IPENZ Transport Conference 2005 - Auckland

Cycle For Science

Developing a Predictive LoS Model to Assess Cycle Facilities in New Zealand

Urie Bezuidenhout - MSc. (Eng.)
Senior Transport Planner and Traffic Engineer
Tel 021 367516

Co-authored by Tim Hughes and Andrew Macbeth

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Abstract

The result of the first 3 phases of an ongoing research project will be presented. (pilot, main data collection and preliminary data analysis)

MWH, on behalf of Land Transport NZ, is researching people's perceptions as cyclists of different kinds of roads and cycling facilities. Participants cycle on a sample of different city streets and cycle paths, recording their perceptions of the facilities.

The main objective is to understand which features influence the use and attractiveness of a cycle facility and then to develop a statistical predictive model. This model can be used to evaluate the existing Level of Service (LoS) of a facility and help design suitable facilities based on the demographic properties of a population that would use them.

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1. Introduction:

This study was initiated by Land Transport New Zealand "… .*to research cyclist perceptions of the cycling environment with a view to providing a tool for rating how well provision for cyclists meets their needs*". The ultimate outcome will be a predictive tool based on measurable attributes that estimates the perceived level of service or cycle friendliness of a cycling facility to cyclists. This would permit better-informed choices when planning and designing for cyclists.

Cyclists views of different kinds of roads and cycling facilities were researched to help understand cyclists' preferences and to help build a model so that traffic engineers would be able to predict the level of service of different kinds of infrastructure for cyclists, for any given geometric and traffic characteristics.

The work has focused initially on mid-block sections of roads, some of which included cycle lanes. Other components of the cycling environment including intersections and off-road paths have been tested but further work is needed for these aspects of the research.

Over the past few years a number of studies have been undertaken in the UK and USA to develop a predictive level of service model based on users perceptions and the physical characteristics of cycling facilities. The current research set out to investigate:

- If NZ cyclists held different perceptions about cycling facilities from overseas cyclists,
- To determine the repeatability of the overseas research results and models.
- To determine if the overseas model can be transferred or adapted to local conditions.

MWH was commissioned to undertake the research and proposed the following components of the research work.

- To collect a statistically relevant sample of users' responses for a variety of cycling facilities and traffic conditions.
- To determine whether cyclists with traffic engineering or transport planning technical expertise or cycling advocates vary in perception from the general population

- To determine differences in perception in different parts of New Zealand
- To understand any other influencing factors not previously discovered in the overseas research
- To build an exploratory predictive model.

2. Previous work

As a precursor to this research previous studies undertaken by various overseas researchers are summarised below.

TRL Report 490, UK:

The research undertaken by Guthrie et al, at Transport Research Laboratories in the UK used a sample of 51 cyclists cycling an instrumented bicycle on a 9.2 km course divided into 11 links. The links were roads surrounding the TRL laboratory and were narrower than those typically found in New Zealand. The cyclists evaluated each section with a score from 1 to 10. These subjective scores were combined with real-time objective road and traffic data. The research showed that the most important features in predicting cyclists' preferences were:

- safety,
- pleasure and,
- smooth road surface to be the most important contributors to overall ratings.

It also showed that a subjective assessment of "cyclability" could be made from easily measured traffic and carriageway conditions such as:

- Vehicle speeds,
- Lane width
- Gradient
- Side turnings - (driveways etc)

It appeared that gender, age and cycling experience did not influence the scores unduly.

Transportation Research Board TRR 1578, USA:

Bruce Landis in Florida, USA, used 150 subjects to rate different cycling facilities over a 27-km urban course divided into 30 near-equal lengths. These facilities had an extensive cross-section of different features representative of collector and arterial streets in North America. The participants evaluated cycle facilities on a six-point scale from best to worst (A to F) on how well they were served as they travelled each segment.

The model developed by Landis is based upon the following variables:

- Volume of traffic (kerbside lane)
- Speed limit (surrogate for actual speed)
- Percentage of HCV's
- Frequency of uncontrolled access (driveways and kerbside parking)
- Pavement surface condition
- Effective width available for cycling (including presence of cycle lane)
- Cycle lanes
- On street parking

Cross traffic generation had little effect.

Two other aspects resulted from Landis' work in that pavement surface conditions appeared to significantly influence participants' perceptions. This aspect made him caution against the use of simulated or video based assessments unless these are calibrated against actual conditions. Despite the varied routes, low correlations and high cross-correlations between some variables resulted in the exclusion of kerb presence, delay at controlled junctions and number of lanes,

Landis has repeated this exercise for cyclist travelling straight through intersections. The volume of turning traffic had to be excluded because it was so highly correlated with through traffic because turning traffic was an almost constant proportion of through traffic.

This highlights the importance of orthogonal experimental design. When data is orthogonal each variable varies in relation to each other variable. For instance with participants we would need a mix of gender, age and experience. If all male riders were old and experienced and all female riders young and inexperienced, we would not be able to distinguish the effects of experience from gender.

3. Methodology

The research methodology used by MWH was developed to produce precision and reproducible results by way of:

- Design of the experiment
- Sample and effect size determination
- Design of the questionnaire survey form
- Data collection using pre-, during and post-survey questions
- Exploratory statistical analysis
- Building a comparative Linear Regression Model

The methodology was designed around developing an experimental design similar to that used in the overseas studies. Routes of varying quality were selected to represent typical good and bad facilities, which had known traffic and geometric data that could be correlated to the cyclist's perception scores.

The methodology developed for the analysis was centred on gaining an understanding of the data in the first instance. The preliminary regression model build attempted as an exploratory step to compare the NZ model to other research using the same model form. It would also inform the next phase that will deal with this aspect in more detail.

