTS)

Age Group	Number of Respondents		
	Male	Female	All
00-14	na	na	na
15-21	61	61	122
22-34	221	87	308
35-45	149	39	188
Over 45	192	38	230
Not known	18	9	27
TOTAL	641	234	875

TABLE C.2 - AGE DISTRIBUTIONS (ALL OCCUPANTS)*

Age Group	Number of Occupants			
	Male	Female	Not Known	All
00-14	423	342	39	804
15-21	185	191	0	376
22-34	317	344	1	662
35-45	200	194	0	394
Over 45	294	313	2	609
Not known	31	35	6	72
TOTAL	1450	1419	48	2917

* Information for 27 households not available.

Occupation Distributions

Occupations of respondents and all occupants were collected in twelve categories, which were coded in the following way:

Code	Occupation
00	Professional, technical and related
01	Administrative, executive and managerial
02	Clerical
03	Sales workers
04	Farmers, fishermen, hunters, timber getters and related
05	Miners, quarrymen and related
06	Workers in transport and communications
07	Craftsmen, production workers and labourers
08	Service, sport and recreation workers
09	Armed forces members
10	Inadequately described or not stated
11	Not in work force

For respondents, occupation code 11 ('not in work force') is not relevant, although six respondents actually recorded their occupations in this group. These six respondents were placed in the group coded 10.

Occupation distributions for respondents are given in Table C.3, while corresponding distributions for all occupants are given in Table C.4.

TABLE C.3 - OCCUPATION DISTRIBUTIONS (RESPONDENTS)

Code	Number of Respondents		
	Male	Female	All
00	85	37	122
01	74	9	83
02	108	106	214
03	50	26	76
04	2	0	2
05	0	0	0
06	47	7	54
07	229	29	258
08	26	18	44
09	10	0	10
10	10	2	12
11	na	na	na
TOTAL	641	234	875

TABLE C.4 - OCCUPATION DISTRIBUTIONS (ALL OCCUPANTS)*

Code	Number of Occupants			
	Male	Female	Not Known	All
00	83	36	0	119
01	95	18	0	113
02	144	182	0	326
03	74	48	0	122
04	2	0	0	2
05	0	0	0	0
06	66	19	0	85
07	357	51	2	410
08	42	43	0	85
09	10	0	0	10
10	123	113	39	275
11	454	909	7	1370
TOTAL	1450	1419	48	2917

* Information for 27 households not available.

Marital Status Distributions

Marital status information was collected only for respondents, and was categorised under the headings 'Married' and 'Not Married'. The distributions of marital status are shown in Table C.5.

TABLE C.5 - MARITAL STATUS DISTRIBUTIONS (RESPONDENTS)

Marital Status	Number		
	Male	Female	All
Married	514	115	629
Not Married	120	115	235
Not known	7	4	11
TOTAL	641	234	875

Income Distributions

Income information was collected only for respondents, and related to invidivual income, rather than household income. The respondents' annual incomes were collected in the following six groups:

Group	Annual Income
1	Under $2000
2	$2000-$2999
3	$3000-$3999
4	$4000-$4999
5	$5000-$7000
6	Over $7000

Income distributions for respondents are shown in Table C.6.

TABLE C.6 - INCOME DISTRIBUTIONS (RESPONDENTS)

Annual Income	Number of Respondents		
	Male	Female	All
Under $2000	25	38	63
$2000-$2999	48	65	113
$3000-$3999	103	61	164
$4000-$4999	142	33	175
$5000-$7000	166	15	181
Over $7000	103	4	107
Not known	54	18	72
TOTAL	641	234	875

Household Size Distribution

The distribution of household size for the sample was generated by reference to the additional information collected by interviewers. This distribution is presented in Table C.7.

TABLE C.7 - HOUSEHOLD SIZE DISTRIBUTION

Size of Household	Number of Households
1 person	46
2 persons	250
3 persons	182
4 persons	173
5 persons	110
6 persons	55
7 persons	16
8 persons	6
9 persons	7
10 persons	3
Not known	27
TOTAL	875

COMPARISON WITH BRISBANE STATISTICAL DIVISION

In order to establish differences between the survey sample and the general Brisbane populace, selected sample characteristics were compared with corresponding characteristics of the entire Brisbane Statistical Division(1). Thus, respondents' characteristics were compared with Brisbane workforce characteristics, while all occupants' characteristics were compared with those of the general Brisbane population.

(1) 1971 Census preliminary results were used for this purpose.

The basis of comparison was to generate sample and Brisbane fractional distributions of particular characteristics. In generating these fractional distributions for the sample, respondents or occupants whose characteristics were missing or incomplete were omitted. In addition, only complete distributions were considered (i.e. the break-up of respondents or occupants into male and female distributions was not performed).

Age distributions for sample respondents and occupants are compared with those of Brisbane in Figure C.1. It is clear that respondents are somewhat older, in general, than their counterparts in the general Brisbane work force. At the same time, all occupants are, in general, younger. These results are partly explained by the fact that respondents were, in the main, heads of households, and hence not completely representative of workers in general. The low overall average age of occupants is explained by rejection of pensioners (or households containing no work force members) from the sample.

Occupation distributions for respondents and all occupants are shown in Figure C.2, and these may also be seen to differ from those of the general population of Brisbane. The same situation prevails for the household size distribution comparison shown in Figure C.3.

Statistical Significance

The sample distributions were formally tested for similarity to those of the Brisbane Statistical Division. Although the results are not presented here, they verify that the sample may be considered significantly different from the general Brisbane population.

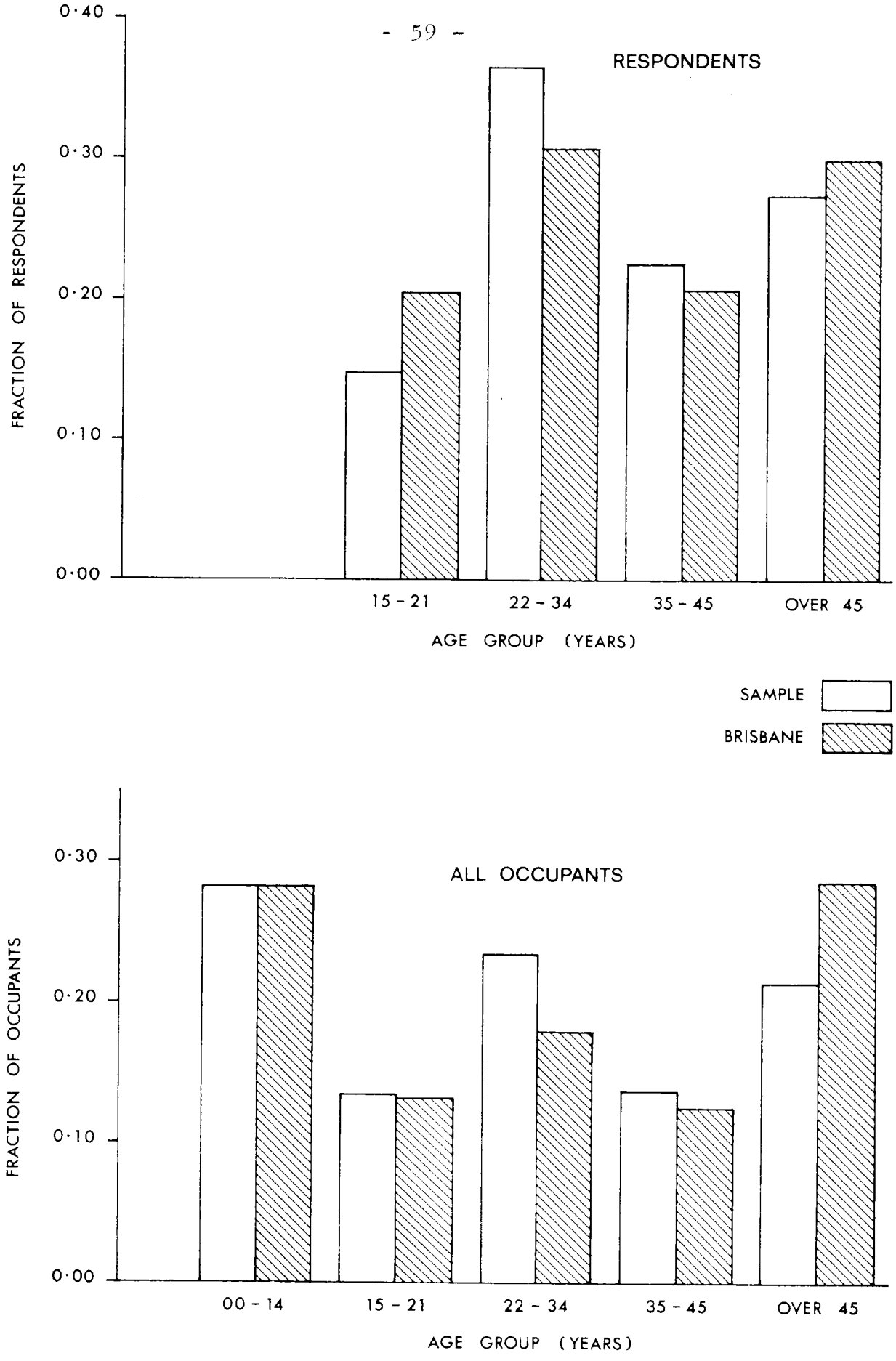


FIGURE C.1 - COMPARISON OF AGE DISTRIBUTIONS

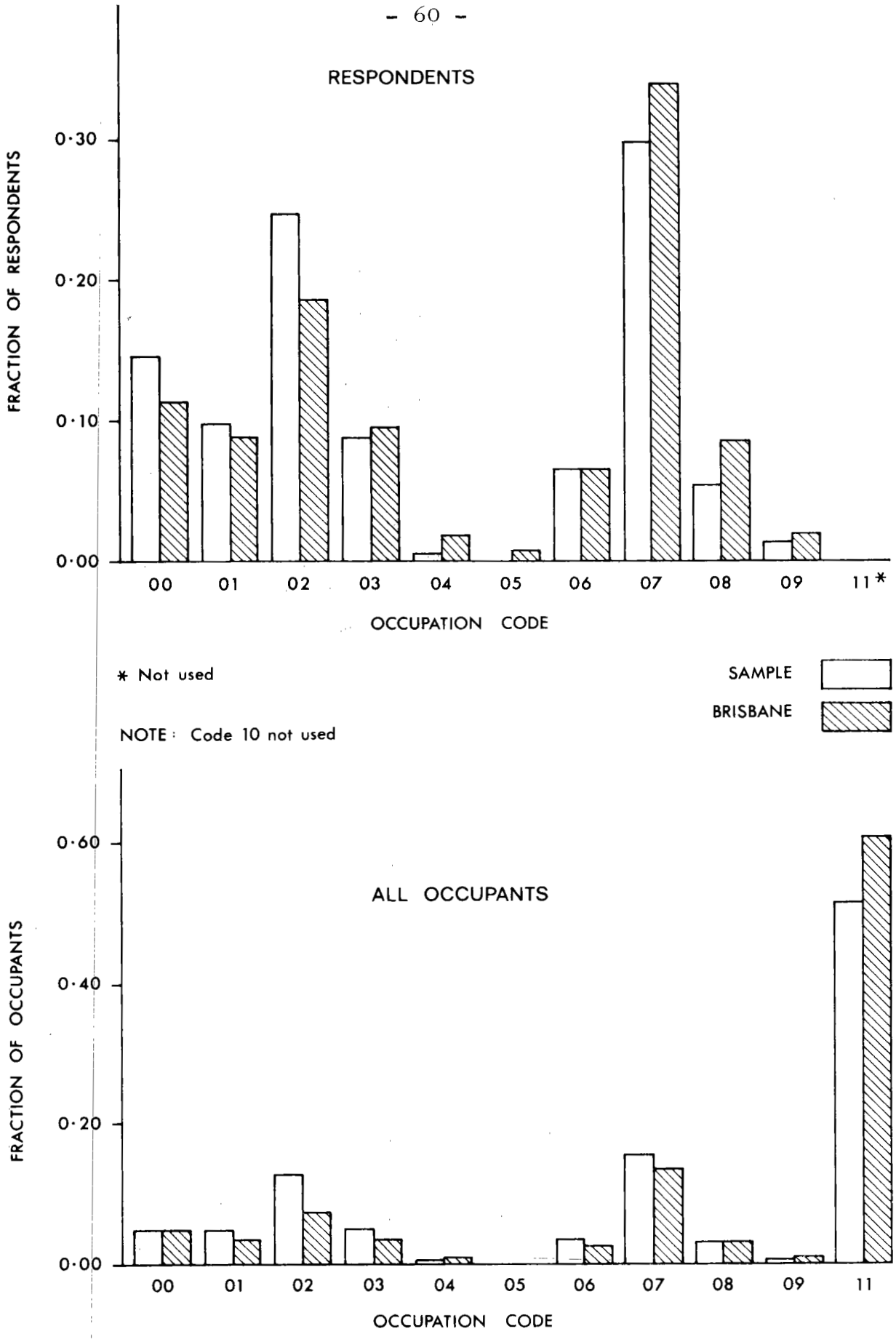


FIGURE C.2 - COMPARISON OF OCCUPATION DISTRIBUTIONS

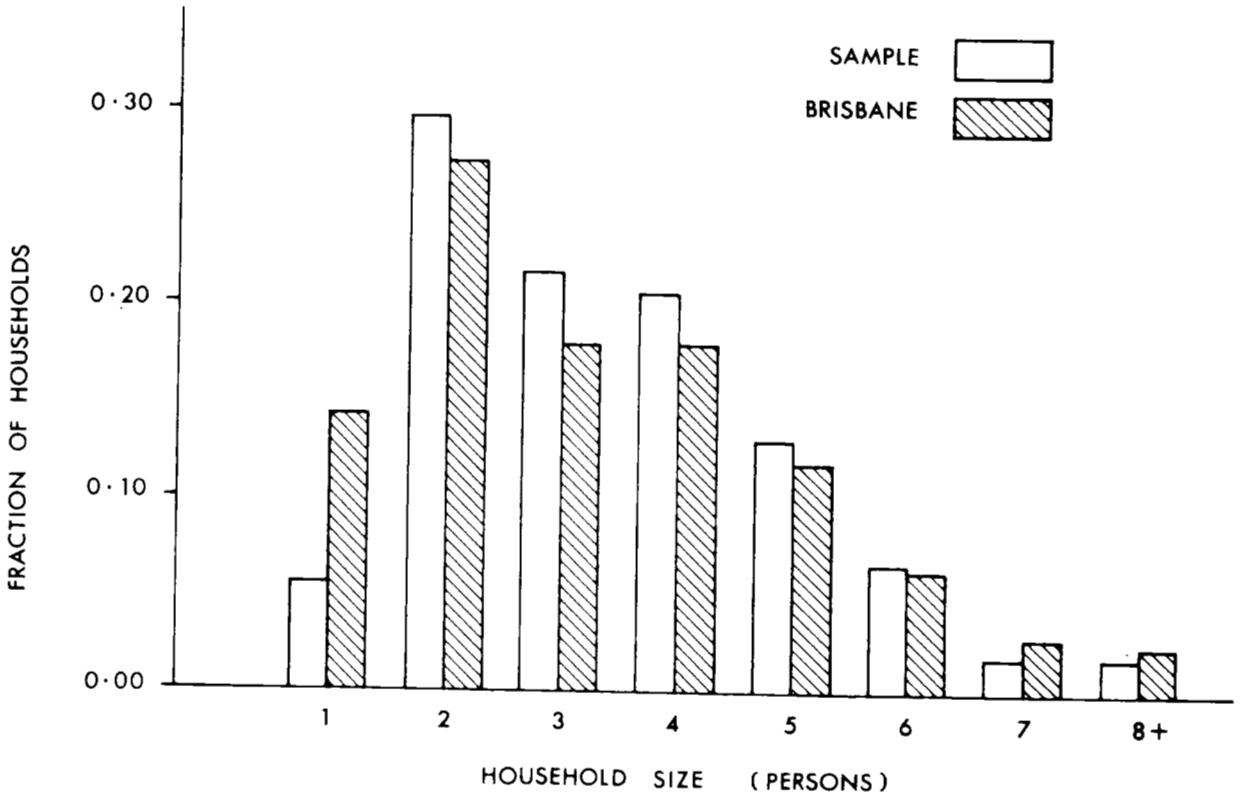


FIGURE C.3 - COMPARISON OF HOUSEHOLD SIZE DISTRIBUTIONS

ANNEX D

RESPONDENTS' TRAVEL CHARACTERISTICS

Since the primary objectives of this survey did not include detailed examination of respondents' trip-making characteristics, travel characteristics have been subjected to only cursory analysis at this stage. In this Annex, brief details of origin/destination patterns and modal split for respondents' home-to-work journeys are outlined. In addition, reasons given for using the customary mode, instead of the main alternative, are tabulated.

ORIGIN/DESTINATION PATTERNS

In Figure D.1, home-to-work origin/destination patterns for respondents who stated that they customarily included a rail trip in their journey to work are shown. Origins and destinations are based on Local Government Areas (LGA's) of respondents' homes and work-places. Use of LGA's for this purpose leads to a coarse desire-line diagram, and origins shown, in particular, may be well removed from the railway lines which were used by the respondents.

A corresponding desire-line diagram for respondents who did not normally use rail travel as part of their work journey is shown in Figure D.2.

MODAL SPLIT AND ALTERNATIVE MODES

In Sections 2 and 3 of the survey questionnaire, respondents were requested to supply details of their usual and main alternative journeys to work. In classifying the information provided in these Sections of the questionnaire, a 'priority mode' system, reflecting the particular interests of the survey, was used. The priority order for transport modes was as follows

- Rail
- Bus
- Car (driver)

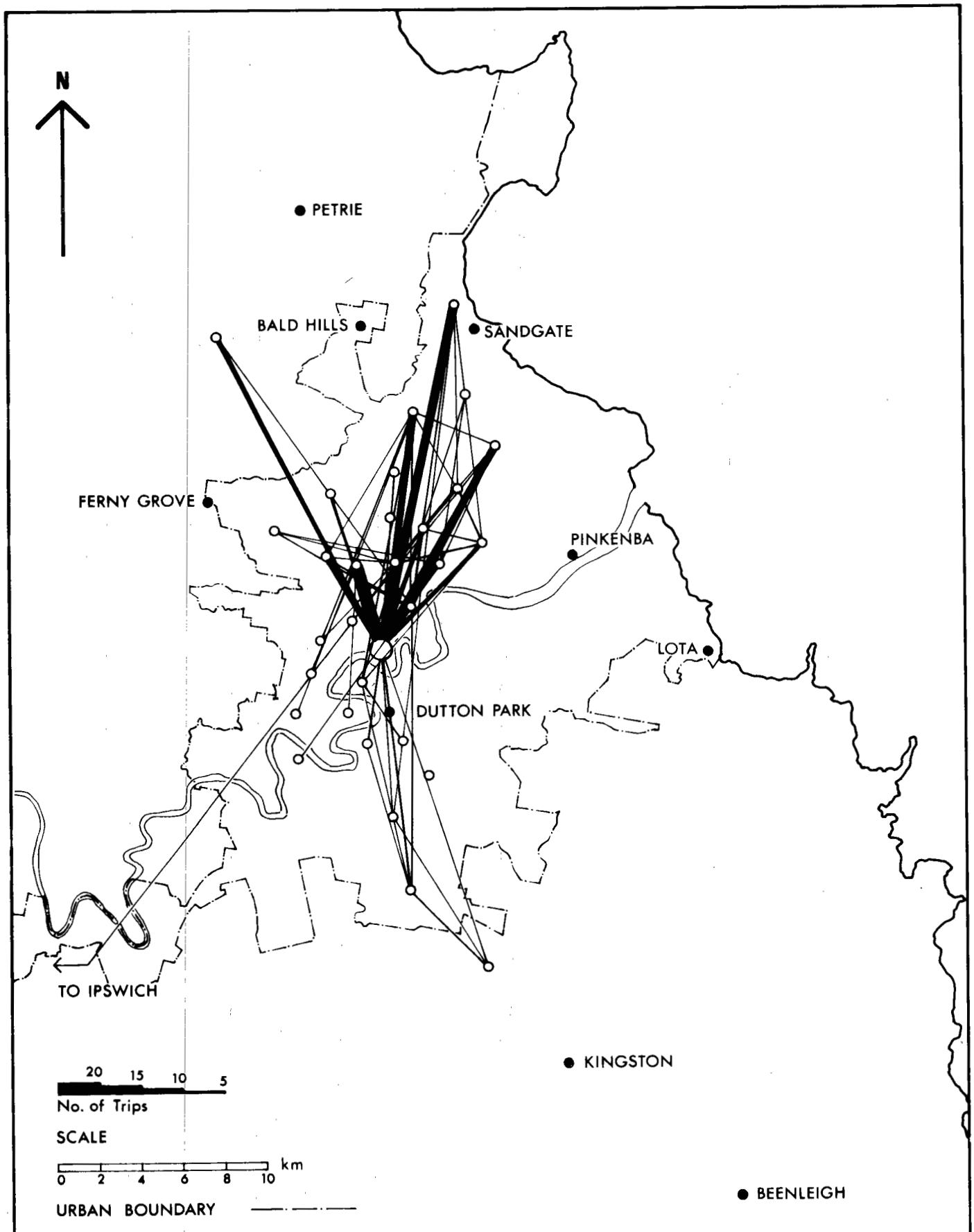


FIGURE D.1 - WORK TRIP DESIRE LINES - RAIL USERS (SURVEY RESULTS)

