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TravelSmart:
A Critical Appraisal

By

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ABSTRACT:

Travel behaviour modification, also called TravelSmart®, Indimark® and Travel Blending®, has been offered as a solution to the dependence of urban populations on the car. Travel behaviour modification is a voluntary programme aimed at changing travel behaviour through providing better information about transport options, rather than through investments in public transport, or through disincentive programmes for the car. The policy has been implemented in Australia in Perth, Adelaide, and Brisbane, and is under active consideration at least in Melbourne and Sydney. The basis of this increasingly widespread potential application of travel behaviour modification is the claim that the program can deliver a shift of travel mode choices through the provision of better information about travel behaviour and travel choices. The claims that are made for this programme are that it can lead to reductions in car use of the order of 10 to 14 percent. If these claims are real, then travel behaviour modification is an enormously valuable programme, with the potential to achieve what has never been done before, i.e. provide a doubling or more of public transport ridership and a significant drop in car use. Such a program would be the answer to the dilemma of how to reduce car use significantly and consequently reduce congestion and vehicular emissions. It is, therefore, appropriate to undertake a critical appraisal to determine if travel behaviour modification is able to deliver these major mode shifts, as its proponents claim.

In this paper, we review a number of published articles, primarily based on the Australian experience with travel behaviour modification, and also review several reports, and materials from the application areas. From these reviews, analyses are performed to see what the actual expected shift is in mode use for the whole population. It is found that there appears to be evidence that the claims of 10 or more percent shift out of car driver are over-stated, and that real shifts may be of the order of six to seven percent. Second, some sampling issues are discussed that indicate that the numbers reported to date may not be as reliable as one would like. Third, the locations of the test applications are examined and discussed, and it is suggested that there may be some significant bias in these locations towards a larger uptake of the shifts into environmentally-friendly modes of travel. In sum, the paper concludes that travel behaviour modification is capable of making changes in the use of environmentally-friendly modes, but not at the rates that have often been claimed. It is suggested that the target populations may need to be limited and that expectations of the size of the shifts in mode use need to be tempered.

KEY WORDS: Travel behaviour modification, TravelSmart®, Indimark®, Travel Blending®, Australia

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1. Introduction

As a means to attempt to shift people out of their cars and into public transport or non-polluting modes of travel, such as walk and bicycle, one of the programmes that has been introduced is one called TravelSmart. This is a voluntary programme aimed at changing travel behaviour through providing better information, rather than through investments in public transport, or through disincentive programs for the car. In Australia, TravelSmart was initially pioneered in Perth, and has more recently been introduced in Brisbane. It is now also identified as one of the strategies expected to be implemented in Melbourne to achieve the goals of 20/2020, and is actively being considered for Sydney. It has also been implemented quite widely in Europe, is under consideration in the Northwest United States, and also in Britain. Another similar approach, called travel blending (Ampt and Rooney, 1998; Ampt, 1999) has also been tried in South Australia. Travel blending is not included in this review, mainly due to a lack of comprehensive statistics about the applications, such as have been published about the Perth and Brisbane cases.

The basis of this increasingly widespread potential application of TravelSmart is the claim that the program can deliver a shift of travel mode choices through the provision of better information about travel behaviour and travel choices. The claims that are made for this programme are that it can lead to reduction in car use of the order of 10 to 14 percent. If these claims are real, then TravelSmart is an enormously valuable programme, with the potential to achieve what has never been done before, i.e. provide a doubling or more of public transport ridership and a significant drop in car use. Such a program would be the answer to the dilemma of how to reduce car use significantly and consequently reduce congestion and vehicular emissions. It is, therefore, appropriate to undertake a critical appraisal to determine if TravelSmart is able to deliver these major mode shifts, as its proponents claim.

2. The Perth Case

2.1 The Pilot Study

The TravelSmart programme was introduced in Australia in South Perth, commencing in 1997 (James, 1998). A sample of 498 households was selected, initially, from the South Perth region. From this sample, 383 households (77 percent) agreed to participate in a travel diary survey. This survey established current travel patterns, and use of travel modes in particular. In common with most urban areas throughout the world, the survey showed a steady erosion of public transport, walking and bicycling as modes of travel, and a concomitant increase in car use, since a previous survey conducted in 1986.

The next step in the process is to contact these same households, to undertake individualised marketing. Of the 383 households, 6 percent were not interested in being involved further. Of the remainder, 36 percent were interested in alternative modes, 9 percent were already using alternative modes, and 49 percent were classified as not interested in alternative modes (James, 1998). Applying these percentages to the original sample of 498 households, we obtain the numbers shown in Figure 1. The figure shows that we now have 138 households left of the original 498, or 27.7 percent.