Experimental Design:

The experimental design was centred on identifying a cross- section of cycle facilities that was thought to range from bad to good. It was also decided to undertake the experiment in 4 to 5 stages, which would include:

- A pilot study - Christchurch
- Stage 1 data collection - Christchurch - routes 1 and 2
- Stage 2 data collection - Christchurch - routes 3 and 4
- Stage 3 data collection - Nelson - route 5
- Stage 4 data collection - Wellington (to be confirmed)
- Stage 5 data collection - Auckland (to be confirmed)

Christchurch is well known in NZ for having a large number of cycle facilities. As the client representative (Tim Hughes) and the MWH project manager (Andrew Macbeth) are intimately familiar with cycle facilities in Christchurch, thus they were able to select an initial sample that would provide a good degree of orthogonality for an experiment. Any deficiencies in achieving an orthogonal design were augmented by the stage 2 data collection.

Data collection was split into 5 main influence categories (4 independent and 1 dependent variable) to determine user perceptions against possible bias factors namely:

Independent variables:

- Demographic variables such as gender, age, and membership of special interest groups etc.
- Participant attitudes such as local knowledge, competence, recent experience and overall cycling attitude
- Experimental conditions such as type of cycle, suspension.
- Physical infrastructure attributes such as type of facility, cycle lane markings, available widths, volumes and mix of traffic, parking etc.
- Other bias variables such as post-survey attitude towards cycling

Dependent variables:

- Perception scores using an Overall Perception score that may or may not be an aggregate of 4 sub-perceptions scores of Delay, Safety, Surface condition and Attractiveness.

Each of the variables is measured at different levels in a mixture of nominal, scale and categorical data. The perceptions score are an ordinal scale using a 6-point Likert scale,from -3 for very bad to +3 for very good with no zero, rather than the usual 5 or 7 point used in social studies. This was intentional to provide:

- a forced-choice (non-neutral) response scale
- to match the six point A-F rating scaling used in previous international research studies (Landis)
- to be compatible in terms of standard Level-of-Service (LoS) assessment scale which is a 6 point qualitative scale used to describe transport facilities using the Highway Capacity Methodology developed by the US Transportation Research Board. This LoS concept is used in countries such as the USA, Australia, New Zealand and South Africa using an alphabetical value A to F.

Sample size:

To estimate a statistical reliable sample is a notoriously difficult task in the absence of known statistical distribution values for the variables to be investigated. The sample size is also dependent on the precision and the error level we are willing to accept in coming to a wrong conclusion, hence sampling forms an important component of any research. Without prior knowledge of the population statistical parameters that describe the shape and distribution of the variable being tested, i.e. the mean (μ) and standard deviation (σ), this task has to rely on best estimates of the sample mean and standard deviation. Prior estimates are usually found via proxies or similar measurements from other research or via pilot studies. At this stage very little NZ data existed for those variables thought to be statistically important in the predictive model.

The initial study of Routes 1 and 2 set out to collect sufficient data to undertake initial hypothesis testing between identified sub-groups of the subjects and facilities. This was to understand any significant underlying differences between groups that may influence future surveys and to ensure the right variables are measured in the experiment. It was also intended to collect the necessary population estimates for variables so that future surveys can use the parameters to estimate new sample sizes based on the estimate of population mean and variances. Three different sampling methods were used during the first 3 stages of data collection.

Sample Method 1

The intention for routes 1 and 2 was to collect sufficient data to satisfy using the Central Limit Theory, which requires > 50 observations if the population mean and variance are unknown. Once these observations were collected from the first round of data collection, various techniques exist to determine an adequate sample size depending on the type of inferential analysis that is required.

Sample Method 2:

The simplistic approach is related to the permissible error that we are willing to tolerate using the expression:

$$n = \frac{1}{error^{2}} \qquad \textit{(Eq. 1)}$$

So at the 5% significance level (*p=0.05*) we require 400 observations.

The following equation was used for routes 3 and 4 to determine a suitable sample size, based on the permissible error in the estimate for selected variables.

Sample size estimation:

$$n = \frac{\alpha^2 s^2 (2 + u^2)}{2d^2} \qquad \textit{(Eq. 2)}$$

Where:

$\alpha^2 (2 + u^2)$ = *7.7 (at 95% Confidence Interval)*

s = standard deviation

d = permissible error in the estimate

n = number of observations

A spreadsheet was developed listing the variables together with their mean and standard deviation values. Using the above formula the various sample sizes were tested to determine the permissible errors in the variables. The most suitable sample sizes that satisfied most of the subjectively set permissible errors were between 60 to 90 observations.

Sample Method 3

For future routes a further estimate of sample size was related to the statistical power based on the probability of detecting an effect of a certain magnitude. If we know 3 of the 4 parameters listed below we can estimate the missing parameter,

- Sample size
- Probability level of accepting an effect as significant
- The ability of the test to detect an effect of a particular size
- The size of the effect,

The Figure 1 on the next page was produced by a specialist software program called G-Power, and summarise the various requirements for multiple regression and a t-test to detect a medium effect size (*f^2=0.15 for regression, d=0.5 for t-test*) at various levels of statistical power.

Using a rule-of-thumb measure of setting the power equal to 0.8, or 80% of an effect being detected, the sample size for a t-test will be around 100 observations, and for multiple regression model using two predictors around 70 observations would be required.