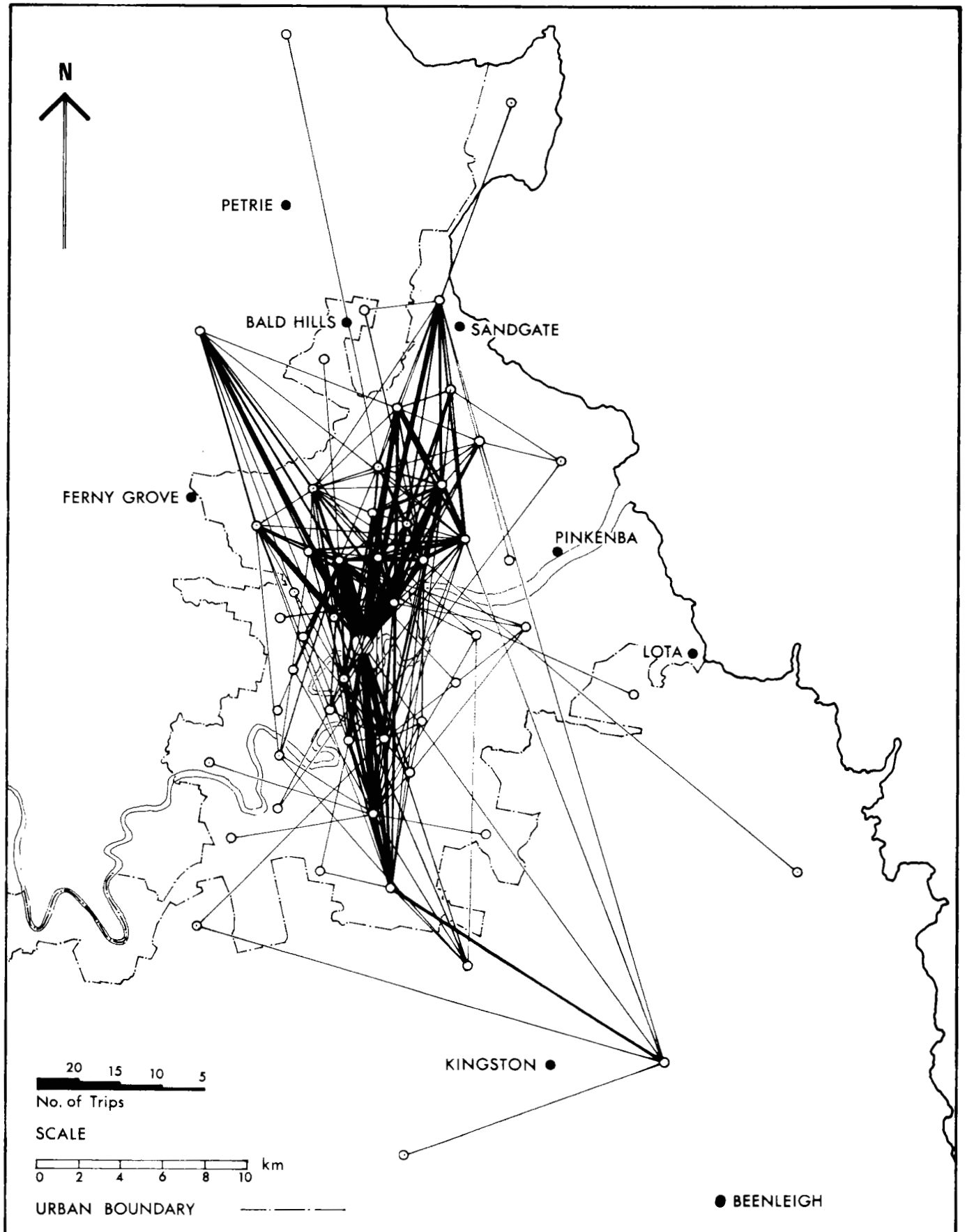


FIGURE D.2 - WORK TRIP DESIRE LINES - NON-USERS (SURVEY RESULTS)

- Car (passenger)
- Motor cycle
- Taxi
- Walk
- Other

Thus a respondent who walked and used a bus and train as stages of his journey would be classified as a rail user, since that mode has highest priority of those included in the journey.

The modal split (both in numeric and fractional values) for respondents' customary work journeys is shown in Table D.1, while the corresponding modal split for main alternative journeys is shown in Table D.2.

TABLE D.1 - MODAL SPLIT (USUAL JOURNEY)

Mode	Number	Fraction
Rail	234	0.267
Bus	96	0.110
Car (driver)	402	0.459
Car (passenger)	71	0.081
Motor cycle	13	0.015
Taxi	6	0.007
Walk	32	0.037
Other	20	0.023
Not known	1	0.001
TOTAL	875	1.000

TABLE D.2 - MODAL SPLIT (MAIN ALTERNATIVE JOURNEY)

Mode	Number	Fraction
Rail	191	0.218
Bus	254	0.290
Car (driver)	94	0.108
Car (passenger)	95	0.109
Motor cycle	3	0.003
Taxi	66	0.075
Walk	56	0.064
Other	10	0.012
Not known	106	0.121
TOTAL	875	1.000

Table D.3 contains a cross-tabulation of usual work journeys against main alternatives.

REASONS FOR MODAL CHOICE

Respondents were asked to list reasons for using their usual method of travel to work in preference to the main alternative. In view of the specific interests of the survey, reasons for modal choice were classified and aggregated under the following pairs of journeys:

Usual Journey	Alternative Journey
Rail	Bus
Rail	Other*
Bus	Rail
Other*	Rail

* Other implies not rail or bus (i.e. predominantly car)

The reasons given in these cases are tabulated in Table D.4. Column totals have no significance in this case, since each respondent was permitted (in fact, encouraged) to give multiple reasons.

TABLE D.3 - CROSS-TABULATION OF USUAL AND ALTERNATIVE MODES

Alternative Mode	Usual Mode: Rail	Bus	Car (driver)	Car (pass)	Motor Cycle	Taxi	Walk	Other	Not Known	Total
Rail	2	25	132	19	6	1	2	4	0	191
Bus	121	6	96	19	2	3	6	1	0	254
Car (driver)	56	16	8	3	3	0	5	3	0	94
Car (passenger)	29	15	45	2	2	0	1	1	0	95
Motor Cycle	1	0	1	1	0	0	0	0	0	3
Taxi	10	15	34	4	0	0	0	3	0	66
Walk	4	6	34	10	0	0	0	2	0	56
Other	0	2	6	1	0	0	1	0	0	10
Not known	11	11	46	12	0	2	17	6	1	106
Total	234	96	402	71	13	6	32	20	1	875

TABLE D.4 - REASONS GIVEN FOR MODAL CHOICE

Usual Journey	Rail	Rail	Bus	Other[a]
Alternative Journey	Bus	Other[a]	Rail	Rail
Reasons				
None	1	5	3	5
Convenience	29	24	6	52
Time	75	27	2	35
Cost	70	53	1	15
Stops near home	13	8	10	17
Stops near work	2	3	8	7
Door-to-door service	0	0	0	10
Frequency of service	14	5	1	21
Delays in alternative	12	4	0	0
Mode changes in alternative	0	0	0	10
Road congestion	4	13	0	0
Parking ease or difficulty	1	16	0	1
No real choice	1	13	3	2
Car required for work	0	0	0	22
Less crowded	9	0	1	0
Comfort	18	10	1	9
Easier	8	10	1	9
Independence	0	0	0	2
Other reasons	5	9	2	12
Number of respondents[b]	121	113	25	164

(a) Not rail or bus - predominantly car.

(b) Column totals have no significance, since each respondent was permitted to give multiple reasons.

ANNEX E

RAIL TRAVEL CHARACTERISTICS RANKING ANALYSIS

Section 4 of the survey questionnaire contained ten characteristics of urban rail travel which respondents were asked to rank from 1 (highest) to 10 (lowest) in order of their view of each characteristic's importance. Only respondents who used rail as part of their normal journey to work were asked to reply to this section of the questionnaire, since they would have had reasonable familiarity with the aspects covered. The ten characteristics listed for ranking were:

A: 20% travel time reduction
B: Improved cleanliness
C: Reduced noise
D: 20% fare reduction
E: Smoother ride
F: Seat availability
G: Space between passengers
H: Carriage interior styling
I: 40% fare reduction
J: Controlled light, temperature and ventilation

In addition, space was provided for up to three extra characteristics of the respondents' choice. These extra characteristics have not been analysed or included in this report.

ANALYSIS OF RANKINGS

Since analysis of rankings of this type requires a full complement of rank orders for each respondent, rankings which were not complete were rejected. Of the 234 eligible respondents, 22 did not fully complete this section, and hence their observations were rejected. Thus, 212 respondents' rankings of the ten characteristics were accepted for further analysis.

Ranks assigned by these respondents were first inspected to ensure that they were in a suitable form for further analysis. This was required because of different methods adopted by respondents in treating 'tied' characteristics. The modified ranks were of the form usually used in sporting results, and the like (i.e. a tie for first resulting in the next place being designated third, etc.). An example of a set of ranks modified in this manner is shown in Table E.1.

TABLE E.1 - EXAMPLE OF RANK MODIFICATION

Characteristic	Original Rank	Modified Rank
A	4	5
B	3	3
C	5	6
D	6	7
E	6	7
F	6	7
G	7	10
H	1	1
I	3	3
J	2	2

A distribution of modified rankings for the 212 accepted respondents is shown in Table E.2. Each element in that table gives the number of respondents assigning specific ranks to particular characteristics.

TABLE E.2 - DISTRIBUTION OF MODIFIED RANKS

Characteristic	Assigned Rank									
	1	2	3	4	5	6	7	8	9	10
A	50	19	32	27	10	17	18	22	10	7
B	25	18	26	29	28	31	26	15	8	6
C	9	10	14	25	32	30	21	31	28	12
D	15	31	17	21	17	11	15	25	38	22
E	8	11	27	30	35	30	30	19	15	7
F	74	23	32	27	17	11	8	10	4	6
G	15	28	14	28	23	24	23	23	22	12
H	9	10	18	22	17	28	28	23	29	28
I	38	16	10	20	10	12	15	12	16	63
J	26	31	22	27	25	22	11	19	13	16

More rigorous treatment of rankings requires that the results should be adjusted for ties. If r_i and r_j are modified ranks for characteristics i and j, such that:

$$r_i = r_j = m$$

Then: $$r_i' = r_j' = \frac{m + (m + 1)}{2}$$

where r_i' and r_j' are <u>adjusted</u> ranks

Similarly, for a three-way tie:

$$r_i' = r_j' = r_k' = \frac{m + (m + 1) + (m + 2)}{3}$$

The example used in Table E.1 is shown in Table E.3 in its adjusted form. The reason for adjustment of ranks is that further analysis depends on the total of ranks for each characteristic being constant (in this case, the total is: 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 55).

TABLE E.3 - EXAMPLE OF RANK ADJUSTMENT

Characteristic	Original Rank	Modified Rank	Adjusted Rank
A	4	5	5.0
B	3	3	3.5
C	5	6	6.0
D	6	7	8.0
E	6	7	8.0
F	6	7	8.0
G	7	10	10.0
H	1	1	1.0
I	3	3	3.5
J	2	2	2.0
TOTAL	43	51	55.0

An estimate of the importance of each characteristic may be obtained by adding together the adjusted ranks assigned to the characteristic by each respondent. In the ranking system adopted here, importance of the characteristic is inversely proportional to the rank total thus obtained. Adjusted rank totals for the ten rail travel characteristics shown in Table E.4. This table also shows the order of importance of the characteristics.

TABLE E.4 - ADJUSTED RANK TOTALS

Characteristic	Description	Adjusted Rank Totals	Final Rank Order
A	20% travel time reduction	959.0	2
B	Improved cleanliness	1069.5	4
C	Reduced noise	1341.5	9
D	20% fare reduction	1292.5	7
E	Smoother ride	1214.5	6
F	Seat availability	758.0	1
G	Space between passengers	1209.0	5
H	Carriage interior styling	1407.0	10
I	40% fare reduction	1340.5	8
J	Controlled light, temperature, etc.	1068.5	3

A 40% fare reduction was rated less important than a 20% reduction; several of the respondents who ranked these two characteristics in that order were re-interviewed to determine the reason. It was found that they equated reductions in fares with decreases in service levels, and hence considered that greater fare reductions were even less desirable than small ones.

SIGNIFICANCE OF RANKING

Two methods were used to test significance of the final ranking shown in Table E.4. In the first test, a 'co-efficient of concordance' was computed. This coefficient is a measure of agreement between respondents, and varies between zero (no agreement) and unity (complete agreement). On a null hypothesis that there is no agreement between respondents, the expected rank totals would be equal, and would have the following value:

$$E_i = N(n+1)/2$$

where E_i is the expected rank total for characteristic i,

N is the number of respondents,

and n is the number of characteristics.

If, in fact, there were complete agreement between respondents, the sum of squares of deviations of observed rank totals from expected rank totals would be a maximum, and could be shown to have the value:

$$S' = N^2(n^3 - n)/12$$

where S' is the maximum sum of squares of deviations.

The coefficient of concordance (W) is now defined as:

$$W = \frac{S}{S'}$$

$$\text{with } S = \sum(O_i - E_i)^2$$

where S is the observed sum of squares of deviation from expected rank totals,

and O_i is the observed rank total for characteristic i.

In the case under consideration, the following values apply:

$N = 212$

$n = 10$

$E_i = 1166$

$S' = 3.7079 \times 10^6$

In Table E.5, values of observed and expected rank totals for each characteristic are shown, together with the deviations and squares of deviations.

TABLE E.5 - DEVIATIONS FROM EXPECTED RANK TOTALS

Characteristic	Observed Rank Total (O_i)	Expected Rank Total (E_i)	Deviation ($O_i - E_i$)	Square of Deviation $(O_i - E_i)^2$
A	959.0	1166.0	-207.0	42849.0
B	1069.5	1166.0	-96.5	9312.3
C	1341.5	1166.0	175.5	30800.3
D	1292.5	1166.0	126.5	16002.3
E	1214.5	1166.0	48.5	2352.3
F	758.0	1166.0	-408.0	166464.0
G	1209.0	1166.0	43.0	1849.0
H	1407.0	1166.0	241.0	58081.0
I	1340.5	1166.0	174.5	30450.3
J	1068.5	1166.0	-97.5	9506.0

From these values, W is computed as 0.0992, which is towards the 'no agreement' end of the scale. However, this result is conditioned by the fact that there was fairly clear agreement on ranks for the more important characteristics, but little agreement on the others.

The other test performed was a variance ratio or F-test. The F-statistic is computed as:

$$F = \frac{(N - 1)W'}{1 - W'}$$

where W' is a corrected derivative of W.

In this case, the correction of W to determine W' is insignificant, and:

$$F = 23.23$$

with $v_1 = 9.0$

$v_2 = 1897.0$

where v_1 and v_2 are upper and lower estimate degrees freedom, respectively.

Consultation of tables(1) of the F distribution with the values of F, v_1 and v_2 given above yields the following result:

$$p << 0.001$$

where p is the probability that the observed deviations could have arisen by chance if there were no agreement between respondents.

This result may be interpreted by stating that it is extremely unlikely that there is not significant agreement between respondents. In general, the deficiencies in the nature of the coefficient of concordance previously pointed out would indicate that the F-test is a somewhat more reliable indicator of agreement in rankings of this type.

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(1) M. Abramowitz and Irene A. Stegun, Handbook of Mathematical Functions, U.S. National Bureau of Standards, 1964.

ANNEX F

DESIGN OPTION ANALYSIS

The major part of the survey questionnaire consisted of questions relating to the respondents' assessments of various methods for achieving specific design objectives. These methods were presented in Question 6 of the questionnaire (see Annex A).

PRESENTATION OF RESULTS

Design Options are identified by letter and number combinations which are listed in Table F.1. Results for each of the 56 options are presented in order of their appearance in the questionnaire, and each set of results occupies one page (latter part of this Annex).

For each option, three response distributions are presented, showing the numbers of respondents who assigned the particular option each of the permissible scale values (-3 to +3). The three distributions relate to the following groups of respondents:

- Train users, defined as respondents who normally travelled to work by train.
- Non-users, who did not normally travel to work by train.
- All respondents.

TABLE F.1 - CORRESPONDENCE BETWEEN OPTIONS, OBJECTIVES AND METHODS

Objective	Method	Option
CONTROL OF TEMPERATURE AND VENTILATION	Forced air circulation (fans)	A/1
	Heating in winter	A/2
	Insulation	A/3
	Small windows	A/4
	Air conditioning	A/5
	Paint with warmer colours	A/6
	Paint with cooler colours	A/7

Objective	Method	Option
LESS NOISE INSIDE THE RAIL CARRIAGE	Automatically closing doors	B/1
	Windows which cannot be opened	B/2
	Wall and floor insulation	B/3
	Regular attention to rattles and squeaks	B/4
	Piped music	B/5
	Control of noisy passengers	B/6
A SMOOTH RIDE	Comfortable seats	C/1
	Smooth starting and stopping	C/2
	Smooth travel around curves	C/3
	Smooth travel along straight track	C/4
MORE SPACE BETWEEN PASSENGERS	Divided seats instead of bench type seats	D/1
	Restrict the number of standing passengers	D/2
	More trains in the peak period	D/3
	One standing-only carriage per train	D/4
	More carriages on each train	D/5
	More space for each seated passenger	D/6
A HIGH LEVEL OF DAYTIME LIGHT	Large windows	E/1
	Use of blinds	E/2
	High level of artificial lighting	E/3
	Transparent roof panels	E/4
	Tinted window glass	E/5

Objective	Method	Option
A SEAT FOR EACH PASSENGER	Utilize carriage standing space to provide more seats	F/1
	Run additional trains in the peak periods	F/2
A HIGH STANDARD OF CARRIAGE CLEANLINESS	Daily internal cleaning service	G/1
	Collection of papers etc. between trips	G/2
	Weekly external cleaning service	G/3
	Use of stain resistant materials	G/4
	Use of colours which do not show the dirt	G/5
	Frequent external painting	G/6
	Frequent internal painting	G/7
	Frequent attention to minor damage	G/8
EXTERNAL APPEARANCE	State-of-the-Art car (SOAC)	H/1
	Bay Area Rapid Transit (BART) car	H/2
	Queensland inter-urban rail-car	H/3
SEATING LAYOUT	Medium seating capacity	I/1
	Low seating capacity	I/2
	High seating capacity	I/3
SEAT DESIGN	Bench seat (individual pads)	J/1
	Divided seats	J/2
	Bench seat	J/3

Objective	Method	Option
SUPPORT FOR STANDING PASSENGERS	Overhead straps	K/1
	Waist-height bars	K/2
	Overhead bars	K/3
IMPROVE RAIL TRAVEL	Restricted areas in carriages for smoking	L/1
	Railway staff on trains to control vandals	L/2
	Wall racks or space under seats for baggage	L/3
	Space on each train for strollers and wheel chairs	L/4
A MODERN, STYLISH CARRIAGE EXTERIOR	Aluminium or stainless steel outside finish	M/1
	Painted carriage exterior	M/2

In addition, the mean response for each group is provided, together with the numbers of errors or omissions for reconciliation purposes.

A histogram of fractional response distributions is provided, for each option, to show the distribution of responses for all respondents. The shaded section of each histogram shows the contribution of train users to the overall distribution.

Brief comments are attached to the results for each option to indicate any particular points of interest in the results, and to summarise the respondents' preferences for the method under consideration.

ADDITIONAL PROCESSING

Although the results appended to this Annex provide a good indication of consumer preferences for various design options, it was felt that some additional analysis of the results should be undertaken. As a result, design option responses were subjected to analysis to determine the following features:

- Whether there was a significant difference between user and non-user responses.
- Whether variations in responses could be ascribed to sex, marital status, age, income or train usage.

In addition, standard deviations were calculated for all response distributions presented at the end of this Annex, but are not included in the tabulations.

User/Non-User Distribution Comparisons

User and non-user response distributions, for each option, were subjected to the Chi-square test to determine whether significant differences between them could be assumed. In this case, non-user response distributions were used to provide expected user distributions, on the null hyopthesis that the distributions were identical. Actual user response distributions were then compared with these expected distributions. The process involved is best illustrated by an example. For design option A/6, the non-user numeric and fractional response distributions are as follows:

Class(i)	Response	Numeric Results(n_i)	Fractional Results(f_i)
1	+3	53	0.086
2	+2	64	0.104
3	+1	77	0.125
4	0	191	0.310
5	-1	61	0.099
6	-2	49	0.080
7	-3	121	0.196

The fractional distribution of results derived above for non-users may now be used to derive expected results for user responses to this option (on the basis that the distributions of responses are identical). If observed and expected results for users are designated O_i and E_i, respectively, then the Chi-square statistic is developed as follows:

$$\chi^2 = \sum_i \frac{(O_i - E_i)^2}{E_i}$$

where $E_i = N f_i$

and N is the number of users in the sample (in this case, 231)

The following table may now be generated:

Class(i)	Observed Result(O_i)	Expected Result(E_i)	$\frac{(O_i - E_i)^2}{E_i}$
1	46	45.276	0.016
2	20	18.480	0.125
3	20	22.869	0.360
4	86	71.610	2.892
5	34	28.875	0.910
6	14	24.024	4.182
7	11	19.866	3.957
		χ^2 ...	12.442

In this case, there are seven classes, and, hence, six degrees of freedom (i.e. only the values for six classes may be assigned arbitrarily). Consulting tables of the Chi-square distribution(1), it is found that, for these values:

(1) M. Abramowitz and Irene A. Stegun, Handbook of Mathematical Functions, U.S. National Bureau of Standards, 1964.

$p = 0.053$

where p is the probability that the given value of x^2 (or greater) could have arisen by chance if the distributions were, in fact, identical.

In this case, the result is inconclusive, since the value of p is insufficiently low to assert that the distributions are not identical, because such an arrangement of the differences could have occurred by chance with a reasonably high probability. In general, values of p well below 0.05 would be regarded as a good indication of significant differences between user and non-user distributions. Values of the Chi-square statistic, together with corresponding values of p, are shown for each design option in Table F.2, which also shows an indication of whether the user and non-user distributions could reasonably be regarded as dissimilar. In general, the distributions appear to be dissimilar, in the statistical sense, although there is usually little difference in the mean responses.