The final step of the procedure was to test the TravelSmart system. For reasons that are not disclosed by James (1998), 56 people were provided with a visit by a public transport operator and a free transit pass for a month. Earlier in his paper, James indicates that the 383 households who responded to the diary survey consisted of 865 persons. The number of households in the final test is not stated, but can be deduced to be 25 households, assuming the average household size of the 383 households, or 5 percent of the population that was initially sampled.

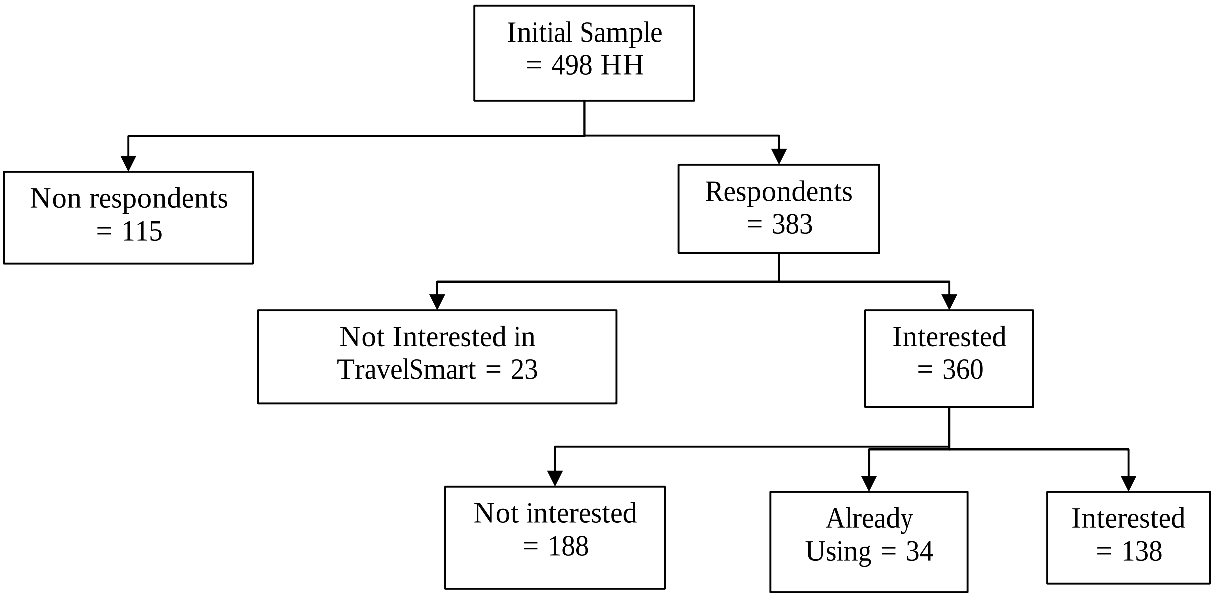

Figure 1: Identification of the Interested Households

James (1998) then reports on an after survey, undertaken after the free one-month transit pass had expired, and about two months after the diary survey. In this survey, James (1998) found that there were 5 percent fewer cars used, fewer car trips made, and less time spent in car travel. He identified a 14 percent reduction in car vehicle kilometres of travel, no change in the number of out-of-home activities visited, and an assortment of shifts on the choice of mode of travel for trips. These changes were reported as a 10 percent reduction in car trips, a 21 percent increase in public transport trips, a 4 percent increase in car passenger trips, a 91 percent increase in bicycle trips and a 16 percent increase in walk trips. It is also noteworthy that James (1998) shows that there are 1,060 trips made on average per person per year. This averages out to about 2.9 trips per person per day. However, average trip making in urban areas is more commonly estimated at about 4 trips per person per weekday, and about 3.8 trips per person per weekend day, for an overall average of a little more than 3.9 trips per person per day. One has to wonder at the rather low figure produced in this survey.

Given that the report is not forthcoming on the reasons that only 25 of the 138 interested households actually participated in the individualised marketing program, it is a little difficult to determine what the community-wide results might be. We can take two alternative positions. First, we can assume that the 25 households were sampled out of the 138 interested households, because of time and cost restrictions on the project, and assume that all 138 households would respond to the individualised marketing in the same way as the 25 households that actually participated. Using the figures from James' paper, we will assume that all 498 households make trips at the same rate as the 25 households that participated in the program. We will also assume that only 138 households of the 498 would be participants, and will assume, for the optimistic case, that all 138 households would exhibit behaviours that are identical to those of the actual 25 households that participated. In that case, the results in terms of annual trips would be about as shown in Table 1. In other words, rather than a 10 percent shift out of car, there would actually be a 2.7 percent shift out of car. Similarly, bus patronage would increase by nearly 6.5 percent, not by 21 percent.