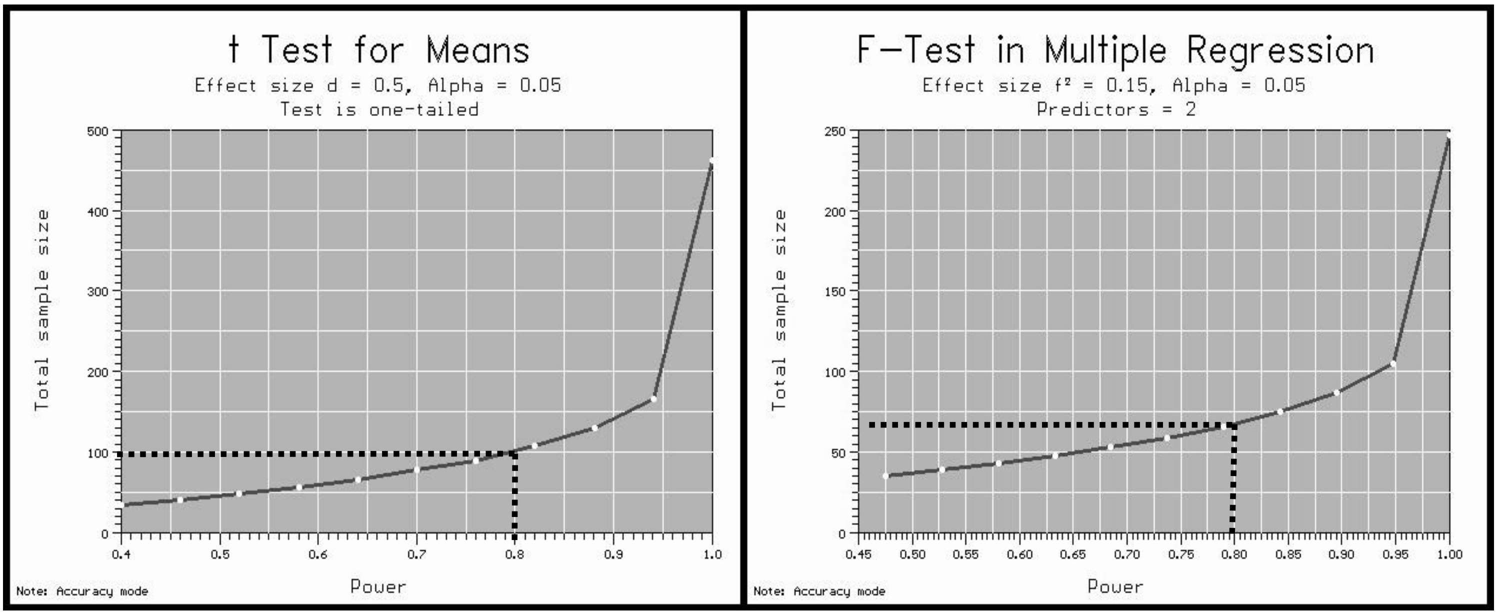

Figure 1: Sample size versus Statistical Power

From sampling method 2 above a sample size of 400 observations would normally be adequate, provided the data is of acceptable quality. Because each participant has rated many sites, the data has the characteristics of a repeated measures or matched pairs type which further increases the analytical power, provided the analytical method such as mixed models can take advantage of this. The table below lists the number of treatments per survey as well as the number of subjects that scores each treatment. In effect there are $(n_{subjects} \times n_{facility})$ independent observations for each route

It is apparent that the sample size is generally more than sufficient. The challenge has been to obtain sufficient variety in combination of all variables to obtain a sufficiently orthogonal design. Orthogonality is achieved when the effects and factors are equal and that the estimate of one effect is not affected by changes in any of the other effects.

Route number 4 is a cohort survey group of participants that have ridden nearly all the sites. Their results can be particlulary used in matched tests between geographical locations, routes or sub-routes. Even though the sample is below 15, by use of the total sample's estimate of the population means and variance, reasonable conclusions are possible. This cohort group has been increased for the Nelson survey n>16.

Table 1 : Sample Size per Route

Route number	Study Phase	Subjects (no. of cyclists	Sub-routes	Facility type (observations)			Geographical Location
				mid block	intersection	offroad	
1	2	61	16	6 (366)	7 (427)	3 (183)	Christchurch
2	2	61	15	8 (427)	4 (244)	3 (183)	Christchurch
3	3	48	26	10 (480)	14 (672)	2 (96)	Christchurch
4*	3	12*	28	16 (192)	10 (120)	2 (24)	Christchurch
5	3						Nelson

* = Cohort group

In summary,

- Routes 1 and 2 took the form of an extended pilot survey to provide a basis for the next phase of data collection.
- Route 3 sample size requirement was based on extending the database and to provide a better representation of the population demographics.

- Route 4 sample is based on a cohort survey group that will appear in all surveys to test geographical and other identified biases. The sample size for future routes is largely determined by the need to increase the range of conditions and othogonality of the sub-routes.
- Route 5 sample is from Nelson with the aim of an increased variety of sub-route conditions.

Questionnaire Design

A number of survey instruments were used to collect data, these were:

- Registration (Web-based form), to collect demographic data.
- Response rating sheet completed by each participant after each sub-section cycled.
- Post-survey attitudinal questionnaire survey completed after completion of circuit and supervised by data collectors.

The questionnaire design was roughly based on previous research, but use was made of an independent expert panel to help design the questionnaire to avoid common pitfalls in questionnaire design that could lead to bias being introduced.

During the experiment, cyclists completed the rating of each section immediately after each section was cycled to capture the experience as soon as possible without influencing the score by relying on lapses in historical recall.

At the conclusion of the experiment cyclist were then required to complete a 3rd questionnaire to collect further data on their attitudes towards various factors such as how important factors such as speed, delay, surface condition etc were to them. This done was to tease out how important these factors weighed in cyclists minds, despite having to score these attributes during the experiment.

4. Exploratory Analysis - Unstandardised Data.

The prime purpose of this analysis was to understand variable distribution, correlation and variances. A secondary purpose was to inspect relationship between independent variable and dependent score variables, and to gain insight into first-order and potential second-order interaction effects between variables. All data were analyses using a statistical software package (SPSS 13) to explore and analyse the data. The following general observations were made that applies to the data at the individual variable level:

- All the data are non-normal distributions. The Kolmogorov- Smirnoff test D(100) $p > 0.05$.
- Variables are either positive or negatively skewed, a few are bimodal (2 or more peaks) or leptokurtic (very peaked)
- All of the perception score data are negatively skewed biased towards good facility ratings.

