

Using the six principles of persuasion to promote travel behaviour change: Findings of a TravelSmart pilot test

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1. Introduction

TravelSmart is an official policy tool of the Victorian Government as part of the Metropolitan Strategy 2030 (Department of Infrastructure, 2002) and the Victorian Greenhouse Strategy (Department of Natural Resources and Environment, 2002). The aim of TravelSmart is “to reduce the negative impacts of car travel through a reduction in vehicle trips and kilometres travelled, achieved through voluntary changes by individuals, households and organizations toward more sustainable travel choices” (Department of Infrastructure, 2002).

As travel behaviour is to a large extent habitual (Verplanken et al., 1994), habits are recognized to be very useful and necessary routines, preventing us from spending too much thinking effort on many daily repetitive activities (Gärling, 1992). However, when external conditions change – for example when environmental problems emerge – old habits may no longer be appropriate. To overcome the barrier of habitual behaviour patterns – that is to “unfreeze” car driving habits (Ronis et al., 1998; Fujii et al. 2003) - current Travel Behaviour Change campaigns are principally based on the provision of information about the effects of modal choices and the availability and benefits of modes other than the car. However, current research in the domain of public health, energy consumption, waste management, etc. have shown that information-based campaigns, including the use of incentives, are, by and large, insufficient for stimulating behavioural change of lasting effect (Hines et al. 1986/87; Hornik et al., 1995). Tertoolen et al. (1998) observe even a negative impact of environmental and economic information on pro-environmental travel behaviour, indicating the presence of reactance and cognitive dissonance effects triggered by a Travel Behaviour Change campaign itself. In this context, social psychology offers a series of six specific persuasion techniques (Cialdini, 2001) that, based on deeply seated human needs, seem to be equally suitable for private sector marketing as for community based social marketing strategies, and which are able to reach beyond the mere raising of awareness and knowledge.

Set in the context of travel behaviour change, the principal objective of this research project is to explore in which way these persuasion principles can be translated into practical communication and social marketing strategies in order to increase the personal involvement of a target population in a TravelSmart campaign.

2. The six principles of persuasion: A brief overview

Since the late 1960's, social psychology has brought forward an impressive number of different taxonomies and strategy lists with respect to persuasion¹. The present research project focuses on one particular selection of six persuasion principles that can be systematically used as “heuristic rules” assisting people in their decision to yield or not to a request (Cialdini 1993; Cialdini, 2001; Groves et al. 1992; McKenzie-Moor and Smith 1999). These persuasion principles are of particular use in a situation of low personal involvement such as daily travel decisions, where information is processed in a routine manner because the individual has no special interest to engage in effortful thinking. The following sub-sections briefly describe the six principles and illustrate their possible application in a TravelSmart context. A more comprehensive overview is provided in Seethaler and Rose (2003).

¹ For example Marwell & Schmitt's (1967) taxonomy of 16 and Levine & Wheelless (1990) list of 53 compliance tactics.

Reciprocation: The principle of reciprocation is based on the deeply seated human need to establish strong social networks with perpetual and multiple forms of exchange because as noted by Groves et al. (1992) "... people thus feel obligated to respond to positive behaviour received (e.g., gifts, favors, services, concessions) with positive behaviour in return". However, the authors point out that according to the theory of reactance (Brehm 1966) compliance is inhibited when the positive behaviour received earlier is not viewed as a genuine favor but rather as a bribe. Thus, according to empirical evidence the strategy requires that an incentive is given UPFRONT and UNCONDITIONALLY, leaving the perception of a genuine favor and the voluntary character of successive decisions intact.

The mechanism of reciprocation is effective from the very start of an interpersonal exchange and that is why this strategy is particularly useful when addressing a target population for the first time. A policy intervention aiming at changing people's behaviour should include a service or gift of value to the target population to be handed out first, before the target population is asked to participate and engage in effortful tasks.

As part of a community-based TravelSmart trial in the Melbourne municipality of Darebin, a small-scale pilot test conducted in 2003 as part of this research project tested the impact of a pre-intervention phase (PIP). An unconditional gift in the form of an environmentally friendly shopping bag and a discount voucher for the local shopping centre was used to raise awareness for environmental concerns and to trigger a positive reciprocation response to the subsequent request to participate in the local TravelSmart campaign.

Commitment and consistency: The principle of commitment is narrowly linked to the desire to be, or at least appear to be, consistent. Once a freely chosen position has been taken by an individual, a tendency to act in line with that commitment will guide further actions. This tendency is even stronger when a person's values are identified first and the communicator then is able to point out that the request is consistent with these values. In such a situation, the recipient of the message has the opportunity to "own" the reason for accepting the request (Cialdini 2001). Hence, before the mechanism of consistency is activated, an initial commitment has to be generated in the target person. Even if the first commitment is very small, bigger requests later on will still be accepted because of the consistency requirement. This commitment-consistency mechanism has been reported to be self-enforcing, especially when the commitments are written (Werner et al. 1995) or made in public (Pallak et al. 1980). Interestingly, empirical evidence also reveals that the initial commitment does not have to be closely related to the exact nature of the final request (e.g. environmentally friendly travel behaviour), but that it is sufficient to relate it to a similar area of concern (pro-environmental behaviour in general or in an area other than transport) (Freedman et al. 1966).

For the community-based TravelSmart programs conducted in Victoria, the strategy of using a small initial commitment to induce further action consistent with the request has so far been used only marginally. A multitude of options are available, ranging from initial opinion surveys confirming the necessity of recycling, water saving, reduction of the use of plastic bags etc. to the signature of petitions to support specific pro-environmental communal policies. In the TravelSmart pilot tests presented in this paper, the durable shopping bag provided in the pre-intervention phase (PIP) was accompanied by a letter, in which the households were invited to reduce the use of plastic bags. This small initial commitment to a pro-environmental action was intended to trigger the commitment-consistency mechanism for the larger request to reduce daily car-based travel that followed as part of a TravelSmart campaign.

Social proof: The principle of social proof states that beliefs, attitudes and actions of similar others are used as standards for one's own beliefs, attitudes and behaviour (Festinger 1954). According to this heuristic process of social validation, the willingness to comply with a request is increased when supported by the belief or evidence that similar peers comply with it as well.