Table 1: Optimistic Projection of Community-wide Effects of TravelSmart

Mode	498 Households before TravelSmart	138 TravelSmart Participant Households	360 TravelSmart Non-participant Households	Percentage Shift in Mode
Car as Driver	780,000	195,000	564,000	-2.7%
Car as Passenger	260,000	75,000	188,000	+1.2%
Public Transport	78,500	26,500	57,000	+6.4%
Bicycle	26,000	14,000	19,000	+26.9%
Walk	44,000	19,000	32,000	+15.9%

On the pessimistic side, one might conclude that the 25 households that participated in TravelSmart were the only ones that were willing to participate, out of the 138 interested households. If this is the case, then the results for the community would be those shown in Table 2. In this case, the shift out of the car amounts to 0.5 percent, and the public transport increase is 1.9 percent.

Table 2: Pessimistic Projection of Community-wide Effects of TravelSmart

Mode	498 Households before TravelSmart	25 TravelSmart Participant Households	473TravelSmart Non-participant Households	Percentage Shift in Mode
Car as Driver	780,000	35,000	741,000	-0.5%
Car as Passenger	260,000	13,500	247,000	+0.2%
Public Transport	78,500	5,000	75,000	+1.9%
Bicycle	26,000	2,500	24,500	+3.8%
Walk	44,000	3,500	42,000	+3.4%

We suspect that the true result lies somewhere between Tables 1 and 2, and would like to hope that it is that shown in Table 1. However, the important point here is that, at best, TravelSmart in South Perth appears to have created a shift of a maximum of less than 3 percent from car into other more sustainable modes.

2.2 The Large Scale Test

James (2002) describes a large-scale test of TravelSmart, still in South Perth, commencing in 2000. As with the description of the pilot test, full details are not readily gleaned from the published papers. However, the following appears to be a description of what was done and what results were obtained. South Perth has a total population of 17,300 households. Of these, 15,300 provided a match of a telephone number and an address, and could be used as the basis of the large-scale test. Of these households, 94 percent, or 14,382 responded to a survey to determine qualifications for and interest in the TravelSmart programme. This group of households split along similar lines to those in the pilot test, with 15 percent reporting that they were already using public transport, walk or bicycle, 40 percent indicating interest in the programme, and 39 percent indicating no interest. The 40 percent who expressed interest were then involved in the programme, which would mean a total of 5,753 households or 33.3 percent of the population of South Perth.

In his paper, James (2002) uses a base of September 1997 as the before situation for South Perth and for another suburb, Victoria Park, used as a control. No before survey is reported on for South Perth. An after survey was conducted in October 2000, which the paper indicates was conducted over all three population segments in South Perth. However, no details are given of the results of the already using and the not interested groups. James (2002) reports that the after survey (presumably of those involved in and interested in the programme) consisted of a sample of 706 households. These households showed shifts from car driver to walk, bicycling, public transport, and car passenger, at the expense of car driver. The base (1997) and October 2000 percentages by mode are shown in Table 3. Also, shown there are the percentages from the control group in Victoria Park.

Table 3: Results of the Large Scale Test in South Perth

Main Mode	Base (September 1997)	After (October 2000)	Control Group (Victoria Park)	
			Before	After
Car Driver	60%	52%	56%	56%
Car Passenger	20%	22%	20%	22%
Public Transport	6%	7%	5%	5%
Bicycling	2%	3%	4%	4%
Walking	12%	16%	15%	13%
Sample Size	383	706	242	242

James uses the 1997 results as the base against which to claim the shifts achieved, e.g., of a decline of 14 percent in car driver and an increase in walking of 35 percent, among other changes. It is curious as to why the percentages obtained in the Victoria Park control group are not used as the base to define change, or why a survey of the same 706 households was not undertaken in South Perth before implementation, to benchmark the results of TravelSmart. Nevertheless, if these results are taken as an accurate representation of what happened and are expanded to the total South Perth population, then the results should be much as shown in Table 4. For the purposes of arriving at the numbers, we have assumed that each person makes 3.4 trips per day (the trip rate reported for the after survey) and that there are 2.2 persons per household in South Perth.