Appendix A has a brief summary of the variables for the 4 routes mid block sections surveyed to date in Christchurch.

Sample Demographics

Age Distribution

The distribution of age for the Christchurch sample is approximately similar to that of Landis[1]' research. A further point of interest of this sample is that the distribution based on gender showing an older male sample. While this may affect the average perceptions score there is enough variety of ages for both sexes to permit this affect to be accounted for in the model development.

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[1] Landis et al (1997) Toward a Bicycle Level of Service, *Transport Research Record 1578*, TRB, Washington DC.

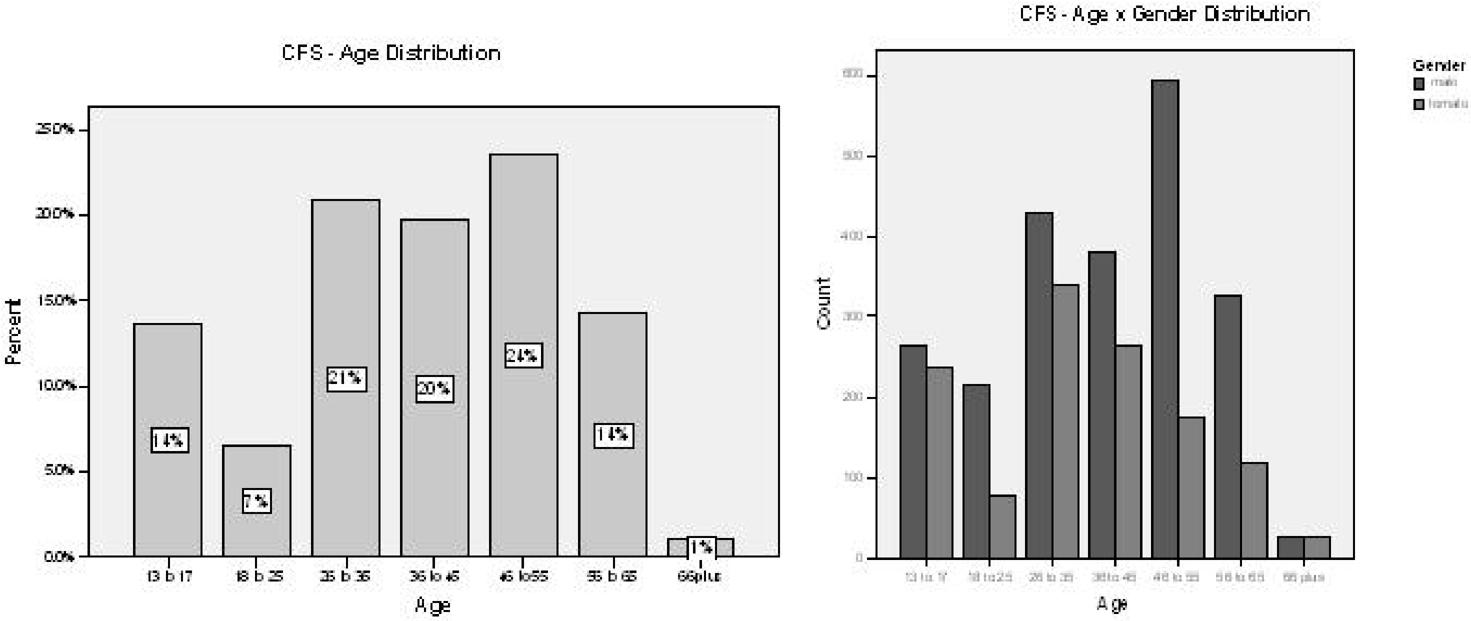

Figure 2: Age distribution of Sample

Experience and cycling purpose

The pie chart in figure 3 shows the breakdown of cycling purpose by average distance cycled per week. This gives an indication of type of cycling experience of the sample with commuter kilometres contributing to more than half the sample's experience. This could be a good indicator of a subject's cycling experience, as higher traffic volumes occur during the commuter peak hour, compared to the other cycle purposes.