A very recent example of nature conservation demonstrates that social proof can operate in the unintended direction when applied wrongly. At the Petrified Forest National Park in Arizona, park officials sought to run a campaign against the theft of petrified wood pieces by the park's visitors. Thus, signage was installed that was intended to induce visitors to refrain from theft, reading: "Your heritage is being vandalized every day by theft losses of petrified wood of 14 tons a year, mostly a small piece at a time". Following the installation of the signs theft increased substantially. The visitors appeared to have learned that the negative behaviour was in fact performed by many other visitors, as well – social proof from similar others (Winter et al., 2000; Cialdini et al., forthcoming). Later controlled experiments by a team of social psychologists from Arizona State University demonstrated that a revised sign saying that "many past visitors have preserved the environment by not taking away any petrified wood" was able to correct the unintended intervention outcome by establishing social proof in the "right" direction (Winter et al., 2000; Cialdini et al., forthcoming).

For travel behaviour change initiatives, the promotion of modal alternatives to the car by similar peers or within peer-groups, and the support from many different community based stakeholder groups and associations, are some examples of how to use the principle of social proof. Again, using the small-scale pilot test of community-based TravelSmart as an example, announcement letters of TravelSmart included not only the Council's logo and signature of the chief officer of transport planning, but also the Logo of the local traders association and its president's signature. Thus, the social proof demonstrates that all businesses of the local test area are supporting the TravelSmart campaign.

Liking: The principle of liking states that people are increasingly inclined to follow a request brought forward by someone they like. Factors that enhance liking have found to be similarity of attitude (Byrne 1979), background (Stotland et al. 1961), physical attractiveness (Benson et al. 1976), dress (Suedfeld et al. 1971) and finally the use of praise (Drachman et al. 1978) and cooperation (Aronson et al. 1987). In private sector marketing, the "Tupperware party" is a setting par excellence combining the different features mentioned above. Similar examples are the marketing strategy of connecting products with the Olympic Games or with national sports heroes.

In this sense, a TravelSmart intervention should carefully select facilitators that are highly esteemed or liked by the target population and attempt to induce the thinking process about travel alternatives in a peer group setting (e.g. Green Transport Plan for the neighborhood, for the Church group, etc.). Also, the TravelSmart materials should be designed and presented in an attractive fashion, i.e. wrapped as a gift.

Authority: The principle of authority states that when making a decision it is common to seek expert advice from an acknowledged source, for example medical, legal, financial or any other professional expertise (Bushman 1984), or to comply with the rules of a properly constituted authority (Groves et al. 1992). Interestingly, the external appearance of authority represented by specific symbols such as a uniform, a professional title, etc. is often sufficient to establish expert appearance (Bickman 1974). The probability of compliance is increased for a request brought forward by a source whose authority is perceived to be legitimate and the credibility of the source is thus an important feature of the persuasive communication (Eagly and Chaiken 1975).

In TravelSmart it is of capital importance to involve mobility councillors that are familiar with the local conditions and that are able to efficiently support the individual in finding new solutions. A creative version of the authority principle is the home-visits of bus drivers (as applied in the IndiMark® program by SocialData), who explain the local public transport options to the participants. In the small-scale pilot test, staff members had to wear identification badges, presented an authorization letter from the Victorian Government and introduced themselves to the householders as staff of an official TravelSmart campaign.

Scarcity: The principle of scarcity reflects the fact that as opportunities become more scarce they are perceived as more valuable (Mazis 1975). This perception is based on the

experience that valuable things are normally rare and that under these conditions hesitating to make a choice may result in a loss of future opportunities. Social psychology recommends the use of negative message framing for the promotion of pro-environmental behaviour (McKenzie-Moor 2002), and to emphasize losses which occur as a result of inaction rather than savings as a result of taking action. Yates (1982) demonstrated in a study on energy conservation that the response to the program was much stronger in those households who were told “how much money they would lose without the insulation” than in those households who were informed about possible financial savings.

This strategy might also be adopted for community based TravelSmart, for example on an individual level by demonstrating the loss in money and time spent on traveling and the loss in opportunities for physical activity when travel patterns remain unchanged. On a community level, the loss in neighbourhood quality and loss of a pollution and noise free environment would be the negative message framing.

Of particular interest for this research project is the opportunity to apply the six principles of persuasion in combination. Table 1 summarizes the different persuasion strategies used in three distinct communication elements related to the TravelSmart recruitment process.

Table 1 Persuasion strategies for the recruitment of TravelSmart

Communication Element	Persuasion Principle	Implementation Form
Pre-Intervention Phase	Reciprocation	Durable “green” shopping bag and shopping voucher provided ten days before TravelSmart.
	Commitment & consistency	Accompanying letter with request to reduce plastic bag use. First commitment step.
	Authority	Accompanying letter is signed by the local council and the local traders association, who together promote the Green Bag.
	Social Proof	The Green Bag is widely distributed in the local area; Shoppers seeing each other carrying the bag reinforce each other in doing so.
	Liking	The Green Bag is presented as a gift (rapped with a ribbon) including a voucher for the local shopping strip.
TravelSmart announcement letter	Authority	Same source, logo and appearance of the TravelSmart announcement letter as used for the letter of the Green Bag (support from local council and traders).
	Liking	The local residents are praised for their (highly visible) participation in using the Green Bag.
	Commitment & consistency	Based on the success of the Green Bag program the local residents are invited by the promoters to participate in the next step.
	Scarcity	As rationale for the TravelSmart the <i>loss</i> in neighborhood quality due to local congestion and air pollution/noise levels is pointed out.
	Reciprocation	The TravelSmart announcement letter mentions some of the services that TravelSmart offers free of charge.

Table 1 (contin'd)

Recruitment Call	Authority	The caller identifies him/herself as being part of the TravelSmart staff authorized by the local council and the local traders association.
	Commitment & Consistency, social proof	The caller draws the attention to the fact that the promoters of the Green Bag now follow up with their promotion of TravelSmart: The promoters themselves are consistent and committed to further action.
	Reciprocation, Liking	The caller offers the respondents the opportunity to "have their say" on personal transport related issues that are found to be important/urgent. A caller showing concern for one's problem is generally appreciated.
	Liking	The conversation on personal transport issues is then used to offer those TravelSmart services that are best able to alleviate a transport problem reported by a particular respondent.
	Social proof	Social proof is engaged by pointing out that the TravelSmart services have found to be useful by participants in other program areas.
	Scarcity	The scarcity principle is engaged by pointing out that the recruitment phone call is a unique opportunity to receive different TravelSmart services that are normally not free of charge.