Table 4: Projected Results of the Large Scale Test of TravelSmart (Daily Trips)

Mode	17,300 Households before TravelSmart	5,753 TravelSmart Participant Households	11,547 TravelSmart Non-participant Households	Percentage Shift in Mode
Car as Driver	53,400	15,400	35,700	-4.3%
Car as Passenger	17,800	6,500	11,900	+3.3%
Public Transport	5,300	2,100	3,600	+7.5%
Bicycle	1,800	900	1,200	+16.7%
Walk	10,700	4,700	7,200	+11.2%

Overall, these figures are not dissimilar to those in Table 1, although we would agree with James (2002) that the results, using the base case of 1997, appear a little better than for the pilot survey undertaken two years earlier. However, rather than the 14 percent shift from car driver, this suggests a shift that is closer to 4 percent for the whole of the City of South Perth.

2.3 The Brisbane Case

Much more recently, TravelSmart was implemented as a pilot test in a group of inner northern suburbs of Brisbane (Marinelli and Roth, 2002). Once again, the claim is made that TravelSmart produces a substantial shift in mode use, specifically a reduction of private vehicle use of 10 percent. The steps in the process were very similar in the Brisbane case. The pilot area chosen was a group of inner northern suburbs of Brisbane, with a total population of 10,000 households, or about 26,000 people.

In this case, the households were divided into two groups – a treatment group and a control group. The two groups comprised 1,080 households, all of whom were sent the before survey, and of which 843 (78%) responded (Marinelli and Roth, 2002). Following the before survey, 455 households were selected to participate in TravelSmart. Of these, 26 were no longer contactable, 17 declined to respond, and the remaining 412 households were continued in the study. These households were split into four groups consisting of 32 households already using public transport and other sustainable modes who did not require further information, 66 households already using public transport and other sustainable modes who needed updated information on travel modes, 196 households who were interested in participating in the individualised marketing approach, and 118 households who desired no further contact. Of these 196 households, Marinelli and Roth (2002) report that 89 percent requested information. This would amount to 174 households. Of these households, some undefined proportion received a home visit to provide further information on a mode, and 8 percent or 15 households received a one month free pass to use the public transport system.

In the following five months, households in both the group of 196 and the control group were recontacted to measure changes in travel behaviour. Marinelli and Roth (2002) report that 700 households were contacted and 589 successfully completed the survey. From the results provided, the average trip rate again is rather noticeably low at 3.2 trips per person per day. Subsequently, Marinelli and Roth (2002) show results on a per person per year basis, in which 1,076 trips are shown before the TravelSmart programme is introduced. Curiously, this number of trips averages out to only 2.55 trips per person per day, which is lower than the average reported in the earlier table. The paper then shows that walking trips increase by 18 per year, bicycle by 1 per year, car as driver decrease by 60 trips per person per year, and car as passenger decrease by 14 trips per year, while public transport trips increase by 20. Two important issues come out of this analysis. The first is that overall trip making dropped from 1076 trip per person per year to 1047, or a decrease of 3.2 percent. Second, there is a reported decrease of 9.6 percent in car driver trips for this subsample of the population. There is also a drop of 5.3 percent of car passenger trips.

The main problem posed by what is reported is to determine to what proportion of the population this shift is attributed. From the earlier statistics provided, it appears that 843 households responded in the original survey from a sample of 1,080, of which 455 were selected to be in the "treatment" group, i.e., the group that participated in the TravelSmart programme. We will assume that both the original 1,080 households, and the 455 who were selected as potential participants were drawn randomly from the population. Because there was a 78 percent response rate in the initial survey, we should assume that the original number of households from which the potential programme participants was drawn was 583 households. Of these, 196 households were interested in participating, but only 89 percent of them asked for further information. It would appear that 174 households were, therefore, at most the number of participating households whose behaviour contributed to the observed changes. This represents 29.8 percent of the original targeted sample.

Unfortunately, further statistics on the detailed results have not been published. As a result, it is not possible to complete an analysis similar to that undertaken for the Perth case. However, it would appear that it is likely that the 10 percent shift claim is again based only on the 174 households who indicated an interest in participating, at most. Thus, the population-based shift, assuming that the original 583 households were sampled randomly from the population, is a shift of 2.9 percent of car driver trips to other modes or to not being undertaken. This is almost identical to the 2.7 percent shift found in Perth.

2.4 The System Context

In addition to the somewhat misleading statistics that have been provided on TravelSmart, resulting from the use of the percentage changes in the target group being applied as though the entire population would behave in this way, there are two further problems with the assumptions of the effectiveness of TravelSmart.