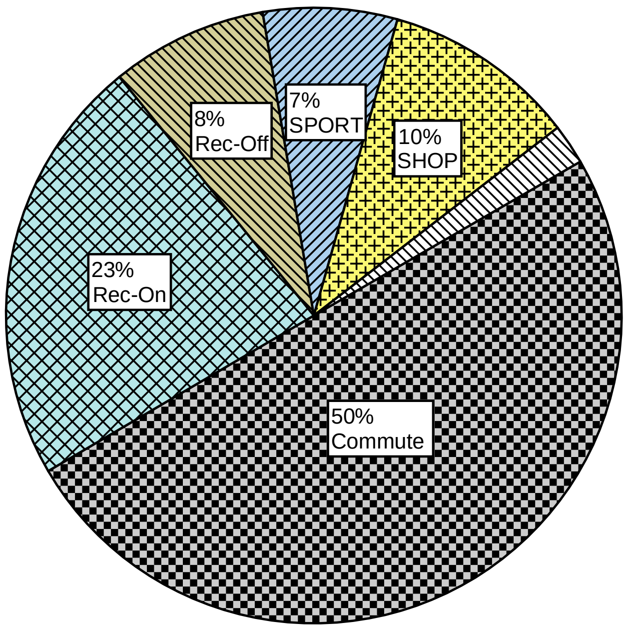

Figure 3 : Cycling Purpose

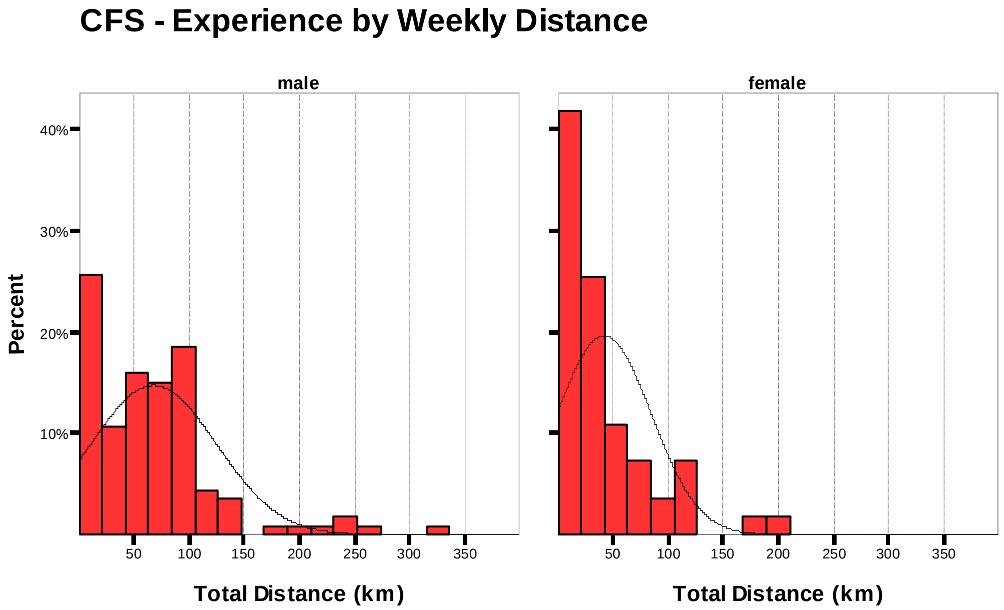

Figure 4: Distribution of Weekly distance by Gender

Figure 4 shows the distribution of cycling distance per week by gender. Females tend to cycle much less than the males per week. The table below shows the difference in the mean values for selected experience variables of Total distance, Commute and self assessed Riding Ability.

Table 2: Experience: Difference by Gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Total Distance	male	113	6 km	57.08	5.37
	female	55	42 km	42.86	5.77
Commute	male	88	44 km	32.06	3.41
	female	43	21 km	20.00	3.05
Ridingability	male	113	3.50	0.746	0.070
	female	54	2.94	1.017	0.138

The "Ridingability" score is converted from an ordinal variable to a numerical scale. Females rating themselves more as moderate (<3) experienced and males more experienced (>3).

Numerical score	Riding ability
1	beginner
2	moderate
3	experienced
4	very exp

The Landis research hypothesised that the gender or experience of a cyclist could potentially influence the perception score. The results of the t-test used in the Landis research was not significant for scores between gender at the $\alpha = 0.05$ level. However, the difference between quality of service score was significant for those who cycled more than 320km and those who cycled less than 320km per year. The less experienced cyclists scoring the facilities better than the more experienced cyclists. As a precursor to the model building phase this bias effect was investigated to determine whether the same results are present in this research as well.

The graphs below illustrate the mean error plots at 95% CI level. By inspection there appears to be a significant difference between gender groups' average experience level as defined by weekly distance cycled and self-assessed ability.

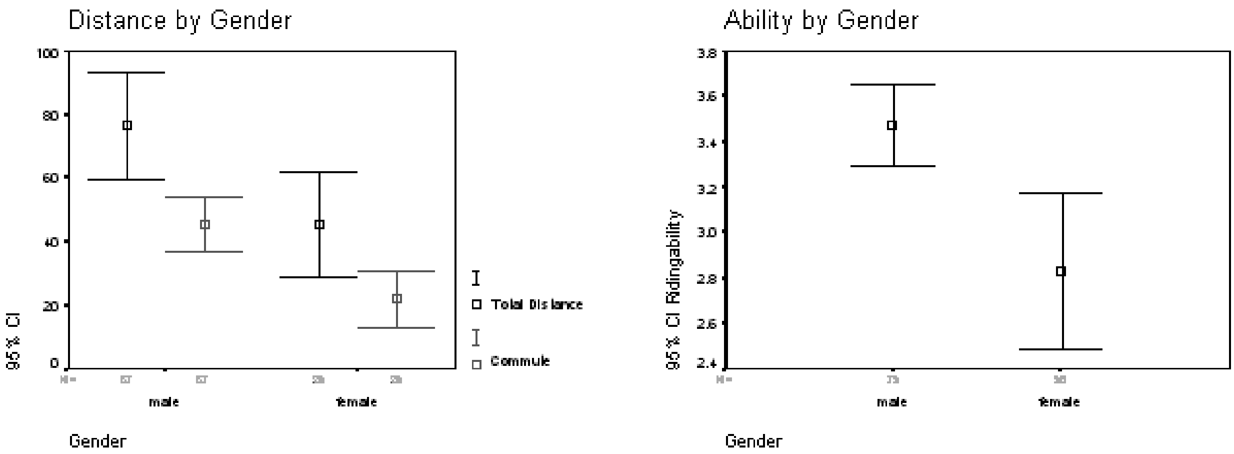

Figure 5: Experience Level by Gender

5. Summary of Perception Scores

Significant differences in perceptions

The boxplot and histogram plot of the mean overall perception scores for the 4 Christchurch surveys and the aggregate of all 4 surveys, for mid-block facilities only, are shown in the figure below. This shows that the overall perception score is skewed to the right, rating the majority of experimental treatments as good. The boxplot on the left shows the distribution of scores for the various surveys and this illustrates the mixture of the experimental treatments on a disaggregated level. It can be seen that the route 4 sites were rated less highly than the others. Route 4 deliberately used some sub-routes that were expected to be more difficult for the experienced cohort group of mostly males that rode it. It has therefore not been used for the preliminary testing of the interactions between rider attribute and overall perceptions ratings because this would bias the results.