3. Research methodology and approach

At the interface of social psychology, public sector policy design and transport planning, this research project attempts to use different theoretical approaches and combine them into a practical field test setting of a TravelSmart campaign, in order to examine their empirical validity. Instead of first testing each design element separately in the laboratory, it was decided to keep the context of the test as close to reality as possible, so that the assessment would not be distorted by the artificial nature of a laboratory setting. However, during the development phase of the test design, a number of communication specialists were consulted with respect to content, wording and presentation of the different messages. Figure 1 presents an overview of the main procedural steps involved in this research.

Organized as a series of two experiments (small scale pilot test and principal field test) in a naturalistic setting of a community based TravelSmart campaign, this research project attempts to systematically introduce the six persuasion elements into the existing TravelSmart intervention design in order to increase uptake (participation rate) and effect (reduction in vehicle kilometres VKT). As part of these trials, a major task consisted of developing and applying an evaluation instrument that was able to reliably measure the effect of the conventional versus the enhanced TravelSmart intervention. This evaluation instrument was organized as a two-wave travel survey of randomly selected panel households from the target population and was conducted before and after the TravelSmart intervention, within 12 months between the before and after surveys.

The small-scale pilot test was conducted in 2003, with a total of 160 households, as a "stand alone" project by the research student (and one full-time research assistant). The principal measure of success was the number of households participating in the TravelSmart campaign (take-up rate). This first field intervention was followed by a telephone survey in order to assess attitude towards, and satisfaction with, single program elements and the TravelSmart campaign as a whole. The findings of the small-scale pilot test and the follow-up survey were used to proceed with the design of the principal field test.

The principal field test was integrated in the regular community based TravelSmart program of the Department of Infrastructure for 2004. From the program area (Darebin council), a small area (suburb of Fairfield) of some 800 households was set apart in which the before and after evaluation survey (March 2004 and March 2005) and the principal field test (April/May 2004) were conducted by the research student (and three part-time research assistants).

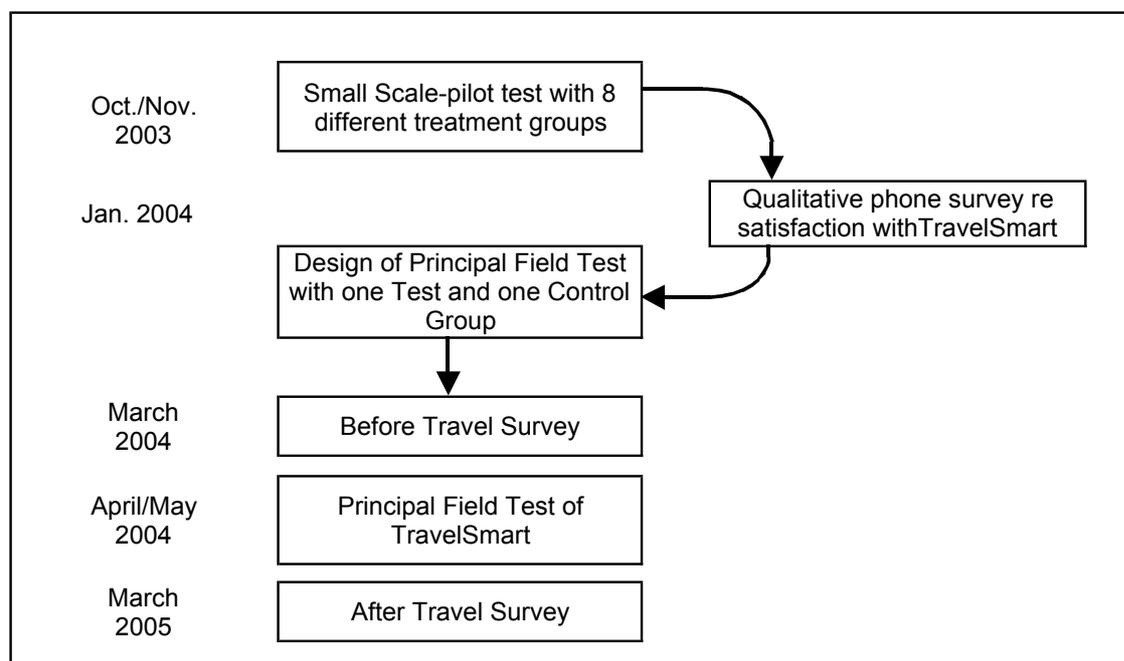


Figure 1 Procedural steps of the research project

From the theoretical investigation and the practical field work conducted so far, a wide array of issues have emerged, that are critical to the success of a community-based TravelSmart campaign. For example, with respect to the evaluation, the question arises as how best to measure the success of a TravelSmart campaign (intervention up-take, VKT reduction, trip reduction, other indicators) and how to control for a possible evaluation effect on the intervention up-take itself.

Whereas the detailed results of the panel survey are not yet completed and will be presented elsewhere (Seethaler 2005a, Seethaler and Rose, forthcoming), the results of this field work highlight the importance of the socio-demographic profile of a target household with respect to TravelSmart intervention uptake and response to the before and after travel survey. While in hindsight this may be obvious, the strength of these effects is still surprising and points to the need for tailoring the recruitment procedures more closely to the individual household.

4. The small-scale pilot test

4.1 Objectives and procedural steps of the small-scale pilot test

The small-scale pilot test was conducted from September to November 2003 in order to:

- test the general feasibility of using different treatment groups,
- gain experience with respect to the study population's reaction to different persuasion elements,
- gain experience with respect to necessary sample sizes for the larger principal field test, and finally

- experiment with the design of an odometer survey incorporated into a household travel survey form (designed without a personal one-day travel diary).

A point of departure for the small-scale pilot test was the original community based TravelSmart program of the Department of Infrastructure as tested in the Elwood pilot program 2002. The communication elements used there were modified in three ways, introducing the six principles of persuasion (as presented in Table 1 above) through,

1. the introduction of a pre-intervention phase (PIP),
2. the modification of the TravelSmart announcement letter,
3. the modification of the initial TravelSmart contact phone call.

The different combinations of these three variations – with/without six persuasion principles – resulted in eight treatment groups as shown in Table 2.

