



WORKING PAPER
ITS-WP-04-24

CAITR 2004

Using the Six Principles
of Persuasion to Promote
Travel Behavior Change

by

Rita Seethaler

8-10 December 2004

ISSN 1440-3501

**INSTITUTE OF
TRANSPORT STUDIES**

The Australian Key Centre
in Transport Management

The University of Sydney
and Monash University

*Established under the Australian Research Council's Key
Centre Program*

NUMBER: Working Paper ITS-WP-04-24

TITLE: Using the Six Principles of Persuasion to Promote Travel Behavior Change

ABSTRACT: Policies aiming to increase the sustainability in urban transport often face the problem of overcoming unsustainable behavior patterns that are principally centered around the car and largely dominated by routine based mode choices. Social psychology offers a series of persuasion techniques that are able to strengthen the impact of community based Travel Behavior Change programs such as the TravelSmart programs currently conducted in some of Melbourne's inner suburbs. This paper presents selected results of a small-scale pilot test where combinations of persuasion elements were tested in eight different treatment groups while controlling for a number of socio-demographic variables. The paper also addresses the issue of evaluating a community-based TravelSmart intervention by means of a before and after travel survey. Selected results are presented from the before travel survey conducted to evaluate a larger TravelSmart field test, whereby special attention is drawn to the factors that enhance the response rate.

KEY WORDS: travel behavior change, TravelSmart, persuasion, evaluation, logistic regression, response rate

AUTHOR: Rita Seethaler

CONTACT: Institute of Transport Studies (Monash)
The Australian Key Centre in Transport Management
Department of Civil Engineering
Building Box 60
Monash University Victoria 3800 Australia

Telephone: +61 3 9905 9627
Facsimile: +61 3 9905 4944
E-mail: itsinfo@eng.monash.edu.au
Internet: civil.eng.monash.edu.au/its/

DATE: 8-10 December 2004

1. PROJECT OVERVIEW

1.1 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).

Like many other community-based environmental campaigns, TravelSmart is facing two major challenges. Firstly, the “*dilemma of the common pool*” (Gardner, 1996) describes a situation, where a behavior makes sense from an individual point of view, but when repeated by a large number of individuals, proves disastrous to society. With respect to motorized transport, the common pool are the natural resources (like clean air, water, energy etc.) where insufficient access restrictions, regulations or property rights prevent their over-use and depletion. Also, each individual user of the transport system perceives his impact as very little compared to the huge size of the resource and has no incentive to reduce motorized travel. Secondly, travel behavior is to a large extent *habitual* (Verplanken et al., 1994). In general, habits are recognized to be very useful and necessary routines, preventing us from spending much thinking efforts on many daily repetitive activities (Gärling, 1992). However, when external conditions change – for example environmental problems emerge – old habits may no longer be appropriate.

To overcome the barrier of habitual behavior patterns – that is to “unfreeze” driving habits (Dahlstrand et al. 1997; 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 behavioral 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 behavior, indicating the presence of *reactance* and *cognitive dissonance* effects triggered by a Travel Behavior 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 behavior 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.

After this general introduction, the present paper provides a brief overview of the six principles of persuasion in the second Chapter and discusses the research methodology and approach in the third Chapter. Selected findings from the small-scale pilot test and the evaluation survey of the principal field test are presented in Chapter four and five, followed by final conclusions and recommendations in Chapter six.

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 routinized 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 et al. (2003).

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 behavior received (e.g., gifts, favors, services, concessions) with positive behavior in return". However, the authors point out that according to the theory of reactance (Brehm 1966) compliance is inhibited when the earlier behavior received 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 behavior 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 the community-based TravelSmart trial in the Melbourne municipality of Darebin, the small-scale pilot test conducted in 2003 as part of this research project was testing the impact of a pre-intervention phase. An unconditional gift in the form of an environmentally friendly shopping bag and a discount voucher for the local shopping centre were being used to raise awareness for environmental concerns and to trigger a positive reciprocation response to the consecutive request to participate in the local TravelSmart campaign.

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

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 the 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 behavior), but that it is sufficient to relate it to a similar area of concern (pro-environmental behavior 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 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.

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 behavior (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 behavior was in fact performed by many other visitors, as well – social proof from similar others (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 (Cialdini et al. forthcoming).