The score values rank from 1 to 6 with a value of 1 equivalent to a Level of Service (LoS) of F (bad), and a 6 equivalent to LoS A (Good). (Note: Landis used 1 for best and 6 for worst)

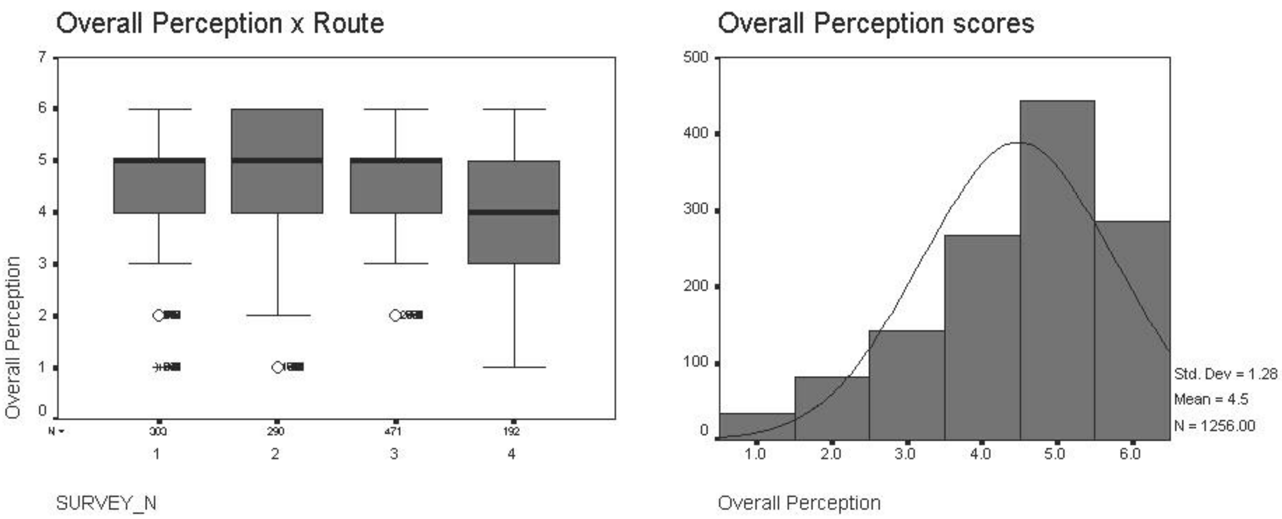

Figure 6: Distribution of Perception Scores

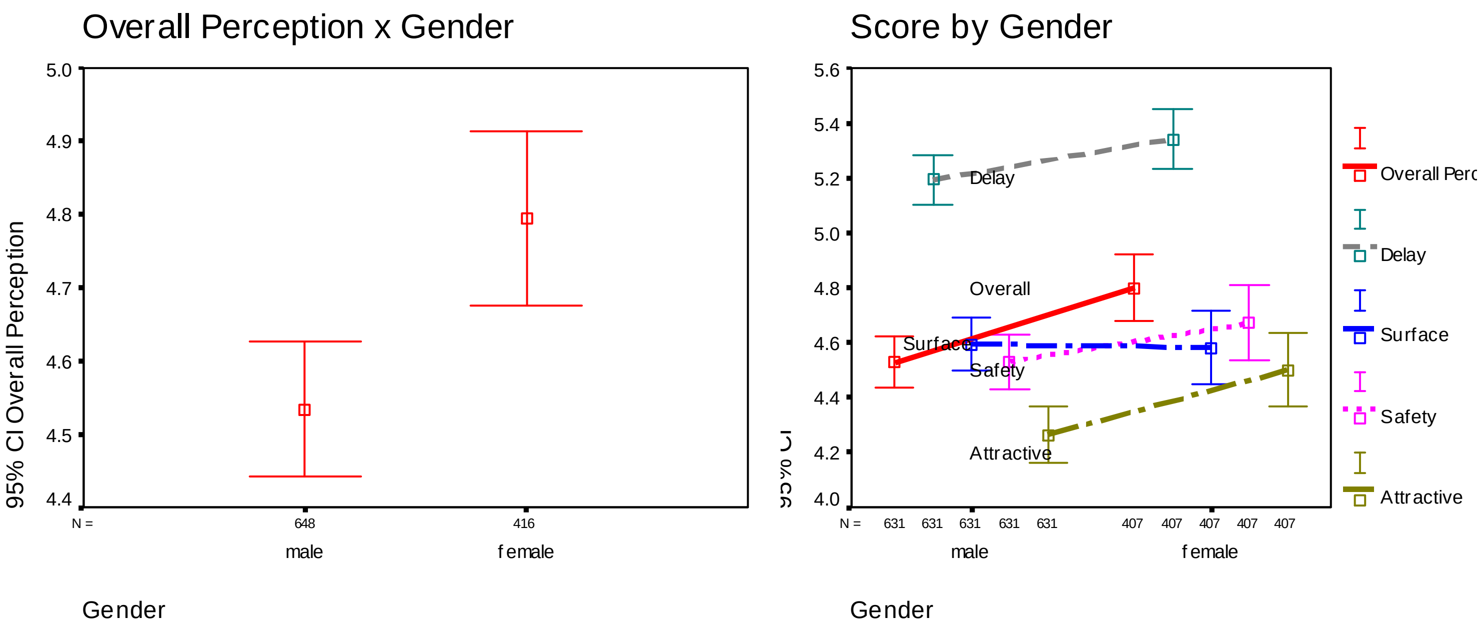

Figure 7: Significant differences in Perception

The error bar plot in Figure 7 illustrates the mean and 95% confidence limits of perceptional differences between male and females for mid-block sections, on an aggregate and disaggregated level. We note that males score notably lower than females and that on the disaggregated level there appears to be a significant difference on how they rate all sub-sections of perception, delay, surface etc. Females appear to be rating facilities significantly higher than males.