Table 2 The eight treatment groups of the small-scale pilot test

Without Pre-Intervention Phase: No Green Bag and Voucher	Old TravelSmart announcement letter	Old phone conversation script
		New phone conversation script with persuasion principles
	New TravelSmart announcement letter with persuasion principles	Old phone conversation script
		New phone conversation script with persuasion principles
With Pre-Intervention Phase: Green Bag and Voucher delivered to households 10 days before the start of TravelSmart along with a letter using persuasion principles	Old TravelSmart announcement letter	Old phone conversation script
		New phone conversation script with persuasion principles
	New TravelSmart announcement letter with persuasion principles	Old phone conversation script
		New phone conversation script with persuasion principles

From the reverse white pages, 160 households of the test area were randomly assigned to one of the eight treatment groups. In order to neatly separate the different treatments of the eight groups, the procedural steps had to be staggered over a time span of 8 weeks. The four groups treated with a pre-intervention phase (PIP), received the pre-intervention pack (durable Green Bag and Voucher with an accompanying letter) at least ten days before the TravelSmart intervention.

Then, at the start of the TravelSmart intervention, an ‘announcement letter’ was sent to the target households informing them about the up-coming TravelSmart program in their local area and the contact call. Three days after the mail-out of the letter, the survey team attempted to contact each target household by phone. Unsuccessful contact attempts were repeated, sometimes over an extended period until a contact could be established. Where answering machines were encountered, a message was left and further attempts were made later on. Upon successful recruitment calls, a personal delivery of the Travelsmart materials was made to the participating households.

In addition to generic information materials delivered to all participating households, the TravelSmart pack also contained specific information selected by the householder during the recruitment call (i.e. information on cycling tracks in Victoria for bike riders, fitness related

information, etc.). Finally, the TravelSmart pack also included a travel survey with a socio-demographic form and odometer booklets for each vehicle in the household.

During the recruitment call, an attempt was made to collect as much socio-demographic information about the contact person and the household as possible. Since the principal task was to raise interest in TravelSmart, the conversation had to be conducted in a flexible format where questions about socio-demographics and current travel patterns had to be directly related to the content of the TravelSmart pack in order not to be perceived as intrusive. Attempts were made during training to achieve consistency of data collection across the two field staff involved. Despite this rather open format of the recruitment call, it was possible to record the following characteristics (corresponding variable names in brackets):

- Linguistic status of the contact person classified into English spoken background or fluid in English vs. non-English speaking background with difficulties to understand the conversation and express him/herself in English (ENGL yes/ no);
- Elderly in the age of retirement or not (ELDERLY yes/no);
- Household with children at school age or younger (KIDS yes/no);
- Bicycles available in the household (BIKE yes/no);
- Cars available in the household (CAR yes/no);
- Public transport use by at least one household member (PT_USE yes/no).

At least to some extent this information makes it possible to check how much impact on TravelSmart intervention uptake (TSU yes/no) has to be expected from socio-demographic characteristics and travel patterns in comparison to the effects of the persuasion treatments (with/without pre-intervention phase, old/new recruitment call, old/new announcement letter).

4.2 Selected findings of the small-scale pilot test

In the small-scale pilot test, the base treatment without pre-intervention phase (without PIP), using the old TravelSmart announcement letter and the old contact call achieved an intervention up-take of 60%. Table 3 presents the “base case” and the outcome for the other seven treatment combinations, in which persuasion elements have been integrated gradually.

Table 3 Combined effects of all three components

Component 1	Component 2	Component 3	Group #	Intervention Up-take (%)
Old Call	Without PIP	Old Letter	1	60.0
Old Call	Without PIP	New Letter	3	70.0
Old Call	With PIP	Old Letter	5	75.0
Old Call	With PIP	New Letter	7	77.8
New Call	Without PIP	Old Letter	2	80.0*
New Call	Without PIP	New Letter	4	85.0**
New Call	With PIP	Old Letter	6	70.0
New Call	With PIP	New Letter	8	75.0

* Statistically significant at 90% confidence level ** Statistically significant at 95% confidence level.

The highest intervention up-takes of 80% and 85% were recorded with the new recruitment call script in combination with the old and new design of the announcement letter. Performing a z-test to compare these proportions with the intervention up-take of the base group indicates statistical significance at a 90% and 95% confidence level.

This result however is misleading. A comparison of the intervention up-takes by main effects and by two-way interactions did not indicate any statistically significant impact of the enhanced treatment effects. With 20 households in each treatment group, the sample sizes were too small in order to detect treatment-induced differences.

Despite the small sample size, using multivariate analysis methods and taking into account predictor variables other than the treatment, the pilot test still reveals some interesting aspects of intervention uptake. Households, that were already using public transport modes in the past and that have bicycles available are more likely to take up TravelSmart. In contrast, the barrier of a non-English speaking contact person with reduced ability to understand and conduct a conversation in English reduces the likelihood of participating in a TravelSmart program significantly. The main results from this assessment can be summarized as follows:

Since the dependent variable “TravelSmart up-take” is binomial (TSU = 1 “want to participate in TravelSmart”, TSU = 0 “no, not interested in TravelSmart”), binary logistic regression was used for the analysis of the data. In the stepwise forward logistic regression model the above described predictor variables and the three treatments were considered as follows:

$$\ln\left(\frac{TSU}{1-TSU}\right) = \beta_0 + \beta_1 ELDERY + \beta_2 ENGL + \beta_3 KIDS + \beta_4 BIKE + \beta_5 CAR + \beta_6 PTUSE + \beta_7 TREATPIP + \beta_8 LETTER + \beta_9 CALL \quad (1)$$

Twenty households had to be excluded from the analysis, because some of the socio-demographic information was missing (i.e. could not be collected during the recruitment call), leaving a complete data set of 138 households. The final model contains main effects only without any interaction effects.

The stepwise regression results reveal that the only significant predictors of the TravelSmart intervention up-take are the linguistic status of the contact person ($p=0.013$), the availability of bicycles in the household ($p=0.009$) and public transit use ($p=0.001$). The results further indicate that the odds ratio of linguistic status, bicycle availability and public transit use reveal a strong positive effect. An English speaking respondent is 4.8 times more likely to agree to participate in TravelSmart than a person of Non-English-speaking background ($e^{\beta}=4.82$). And households where one or more bicycles are available are nearly 6 times more likely to participate in TravelSmart ($e^{\beta}=5.99$). Finally, households whose members are already using public transport are also 6.5 times more likely of participating in TravelSmart ($e^{\beta}=6.46$).