TABLE F.2 - TESTS FOR DIFFERENCES BETWEEN USER AND NON-USER RESPONSE DISTRIBUTIONS

Option	x^2	p	Possibility of Differences
A/1	6.84	0.336	Possible
A/2	26.34	<0.001	Very likely
A/3	9.82	0.130	Possible
A/4	9.24	0.160	Possible
A/5	43.08	<0.001	Very likely
A/6	12.44	0.053	Likely
A/7	17.87	0.007	Very likely
B/1	8.11	0.231	Possible
B/2	36.98	<0.001	Very likely
B/3	6.94	0.324	Possible
B/4	19.58	0.003	Very likely
B/5	7.06	0.314	Possible
B/6	8.55	0.203	Possible
C/1	13.55	0.035	Likely
C/2	4.38	0.621	Unlikely
C/3	25.27	<0.001	Very likely
C/4	13.35	0.037	Likely

Option	x^2	p	Possibility of Differences
D/1	19.32	0.004	Very likely
D/2	47.75	<0.001	Very likely
D/3	8.96	0.175	Possible
D/4	12.08	0.060	Likely
D/5	21.63	0.001	Very likely
D/6	5.92	0.430	Possible
E/1	6.71	0.349	Possible
E/2	2.26	0.885	Unlikely
E/3	11.71	0.068	Likely
E/4	7.34	0.292	Possible
E/5	6.74	0.347	Possible
F/1	4.09	0.665	Unlikely
F/2	12.53	0.050	Likely
G/1	20.09	0.003	Very likely
G/2	13.63	0.035	Likely
G/3	4.58	0.598	Unlikely
G/4	29.40	<0.001	Very likely
G/5	17.30	0.008	Very likely
G/6	22.28	0.001	Very likely
G/7	11.57	0.072	Likely
G/8	4.91	0.557	Unlikely
H/1	16.24	0.012	Likely
H/2	8.88	0.179	Possible
H/3	11.91	0.064	Likely
I/1	15.24	0.018	Likely
I/2	9.11	0.168	Possible
I/3	21.92	0.001	Very likely
J/1	7.76	0.255	Possible
J/2	17.33	0.008	Very likely
J/3	16.64	0.010	Very likely
K/1	7.67	0.263	Possible
K/2	16.77	0.010	Likely
K/3	10.05	0.120	Possible
L/1	16.74	0.010	Likely
L/2	8.89	0.177	Possible
L/3	25.17	<0.001	Very likely
L/4	7.09	0.322	Possible
M/1	14.22	0.026	Likely
M/2	5.56	0.479	Possible

Regression Analysis of Responses

In an attempt to identify relationships between response to a particular design option question and social and travel characteristics of the respondents, the information obtained in this survey was subjected to regression analysis. The object of this analysis was to estimate an equation of the form:

$$R = a_o + a_1 S + a_2 M + a_3 A + a_4 I + a_5 T$$

where R is the response value for the option,
S is a dummy variable representing the respondent's sex,
M is a dummy variable representing the respondent's marital status,
A is the respondent's age,
I is the respondent's income,
T is a binary variable relating to use of railways for the work journey,
and a_o ... a_5 are regression coefficients.

Initially, this analysis was performed using normal multiple linear regression techniques, but the data did not lend themselves to analysis in this way. A further attempt was made using stepwise regression techniques[1,2] with, again, little success. In the stepwise regression process, variables are brought into the regression equation on the basis of their correlation with the response. In this case, a test proportion of variance of 0.01 was used to control entry of variables.

In most cases, no variables were selected by this process, indicating that responses to the design option questions were not readily explained by differences in the independent

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(1) N.R. Draper and H. Smith, Applied Regression Analysis, John Wiley and Sons, U.S.A., 1966.

(2) System/360 Scientific Subprogram Package - Version III, IBM Ref GH20-0205-4, August 1970.

variables used in the regression equation. Table F.3 shows results of this analysis for cases in which a regression equation was estimated. In each such case, the signs of the regression coefficients (for variables included in the equation) are shown. The multiple correlation coefficient is also shown.

Where the variable entered in the equation is of the 0-1 type, a positive sign indicates that the class of people to whom the value of 1 has been arbitrarily assigned tend to approve of the measure or to consider it effective in fulfilling its stated objective. In the case of age or income, a positive sign means that people who are older or who have higher incomes tend to approve or consider the measure effective.

In general, the low values of multiple correlation coefficients, together with the difficulty in obtaining satisfactory regression equations, indicate that responses to matters of carriage design are not primarily determined by the variables considered.

TABLE F.3 - RESULTS OF STEPWISE MULTIPLE REGRESSION ANALYSIS

Option	Method	Variables Entered in Equation					Multiple Correlation Coefficient
		Sex[a]	Marital Status[b]	Age	Income	Train Usage[c]	
A/2	Heating in winter				(-)		0.113
A/5	Air conditioning					(-)	0.147
A/6	Paint with warmer colours				(-)		0.132
A/7	Paint with cooler colours			(+)			0.154
B/2	Windows which cannot be opened		(+)			(-)	0.232
B/3	Wall and floor insulation				(+)		0.126
B/5	Piped music			(-)			0.125
B/6	Control of noisy passengers			(+)			0.226
C/3	Smooth travel around curves	(+)		(+)			0.172
C/4	Smooth travel along straight track			(+)			0.123
D/1	Divided seats instead of bench type seats					(-)	0.118
D/2	Restrict the number of standing passengers					(-)	0.124
D/5	More carriages on each train					(+)	0.107
E/3	High level of artificial lighting			(+)			0.105

Option	Method	Variables Entered in Equation					Multiple Correlation Coefficient
		Sex[a]	Marital Status[b]	Age	Income	Train Usage[c]	
E/4	Transparent roof panels			(-)			0.130
F/2	Run additional trains in the peak period			(-)			0.112
G/5	Use of colours which do not show the dirt				(-)	(-)	0.149
G/6	Frequent external painting				(-)		0.105
G/7	Frequent internal painting				(-)		0.119
L/2	Railway staff on trains to control vandals			(+)			0.105
L/3	Wall racks or space under seats for baggage	(+)				(-)	0.149
L/4	Space on each train for strollers and wheel chairs				(-)		0.116
M/2	Painted carriage exterior				(-)		0.116

(a) 0 if male; 1 if female

(b) 0 if unmarried; 1 if married

(c) 0 if non-user; 1 if user

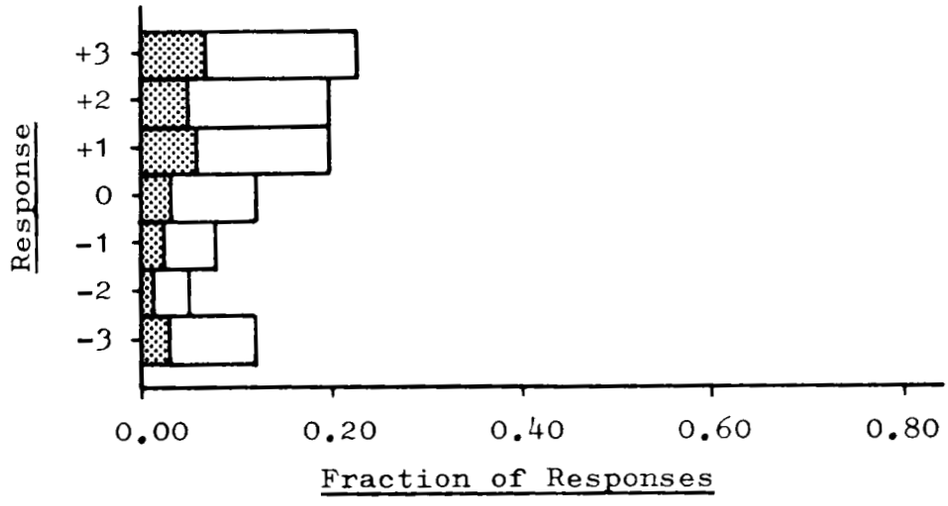
OBJECTIVE ... CONTROL OF TEMPERATURE AND VENTILATION

METHOD ..... Forced air circulation (fans)

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	60	140	200
+2	41	131	172
+1	50	119	169
0	29	71	100
-1	17	49	66
-2	7	34	41
-3	25	80	105
Errors	5	17	22
Total	234	641	875
Mean	0.90	0.71	0.76

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

While the predominant opinion of this method of controlling temperature and ventilation was favourable, the overall mean response of 0.76 is probably insufficient to indicate its general acceptance as a useful measure.

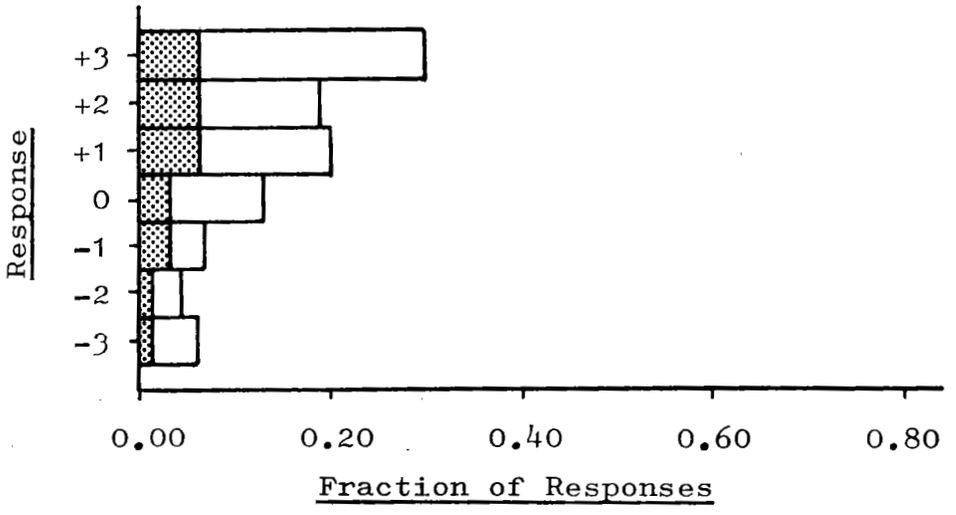
OBJECTIVE ... CONTROL OF TEMPERATURE AND VENTILATION

METHOD ..... Heating in winter

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	54	208	262
+2	51	112	163
+1	53	119	172
0	27	88	115
-1	27	36	63
-2	9	25	34
-3	12	40	52
Errors	1	13	14
Total	234	641	875
Mean	1.01	1.21	1.16

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response to this question was 1.16, which indicates that it was generally regarded as a desirable measure. The mild Brisbane winter climate probably conditioned this response, and significantly stronger responses might be expected in Southern States.

OPTION ... A/3

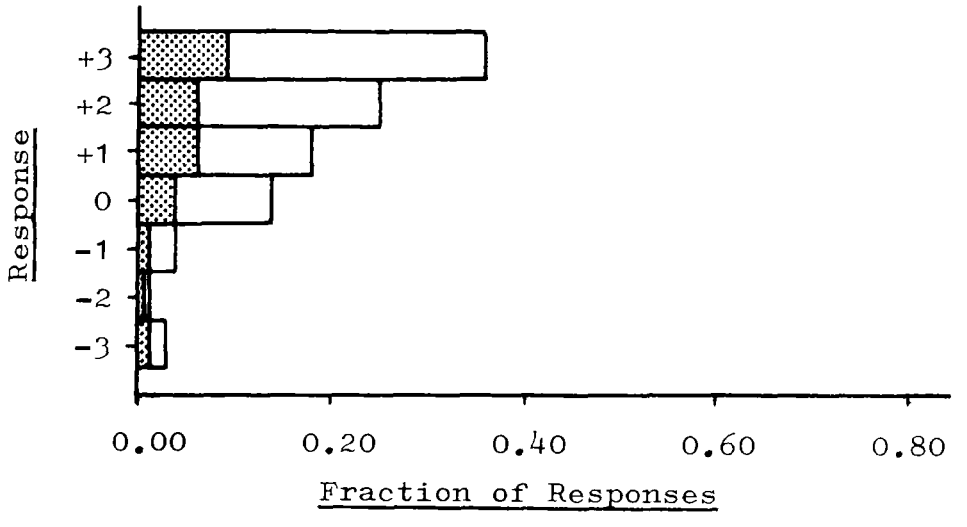
OBJECTIVE ... CONTROL OF TEMPERATURE AND VENTILATION

METHOD ..... Insulation

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	80	226	306
+2	50	161	211
+1	52	100	152
0	30	87	117
-1	9	23	32
-2	1	9	10
-3	7	16	23
Errors	5	19	24
Total	234	641	875
Mean	1.57	1.63	1.61

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Insulation of carriages elicited a mean response of 1.61, which indicates that it was generally regarded as a desirable measure. As shown in the histogram of results, almost 40% of respondents assigned a response of +3 ('very desirable') to this option.

OPTION ... A/4

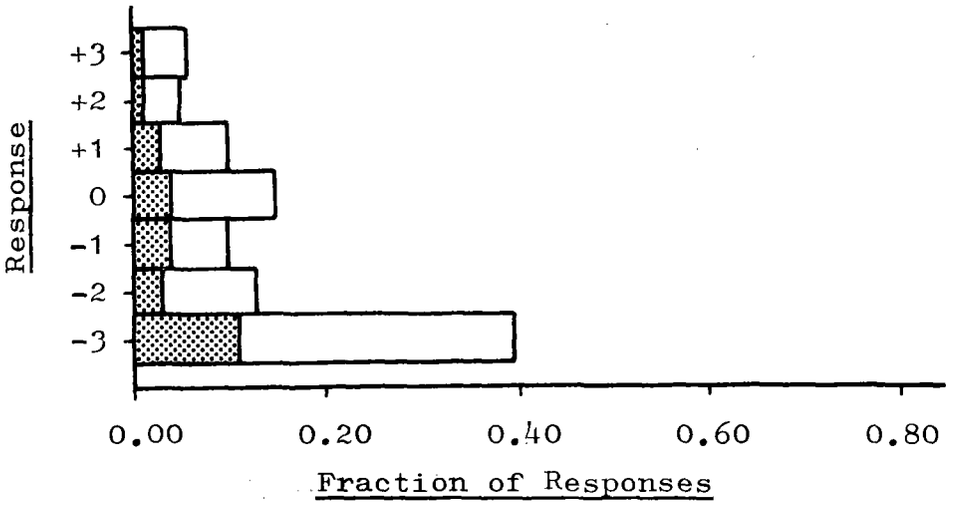
OBJECTIVE ... CONTROL OF TEMPERATURE AND VENTILATION

METHOD ..... Small windows

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	12	40	52
+2	8	38	46
+1	22	63	85
0	32	97	129
-1	30	56	86
-2	27	85	112
-3	96	237	333
Errors	7	25	32
Total	234	641	875
Mean	-1.31	-1.10	-1.16

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Almost 40% of respondents assigned a response of -3 ('very undesirable') to this option. However, the remaining responses were comparatively uniformly distributed. The overall mean response of -1.16 indicates that this measure was generally considered ineffective for this objective. This result is doubtless conditioned by the warm Brisbane climate, and probably reflects other disadvantages of small windows.

OPTION ... A/5

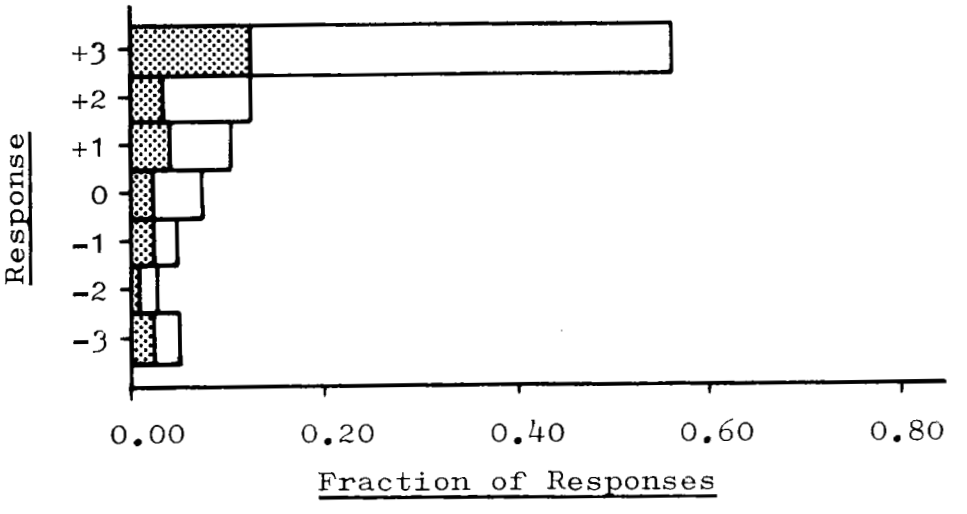
OBJECTIVE ... CONTROL OF TEMPERATURE AND VENTILATION

METHOD ..... Air conditioning

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	108	377	485
+2	27	80	107
+1	34	55	89
0	19	48	67
-1	19	23	42
-2	4	19	23
-3	21	27	48
Errors	2	12	14
Total	234	641	875
Mean	1.39	1.91	1.77

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

This measure was considered highly desirable and the responses indicate that it is the most desirable option for this particular objective. The much higher preferences of non-users for this option may be significant in considering measures for attracting car users to public transport.

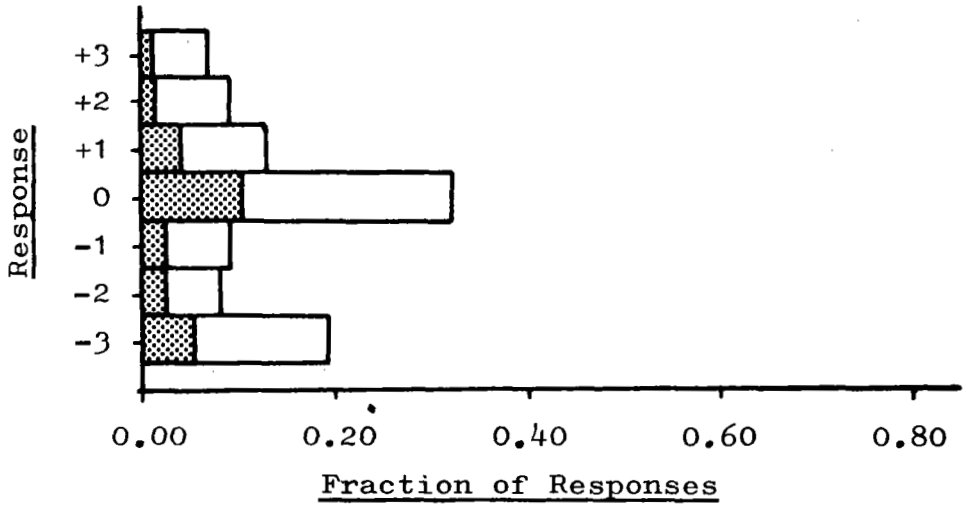
OBJECTIVE ... CONTROL OF TEMPERATURE AND VENTILATION

METHOD ..... Paint with warmer colours

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	11	53	64
+2	14	64	78
+1	34	77	111
0	86	191	277
-1	20	61	81
-2	20	49	69
-3	46	121	167
Errors	3	25	28
Total	234	641	875
Mean	-0.45	-0.26	-0.31

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response of -0.31 to this question indicates that warmer colours were not considered of great consequence in controlling temperature. The histogram of responses bears this out, although some 20% of respondents rated this option as very undesirable.

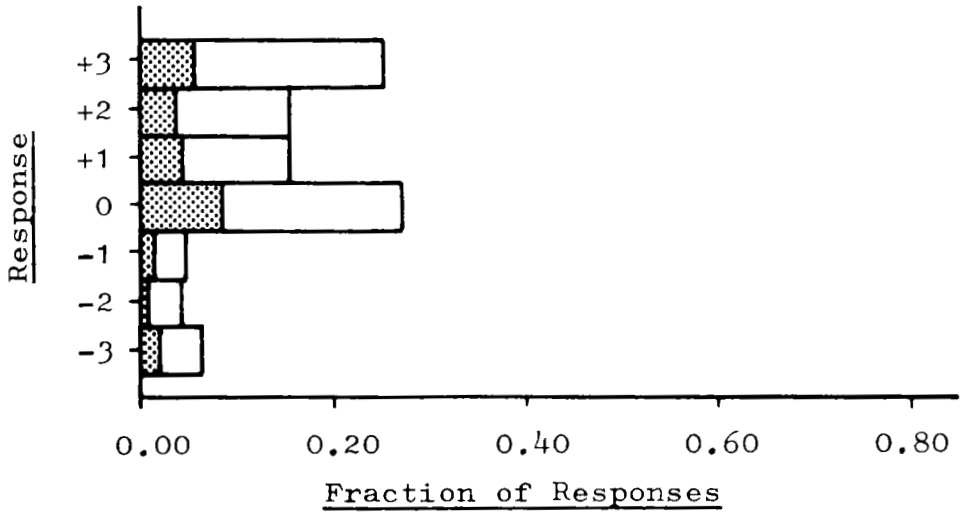
OBJECTIVE ... CONTROL OF TEMPERATURE AND VENTILATION

METHOD ..... Paint with cooler colours

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	48	171	219
+2	31	105	136
+1	39	96	135
0	74	163	237
-1	15	25	40
-2	5	33	38
-3	18	38	56
Errors	4	10	14
Total	234	641	875
Mean	0.72	0.97	0.91

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The response to this option was largely favourable, but the overall mean response of 0.91 is probably insufficient to illustrate strong preferences for this method. In addition, responses to this question probably reflect respondents' visual preferences for colours, in addition to their effects on temperature appreciation.

OPTION ... B/1

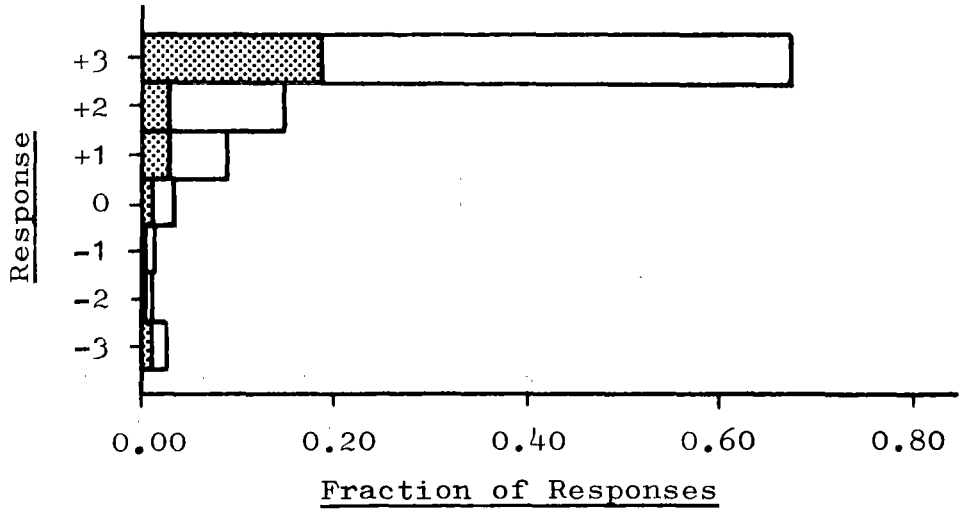
OBJECTIVE ... LESS NOISE INSIDE THE RAIL CARRIAGE

METHOD ..... Automatically closing doors

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	160	420	580
+2	27	99	126
+1	26	53	79
0	9	22	31
-1	1	12	13
-2	2	4	6
-3	8	17	25
Errors	1	14	15
Total	234	641	875
Mean	2.28	2.30	2.29

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overwhelming response to this option was favourable, with some 70% of all respondents rating it as very desirable. There was virtually no difference between the user and non-user responses. It is likely that the response to this question was strongly conditioned by factors other than noise.