The table below summarises the outcome of the analysis of the error plots for other selected variables. Continuous variables have been coded into quartile values.

Table 3: Summary of Variables Influence on Perception

Variable	Higher Overall Perception	Lower Overall Perception
Cycling advocate	No	Yes
Technical background	Yes - marginally	No - marginally
When Last rode	Those with less recent experience	Those that cycled recently within the week preceding survey
Riding Ability	Less experienced	More experienced
Frequency	Those that cycle less than a fortnightly basis	Those that cycle at most days of the week
Age	Younger and mature	Middle aged
Off-road Path width	Wider than 3m	2m and less
Parking Occupancy	Lower parking rate	Higher parking rate
Cycle lane width	Not discernible (small data range)	Not discernible
Short term parking	Lower	Higher
HCV's	Lower %	Higher %
On street parking percentage	Lower values	Higher values
Effective width	Higher values	Lower values
AADT & 15 min Vol	Lower values	Higher values

Interaction Effects

The interaction effects are illustrated through the use of combined panel error plots. Two levels of interaction were explored using gender as a first order effect and using other bias variables and experimental treatments as possible second order effects.

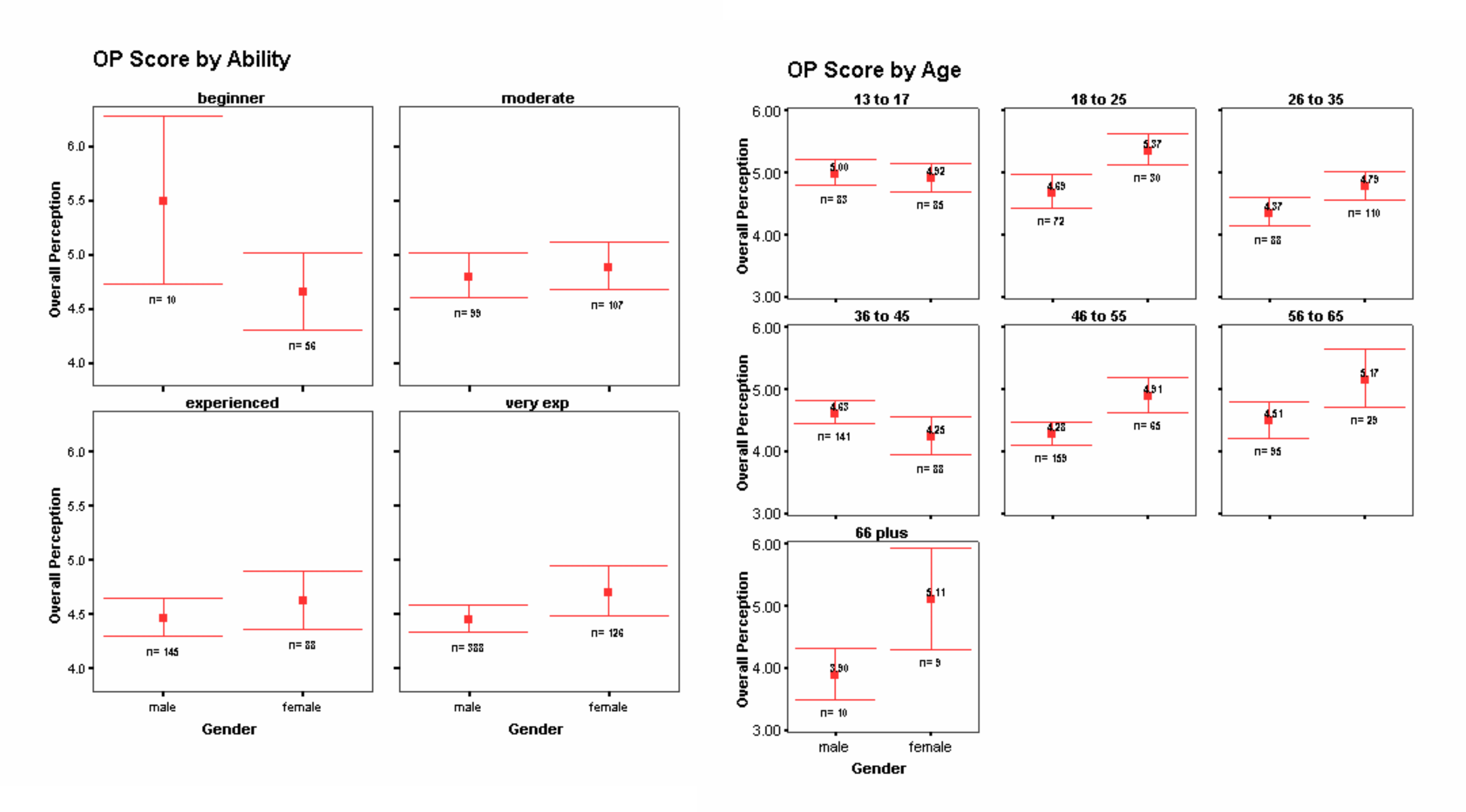

Figure 8: Interaction effect by Gender

Figure 8 shows possible interaction between gender and level of experience. Male beginner's score higher than their female counterparts, whereas overall males tend to score much lower than females. Also, age and gender appear to be interacting in the young and middle age groups, but the effect is not as pronounced.

6. Exploratory model

A preliminary exploration of mid-block models has been undertaken. It suggests that the best fit is from a model that takes into account available width, traffic volume, speed, proportion of large vehicles and parking - the same sub-route attributes used by Landis. However, more work is required before we can provide reliable models.

The required orthogonality has not been achieved. There is insufficient variety of speeds, %HCV, road widths and traffic volumes. The higher values of these tend to be in survey route 4 ridden by the cohort group only, and the modelling process for including survey 4 and correcting for the different demographics of that group have not been developed.