The global test of the null hypotheses ($\beta = 0$) testing the model with a constant only against the model with the three predictors mentioned above is significant ($\chi^2 = 32.473$ with $df=3$ and $p=0.000$)². The model including the three predictors performs significantly better than the constant only model and the null hypothesis must be rejected.

In order to avoid miss-classification Hosmer and Lemeshof (1989) recommend the inclusion of those predictor variables into the model that have a significance p-value of up to 0.2. Under these circumstances, the treatment variable “old versus new recruitment call” should be included into the model as well ($p=0.139$). The new design of the treatment call seems to have a positive effect, making it 2.3 times more likely for a household to participate in TravelSmart than when the old recruitment call script has been used. Given the small sample size of the eight treatment groups, for the other treatment elements “pre-intervention phase” (with, without) and “announcement letter” (old/new design) no conclusive effect on intervention uptake could be observed.

During the TravelSmart recruitment call, it was also recorded if a contact person mentioned having seen the TravelSmart announcement letter without being prompted. Although in the above model the pre-intervention phase did not show a direct effect on intervention up-take, it appears that its effect was of *indirect* nature. During the subsequent recruitment call 37% contact persons of households with a pre-intervention treatment (Green Bag and Voucher) remembered having seen the TravelSmart announcement letter compared to 21% of households without pre-intervention treatment. This difference of 16% is statistically significant ($p=0.02$) at a Confidence Level of 95%.

² Omnibus test of model coefficients is computing the chi-square test statistic as the difference between the loglikelihood ratio of the full model and the constant-only model $\chi^2 = 2[-LL(\text{all}) - (-LL(0))]$.

5. The principal field test with a before and after travel survey

5.1 Design and selected findings of the principal field test

Based on the experience gained from the small-scale field test and given the logistic requirements, the design for the principal field test had to be simplified considerably. Instead of eight treatment groups, only one test group of some 800 households was to be exposed to a treatment that included the pre-intervention phase and a modified TravelSmart announcement letter. Thus, the test households would first receive a Pre-Intervention Pack (Green Bag with accompanying letter) and approximately ten days later, a TravelSmart announcement letter with integrated persuasion elements. In contrast, the control households would receive the regular TravelSmart announcement letter without persuasion elements and no Pre-intervention Pack. After that initial recruitment phase, the university research team would then “hand over” the test households to the marketing institute, where the test addresses would become part of the address pool of the 30,00 target households of the Darebin TravelSmart. This way, all further steps including the recruitment phone call were conducted in the same way for test and control households following the regular TravelSmart procedure of the contractor.

The principal field test largely confirmed the positive results of the small-scale pilot test. In the test area where all households received the pre-intervention pack (durable Green Bag) and the modified TravelSmart announcement letter, *58 percent* of the households wanted to participate and wished to receive information and services offered as part of the TravelSmart program. In the control areas, where no pre-intervention phase took place and the regular TravelSmart announcement letter was used, the recruitment call produced an up-take rate of *51 percent*. Approximately *42 percent* of households in the test area and *49 percent* in the control area were either not interested, said to use already public transit and therefore did not need further TravelSmart information or refused to participate in TravelSmart.

From a statistical point of view, the difference between test and control group in terms of intervention up-take (58% vs 51%) is significant at a confidence level of 95% ($p=7.48E-05$). Unfortunately, given the sheer magnitude of the project, no attempt was made during the TravelSmart recruitment process to systematically record some of the socio-demographic variables such as linguistic status, household size, car availability, etc. that would have allowed further comparison of the impact of these socio-demographic factors with the treatment effect.

5.2 Conclusions with respect to the two TravelSmart field tests

Despite the restricted sample size, the small-scale pilot test delivered promising signs that the persuasion elements may enhance the effect of the TravelSmart intervention in a direct or indirect way. The telephone survey conducted with test households in preparation for the larger principal field test further indicated that the pre-intervention phase had triggered an awareness for and willingness to engage in a pro-environmental shopping behaviour. This first step seemed to have acted as an initial small commitment for the larger commitment to participate in TravelSmart later on. Also, the fact that both the pre-intervention phase and the TravelSmart campaign were accompanied by letters using the same design (logo and appearance) and including signatures of important stakeholders of the local business community, came across as a strong signal of social proof. The combination of these different persuasion strategies into one treatment for the principal field test was therefore able to confirm the positive impact on the take-up rate on a statistically significant level.

Furthermore, from a practical implementation point of view for a TravelSmart intervention the findings of the small-scale pilot test revealed some interesting strategic issues. Firstly, further efforts have to be made to make the TravelSmart program appealing to households who do not yet use public transport and who are not already in the possession of bicycles. Secondly,

language reveals itself to be a major barrier for non-English speaking households, because the recruitment procedure for TravelSmart relies heavily on several verbal communication steps. Although many communities offer a free translation service, this seems to be irrelevant in a situation of a spontaneous decision to participate or not in a campaign. For suburbs/regions where the cultural composition is known in advance, the field team has therefore to be selected accordingly.

However, this is only a partial remedy to a more general problem. Little is known about the way different ethnic groups respond to community-based social marketing campaigns. In the literature review conducted as part of this research project, only two publications were found that examine cultural differences in the way communication is received and processed by a target audience (Nisbett, 2003), and how different ethnical groups respond to persuasion strategies in different ways (Wosinska, 2001). In light of the increasing need to promote pro-environmental behaviour (i.e. water saving, waste recycling, etc.) through community-based social marketing practices, knowing how to match the design of an intervention with the cultural background of a target population becomes a critical factor of success.

5.3 Objectives and procedural steps of the before and after evaluation survey

One of the key targets of TravelSmart is the reduction of greenhouse gas emissions. The present research project therefore focuses primarily on the vehicle kilometres before and after the TravelSmart intervention. To measure the impact of the principal field test, a before and after travel survey has been designed in which socio-demographic variables were collected at a household and a person level together with some measures of weekly travel mode choice of each household member and detailed characteristics of each motorized vehicle in the household. In addition, for each car in the household a set of two odometer readings were recorded over an interval of one week. These odometer readings allow calculation of a change in daily average vehicle kilometres between the before and after survey for the test and the control households.