2.5 Induced Travel and Car Driver Shifts

In the Perth case, there are only just less than 28 percent of households that were interested in participation in the pilot, 40 percent in the large-scale application, and probably 30 percent in Brisbane. If there were a shift out of car by this portion of the population, the reduction in car travel would result in some improvement to travel speeds on the road system in the local area. Improvement in travel speeds can be expected to operate in a similar manner to increases in capacity, because both have the same effect – an improvement in travel speeds. The effect that can be anticipated is that there will be an increase in travel, resulting from induced demand. Because 9 percent of the population in Perth were public transport users already, and 28 to 40 percent were interested in participating in TravelSmart, there is a pool of 50 to 63 percent of households that could contribute to the induced demand. In Brisbane, the figures are almost identical with 9 percent using public transport, and 30 percent interested in participating in TravelSmart, resulting in a pool of 61 percent of the population who are not using public transport and who are not interested in TravelSmart. This segment of the population is likely to take advantage of improved travel speeds by travelling more.

While there has been no such measurement to date, it seems implausible to suppose that the changes anticipated to arise from implementing TravelSmart, by itself, would result in any noticeable reduction in congestion levels, or overall car use. Instead, it would appear most likely that the results of implementing TravelSmart would be roughly as follows:

In the short term, there may be a shift from car driver to more environmentally friendly modes by the approximately 35 percent of the population that may volunteer to participate in the program. Using the most optimistic figures, one might expect that this group could shift as many as 10 percent of their car driver trips from car driver into other modes, such as public transport, ride sharing, walk, or bicycle. This would result in an overall drop in car driver trips of about 3.5 percent. Evidence from Perth and Brisbane indicate switching to car driver from other modes by the general population, without any induced traffic, or other effects. For example, James et al. (1999) indicate that, in eleven years in South Perth, car driver increased by 5 percent, while other modes decreased by a total of this amount, with most of the losses coming from walking. Prorating this, one could assume that the annual change to car driver in the population at large is about 0.5 percent. Thus, within about seven years, with no other effects than the continuing shift into car driver travel, the gains of TravelSmart would be eliminated by the rest of the population.

Assuming population growth of between 1 and 2 percent per annum, the 3.5 percent shift of car driver trips will be taken up by growth in less than two years. In addition, before that is complete, it could be expected that induced travel would also result in increased car driver travel from the 60 percent of the population that is not interested in TravelSmart and is not already riding public transport. In contrast to the 10 percent shift out of car driver, it would take less than a 5 percent increase in trip making by those not participating in TravelSmart to wipe out the gains of the programme.

2.6 Choice of Suburbs

It is also important to note here that the Perth experiment chose one suburb – South Perth – as the basis of the experiment, and Brisbane chose a group of inner north suburbs comprising the Ward of Grange. In neither case was there an attempt to draw a representative sample from the entire region, although claims were subsequently made about what this program would do for the entire region, based on applying the figures for the interested subgroup to the full population. For example, Marinelli and Roth state:

> "The enormous social and economic benefits support its wide scale application in the Queensland urban context. [TravelSmart] could be a major tool in holding current private vehicle growth in check for several years to eliminate or delay the need to spend several billion dollars on road expansion and technology solutions." (Marinelli and Roth, 2002).

In the case of Perth, the suburb chosen was South Perth. This is an inner city suburb that is not representative of the Perth region. On median income, workforce participation, and median age, it is similar to Perth as a whole. However, it has smaller households, lower car ownership, and higher use of environmentally friendly modes of travel, as shown in Table 5. It also has a smaller proportion of children and a larger proportion of persons over 65. Clearly South Perth is not representative of Perth, and extrapolation of results from South Perth to the Perth Metropolitan Region is not a valid procedure. The use of Victoria Park as a control community for the large scale application also seems somewhat odd, after reviewing the statistics in Table 5. Victoria Park is geographically adjacent to South Perth and also an inner city area. However, t has even smaller households, fewer children, more elderly, lower employed workers, much higher proportion of non-car-owning households, and much lower percentage driving to work than South Perth, let alone the entire Perth region. Using this community as a control seems open to considerable question.

Table 5: Comparative Statistics for Perth and South Perth

Statistic	Perth	South Perth	Victoria Park
Average Household Size	2.6	2.2	2.0
Median Weekly Household Income	$800-$999	$800-$999	$600-$699
Median Age	34	35	34
Percentage of Persons Aged Under 15	20.7%	13.7%	12.7%
Percentage of Persons Aged Over 65	11.3%	14.0%	17.3%
Percentage of Single Parent Families	15.5%	15.9%	17.4%
Percentage of Workforce Employed	92.3%	93.2%	90.0%
Percentage of Non Car Owning Households	7.8%	9.7%	16.1%
Average Car Ownership per Household	1.57	1.38	1.17
Percent Driving to Work	63.2%	61.5%	57.0%
Percent Using Public Transport to Work	8.4%	9.8%	14.0%
Percent Walk or Bicycle to Work	2.7%	4.0%	4.6%

Source: ABS (2002a), (2002b), (2002c)

Similar statistics compiled for the Grange Ward in Brisbane are shown in Table 6. There appears to be a very similar pattern here to that of Perth. Grange Ward has smaller households (identical in size to those of South Perth), fewer children, more elderly, substantially more non-car-owning households, fewer cars per household, many fewer persons driving to work, and substantially higher public transport use than the entire Brisbane region.