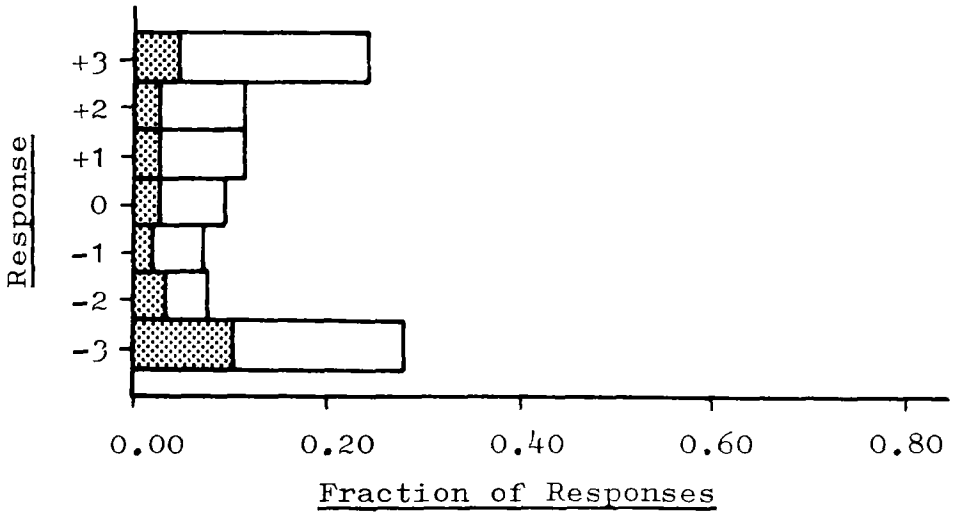
OBJECTIVE ... LESS NOISE INSIDE THE RAIL CARRIAGE

METHOD ..... Windows which cannot be opened

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	37	176	213
+2	24	77	101
+1	22	76	98
0	21	59	80
-1	17	47	64
-2	26	39	65
-3	86	157	243
Errors	1	10	11
Total	234	641	875
Mean	-0.63	0.26	0.02

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

As shown in the histogram of results, the response distribution for this option was markedly bimodal, and there was some difference between the mean responses of users and non-users. No conclusive preference could be drawn from the results, possibly because the window opening choice involves other important factors such as safety and temperature effects.

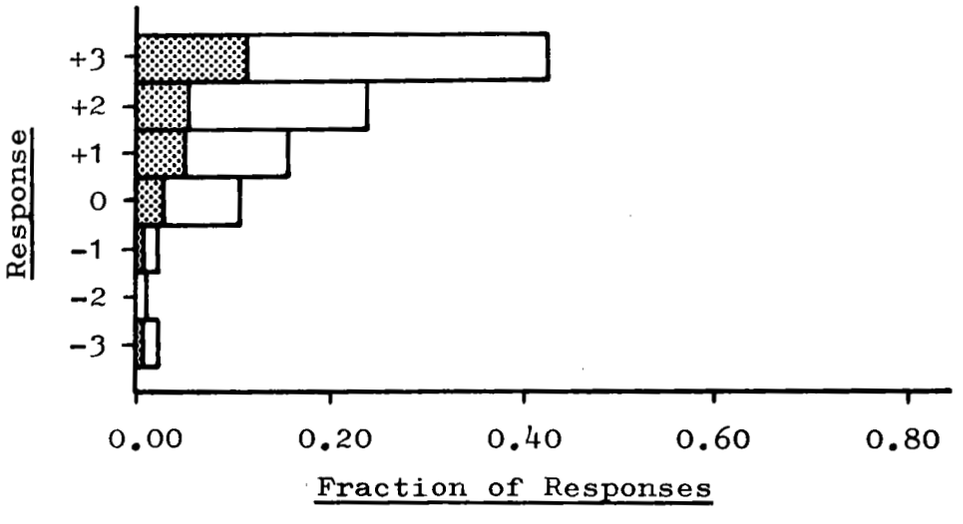
OBJECTIVE ... LESS NOISE INSIDE THE RAIL CARRIAGE

METHOD ..... Wall and floor insulation

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	100	267	367
+2	48	159	207
+1	43	93	136
0	25	69	94
-1	7	13	20
-2	1	9	10
-3	6	14	20
Errors	4	17	21
Total	234	641	875
Mean	1.79	1.83	1.82

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The mean response to this option was 1.82, indicating that it was generally highly regarded. About 40% of all respondents rated this option as very desirable.

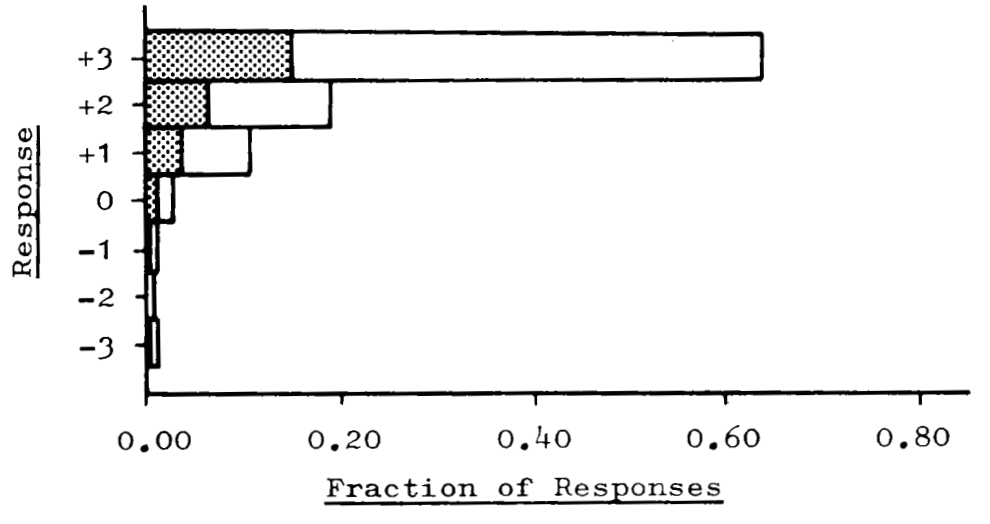
OBJECTIVE ... LESS NOISE INSIDE THE RAIL CARRIAGE

METHOD ..... Regular attention to rattles and squeaks

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	128	425	553
+2	58	109	167
+1	32	64	96
0	9	17	26
-1	2	2	4
-2	1	4	5
-3	3	7	10
Errors	1	13	14
Total	234	641	875
Mean	2.23	2.43	2.38

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Almost 65% of all respondents rated this option as very desirable. The very high mean response of 2.38 indicates that attention to mechanical noises is regarded highly as a means of reducing noise. This response may also reflect dissatisfaction with existing rail-cars in Brisbane, as these are predominantly old.

OPTION ... B/5

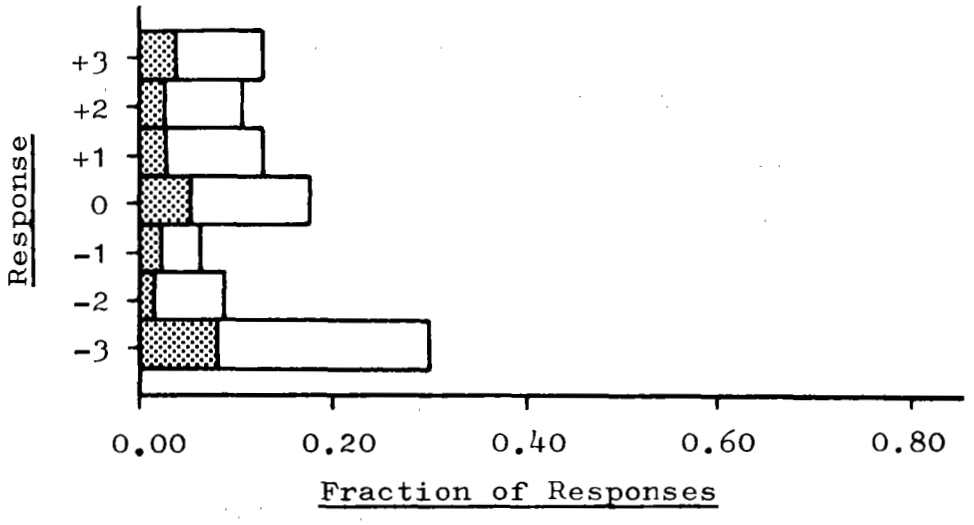
OBJECTIVE ... LESS NOISE INSIDE THE RAIL CARRIAGE

METHOD ..... Piped music

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	34	80	114
+2	23	64	87
+1	28	83	111
0	46	108	154
-1	19	38	57
-2	15	65	80
-3	68	191	259
Errors	1	12	13
Total	234	641	875
Mean	-0.33	-0.46	-0.43

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The histogram of results indicates that there is some evidence of bimodality in responses to this option. The mean score of -0.43 is probably not significant, and it appears that piped music is generally considered less than desirable.

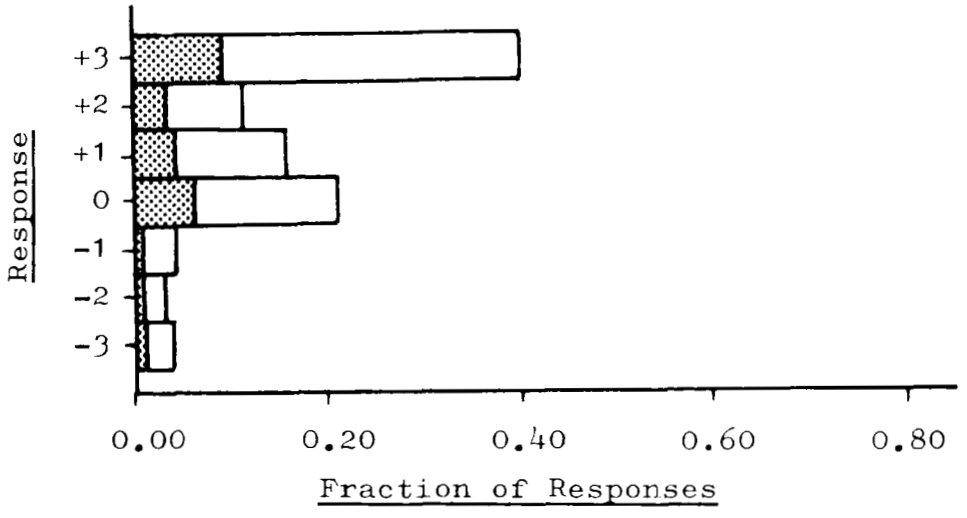
OBJECTIVE ... LESS NOISE INSIDE THE RAIL CARRIAGE

METHOD ..... Control of noisy passengers

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	79	268	347
+2	31	70	101
+1	38	100	138
0	56	124	180
-1	9	27	36
-2	9	19	28
-3	11	24	35
Errors	1	9	10
Total	234	641	875
Mean	1.19	1.44	1.37

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response for this method of reducing noise was 1.37, and 40% of all respondents rated this method as very desirable. However 20% indicated that they were indifferent either to its effectiveness or desirability. Possibly some respondents had reservations about the means of passenger control which may be employed.

OPTION ... C/1

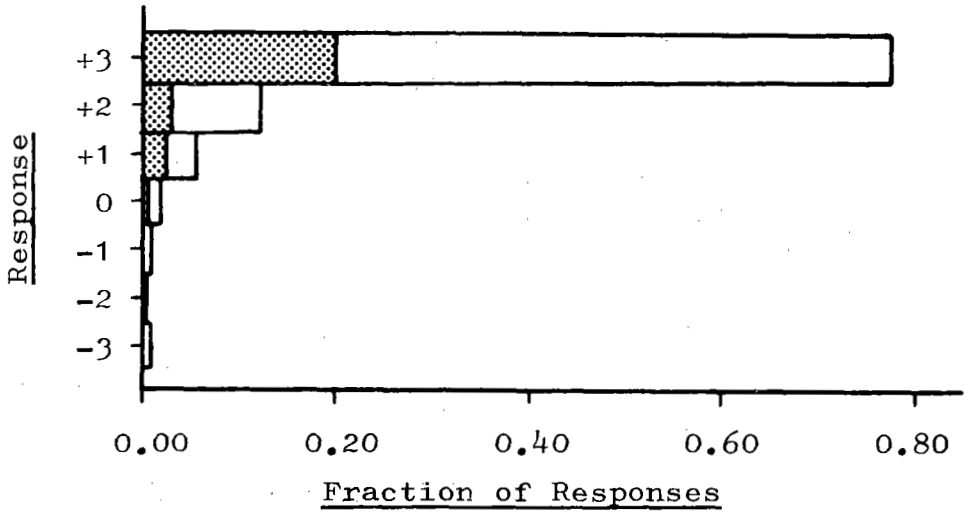
OBJECTIVE ... A SMOOTH RIDE

METHOD ..... Comfortable seats

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	174	500	674
+2	29	83	112
+1	22	29	51
0	5	11	16
-1	2	4	6
-2	0	1	1
-3	1	4	5
Errors	1	9	10
Total	234	641	875
Mean	2.56	2.65	2.63

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Almost 80% of all respondents rated this method as very desirable, reflecting the great importance of seating in train comfort. This result was slightly more marked for users than non-users. The general desire for smooth riding characteristics has ramifications in track construction and maintenance, as well as in rail-car design.

OPTION ... C/2

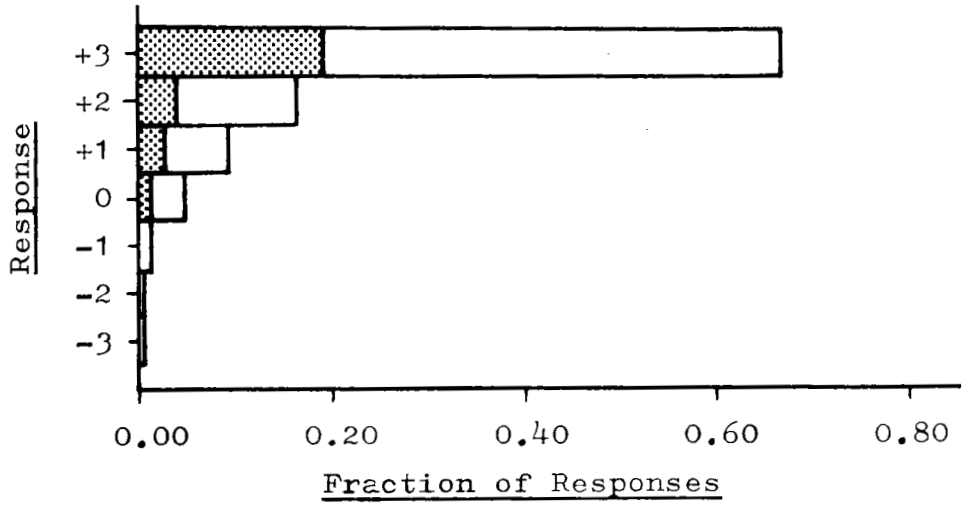
OBJECTIVE ... A SMOOTH RIDE

METHOD ..... Smooth starting and stopping

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	163	413	576
+2	35	117	152
+1	23	58	81
0	10	31	41
-1	1	7	8
-2	0	2	2
-3	1	2	3
Errors	1	11	12
Total	234	641	875
Mean	2.48	2.40	2.42

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Almost 70% of all respondents rated this method as very desirable, and there was high agreement between user and non-user response distributions.

OPTION ... C/3

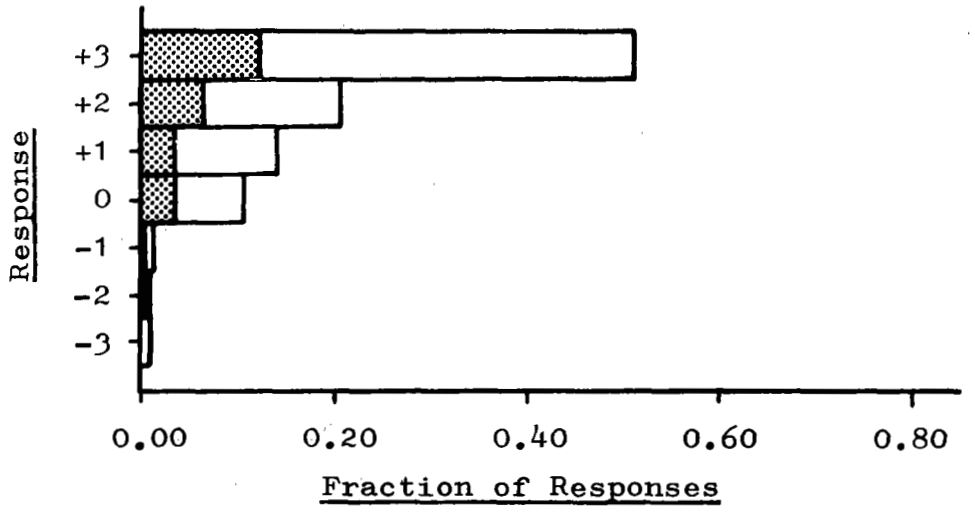
OBJECTIVE ... A SMOOTH RIDE

METHOD ..... Smooth travel around curves

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	107	337	444
+2	54	125	179
+1	34	88	122
0	30	63	93
-1	3	9	12
-2	3	1	4
-3	1	6	7
Errors	2	12	14
Total	234	641	875
Mean	1.94	2.10	2.06

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response to this question was 2.06, indicating that it was highly regarded as a measure for improving the comfort of train travel. In general, non-users rated this method more highly than users.

OPTION ... C/4

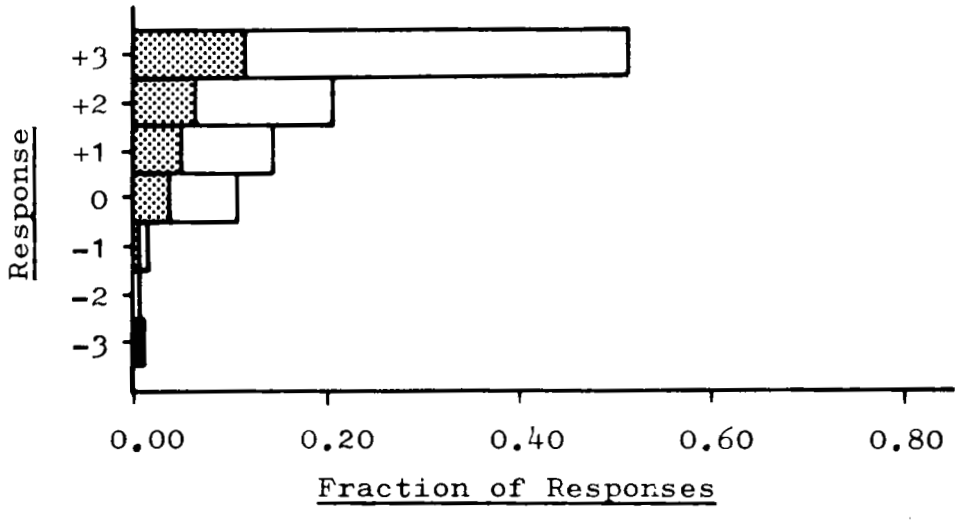
OBJECTIVE ... A SMOOTH RIDE

METHOD ..... Smooth travel along straight track

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	99	346	445
+2	54	123	177
+1	40	85	125
0	31	62	93
-1	3	8	11
-2	3	0	3
-3	2	5	7
Errors	2	12	14
Total	234	641	875
Mean	1.85	2.14	2.06

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response to this question was 2.06, but the importance of this method was somewhat greater to non-users than to users. Over 50% of all respondents rated this method as very desirable.

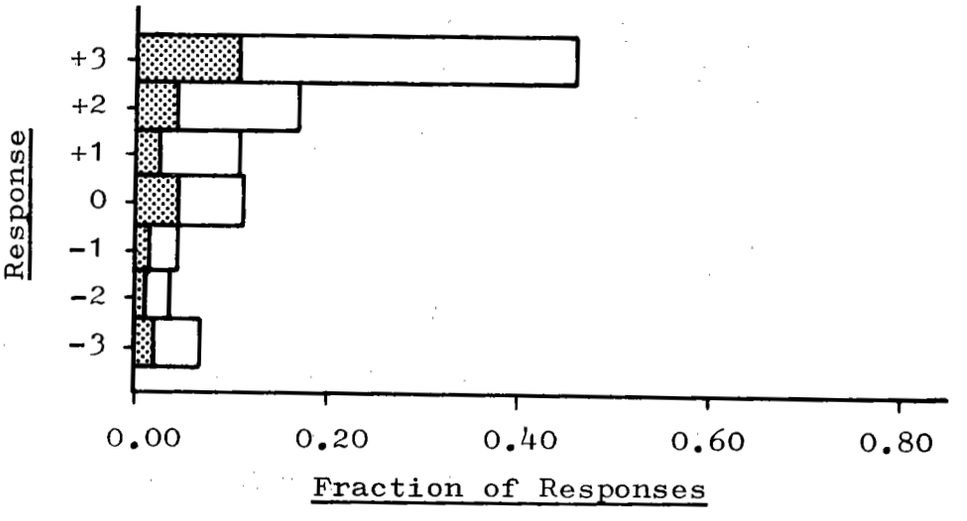
OBJECTIVE ... MORE SPACE BETWEEN PASSENGERS

METHOD ..... Divided seats instead of bench type seats

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	94	304	398
+2	37	113	150
+1	22	72	94
0	37	59	96
-1	12	24	36
-2	11	18	29
-3	17	41	58
Errors	4	10	14
Total	234	641	875
Mean	1.27	1.63	1.53

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

While 46% of all respondents rated this method as very desirable, opinion appeared to vary amongst the remainder. Nevertheless, this option was generally regarded favourably, as illustrated by the overall mean response of 1.53. It is expected that some respondents may have considered that this option implied less seating, and that other disadvantages (e.g. control when travelling with small children) may have been contemplated.