The before survey was conducted in March 2004, approximately one month before the start of the TravelSmart campaign and special attention was paid to separate the two interventions in terms of design and appearance of the materials. Also, in explaining both the travel survey and the TravelSmart campaign to the target population, no causal link was drawn between the two interventions. The after survey was conducted in March 2005, exactly one year after the first wave, in order to control for seasonality effects and to gain evidence about the medium-term impact of TravelSmart on vehicle kilometres driven by the target population. Also, for the principal field test of this research project it was an advantage to choose for both evaluation surveys the same timing as the official evaluation survey for the TravelSmart project conducted in the entire Council of Darebin (for a description see Richardson et al, 2005). In addition to the intervention up-take that was measured during the implementation of the regular and the enhanced TravelSmart treatment, the before and after travel survey will allow measurement of the treatment effects on vehicle-kilometres at a vehicle and a household level.

Because the conduct of a travel survey requires considerable effort from a participating household, an impact of the before travel survey on the intervention up-take of TravelSmart itself cannot be excluded (Seethaler, 2005b). In order to measure this effect, the before and after travel surveys were only conducted with half of the test group. Furthermore, in order to control for effects that are not related to the two different TravelSmart treatments, during the recruitment process of the travel survey and in the travel survey itself a range of socio-demographic variables were recorded as well.

At the current stage, the before and after travel surveys of the principal test are both completed, but the analysis of the TravelSmart effect on vehicle kilometres is still underway. Nevertheless, the conduct of the before and after travel survey have already brought forward some important issues with respect to the response rate that are highly relevant to

the efficiency of this entire evaluation scheme of community based TravelSmart. The remainder of this paper will therefore concentrate on factors affecting the response rate of the before and after travel survey.

The self-completion travel survey questionnaires were delivered and collected personally in order to allow the field staff to motivate and assist the householders in their task. For delivery efficiency, the survey area was subdivided in 14 walkable blocks, each of which was assigned to a specific starting day of a survey travel week. Thus, over a total of 27 field days the following procedural steps were executed in a staggered manner:

- Checking the selected households in the field, eliminating empty blocks, construction sites, vacant houses;
- Postal mail out of the Announcement Letter of the Before Travel Survey;
- Personal delivery of Survey Materials to the household two days before start of the survey week;
- Motivational call on the evening before the start of the survey week (where phone numbers could not be obtained from the contact person during personal delivery, phone numbers of the reverse white pages were used);
- Personal delivery of a reminder card for the second odometer reading at the last day of the survey week;
- Personal pick-up of survey materials / or provision of notice with pre-paid return envelope if no one is home or if the survey is not yet finished;
- Mail out of reminder letters for non-respondents.

Besides the personal delivery and the personal pick-up of the survey materials, the motivational call on the evening before the start of the survey and the distribution of reminder cards were additional steps to achieve the highest possible response rate. The entire process was guided by a series of control sheets that were continuously up-dated at each step of the field-work and entered into a database in order to be able to specify and co-ordinate the tasks for each day at a single household level. A year later – with the TravelSmart intervention in between – exactly the same procedure was used for the after travel survey. For this second wave, only households that had responded to the before travel survey were approached.

5.4 The response to the Before Travel Survey

Analyzing the response to the before travel survey, one must take into account the procedures used in this field test to recruit target households. In the context of TravelSmart evaluations, relatively little research attention has been focused on the effect of different recruitment procedures on the response rate to household travel surveys. However, experience from European travel surveys in the nineties shows that personal contact, either at the door-step or over the phone is able to increase the response rates (Axhausen 1999).

Given that the Victorian Department of Infrastructure (DOI) as the client of this project, set a target response rate of 60%, intensive recruitment procedures were chosen that included personal contact at delivery of the survey pack, a personal motivational call on the evening before the reporting week started and personal pick-up of the survey forms.

During the personal delivery of the survey materials, it was found that 68% of the households accepted the forms along with some instructions provided at that first personal contact. In 21% of the cases, no personal contact could be made and the survey forms were left in the mailbox. In 9% of the cases a personal contact was made at the doorstep but the participation was refused. Finally, at delivery 1% of addresses had to be classified as sample loss (empty house, under construction). This result of the delivery process then turned into a final response to the before travel survey of 59% of the 392 addresses initially sampled.

In order to understand the driving factors of a positive response to the before travel survey, the detailed recruitment records of the fieldwork may be used in a first step to relate the

method of recruitment to the response rate. The outcome variable “Response to the before survey” was recoded as a binomial variable, with a positive result for those households who sent back a completed survey form (RESPOND yes/no).

A binomial variable was coded for the presence or absence of personal contact during delivery of the survey forms (DELIVER yes/no) and for the presence or absence of a personal contact during the motivational call (MOTCALL yes/no). To control for the effect of the long weekend from March 6-8, 2004 that was part of the survey delivery and recruitment period and where one could expect a greater number of families on holiday, a binomial variable was coded (LONGWKD yes/no).

Whenever personal contact during delivery of the survey forms could be established, a few socio-demographic characteristics of the contact person were recorded by the field staff, namely (corresponding variable names in brackets):

- The gender of the contact person (GEN male/female);
- An estimate of the age of the contact person (AGE continuous);
- The linguistic status of the contact person classified into English speaking background or fluid in English vs. non-English speaking background with difficulties in understanding the conversation and expressing him/herself in English (ENGL yes/no)

Thus, in a second step, response was also modelled as a function of socio-demographic variables – but only for those households where contact could be established during personal delivery of the survey forms.

Since the dependent variable “response to the travel survey” is binomial, binary logistic regression was used for the analysis of the data. In the first step, the three predictor variables “contact at delivery”, “contact at motivational call” and “contacting period with/without long weekend” were entered into the model at the same time:

$$\ln \frac{\square \text{RESPOND} \square}{\square \square \text{RESPOND} \square} = \square + \square \text{DELIVER} + \square \text{MOTCALL} + \square \text{LONGWKD} \quad (2)$$

After exclusion of sample loss (i.e. empty house, house under construction) a total of 378 households were included in the analysis.

The regression results reveal that the predictors “contact at delivery” and “motivational call” are both highly significant ($p=0.001$ and $p=0.00$). Establishing personal contact at delivery makes it 2.4 times more likely for a household to respond to the travel survey, and the motivational call on the evening before the start of the survey has an even higher odds ratio of 2.7. In contrast, no significant effect was observed for households where the recruiting period happened during the long weekend ($p=0.878$).