Table 6: Comparative Statistics for Grange Ward and Brisbane

Statistic	All Brisbane	Grange Ward
Average Household Size	2.6	2.2
Median Weekly Income	$800-$999	$800-$999
Median Age	34	34
Percentage of Persons Aged Under 15	20.9%	16.5%
Percentage of Persons Aged Over 65	11.0%	13.1%
Percentage of Single Parent Families	16.4%	16.3%
Percentage of Workforce Employed	92.2%	93.4%
Percentage of Non Car Owning Households	9.8%	14.7%
Average Car Ownership per Household	1.46	1.25
Percent Driving to Work	58.2%	51.5%
Percent Using Public Transport to Work	11.4%	19.1%
Percent Walk or Bicycle to Work	3.4%	4.3%

Source: ABS (2002d), (2002e)

Because the suburbs chosen for the experiment are inner city suburbs with lower car ownership than average, smaller households, fewer children, more elderly persons, and already a more public transport orientated workforce would tend to suggest that there would be much greater likelihood that persons in these suburbs would be likely to be influenced to change from driving cars. Although it is very difficult to quantify such things, it is likely that these areas – South Perth, Victoria Park, and Grange Ward – have better public transport service because of their proximity to the CBD, and it is also more likely that workers in these two areas will tend to work where bus routes provide travel options. The issue surely must be whether a similar result to that reported for South Perth and Grange would occur in a suburb that is some distance from the CBD, has relatively poor bus service, has larger households with more children present, and has many fewer people travelling to the CBD for work.

2.7 Effects of Sampling Error

Another matter for concern in all of this is that the effects of sampling error appear to be ignored in looking at the shifts in mode use. It appears that the population of South Perth is 17,300 households (James, 2002). In the original work of James (1998), a sample of 498 households was planned. The actual sample realised was 383 households. However, the statistics on modal shifts for those participating in the TravelSmart programme are, at best, based on no more than 138 households and could be as few as 25 households. Giving the benefit of the larger sample size, it is this number of 138 that is important for estimating sampling errors. Furthermore, the results are based on determining a difference between two occasions. The sampling error for a difference between two occasions has a variance that is equal to the sum of the variances on each of the two occasions, less twice the covariance between the two occasions (Yates, 1965). Because variances and covariances are not provided, they must be assumed. Because change has taken place, and different households are likely to have behaved differently, the assumption is made that the correlation between the before and after surveys is 0.9. It is also assumed here that all of the 138 households responded on both occasions (which is probably not the case), which will give the lowest sampling error estimate. Given the population of 17,300 and a sample of 138, the finite population correction can be ignored.

The specific interest here is in a change in proportions. In other words, the sampling error should be estimated for $(p_2 - p_1)$ where p_2 and p_1 are the proportions using a particular mode in the after and the before survey, respectively. The sampling error of the change in a particular mode is:

$$s.e.(p_2 - p_1) = \sqrt{\frac{(V(p_2) + V(p_1) - 2r\sqrt{V(p_2)V(p_1)}}{n}}$$

The variance of a proportion is $p(1 - p)$. Therefore, assuming the n is 138, and r is 0.9, the sampling errors for the modal share differences for the Perth experiment are shown in Table 7.

Table 7: Sampling Errors for the Perth Initial Sample

Mode	Before		After		Change	Sampling Error	95% Confidence
Walk	70	6.03%	85	7.33%	1.29%	±0.97%	1.90%
Bicycle	232	20.00%	241	20.78%	0.78%	±1.53%	3.01%
Car Driver	696	60.00%	629	54.22%	-5.78%	±1.88%	3.69%
Car Passenger	23	1.98%	44	3.79%	1.81%	±0.76%	1.49%
Public Transport	139	11.98%	161	13.88%	1.90%	±1.29%	2.52%
Total	1160	100.00%	1160	100.00%			

By comparing the last column of this table with the column headed “change”, it can be seen that the change in walk is not statistically significantly different from zero at 95 percent confidence, nor is the change in bicycle. The change in car driver could be anywhere from 2.09 percent to 9.47 percent, that for car passenger between 0.32 percent to 3.3 percent, and that for public transport is not significantly different from zero. If the after results were actually based on 25 households, as appears may have been the case, then none of the changes are significant. Changing the correlation between the two occasions from 0.9 to 0.95 or to 0.85 does not change the conclusions on statistical significance, although it does change slightly the bounds of the 95 percent confidence interval on car driver and car passenger.