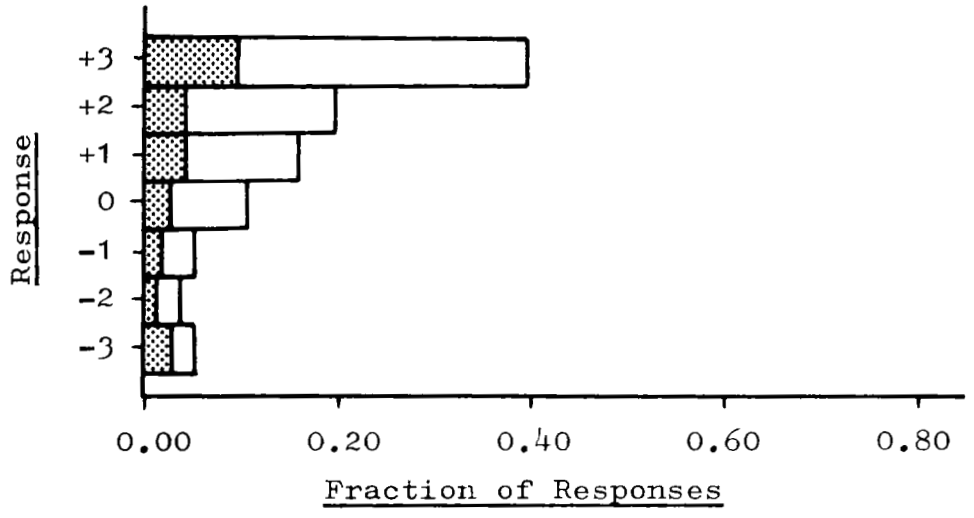
OBJECTIVE ... MORE SPACE BETWEEN PASSENGERS

METHOD ..... Restrict the number of standing passengers

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	85	257	342
+2	35	136	171
+1	38	99	137
0	22	68	90
-1	16	30	46
-2	11	20	31
-3	24	20	44
Errors	3	11	14
Total	234	641	875
Mean	1.10	1.61	1.47

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response for this method was 1.47, which indicated that it was generally regarded as desirable. However, the difference between response distributions for users and non-users was marked, with the latter favouring this method more than the former. Users may have been concerned that restricting standing could lead to longer waiting times before being able to board a train.

OPTION ... D/3

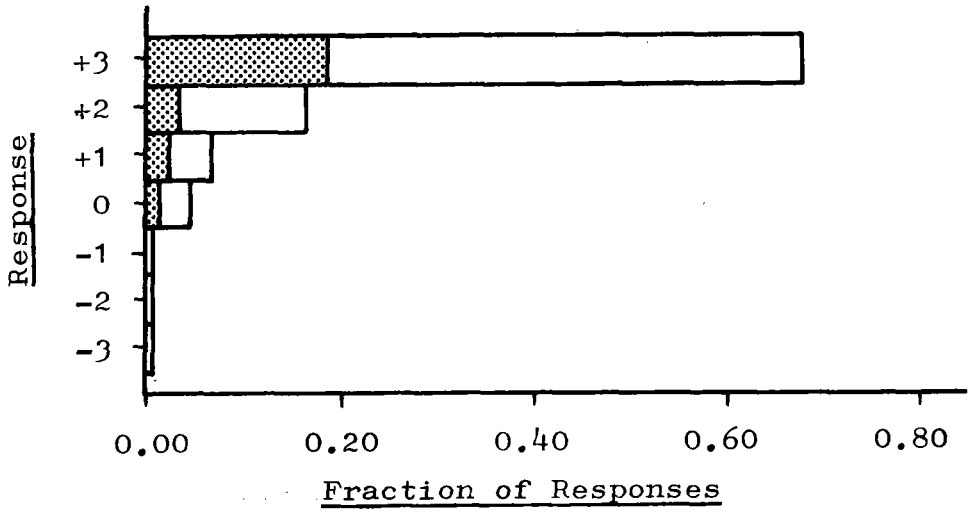
OBJECTIVE ... MORE SPACE BETWEEN PASSENGERS

METHOD ..... More trains in the peak period

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	164	435	599
+2	30	116	146
+1	23	43	66
0	11	24	35
-1	2	4	6
-2	0	3	3
-3	2	5	7
Errors	2	11	13
Total	234	641	875
Mean	2.44	2.47	2.46

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Almost 70% of all respondents considered this method very desirable, and this result is reflected in the overall mean response of 2.46. There was little difference between user and non-user response distributions for this question. Responses to this question may also reflect the importance tc travellers of waiting time and seat availability.

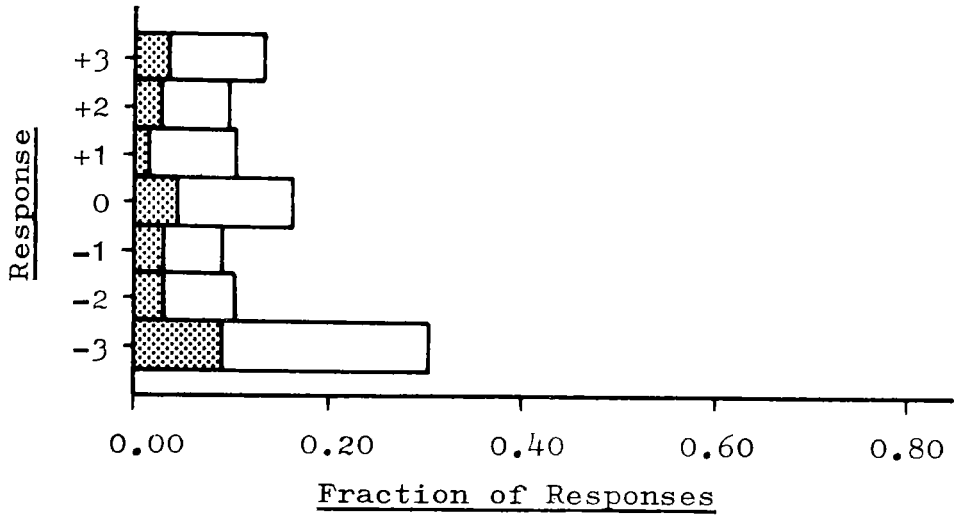
OBJECTIVE ... MORE SPACE BETWEEN PASSENGERS

METHOD ..... One standing-only carriage per train

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	30	85	115
+2	21	60	81
+1	13	77	90
0	37	105	142
-1	26	54	80
-2	25	64	89
-3	78	184	262
Errors	4	12	16
Total	234	641	875
Mean	-0.72	-0.45	-0.52

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response to this question was -0.52, indicating that the predominant opinion of this method was unfavourable. Approximately 30% of all respondents rated this method very undesirable, but the remainder of the response distribution is comparatively flat, indicating that opinion on this matter is varied.

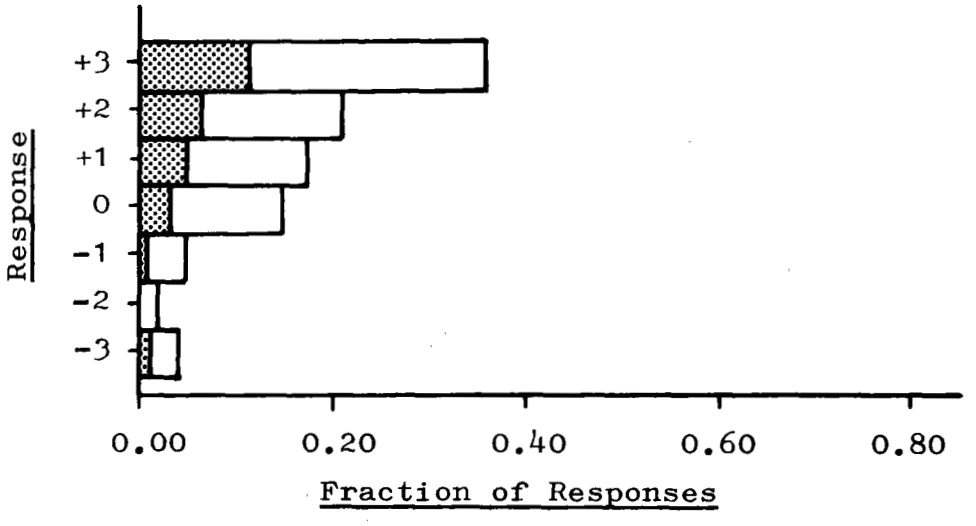
OBJECTIVE ... MORE SPACE BETWEEN PASSENGERS

METHOD ..... More carriages on each train

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	98	212	310
+2	53	130	183
+1	43	108	151
0	24	106	130
-1	3	35	38
-2	1	11	12
-3	9	26	35
Errors	3	13	16
Total	234	641	875
Mean	1.78	1.38	1.49

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response for this method was 1.49, while 36% of all respondents rated it as very desirable. However, users appeared to regard this method more highly than non-users. The favourable response probably relates, to some extent, to the attraction of increased seat availability.

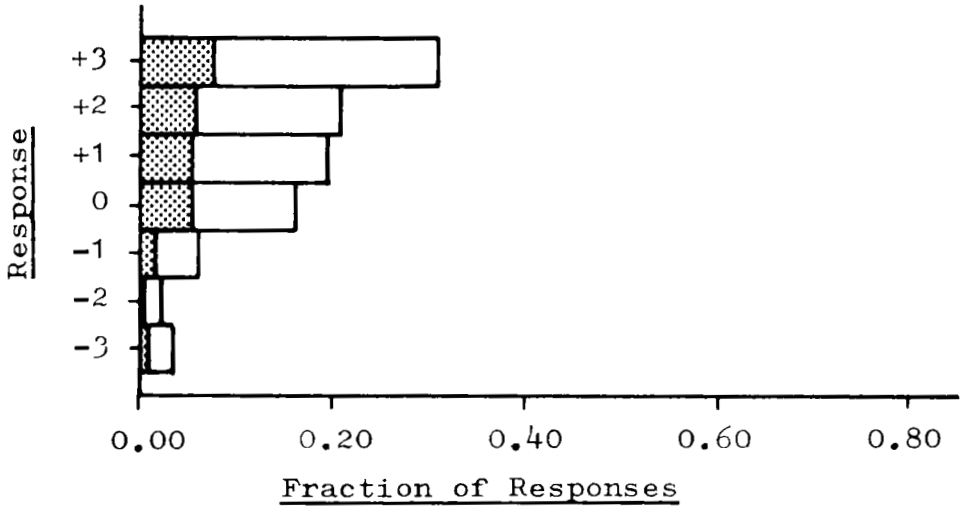
OBJECTIVE ... MORE SPACE BETWEEN PASSENGERS

METHOD ..... More space for each seated passenger

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	66	202	268
+2	46	135	181
+1	47	123	170
0	46	92	138
-1	15	38	53
-2	5	14	19
-3	7	23	30
Errors	2	14	16
Total	234	641	875
Mean	1.25	1.38	1.34

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response for this method was 1.34, and agreement between users and non-users was generally good.

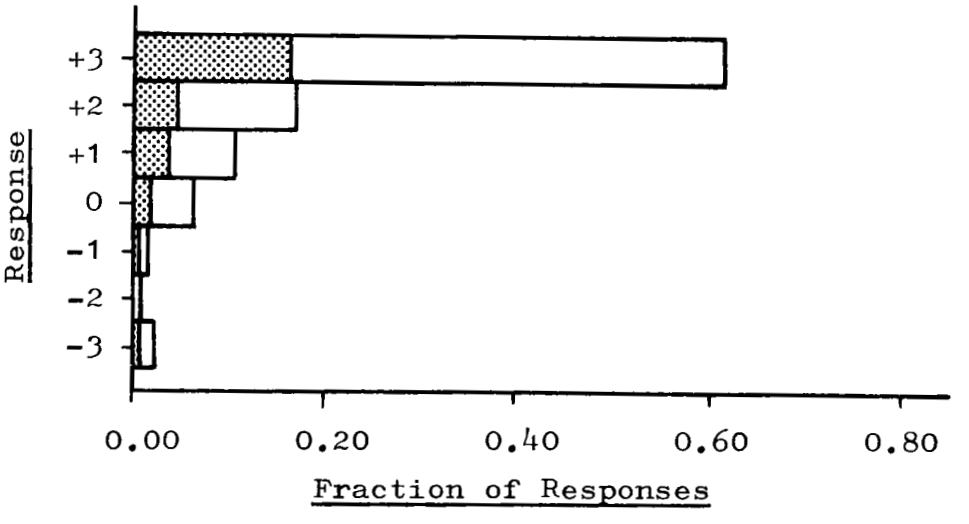
OBJECTIVE ... A HIGH LEVEL OF DAYTIME LIGHT

METHOD ..... Large windows

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	140	391	531
+2	39	106	145
+1	32	61	93
0	15	42	57
-1	3	12	15
-2	0	5	5
-3	4	14	18
Errors	1	10	11
Total	234	641	875
Mean	2.21	2.19	2.20

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Over 60% of all respondents rated this method as very desirable, and the overall mean response was 2.20. Agreement between users and non-users was quite high, and large windows are clearly considered effective in improving light conditions inside the rail carriage, and probably also in other respects.

OPTION ... E/2

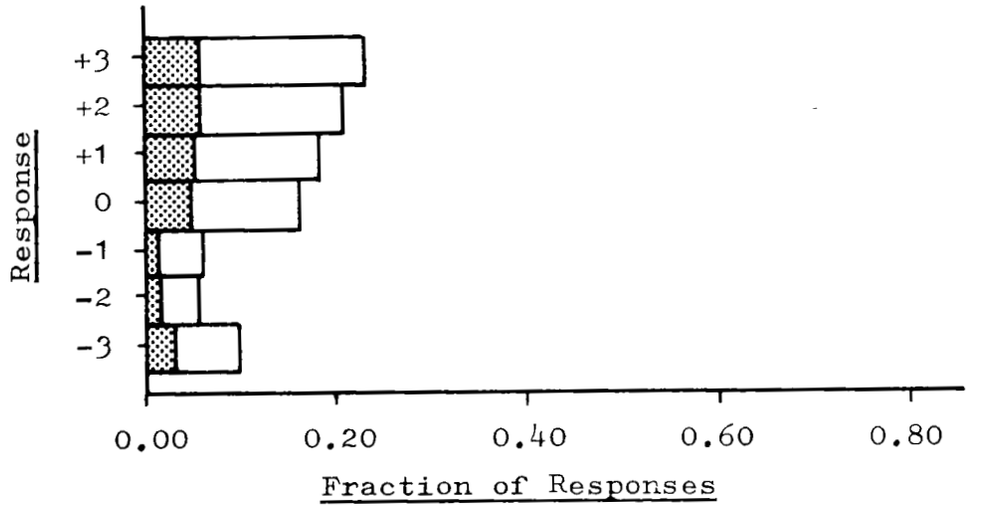
OBJECTIVE ... A HIGH LEVEL OF DAYTIME LIGHT

METHOD ..... Use of blinds

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	50	148	198
+2	49	128	177
+1	44	112	156
0	40	98	138
-1	12	43	55
-2	13	37	50
-3	25	61	86
Errors	1	14	15
Total	234	641	875
Mean	0.77	0.82	0.80

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response to this method was 0.80, while the distribution of responses was not markedly peaked. Agreement between user and non-user response distributions was very high, but this design feature cannot be regarded as highly desirable.

OPTION ... E/3

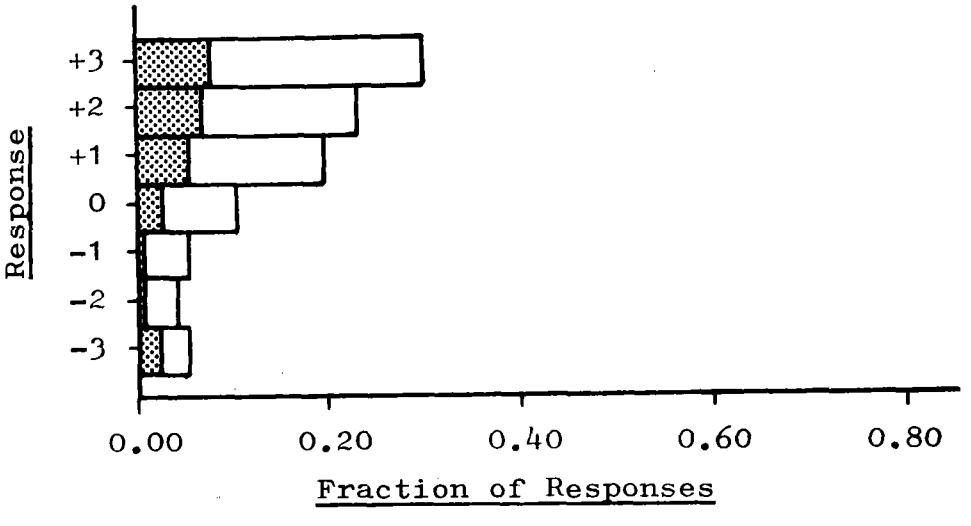
OBJECTIVE ... A HIGH LEVEL OF DAYTIME LIGHT

METHOD ..... High level of artificial lighting

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	68	189	257
+2	58	145	203
+1	50	120	170
0	25	69	94
-1	7	41	48
-2	7	32	39
-3	18	30	48
Errors	1	15	16
Total	234	641	875
Mean	1.27	1.25	1.25

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Approximately 30% of all respondents rated this method as very desirable, and the overall mean response of 1.25 indicates that the measure is largely regarded as desirable.

OPTION ... E/4

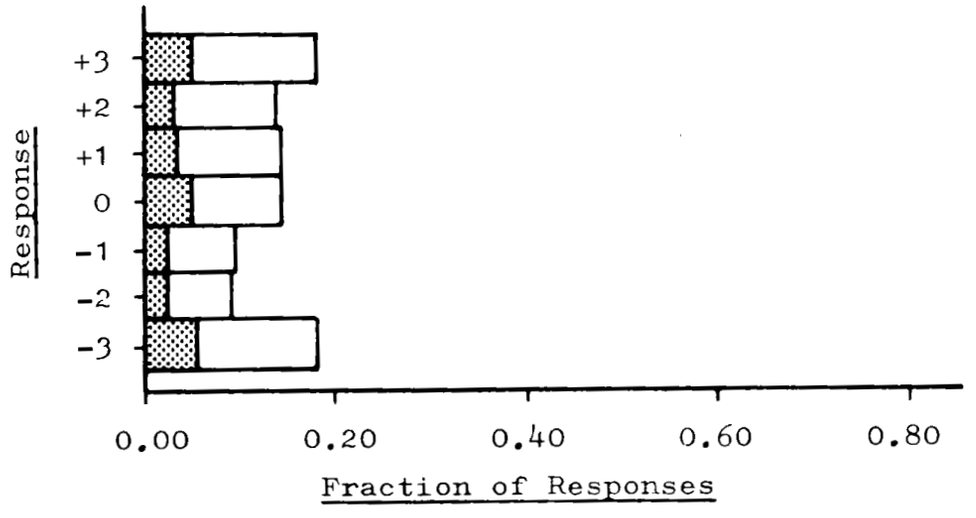
OBJECTIVE ... A HIGH LEVEL OF DAYTIME LIGHT

METHOD ..... Transparent roof panels

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	45	111	156
+2	28	94	122
+1	29	99	128
0	41	85	126
-1	20	64	84
-2	22	58	80
-3	48	116	164
Errors	1	14	15
Total	234	641	875
Mean	0.05	0.15	0.12

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Opinion on the effectiveness of transparent roof panels was clearly varied, as indicated by the shape of the response distributions and the overall mean response of 0.12. Agreement between user and non-user response distributions was quite high.

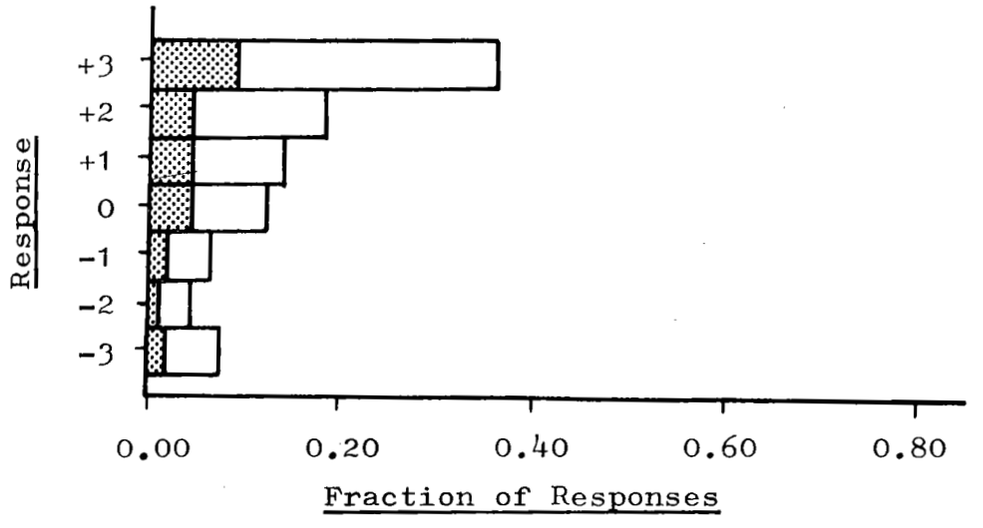
OBJECTIVE ... A HIGH LEVEL OF DAYTIME LIGHT

METHOD ..... Tinted window glass

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	80	236	316
+2	40	120	160
+1	36	88	124
0	36	69	105
-1	16	41	57
-2	8	29	37
-3	16	49	65
Errors	2	9	11
Total	234	641	875
Mean	1.19	1.25	1.23

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The predominant opinion of this method was favourable, as indicated by the overall mean response of 1.23. 37% of all respondents rated this method as very desirable, and agreement between user and non-user response distributions was quite high. The favourable response to this option may result from the fact that it is a passive measure, and is not susceptible to interference and abuse.