The global test of the null hypothesis testing the model with a constant only against the model with the three predictors is significant ($\chi^2 = 37.630$ with $df=3$ and $p=0.000$). Thus, the model including the three predictors performs significantly better than the constant only model and the null hypothesis can be rejected. Further examination of different models with all three predictors, combinations of two predictors, or with one single predictor indicated, that the best fit was achieved by the model with contact at delivery and motivational call.

In a second step, only those households where socio-demographic data could be retrieved during delivery contact ($N=308$) were considered. This model confirmed the strong positive effect of the motivational call on the response rate found in the first step ($p=0.000$). However, in this sub-group of households none of the socio-demographic variables were significant.

5.5 The response to the After Travel Survey

For the after travel survey only those households from which a completed survey form of the first wave could be obtained were approached. In order to control for seasonality effects, the after travel survey was conducted in the same period of the year as the first wave. In addition, each household had the same starting day (Monday to Sunday) assigned for their travel week, and those households that reported over the long weekend period of Labour Day in the first wave, were again asked to do so in the after travel survey.

Table 4 presents the final response rate to both waves in percent of the sample drawn for the initial before travel survey ($N_{\text{before}}=392$) and in percent of the households approached for the after travel survey ($N_{\text{after}}=230$).

Table 4 Response to the After Travel Survey

Household response to After Travel Survey			In % of After Sample (n=230)	In % of Before Sample (n=392)
Recruited for After Survey 2005	230	HH	100.0%	58.7%
Sample loss	12	HH	5.2%	3.1%
Refusal	21	HH	9.1%	5.4%
Response (both waves)	197	HH	85.7%	50.3%

For the community wide TravelSmart application in the Melbourne suburb of Darebin, pilot evaluation surveys had indicated a response rate of 52% to the before travel survey. It was further assumed that 75% of these households would also respond to the after travel survey. Also, residential mobility data from the ABS census indicated that 15% of sampled households would have moved residence during the one-year interval between the before and after survey. Taking all three factors into account ($0.52 \times 0.75 \times 0.85 = 0.33$), it was to be expected that the final response rate (households responding to both waves) would reach just over 30% of the initial sample of the before survey.

As Table 4 indicates, the before and after travel surveys for this research project performed better than predicted and achieved a 50% response rate for both waves combined. The reasons for this result might be the simpler questionnaire used for this research project (apart from the odometer readings for the household vehicles, no personal travel diary had to be completed by the household members) compared to the official survey instrument of the Darebin TravelSmart evaluation, and also the slightly higher average social status of the test area compared to the entire community of Darebin.

With those households that had responded to the before travel survey and that were therefore approached again for the after travel survey, the same Logistic Regression model was performed as for the first wave (see Equation 2). Once again the results confirmed that the motivational call on the evening before the start of the first survey day was the most significant variable ($p < 0.005$). However, in contrast to the first wave, the personal contact during the delivery of the survey form did not seem to matter all that much in the second wave. People who found the survey form left at their doorstep this time, seemed to remember it from the year before, and where they didn't, they were prompted by the motivational phone call on the following day.

In conclusion, the results obtained from the before and after travel survey demonstrate how important it is to have recruitment procedures in place that include personal contact with the target households, both at delivery of the survey forms and during the motivational phone call. The latter remains also the most important factor to secure a positive response in the after travel survey. Somewhat surprisingly, the long weekend of Labour Day did not seem to have a significant effect on the recruitment of target households in both waves. Finally, the problem of panel attrition due to residential mobility between waves cannot be prevented by an increase in personal contact during recruitment. Rather, this effect needs to be taken into account at the very beginning, when the sample size is determined.

6. Outlook and further research needs

The pilot testing of TravelSmart and the two-wave evaluation survey presented in this paper indicate that the use of the six persuasion principles is able to positively affect the TravelSmart up-take rate. Also, in order to increase the TravelSmart up-take and the response to the travel surveys, personal contact has proven to be essential. Experience gained throughout the fieldwork indicates a need for further research in order to understand how the design of the TravelSmart intervention and similar other pro-environmental campaigns should be matched to the cultural background of a target population.

Finally, another important problem is the effect that the survey evaluation can have on the TravelSmart intervention itself. Known as 'instrument reactivity' (DeVaus, 2001), the before survey can affect how the responding households react to the TravelSmart intervention to which they are exposed after completion of the travel survey. Some evidence was gained during the pilot test about the possible nature of instrument reactivity (Seethaler, 2005b), and indicates a need for further research in the context of community based TravelSmart in order to understand by which measures instrument reactivity can successfully be prevented.

7. References

- Axhausen, K.W. (1999) *Suggested administration and evaluation for travel diaries: a manual* Delivery 9 of MEST Methods for European Surveys of Travel Behaviour, Innsbruck, Austria
- Aronson, E. D., Bridgeman, D. L., and Geffner, R. (1987) Inter-dependent interactions and pro-social behaviour *Journal of Research and Development in Educations*, 12, 16-27
- Benson, P. L., Karabenic, S. A., and Lerner, R. M. (1976) Pretty pleases: The effect of physical attractiveness on race, sex, and receiving help *Journal of Experimental Psychology*, 12, 409-15
- Bickman, L. (1974) The social power of a uniform. *Journal of Applied Social Psychology*, 4, 47-61
- Brehm, J. (1966) *A theory of psychological reactance*, New York: Academic Press
- Bushman, B. J. (1984) Perceived symbols of authority and their influence on compliance *Journal of Applied Social Psychology*, 14, 501-508
- Byrne, D. (1979) *The attraction paradigm*, New York: Academic Press
- Cialdini, R. B. (1993) *Influence: Science and practice* New York: Harper Collins
- Cialdini, R. B. (2001) Harnessing the science of persuasion *Harvard Business Review*, 79(15), 71-80
- Cialdini, R. B., Demaine, L. J., Sagarin, B. J., Barrett D. W., Kelton, L. V. R., and Winter, P. L. (forthcoming) Managing Social Norms for Persuasive Impact *Journal of Environment and Behavior* (in press)
- Cialdini, R.B. (2003) Crafting normative messages to protect the environment *Current Directions in Psychological Science*. August 2003, Vol.12, No. 4, pp 105-109
- Davis, J. J. (1995) The effects of message framing on response to environmental communications. *Journalism and Mass Communication Quarterly*, 72, 285-299.
- Department of Infrastructure DOI (2002) *Metropolitan Strategy 2030* Melbourne: Victorian Department of Infrastructure
- Department of Natural Resources and Environment DNRE (2002) *Victorian Greenhouse Gas Inventory 1999*. Melbourne: Government of Victoria
- Drachman, D., deCarufel, A., and Insko, C. A. (1978) The extra credit effect in interpersonal attraction *Journal of Experimental Social Psychology*, 14, 458-67
- DeVaus D. A. (2001) *Research design in social research* London/Thousand Oaks/New Delhi: Sage Publications
- Eagly, A. H., and Chaiken, S. (1975) An attributional analysis of the effect of communicator characteristics on opinion change: The case of communicator attractiveness *Journal of Personality and Social Psychology*, 32, 136-144
- Festinger, L. (1954) A theory of social comparison processes *Human Relations*, 7, 117-40