Table 4: Descriptive statistics of NZ variables for Mid-block sections

	Mean	Std. Deviation	N
Overall Perception Score	4.4618	1.2817	1256
15 min Volume (same direction)	103.5155	92.3006	1256
HCV Ratio	0.028	2.533E-02	1256
Effective width (Ew)	1.4368	.8030	1256
LANE1_Width	4.5920	1.6081	1256

7. Conclusions

- The research to date has provided a rich data set that will allow detailed analysis of the various factors and influences.
- Some of the initial findings suggest an interaction effect of gender, age and experience on the users' perception of Level of Service. Further analysis will explore this and compare the conflicting results from other research undertaken in the UK and USA.
- Females, young and mature persons, those lesser-experienced score much higher, thus are more forgiving in their assessment.
- Subjects with a technical background (i.e. engineers) or part of a cycling advocacy group, experienced riders and middle aged tend to score more harshly and thus score the level of service significantly lower.
- Expansion of the survey to other centres in New Zealand will be necessary to determine geographical differences and use of the cohort group would permit matching to test these differences.
- Some extra data collection is likely to be useful to tease out the effects of some of the variables such as speed, large vehicles, and compromised space for cycling. This may include use of intercept surveys to permit ratings of conditions for the same route under different traffic conditions.
- Further analysis is required to fully explore the use of the Cohort group to serve as a proxy in lieu of using local subjects for data collection.

Discussion

- There is likely to be some complex interactions between the site attributes. For instance where generous space is allocated to cyclist clear of motorised traffic, the traffic speed, volume and composition is likely to be less critical than where cyclists have insufficient space to keep clear. The development of models will need to explore such interactions if the form of the prediction equation is to reasonably represent reality.
- Any models developed will predict the Level of Service for a notional standardised cyclist. Given that rider perceptions appear to vary in predictable way, who should be the standard cyclist? Are the more generous ratings given by inexperienced cyclist more important are they simply more naïve. Are the critical ratings given by the more experienced cyclists more valid, or represent where inexperienced cyclists will become with more experience?

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Appendix A

Descriptive Statistics

Variable	Description	N	Minimum	Maximum	Mean	Std. Deviation
Demographics						
Ridingability	Self assessed competence	1412	1	4	3.26	.92
LastRode?	Recent experience	1465	1	5	1.61	.94
CycleinChch?	Local knowledge	1465	0	1	.93	.25
Total Distance	Weekly cycling experience	1372	.50	1040.00	80.35	145.27
Commute	Commuter Distance per week	1061	2.00	150.00	37.27	30.84
Rec-On	On-road recreational distance per week	751	2.00	120.00	23.15	25.72
Rec-Off	Off-road recreational distance per week	417	2.00	50.00	16.03	12.36
SPORT	Recreational distance per week	68	1.00	250.00	98.20	94.98
SHOP	Cycling distance to shop	758	.50	80.00	10.44	12.89
VISIT	Cycling distance to visit	214	1.00	20.00	8.60	5.23
FREQUENCY		1465	1	6	2.32	1.34
Pre-Survey Attitudes						
cycling is hard work	Factors preventing more cycle activity 1= disagree and 6 = agree with statement (applies to: cycling is hard work – Personalsafety)	1455	1.00	4.00	2.26	.86
cycling is enjoyable		1465	1.00	5.00	4.38	.66
cycle for exercise		1465	2.00	5.00	4.03	.71
Trafficsafety		1429	1.00	5.00	2.45	1.10
Personalsafety		1465	1.00	5.00	1.93	.92
Convenient		1455	1.00	5.00	4.44	.68
Gender		1465	1	2	1.34	.47
Age		1465	1	7	3.72	1.60
During Survey Perception Scores						
Overall Perception	Score of 1 = poor facility and 6 a good facility	1256	1.00	6.00	4.47	1.28
Delay	Qualitative score based on experienced route delay	1258	1.00	6.00	5.24	1.12
Surface	Qualitative score based on surface condition of section	1263	1.00	6.00	4.53	1.27
Safety	Qualitative score based on perceived safety of cycle facility	1248	1.00	6.00	4.43	1.36
Attractive	Qualitative score based on the attractiveness of cycle facility	1256	1.00	6.00	4.19	1.36

Variable	Description	N	Minimum	Maximum	Mean	Std. Deviation
Geometric Elements						
Offroad PATH_Width	Width of offroad path	424	1.70	3.00	2.17	.415
PARKing bay _Width	Width of parking bay next to cycle lane or road edge	787	1.70	2.70	2.04	.185
Cycle LANE_Width	Cycle facility if marked	605	1.20	2.00	1.49	.15
LANE1_Width	Width of travelled lane between centreline and kerb	1404	3.00	10.00	4.71	1.70
OCCUPANCY of parking bays	Percentage occupancy of parking bays along section	1209	.00	1.00	.20	.28
15 min Vol same dir	15 min volume measured from SCATS or tube loops on the survey day	1465	4.00	465.00	96.53	89.98
15 minute VOL_opposing	15 min opposing lane volume measured from SCATS loops on the survey day	618	34	206	111.64	61.43
AADT	Estimate of AADT	1404	250.00	32933.00	10532.11	8009.91
Edge	Subjective estimate of cyclist shy line distance from edge of kerb	1404	.30	.60	.31	.05
STP	Subjective short term / long term parking factor	1404	1.00	1.50	1.04	.14
HCV	Estimate of HCV either from RAMM or subjective	1404	.01	.15	.02	.02
OSP	Percentage of total parking capacity actually occupied at the time of survey	1404	.00	1.00	.18	.27
Aw	Total available width to cycle in one direction	1404	3.80	10.00	6.51	1.24
Ew	Calculated effective cycling width available	1404	-.20	3.65	1.45	.84
Speed	Posted Speed limit in Km/h	1404	50.00	80.00	51.28	5.15
Road Class	Class based on AADT	1404	1	4	2.52	1.01