OPTION ... F/1

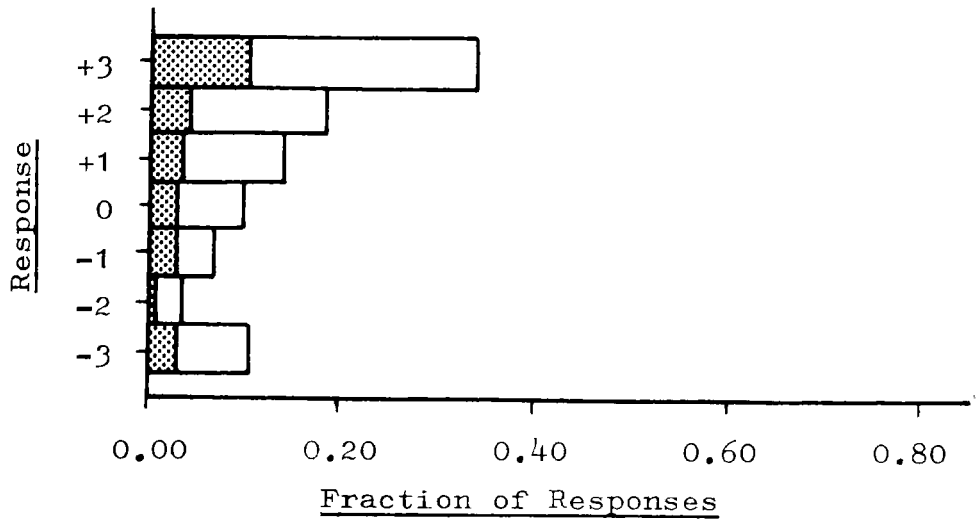
OBJECTIVE ... A SEAT FOR EACH PASSENGER

METHOD ..... Utilise carriage standing space to provide more seats

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	88	214	302
+2	39	119	158
+1	32	93	125
0	24	62	86
-1	12	47	59
-2	8	25	33
-3	27	64	91
Errors	4	17	21
Total	234	641	875
Mean	1.15	1.10	1.11

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response of 1.11 indicates that this method was largely viewed favourably. However, some 11% of all respondents rated this measure very undesirable, possibly because it could be interpreted to imply a longer wait for some passengers to board a train. Agreement between user and non-user response distribution was quite high.

OPTION ... F/2

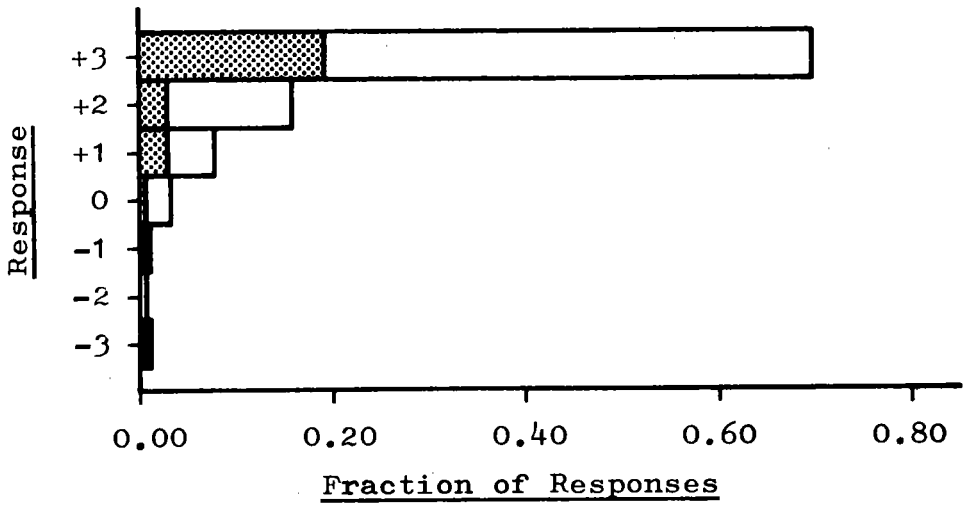
OBJECTIVE ... A SEAT FOR EACH PASSENGER

METHOD ..... Run additional trains in the peak periods

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	167	438	605
+2	28	110	138
+1	23	48	71
0	6	23	29
-1	3	5	8
-2	1	3	4
-3	5	5	10
Errors	1	9	10
Total	234	641	875
Mean	2.40	2.46	2.45

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

70% of all respondents rated this method as very desirable and the overall mean response of 2.45 indicates that the overwhelming body of opinion is in favour of this method.

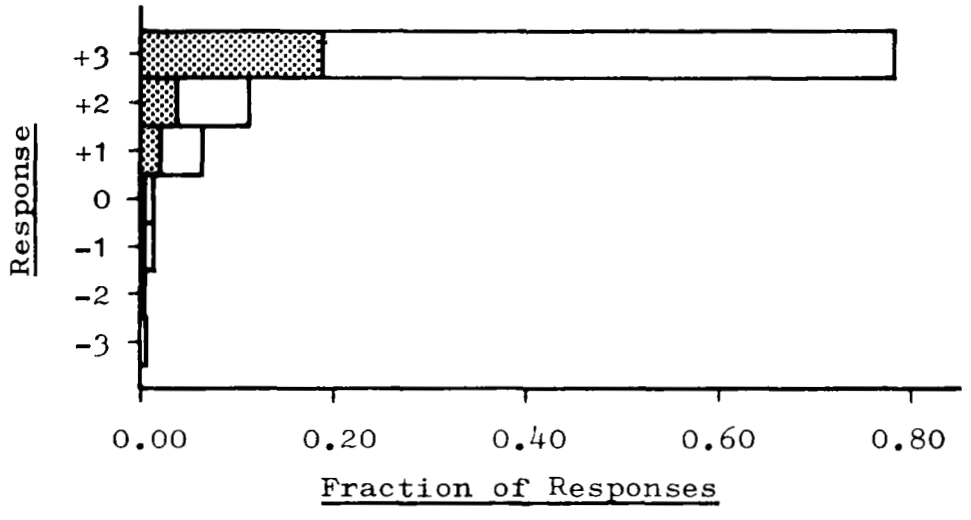
OBJECTIVE ... A HIGH STANDARD OF CARRIAGE CLEANLINESS

METHOD ..... Daily internal cleaning service

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	166	512	678
+2	35	67	102
+1	22	35	57
0	7	8	15
-1	2	4	6
-2	0	2	2
-3	1	4	5
Errors	1	9	10
Total	234	641	875
Mean	2.51	2.67	2.62

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

This method of controlling carriage cleanliness was overwhelmingly considered extremely desirable, with almost 80% of all respondents assigning it a response of +3. The overall mean response of 2.62 bears out this finding.

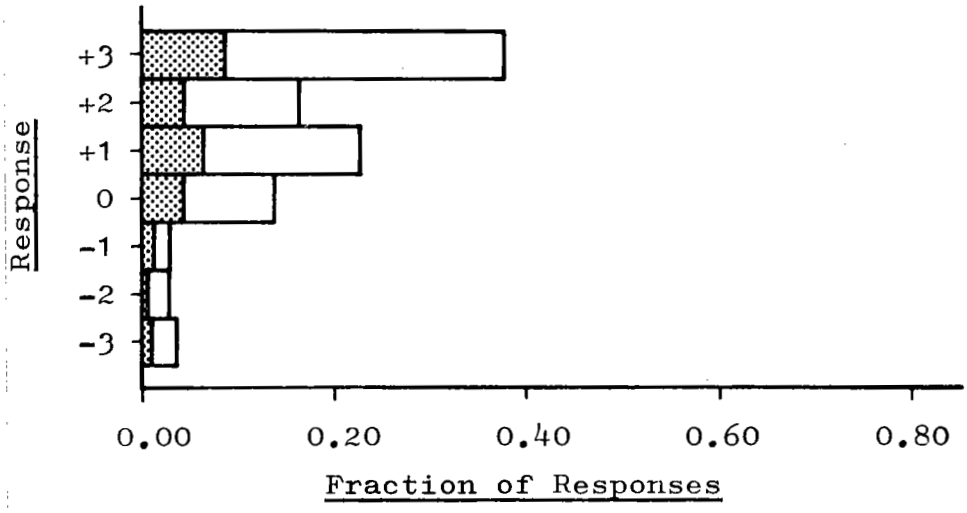
OBJECTIVE ... A HIGH STANDARD OF CARRIAGE CLEANLINESS

METHOD ..... Collection of papers, etc., between trips

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	76	248	324
+2	39	101	140
+1	55	141	196
0	35	85	120
-1	10	16	26
-2	5	18	23
-3	13	17	30
Errors	1	15	16
Total	234	641	875
Mean	1.30	1.57	1.50

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

While this method was predominantly considered desirable, the response distribution is comparatively flat over a reasonable range. Nevertheless, the overall mean response of 1.50 is indicative of general approval of this method.

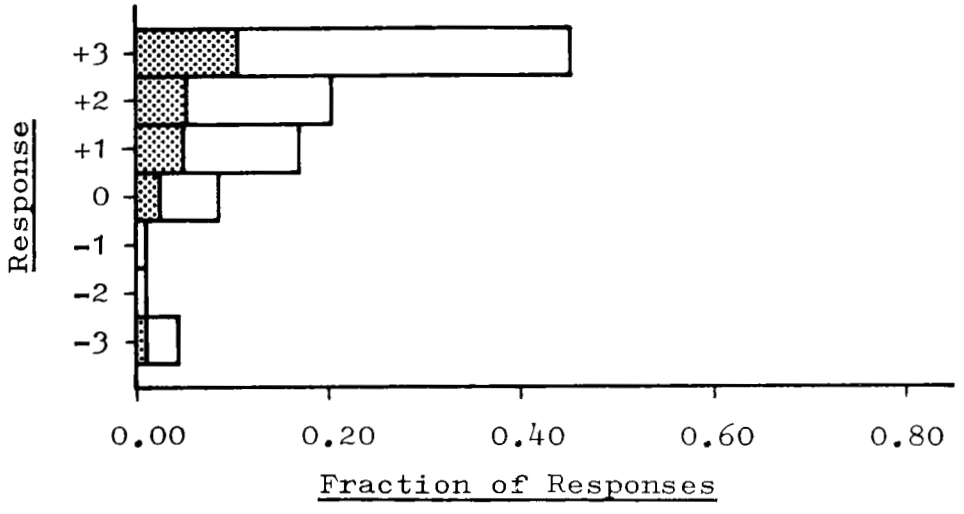
OBJECTIVE ... A HIGH STANDARD OF CARRIAGE CLEANLINESS

METHOD ..... Weekly external cleaning service

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	96	297	393
+2	49	126	175
+1	43	105	148
0	23	56	79
-1	4	8	12
-2	4	9	13
-3	13	25	38
Errors	2	15	17
Total	234	641	875
Mean	1.63	1.83	1.78

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response of 1.78 and the high proportion (almost 50%) of respondents who assigned this method a +3 response indicate that a high standard of external cleanliness is regarded as a desirable measure.

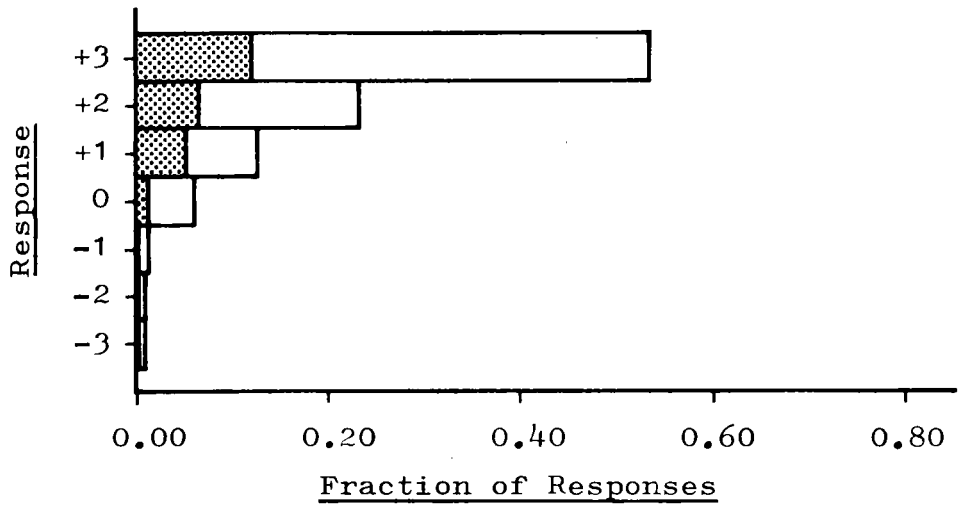
OBJECTIVE ... A HIGH STANDARD OF CARRIAGE CLEANLINESS

METHOD ..... Use of stain resistant materials

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	106	358	464
+2	58	145	203
+1	47	64	111
0	14	40	54
-1	3	11	14
-2	3	6	9
-3	2	7	9
Errors	1	10	11
Total	234	641	875
Mean	2.00	2.19	2.14

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

This method elicited a very favourable response (overall mean of 2.14) and was accorded a +3 response by approximately 54% of all respondents.

OPTION ... G/5

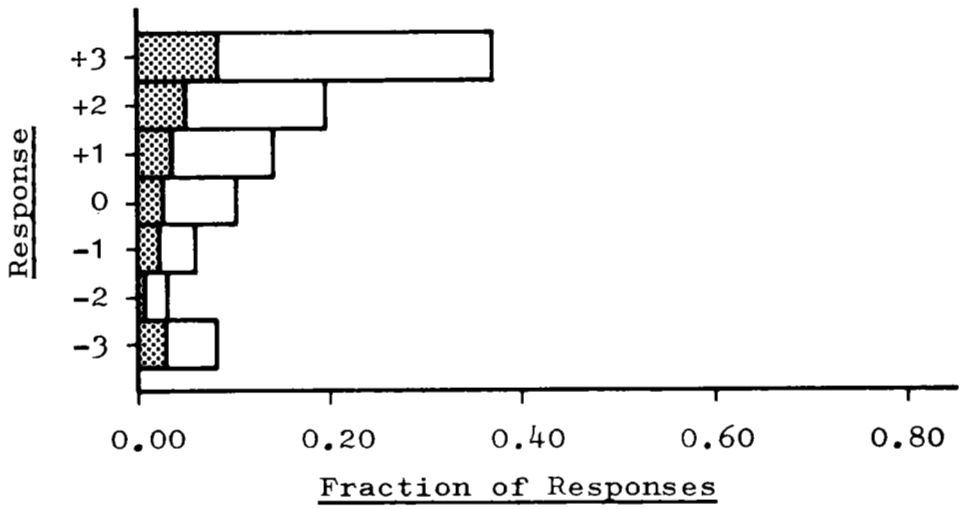
OBJECTIVE ... A HIGH STANDARD OF CARRIAGE CLEANLINESS

METHOD ..... Use of colours which do not show the dirt

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	75	247	322
+2	44	127	171
+1	33	91	124
0	24	67	91
-1	21	33	54
-2	8	22	30
-3	28	45	73
Errors	1	9	10
Total	234	641	875
Mean	0.97	1.38	1.27

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

While almost 40% of all respondents assigned this method a response of +3, the overall mean response was 1.27, which is not notably high. The mean response for users was considerably lower than for non-users, and may reflect a poor opinion of rail travel among non-users.

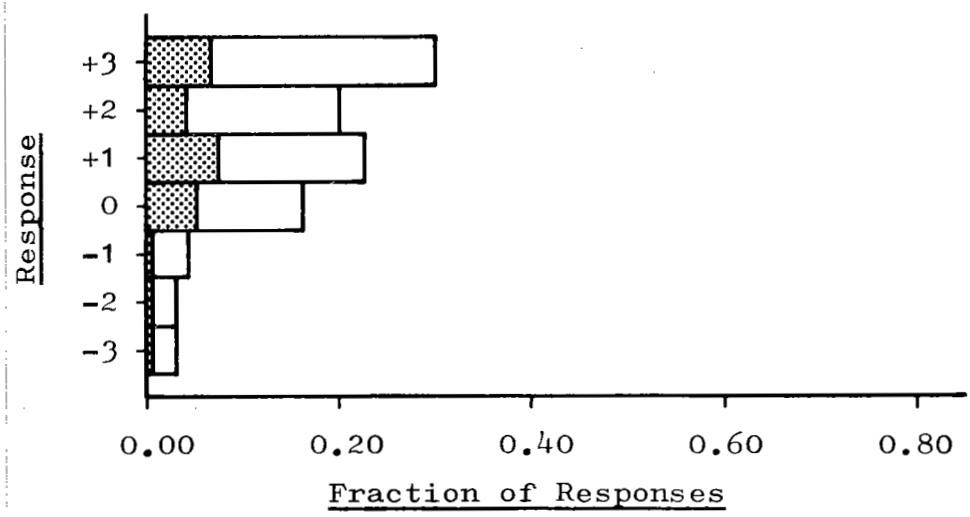
OBJECTIVE ... A HIGH STANDARD OF CARRIAGE CLEANLINESS

METHOD ..... Frequent external painting

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	61	200	261
+2	37	136	173
+1	67	131	198
0	47	95	142
-1	6	30	36
-2	4	19	23
-3	10	18	28
Errors	2	12	14
Total	234	641	875
Mean	1.21	1.40	1.35

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

While the predominant response to this method was favourable, with an overall mean response of 1.35, the distribution of responses is comparatively flat over the range 0 to +3, indicating reasonably wide variations in opinion.

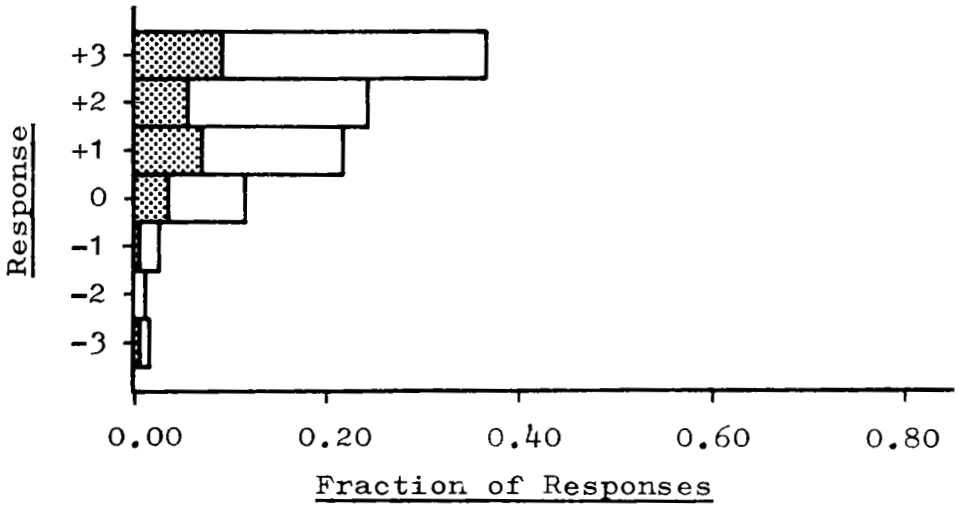
OBJECTIVE ... A HIGH STANDARD OF CARRIAGE CLEANLINESS

METHOD ..... Frequent internal painting

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	80	238	318
+2	51	159	210
+1	60	128	188
0	31	67	98
-1	4	21	25
-2	2	10	12
-3	5	7	12
Errors	1	11	12
Total	234	641	875
Mean	1.63	1.74	1.71

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response to this method was 1.71, with some 37% of all respondents assigning it a response of +3. This method was clearly considered desirable.

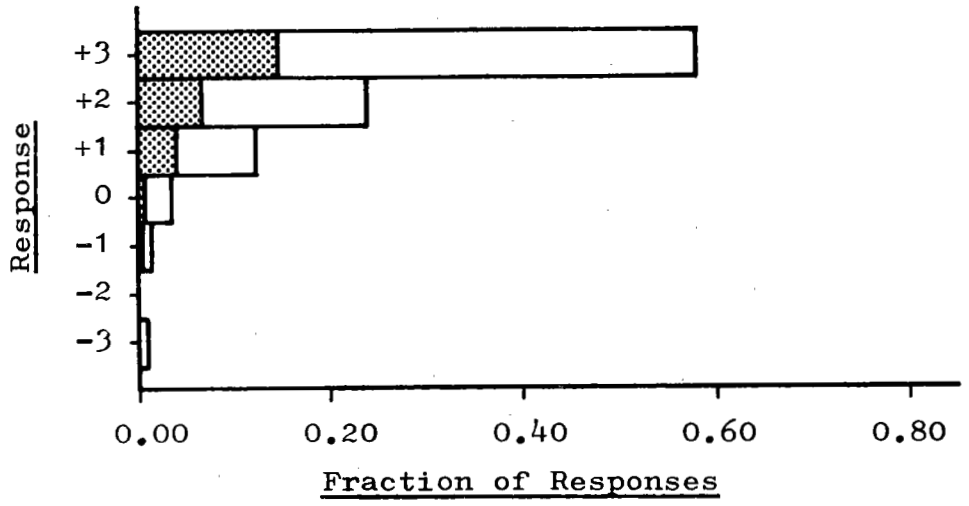
OBJECTIVE ... A HIGH STANDARD OF CARRIAGE CLEANLINESS

METHOD ..... Frequent attention to minor damage

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	127	375	502
+2	59	148	207
+1	35	71	106
0	7	22	29
-1	3	10	13
-2	0	1	1
-3	2	5	7
Errors	1	9	10
Total	234	641	875
Mean	2.25	2.32	2.30

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

This method elicited a very favourable overall mean response of 2.30, with 58% of all respondents assigning it a response of +3. Damage prevention and quick repair of damage must therefore be considered highly desirable.