Freedman, J. L., and Fraser, S. C. (1966) Compliance without pressure: The foot-in-the-door technique *Journal of Personality and Social Psychology*, 4, 195-203

Fujii, S., and Kitamura, R. (2003) What does a one-month free bus ticket do to habitual drivers? An experimental analysis of habit and attitude change *Transportation*, 30, 81-95

Gardner, G. T., and Stern, P. C. (1996) *Environmental problems and human behaviour* Boston: Allyn and Bacon

Gärling, T. (1992) The importance of routines for the performance of everyday activities *Scandinavian Journal of Psychology*, 19, 41-80

Groves, R. M., Cialdini, R. B., and Couper, M. P. (1992) Understanding the decision to participate in a survey *Public Opinion Quarterly*, 56(4), 475-495.

Hines, J. M., Hungerford, H. R., and Tomera, A. N. (1987) Analysis and synthesis of research on responsible environmental behaviour: A meta-analysis *Journal of Environmental Education*, 18(2), 1-8.

Hosmer D.W. and Lemeshow S. (1989) *Applied Logistic Regression*. New York: Wiley

Hornik, J., Cherian, J., Madansky, M., and Narayana C. (1995) Determinants of recycling behaviour: A synthesis of research results *Journal of Socio-Economics*, 24(3), 105-127

Komorita, S. S., and Parks, C. D. (1994) *Social Dilemmas* Madison, WI: Brown and Benchmark

Mazis, M. B. (1975) Antipollution measures and psychological reactance theory: a field experiment *Journal of Personality and Social Psychology*, 31, 654-66.

McKenzie-Moor, D. (2002) *Guide to community-based social marketing* McKenzie-Mohr website: <http://www.cbsm.com/Chapters/introduction.htm> (last accessed June 20, 2005)

McKenzie-Moor, D., and Smith, W. (1999) *Fostering sustainable behaviour: An introduction to community-based social marketing*, Gabriola Islands, B.C.: New Society Publishers

Nisbett, R. (2003) *The geography of thought. How Asians and Westerners think differently and why* New York: The Free Press/ Simon & Schuster Inc

Pallak, M. S., Cook, D. A., and Sullivan, J. J. (1980) Commitment and energy conservation *Applied social psychology annual*, L. Bickman, ed., Sage, Beverly Hills, CA, 235-253

Richardson A.J., Davis M.B., Harbutt P.L. (2005) Evaluation of a TravelSmart Program using Before and After Household TravelSurvey *Papers of the 28th Australasian Transport Research Forum ATRF*, 28-30 September 2005, Sydney NSW

Ronis, D. L., F, Y. J., and Kritsch, J. P. (1998) Attitudes, decisions, and habits as determinants of repeated behaviour *Attitude structure and function*, A. R. Pratkanis, S. J. Beckler, and A. G. Greenwald, Eds., Erlbaum, Hillsdale, JN, 213-239

Seethaler, R.K. (2005a) The use of odometer surveys in the evaluation of community based TravelSmart programs. TUTI Report TR 55-2005, <http://www.tuti.com.au/pubs2005.html>

Seethaler, R.K. (2005b) Evaluating community based TravelSmart in Melbourne. Paper presented at the Annual Meeting and Exhibit of the Institute of Transportation Engineers, August 7-10, 2005, Melbourne, <http://www.tuti.com.au/pubs2005.html>

Seethaler, R.K. and Richardson, A.J. (2003) *Seasonality in Daily Travel Pattern* TUTI Report TR 24-2003, a report to the Victorian Department of Infrastructure, Taggerty VIC

Seethaler, R.K. and Rose G. (2003) Application of psychological principles to promote travel behaviour change . *Papers of the 26th Australasian Transport Research Forum ATRF*, 1-3 October 2003, Wellington NZ

Seethaler, R.K. and Rose G. (2006) Using the Six Principles of Persuasion to Promote Community based Travel Behavior Change. Paper submitted to the *82th Transportation Research Board Annual Meeting*, Washington D.C., (forthcoming)

Stotland, E., and Patchen, M. (1961) Identification and change in prejudice and authoritarianism *Journal of Abnormal and Social Psychology*, 62, 250-56

Suedfeld, P., Bochner, S., and Matas, C. (1971) Petitioner's attire and petition signing by peace demonstrations: a field experiment *Journal of Applied Social Psychology*, 1, 278-83

Tertoolen, G., Van Kreveld, D., and Verstraten, B. (1998) Psychological resistance against attempts to reduce private car use *Transportation Research Part A*, 32(3), 171-181

Verplanken, B., Aarts, H., and van Knippenberg, A. (1994) Attitude versus general habit: Antecedents of travel mode choice *Journal of Applied Social Psychology*, 24, 285-300

Werner, C. M., Turner, J., Shipman, K., and Twitchell, F. S. (1995) Commitment, behaviour, and attitude change: An analysis of voluntary recycling. *Special Issue: Green psychology.* *Journal of Environmental Psychology*, 15(197-208)

Winter, P. L., Sagarin, B. J., Rhoads, K., Barrett, D. W., and Cialdini, R. B. (2000) Choosing to Encourage or Discourage: Perceived Effectiveness of Prescriptive versus Proscriptive Messages *Environmental Management* 26 (6), pp. 589-594

Wosinska, W., Cialdini, R. B., Barrett, D. W., and Reyskowski, J. (2001) *The practice of social influence in multiple cultures* Mahwah, NJ : Lawrence Erlbaum Associates, Inc.

Yates, S. (1982) *Using prospect theory to create persuasive communications about solar water heaters and insulation*. Unpublished doctoral dissertation Santa Cruz, CA: University of California