Even in the larger scale application in South Perth in 2000, the sample from which change is estimated is still only a sample of 706 households. While this size of sample improves the statistical reliability of the measurement of change, it still leaves some considerable degree of uncertainty in the actual figures as shown in Table 8.

Table 8: Sampling Errors for the Perth Initial Sample

Mode	Before		After		Change	Sampling Error	95% Confidence
Walk	237	12.02%	582	16.01%	3.99%	±0.60%	1.18%
Bicycle	39	1.98%	109	3.00%	1.02%	±0.28%	0.56%
Car Driver	1183	60.02%	1890	51.99%	-8.03%	±0.83%	1.63%
Car Passenger	394	19.99%	800	22.01%	2.02%	±0.69%	1.35%
Public Transport	118	5.99%	254	6.99%	1.00%	±0.42%	0.82%
Total	1971	100%	3635	100%			

Again, these figures are based on the assumption of a 0.9 correlation between the before and after figures, which may not be reasonable. Also, it is more likely, in this case that the two samples are independent, because the before sample was from the pilot study, and the after sample is from households that were not included in the original pilot study. In that case, the errors change rather significantly, as shown in Table 9. now, only the car driver and walk changes are statistically significant, with the former ranging from a change of 2.87 to 13.19 percent, and the latter changing between 0.37 and 7.61 percent.

Table 9: Sampling Errors Assuming Two Independent Samples

Mode	Before		After		Change	Sampling Error	95% Confidence
Walk	237	12.02%	582	16.01%	-3.99%	1.84%	3.62%
Bicycle	39	1.98%	109	3.00%	-1.02%	0.83%	1.62%
Car Driver	1183	60.02%	1890	51.99%	8.03%	2.63%	5.16%
Car Passenger	394	19.99%	800	22.01%	-2.02%	2.17%	4.25%
Public Transport	118	5.99%	254	6.99%	-1.00%	1.31%	2.57%
Total	1971	100.00%	3635	100.00%			

One must, therefore, conclude that there is great uncertainty in the claimed results, based on the sampling errors that have been estimated here. Indeed, it may be suggested that the changes to walking, bicycling, and public transport found in the two surveys could have occurred purely by chance, although there is evidence that there has been a non-zero change in each of car driver and car passenger.

2.8 Sustainability of the Changes

Little has been written to date about the sustainability of TravelSmart. In their paper, Marinelli and Roth (2002) suggest that the South Perth experiment has shown sustainability for a period of two and one half years, although the report on which this is based does not appear to be a published source. They also suggest that reports from Germany indicate sustainability over a period of four years. No references are provided to back up this claim. There is also no indication as to whether the TravelSmart behaviours have been sustained through further individualised marketing to the participants, or whether they have maintained the behaviours without further reinforcement. Given the mobility of people generally in countries such as Australia, the U.S., and elsewhere, it seems likely that these behaviour changes might be threatened once people move out of the area where they first participated in TravelSmart. It also seems likely that, as households change through births, deaths, divorce, children leaving home, and other such changes, these behaviour changes may not be sustained, unless the programme is repeated periodically with the population. Cost-benefit calculations reported on the programme do not appear to take into account any repetition of the TravelSmart programme to reinforce the behaviour changes.

Conclusions

TravelSmart is an interesting procedure that appears to hold out real promise to cause behavioural change in a minority of the population, with respect to car driver trips. Shifts on the order of 10 percent of car driver trips appear to have been achieved in both Perth and Brisbane for the subset of the population that expressed an interest in the programme. When applied to the total population, this shift reduces to a shift of no more than 3 percent of car driver trips for an entire region, assuming that the suburbs in which it has been tested are typical of the urban region. However, even rather small population growth is likely to counteract this shift within one or two years, and there are also likely to be further shifts into car driver by the two-thirds of the population who are not interested in TravelSmart, that would also largely wipe out the shifts of TravelSmart within two or three years, even without any population growth.

Unfortunately, it appears that the benefits of TravelSmart are being oversold to policy makers. Claims of a 10 percent shift from car driver trips are made without reference, generally, to the fact that this shift will occur, at best, for only a one-third minority of the population. Second, it is assumed that the remainder of the population will not change their behaviour to compensate for the shifts made by the TravelSmart households. This is rather similar to the delusion held for many years by traffic engineers that adding capacity to roadways that were congested would result in elimination of congestion, and increases in average travel speeds, over the long term. Third, the sample sizes used in the experiments to date are not sufficient to demonstrate clearly how much of a shift TravelSmart can produce. The statistical tests suggest that some significant shifting of car driver trips has occurred as has a shift in car passenger in Perth. However, the size of this shift is open to speculation.