OPTION ... H/1

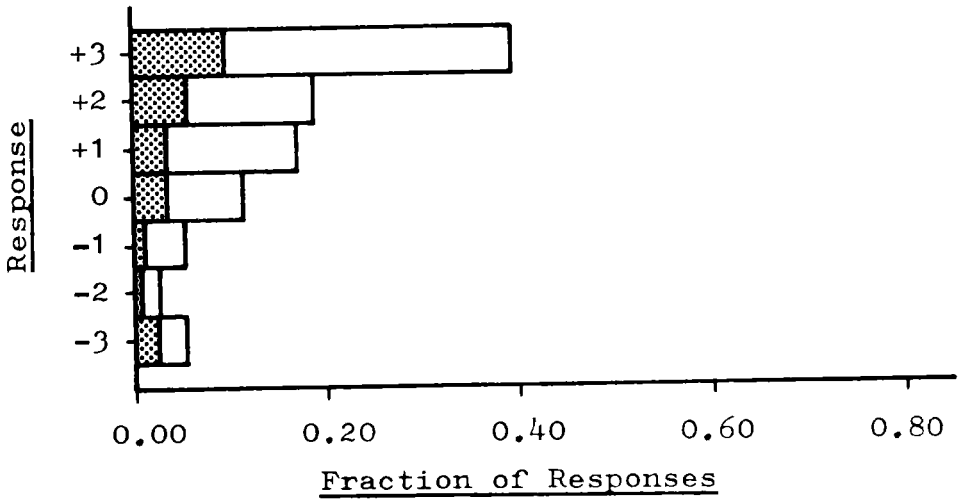
OBJECTIVE ... EXTERNAL APPEARANCE

METHOD ..... State-of-the-Art Car (SOAC)*

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	84	253	337
+2	50	111	161
+1	32	113	145
0	31	66	97
-1	9	35	44
-2	6	16	22
-3	19	27	46
Errors	3	20	23
Total	234	641	875
Mean	1.32	1.52	1.47

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Almost 40% of all respondents assigned this particular design a response of +3. This result is somewhat modified by the overall mean response of 1.47, but the SOAC exterior appearance was clearly considered preferable to the other styles presented.

* Illustrated in questionnaire.

OPTION ... H/2

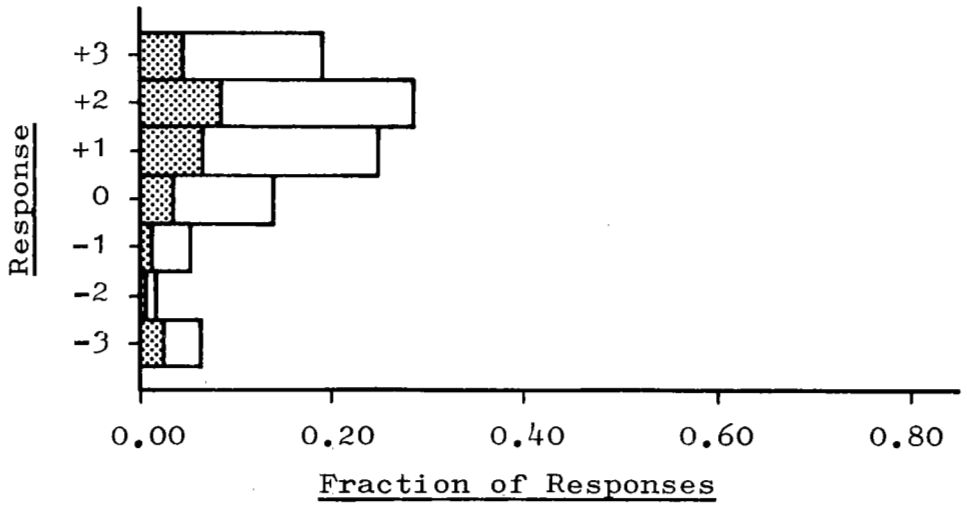
OBJECTIVE ... EXTERNAL APPEARANCE

METHOD ..... Bay Area Rapid Transit (BART) Car*

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	36	125	161
+2	69	172	241
+1	56	156	212
0	31	88	119
-1	13	33	46
-2	5	10	15
-3	21	34	55
Errors	3	23	26
Total	234	641	875
Mean	0.94	1.17	1.10

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response to this design was 1.10, and the distribution of responses is not as notably peaked as for the other options. Only 19% of all respondents assigned this design a respor of +3.

* Illustrated in questionnaire.

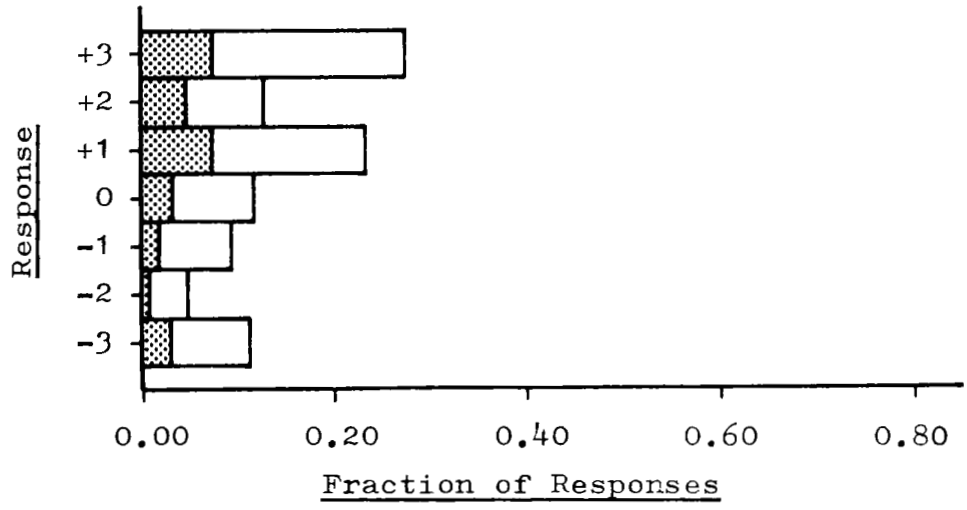
OBJECTIVE ... EXTERNAL APPEARANCE

METHOD ..... Queensland inter-urban rail-car*

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	64	169	233
+2	37	68	105
+1	59	139	198
0	23	75	98
-1	17	64	81
-2	7	33	40
-3	24	73	97
Errors	3	20	23
Total	234	641	875
Mean	0.96	0.70	0.77

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The response to this particular design was quite varied, as shown by the histogram of responses. While some 27% of all respondents rated it as very desirable, the shape of the response distribution, and the overall mean response of 0.77, indicate that it is generally considered only marginally desirable.

* Illustrated in questionnaire.

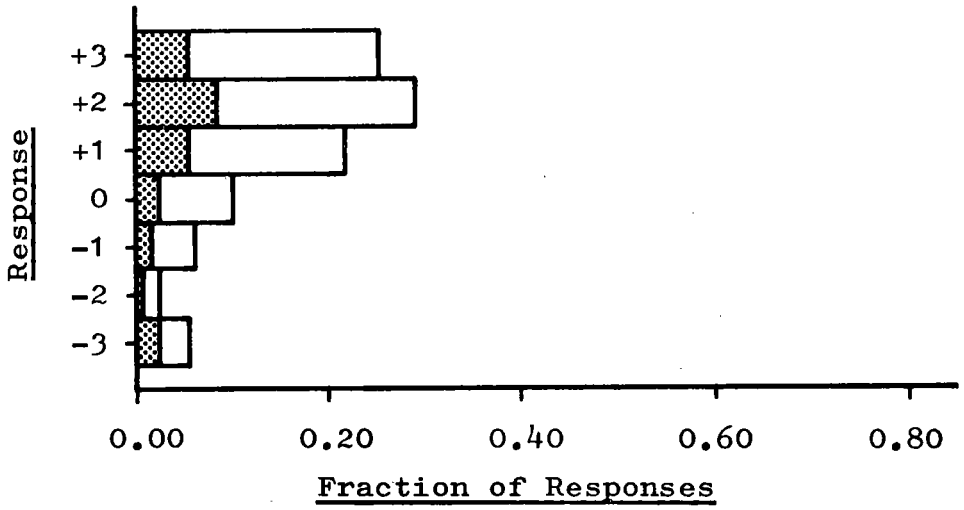
OBJECTIVE ... SEATING LAYOUT

METHOD ..... Longitudinal/transverse arrangement*

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	49	166	215
+2	70	177	247
+1	48	138	186
0	19	66	85
-1	16	35	51
-2	8	13	21
-3	19	27	46
Errors	5	19	24
Total	234	641	875
Mean	1.07	1.36	1.29

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response to this method of arranging seats was 1.29, while some 25% of all respondents assigned it a response of +3. The response distribution was comparatively flat between +1 and +3, indicating generally favourable, but varied, responses.

* Illustrated in questionnaire.

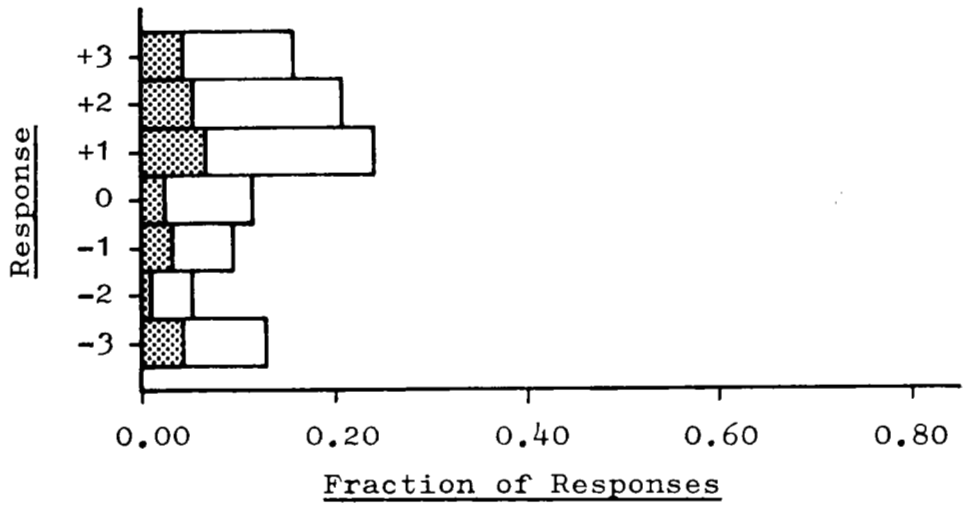
OBJECTIVE ... SEATING LAYOUT

METHOD ..... Longitudinal arrangement*

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	37	99	136
+2	47	132	179
+1	58	146	204
0	20	78	98
-1	25	56	81
-2	7	37	44
-3	34	73	107
Errors	6	20	26
Total	234	641	875
Mean	0.54	0.58	0.57

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response to this method was 0.57, which indicates that it was regarded as only marginally desirable. There is slight evidence of bimodality in the response distribution, with 16% of respondents rating it +3, and almost 13% rating it -3.

* Illustrated in questionnaire.

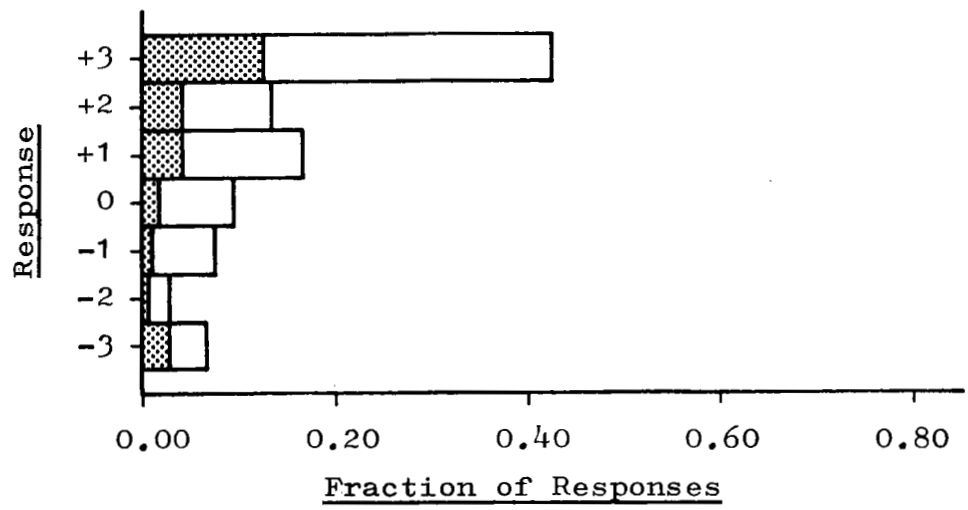
OBJECTIVE ... SEATING LAYOUT

METHOD ..... Transverse arrangement*

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	108	254	362
+2	34	83	117
+1	35	106	141
0	15	68	83
-1	8	58	66
-2	6	17	23
-3	23	37	60
Errors	5	18	23
Total	234	641	875
Mean	1.48	1.33	1.37

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Almost 43% of respondents assigned this seating layout a response of +3, and the overall mean response was 1.37. This method was considered comparatively desirable and was the most favoured of the three alternatives evaluated.

* Illustrated in questionnaire.

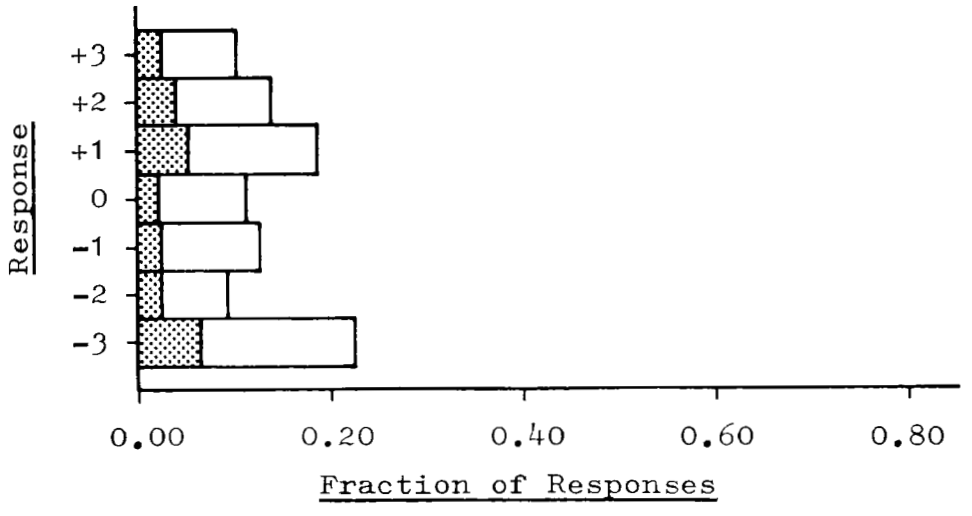
OBJECTIVE ... SEAT DESIGN

METHOD ..... Bench seat (individual pads)*

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	27	62	89
+2	36	84	120
+1	47	118	165
0	18	81	99
-1	25	81	106
-2	24	58	82
-3	53	137	190
Errors	4	20	24
Total	234	641	875
Mean	-0.14	-0.22	-0.20

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The response distribution for this option was quite flat, with slight evidence of bimodality. This particular design elicited a mean response of -0.20, which indicated that it was predominantly considered undesirable.

* Illustrated in questionnaire.

OPTION ... J/2

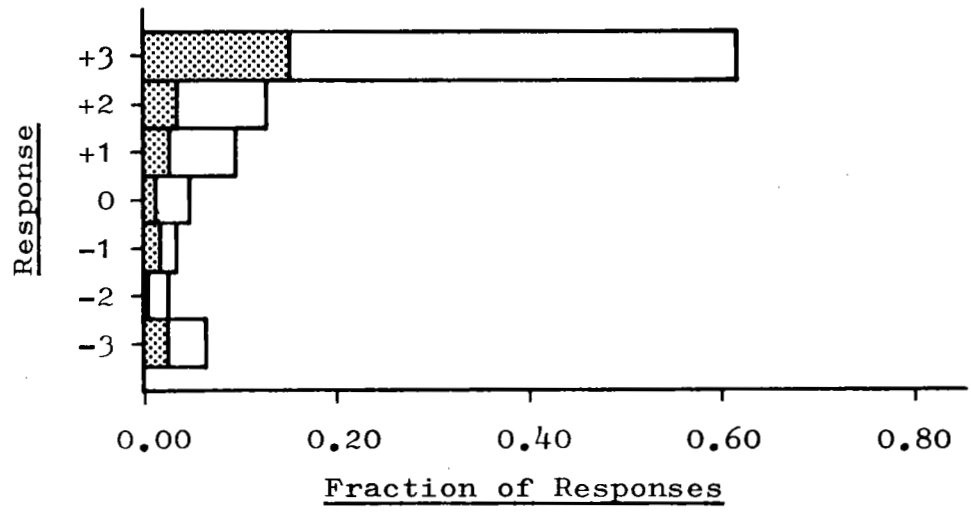
OBJECTIVE ... SEAT DESIGN

METHOD ..... Divided seats*

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	130	401	531
+2	31	74	105
+1	22	58	80
0	13	28	41
-1	13	16	29
-2	4	18	22
-3	20	34	54
Errors	1	12	13
Total	234	641	875
Mean	1.69	2.00	1.91

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

General response to this design was very favourable, with almost 62% of all respondents according it a response of +3. This is reinforced by the overall mean response of 1.91. Divided seating is clearly considered highly desirable, and is clearly the best of the three alternatives evaluated.

* Illustrated in questionnaire.

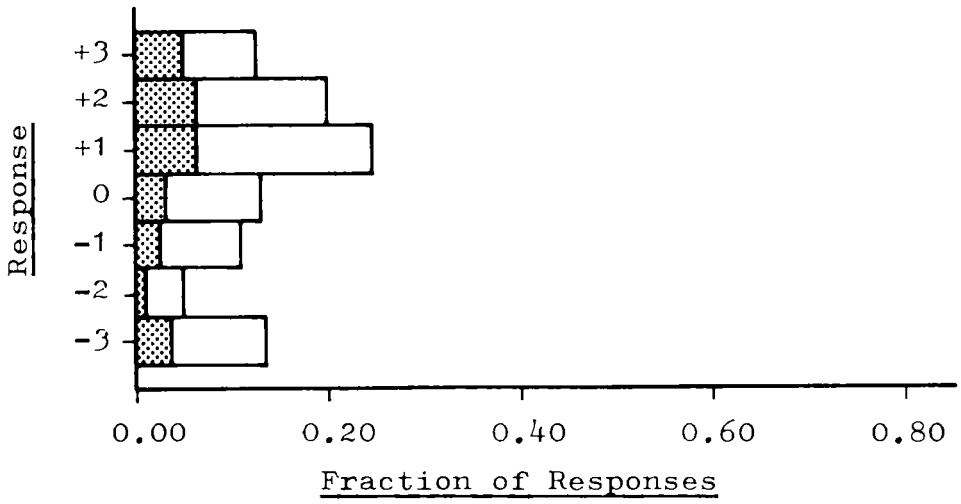
OBJECTIVE ... SEAT DESIGN

METHOD ..... Bench seat*

DISTRIBUTION OF RESPONSES

Response	Train Users	Non-Users	All
+3	41	66	107
+2	51	119	170
+1	51	158	209
0	29	86	115
-1	21	70	91
-2	8	34	42
-3	29	89	118
Errors	4	19	23
Total	234	641	875
Mean	0.66	0.30	0.40

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

This type of seat was considered only marginally desirable, and the response distribution was comparatively flat. The overall mean response was 0.40.

*Illustrated in questionnaire.

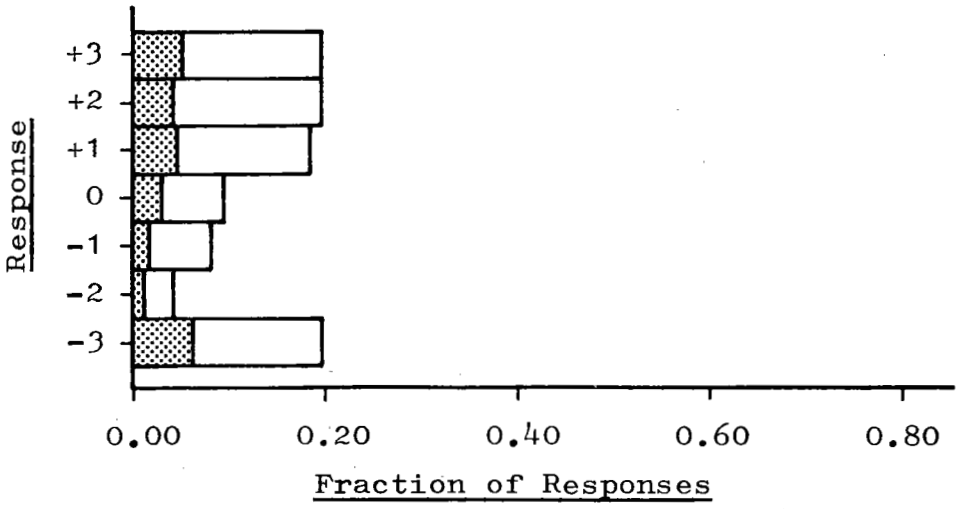
OBJECTIVE ... SUPPORT FOR STANDING PASSENGERS

METHOD ..... Overhead straps*

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	45	124	169
+2	38	133	171
+1	41	117	158
0	24	55	79
-1	17	54	71
-2	12	25	37
-3	54	115	169
Errors	3	18	21
Total	234	641	875
Mean	0.21	0.49	0.42

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

The overall mean response of 0.42 indicates that this method was considered only marginally desirable. There is some evidence of bimodality in the response distribution. This response would probably be reinforced if responses from other sectors of the community (i.e. non-work-force) were available.

* Illustrated in questionnaire.

OPTION ... K/2

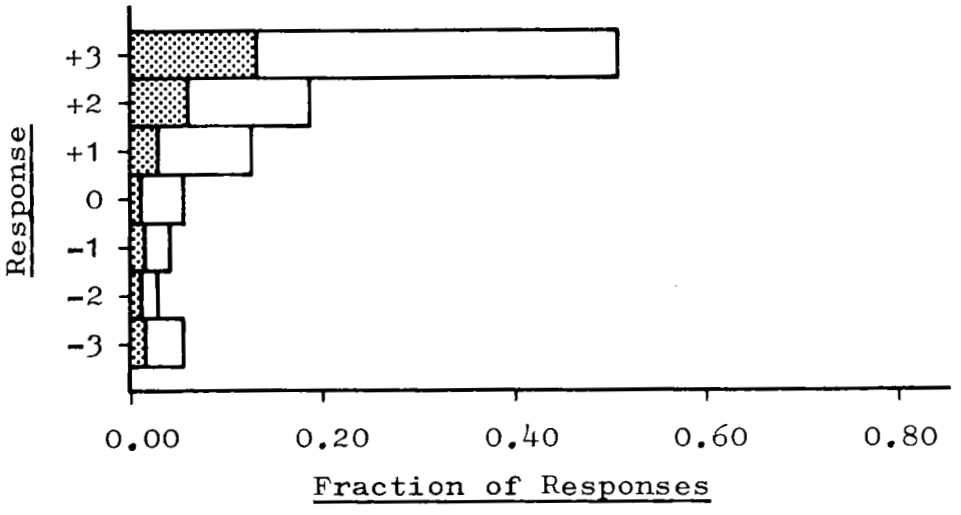
OBJECTIVE ... SUPPORT FOR STANDING PASSENGERS

METHOD ..... Waist-height bars*

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	112	325	437
+2	51	111	162
+1	25	80	105
0	7	41	48
-1	15	20	35
-2	8	17	25
-3	15	34	49
Errors	1	13	14
Total	234	641	875
Mean	1.66	1.79	1.75

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

This method was generally regarded as the most favourable of the alternatives evaluated. The overall mean response was 1.75 and over 50% of all respondents assigned this method a response of +3.