For travel behavior 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 neighbourhood, for the Church group, etc.). Also, the TravelSmart materials should be designed and presented in an attractive fashion, i.e. 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 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 a pollution and noise free environment would be the negative message framing.

Of particular interest in the present research project is the impact of combining the six principles. In the small-scale pilot and the principal field test offering the Green Bag to future target households, is an upfront, unconditional gift. Householders using it for the reduction of plastic bags contribute a first - albeit rather small – effort to protect the environment, and by doing so, are starting to commit themselves to environmental friendly behavior. This is done publicly through being seen walking around with the Green Bag in the local shopping strip. In addition, all TravelSmart print matter is using the logos of the major stakeholder, the local traders association, in order to activate the principle of social proof as well.

3. RESEARCH METHODOLOGY AND APPROACH

At the interface of social psychology, public sector policy design and civil engineering, 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. Figure 1 presents an overview of the main procedural steps involved in this research.

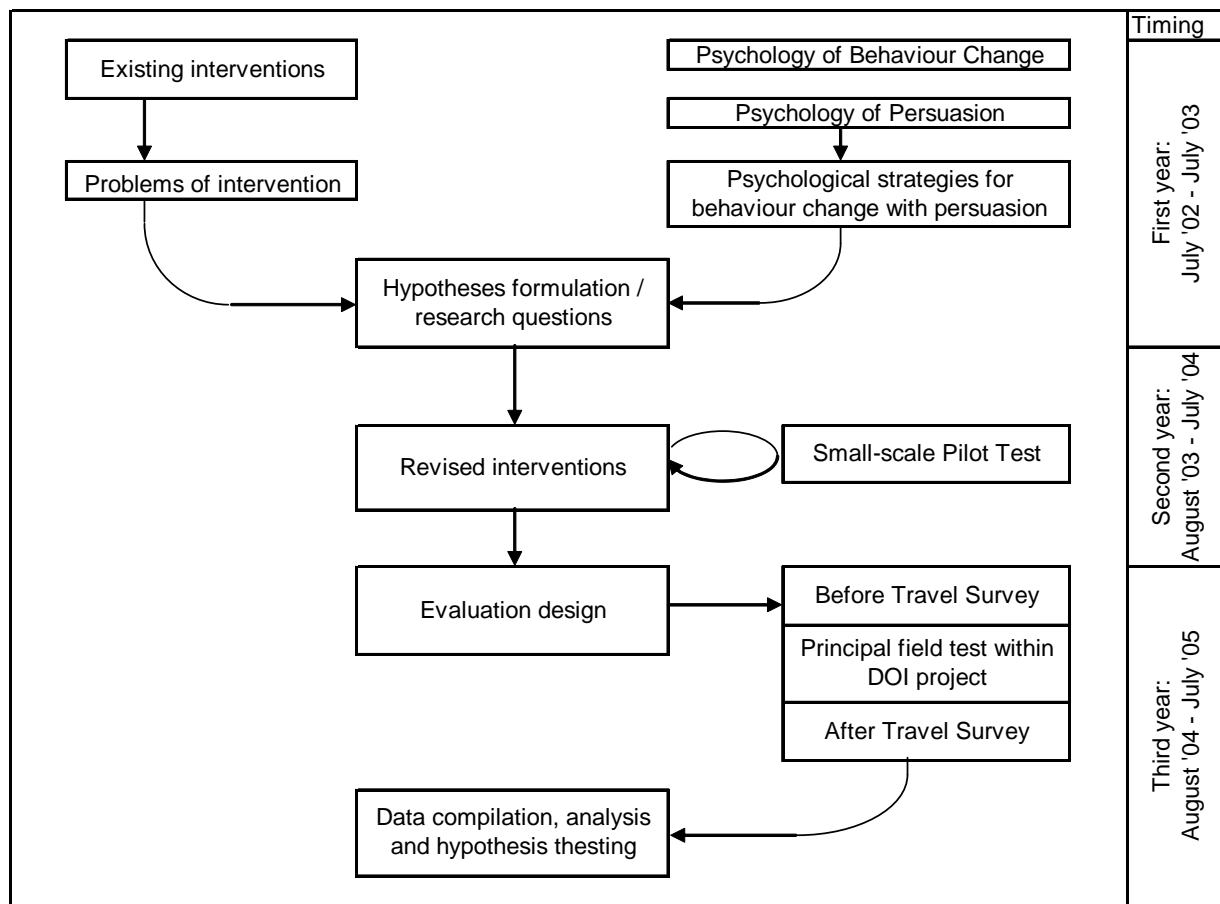


Figure 1. Procedural steps of the research project

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, the 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 consists in developing and applying an evaluation instrument that is able to reliably measure the effect of the conventional vs. the enhanced TravelSmart intervention. This evaluation instrument is organized as a two-wave travel survey of randomly selected panel households from the target population and is conducted before and after the TravelSmart intervention within the interval of a year.

Whereas 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 field test is integrated in the regular community based TravelSmart program 2004/05 of the Department of Infrastructure. From the program area (Darebin council), a small area (suburb of Fairfield) of some 800 households is set apart in which the before and after evaluation survey and the principal field test can be conducted by the research student (and three part-time research assistants).

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.

For the present paper, of the small-scale pilot and the principal field test selected results are presented, that highlight the importance of the socio-demographic profile of a target household with respect to TravelSmart intervention uptake. In hindsight obvious, the strength of these effects is still surprising and points to the need of tailoring the recruitment procedures more closely to the individual household.

4. THE SMALL-SCALE PILOT TEST

4.1 Objectives and procedural steps of the 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 principal field experiment, and finally
- experiment with the design of an odometer survey incorporated into a household travel survey form.