As a further problem, in Australia, at least, TravelSmart has been applied in inner city suburbs that are not typical of the entire urban area. Therefore, there has to be some considerable doubt as to whether even one third of the population would be interested in the programme, if applied in an entire metropolitan area. The bias to small households with few children in suburbs that are proximate to the CBD, probably well served with public transport to the CBD, possibly involving shorter than average commute trip lengths (therefore opening up the possibility of using bicycle or walk), have lower car ownership, and more households with no cars, is matter for concern in considering any extrapolation of the results to a more general public.

TravelSmart has been shown to have the potential to change behaviour. However, TravelSmart is flawed because of the two thirds of the population that are likely to remain not interested in and non participants in the programme. Furthermore, claims that it will shift 10 percent of car driver trips out of that mode and into other more environmentally friendly modes must be treated with considerable caution, and must be interpreted as applying only to those households that are interested in participating in TravelSmart in the first place.

References

Ampt, E. and A. Rooney (1998), "Reducing the Impact of the Car – A Sistainable Approach: TravelSmart Adelaide", Papers of the Australasian Transport Research Forum, Volume 22, Part 2, September, pp. 806-819.

Ampt, L. (1999), "From Travel Blending to Living Neighbourhoods – A Vision for the Future", Papers of the Australasian Transport Research Forum, Volume 23, Part 2, September 1999, pp. 579-589.

Australian Bureau of Statistics (2002a) '2001 Census Basic Community Profile and Snapshot: 505257840 South Perth (C) (Statistical Local Area)' [Online] Accessed 28/11/02: http://www.abs.gov.au/ausstats/abs%40census.nsf/ddc9b4f92657325cca256c3e000bdbaf/f4df520b2e86c846ca256bbf000197b5!OpenDocument

Australian Bureau of Statistics (2002b) '2001 Census Basic Community Profile and Snapshot: 505 Perth (Statistical Division)' [Online] Accessed 28/11/02: http://www.abs.gov.au/ausstats/abs%40census.nsf/ddc9b4f92657325cca256c3e000bdbaf/8b5b9b4a344f292fca256bbf000171e0!OpenDocument

Australian Bureau of Statistics (2002c) '2001 Census Basic Community Profile and Snapshot: 505258510 Victoria Park (T) (Statistical Local Area)' [Online] Accessed 28/11/02: http://www.abs.gov.au/ausstats/abs%40census.nsf/ddc9b4f92657325cca256c3e000bdbaf/249711b86413d79aca256bbf0001991d!OpenDocument

Australian Bureau of Statistics (2002d) '2001 Census Basic Community Profile and Snapshot: 305 Brisbane (Statistical Division)' [Online] Accessed 28/11/02: http://www.abs.gov.au/ausstats/abs%40census.nsf/ddc9b4f92657325cca256c3e000bdbaf/6714103d8b354507ca256bbf0000dbf9!OpenDocument

Australian Bureau of Statistics (2002e) 2001 Census Basic Community Profile and Snapshot for Alderly, Lutwych, Windor, Wilston, Newmarket, Grange, Kedron (Statistical Local Areas)' [Online] Accessed 28/11/02: http://www.abs.gov.au/ausstats/abs%40census.nsf/Census_BCP_Free_ASGC_ViewTemplate!ReadForm&Start=1&Count=1500&Expand=1.3.1.1

James, B. (1998), "Changing Travel Behaviour Through Individualised Marketing: Application and Lessons from South Perth", Papers of the Australasian Transport Research Forum, Volume 22, Part 2, pp. 635-647.

James, B. (2002), "TravelSmart – Large-Scale Cost-Effective Mobility Management. Experiences from Perth, Western Australia", Municipal Engineer, Vol. 151, Issue 1, pp 39-48.

James, B., W. Brög, E. Erl, and S. Funke (1999), "Behaviour Change Sustainability from Individualised Marketing", Papers of the Australasian Transport Research Forum, Volume 23, Part 2, pp. 549-562.

Marinelli, P. and M.T. Roth (2002), "TravelSmart Suburbs Brisbane – A Successful Pilot of a Voluntary Behaviour Change Technique", paper presented to the 25th Australasian Transport Research Forum, October.

Yates, F. (1965) Sampling Methods for Censuses and Surveys, Griffin and Co., London, 3rd Edition.