* Illustrated in questionnaire.

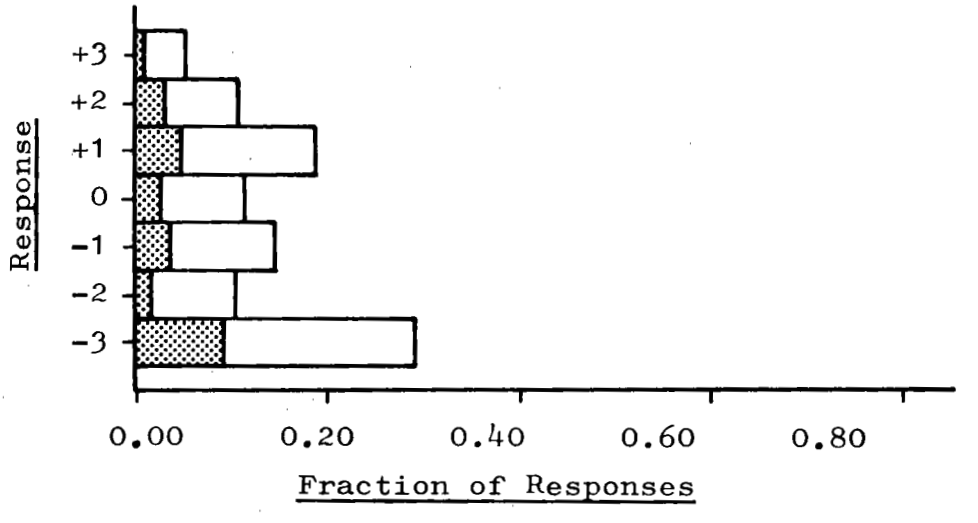
OBJECTIVE ... SUPPORT FOR STANDING PASSENGERS

METHOD ..... Overhead bars*

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	11	34	45
+2	30	59	89
+1	42	119	161
0	22	74	96
-1	32	93	125
-2	18	72	90
-3	76	170	246
Errors	3	20	23
Total	234	641	875
Mean	-0.70	-0.66	-0.67

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Almost 30% of all respondents rated this method -3, and its general undesirability is demonstrated by the unfavourable overall mean response of -0.67.

* Illustrated in questionnaire.

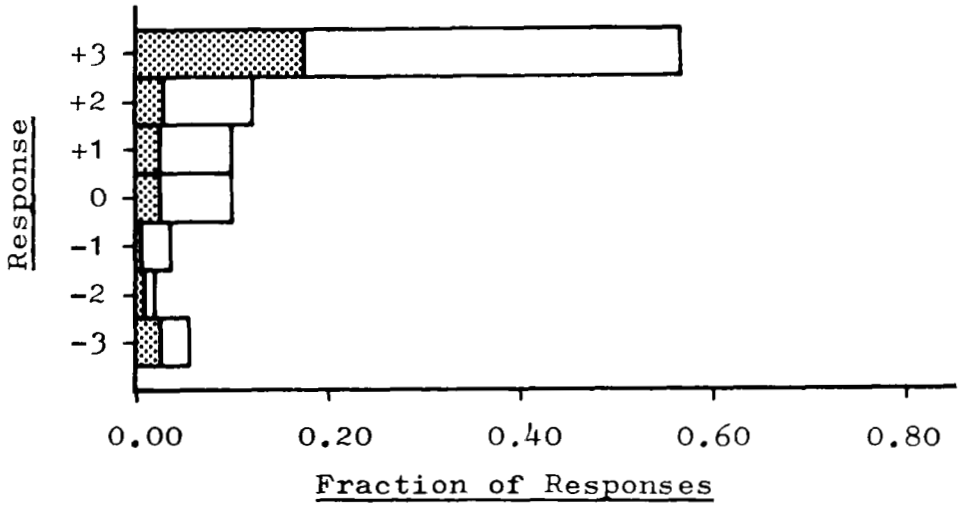
OBJECTIVE ... IMPROVE RAIL TRAVEL

METHOD ..... Restricted areas in carriages for smoking

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	134	355	489
+2	22	82	104
+1	22	63	85
0	20	65	85
-1	6	27	33
-2	7	10	17
-3	20	28	48
Errors	3	11	14
Total	234	641	875
Mean	1.68	1.84	1.80

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Almost 60% of all respondents rated this method as very desirable, and the overall mean response to the question was 1.80. In general, it is clear that restricted smoking areas are considered highly desirable. In fact, response to this option is sufficiently strong to warrant consideration of a complete ban on smoking in trains, as implemented in some new overseas systems.

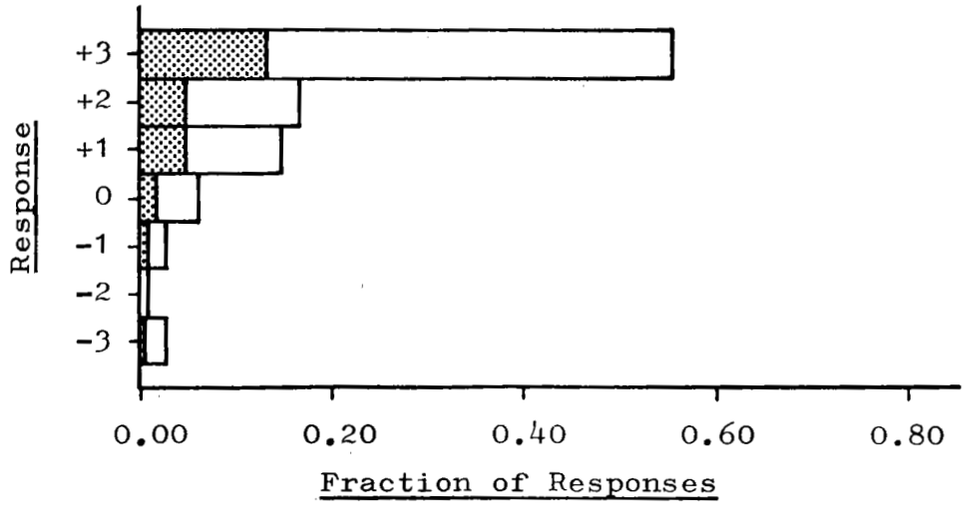
OBJECTIVE ... IMPROVE RAIL TRAVEL

METHOD ..... Railway staff on trains to control vandals

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	118	360	478
+2	42	104	146
+1	42	88	130
0	17	36	53
-1	5	18	23
-2	3	6	9
-3	3	19	22
Errors	4	10	14
Total	234	641	875
Mean	2.00	2.04	2.03

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Some 56% of all respondents rated this method as very desirable, and the overall mean response was 2.03. These results appear to reflect general approval of active efforts to minimise vandalism. They may also reflect increasing concern for public safety in trains.

OPTION ... L/3

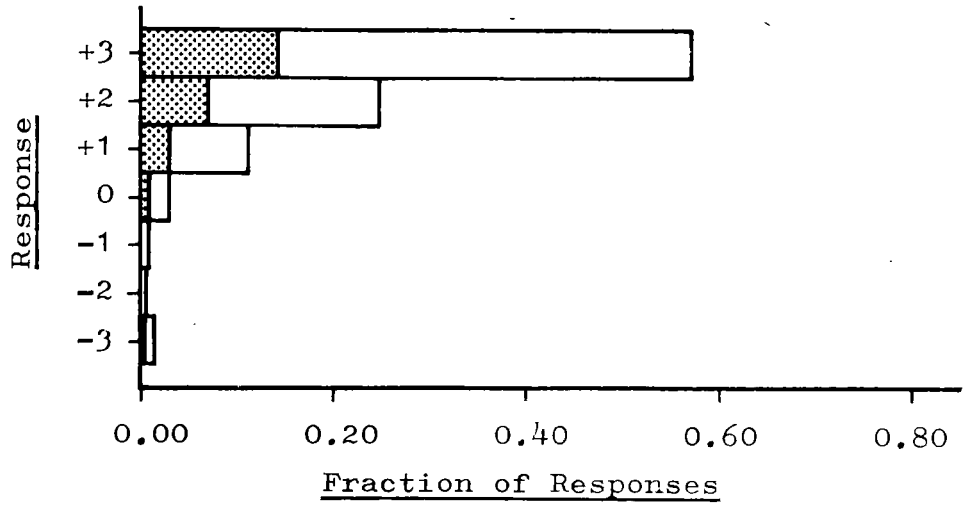
OBJECTIVE ... IMPROVE RAIL TRAVEL

METHOD ..... Wall racks or space under seats for baggage

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	122	368	490
+2	61	151	212
+1	27	73	100
0	10	17	27
-1	2	7	9
-2	3	1	4
-3	6	9	15
Errors	3	15	18
Total	234	641	875
Mean	2.12	2.31	2.25

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Over 57% of all respondents rated this method as very desirable, and the overall mean response was 2.25. These results indicate that considerable importance is attached to provision of space for baggage.

OPTION ... L/4

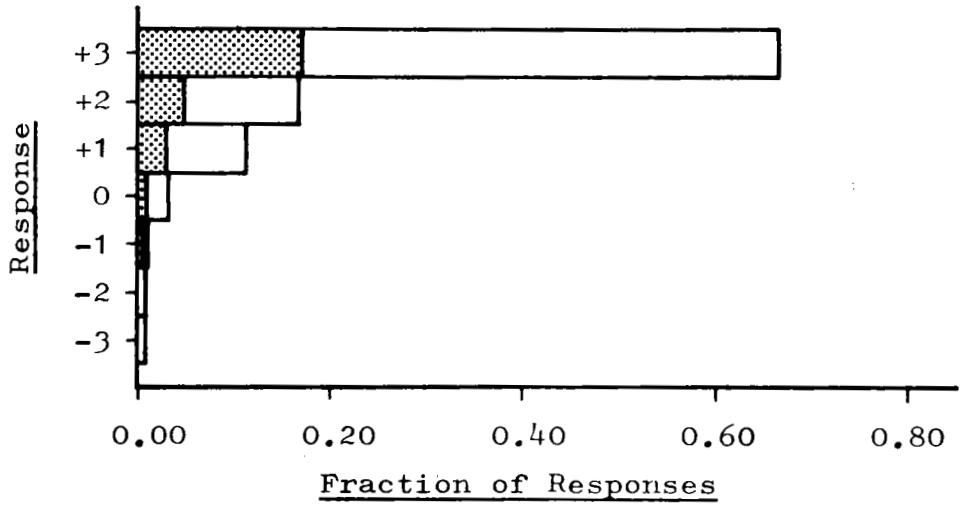
OBJECTIVE ... IMPROVE RAIL TRAVEL

METHOD ..... Space on each train for strollers and wheel chairs

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	145	422	567
+2	39	105	144
+1	31	66	97
0	10	19	29
-1	3	4	7
-2	2	3	5
-3	1	7	8
Errors	3	15	18
Total	234	641	875
Mean	2.31	2.41	2.39

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Over 66% of all respondents rated this method as very desirable, and the overall mean response was 2.39.

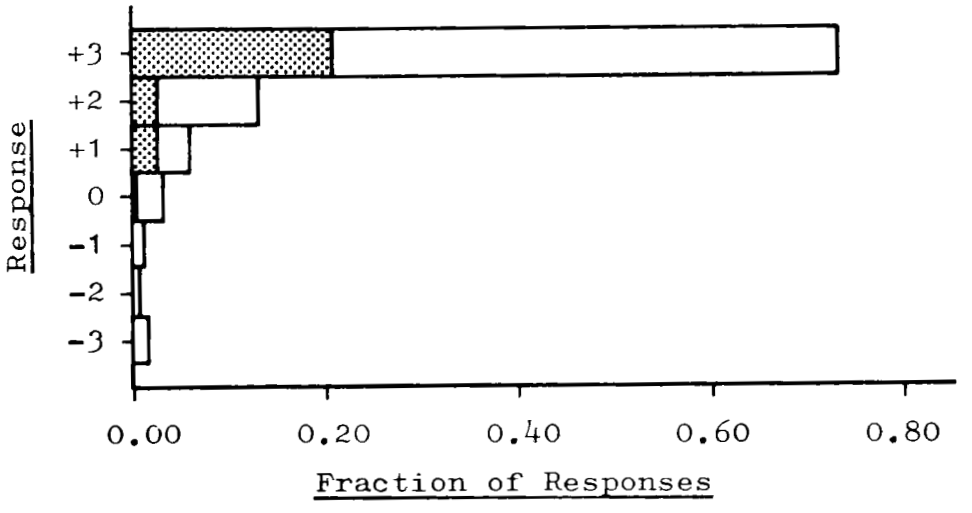
OBJECTIVE ... A MODERN, STYLISH CARRIAGE EXTERIOR

METHOD ..... Aluminium or stainless steel outside finish

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	175	447	622
+2	23	93	116
+1	20	32	52
0	6	24	30
-1	2	9	11
-2	0	2	2
-3	2	14	16
Errors	6	20	26
Total	234	641	875
Mean	2.56	2.42	2.46

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

Over 73% of all respondents rated this method as very desirable, and the overall mean response was the very high value of 2.46. These results reflect high acceptance of this type of finish. Further information on this topic is given in Annex G.

OPTION ... M/2

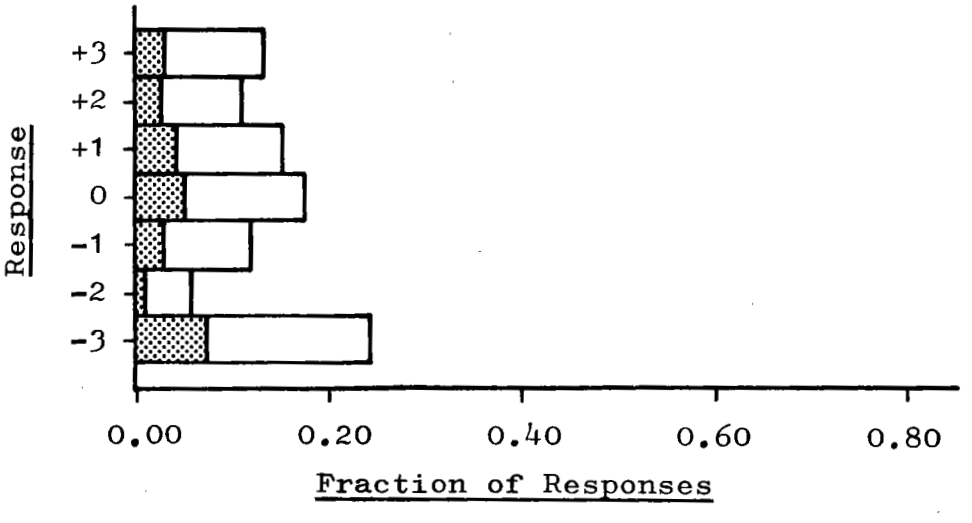
OBJECTIVE ... A MODERN, STYLISH CARRIAGE EXTERIOR

METHOD ..... Painted carriage exterior

DISTRIBUTION OF RESULTS

Response	Train Users	Non-Users	All
+3	28	82	110
+2	22	69	91
+1	35	92	127
0	41	107	148
-1	23	78	101
-2	11	38	49
-3	65	142	207
Errors	9	33	42
Total	234	641	875
Mean	-0.34	-0.17	-0.22

HISTOGRAM OF RESULTS (Shaded area represents train users)



COMMENTS ON RESULTS

This method was considered marginally undesirable, as shown by the overall mean response of -0.22. The distribution of responses was fairly flat, with some indication of bimodality. Almost 25% of all respondents rated this method as very undesirable. Further information on this topic is given in Annex G.

ANNEX G

COLOUR SCHEME PREFERENCES

In Questions 6(a) and 6(m) of the survey questionnaire, respondents were asked to list their preferences for interior and exterior rail-car colours. Although the colour question is perhaps significantly less important than other questions raised by the survey, it is, nonetheless, a part of public opinion on rail-car design, and accordingly is examined in this Annex. Replies to these colour questions were coded into ten colour groups. Where respondents provided several colour choices, only the first choices were considered. Preferences for interior colours are presented in Table G.1, while exterior colour preferences are presented in Table G.2.

In order to test the hypothesis that these colour preference distributions were identical for users and non-users, they were subjected to a Chi-square test similar to that used for design option analysis. For interior colour preferences, the result was $p = 0.186$, which indicates that it is possible that user and non-user preference distributions were dissimilar. For exterior colour preferences, the value $p = 0.025$ indicates that it is quite likely that the distributions were different.

The preferences for interior/exterior colour combinations for users are shown in Table G.3. Similar preference distributions for non-users and all respondents are shown in Tables G.4 and G.5.

COMMENT ON COLOUR PREFERENCES

There appears to be a clear preference for aluminium or stainless steel carriage exteriors, based on the colour preferences of all respondents. Greens and blues appear to dominate in choices of interior colours. However, while these colours are highly regarded in isolation, choices for combinations of exterior and interior colour schemes are not so well-defined (as shown in Table G.5).

TABLE G.1 - INTERIOR COLOUR PREFERENCES

Colour	Users	Non-Users	All
Cream/White	29	67	96
Red	2	9	11
Maroon	0	3	3
Gold/Yellow	4	18	22
Green	31	106	137
Blue	48	122	170
Grey	7	10	17
Neutral (fawn, beige, etc.)	9	43	52
Pastel shades	16	42	58
Others and "don't care"	36	82	118
No choice expressed	52	139	191
TOTAL	234	641	875

TABLE G.2 - EXTERIOR COLOUR PREFERENCES

Colour	Users	Non-Users	All
Cream/White	4	43	47
Red	7	11	18
Maroon	5	7	12
Green	22	54	76
Blue	34	91	125
Grey	3	19	22
Brown	6	12	18
Silver, aluminium, stainless steel	70	202	272
Pastel shades	3	18	21
Others and "don't care"	21	61	82
No choice expressed	59	123	182
TOTAL	234	641	875

TABLE G.3 - INTERIOR/EXTERIOR COLOUR COMBINATION PREFERENCES (USERS)

Exterior Colour	Interior Colour											
	Cream/ White	Red	Maroon	Gold/ Yellow	Green	Blue	Grey	Neutral	Pastel	Other	No Choice	Total
Cream/White	1	0	0	0	0	1	0	0	0	0	2	4
Red	0	0	0	1	0	4	0	0	0	0	2	7
Maroon	0	0	0	0	1	1	0	1	0	1	1	5
Green	3	0	0	0	6	5	3	0	1	2	2	22
Blue	7	1	0	0	4	12	1	1	1	3	4	34
Grey	1	0	0	0	1	0	0	0	0	0	1	3
Brown	2	0	0	0	1	3	0	0	0	0	0	6
Silver, etc	9	1	0	2	9	16	2	6	5	15	5	70
Pastel	1	0	0	0	0	0	0	0	0	1	1	3
Other, etc	1	0	0	0	1	2	0	1	4	7	5	21
No choice	4	0	0	1	8	4	1	0	5	7	29	59
TOTAL	29	2	0	4	31	48	7	9	16	36	52	234

TABLE G.4 - INTERIOR/EXTERIOR COLOUR COMBINATION PREFERENCES (NON-USERS)

Exterior Colour	Interior Colour											
	Cream/ White	Red	Maroon	Gold/ Yellow	Green	Blue	Grey	Neutral	Pastel	Other	No Choice	Total
Cream/White	7	0	1	1	11	6	0	5	1	3	8	43
Red	1	2	1	0	2	2	0	0	0	1	2	11
Maroon	2	0	0	0	0	2	0	1	1	0	1	7
Green	9	1	0	2	12	8	1	2	5	4	10	54
Blue	15	3	1	2	12	27	3	5	2	13	8	91
Grey	1	0	0	0	6	7	0	0	0	0	5	19
Brown	0	0	0	0	5	1	0	3	0	0	3	12
Silver, etc	24	3	0	6	40	41	3	13	18	23	31	202
Pastel	4	0	0	1	0	2	1	3	4	2	1	18
Other, etc	1	0	0	3	8	10	1	4	2	24	8	61
No choice	3	0	0	3	10	16	1	7	9	12	62	123
TOTAL	67	9	4	18	106	122	10	43	42	82	139	641

TABLE G.5 - INTERIOR/EXTERIOR COLOUR COMBINATION PREFERENCES (ALL RESPONDENTS)

Exterior Colour	Interior Colour											
	Cream/ White	Red	Maroon	Gold/ Yellow	Green	Blue	Grey	Neutral	Pastel	Other	No Choice	Total
Cream/White	8	0	1	1	11	7	0	5	1	3	10	47
Red	1	2	1	1	2	6	0	0	0	1	4	18
Maroon	2	0	0	0	1	3	0	2	1	1	2	12
Green	12	1	0	2	18	13	4	2	6	6	12	76
Blue	22	4	1	2	16	39	4	6	3	16	12	125
Grey	2	0	0	0	7	7	0	0	0	0	6	22
Brown	2	0	0	0	6	4	0	3	0	0	3	18
Silver, etc	33	4	0	8	49	57	5	19	23	38	36	272
Pastel	5	0	0	1	0	2	1	3	4	3	2	21
Other, etc	2	0	0	3	9	12	1	5	6	31	13	82
No choice	7	0	0	4	18	20	2	7	14	19	91	182
TOTAL	96	11	3	22	137	170	17	52	58	118	191	875