Point of departure for the small-scale pilot test was the original community based TravelSmart program of Steer Davies Gleave as tested in the Elwood pilot program 2002. The communication elements used there were modified in three ways, introducing the six principles of persuasion through,

1. the introduction of a pre-intervention phase,
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 Figure 2.

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

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

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, received the pre-intervention pack (durable Green Bag and Voucher with letter) at least ten days before the TravelSmart intervention.

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 included also 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:

- 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 (PTUSE 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, using the old TravelSmart announcement letter and the old contact call achieved an intervention up-take of 60%. Table 1 presents the “base case” and the outcome for the other seven treatment combinations, in which persuasion elements had been integrated gradually.

Table 1. 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:

Method of analysis:

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 is used for the analysis of the data.

In the stepwise forward logistic regression model the above described predictor variables and the three treatments are considered as follows:

$$\ln\left(\frac{TSU}{1-TSU}\right) = \alpha + \beta ELDERY + \beta ENGL + \beta KIDS + \beta BIKE + \beta CAR + \beta PTUSE + \beta TREATPIP + \beta LETTER + \beta CALL \quad (1)$$

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.

Results:

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), as shown in Table 2.

Table 2. Analysis of Maximum Likelihood Estimates

Variable	B	s.e. (B)	Wald	df	Sig.	Exp(B)	95% C.I. for Exp(B)	
							Lower	Upper
ENGL	1.573	.631	6.211	1	.013	4.819	1.399	16.599
BIKE	1.790	.688	6.773	1	.009	5.991	1.556	23.067
PTUSE	1.866	.554	11.337	1	.001	6.463	2.181	19.150
Constant	- 1.500	.690	4.725	1	.030	0.223		

The exponent of a parameter $\text{Exp}(B)$, also called odds ratio in some statistical software packages because of its exponential relationship to the odds ratio of the successful outcome, is an indicator of strength. Thus, the results of Table 2 indicate that the odds ratio of the linguistic status and bicycle availability 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 ($e^b=4.82$). And households where one or more bicycles are available are nearly 6 times more likely to participate in TravelSmart ($e^b=5.99$). Finally, households whose members are already using public transport are also 6.5 times more likely of participating in TravelSmart ($e^b=6.46$).

The global test of the null hypotheses ($\beta = 0$) testing the model with a constant only against the model with the three predictors shown 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.

An additional way of testing model performance is based on the comparison of observed and predicted cell frequencies. Using the model with the three predictors, the Hosmer and Lemeshof Test of chi-square ($\chi^2=6.813$ with $df = 4$) doesn't show a significant difference between observed and predicted cell frequencies ($p=0.146$), indicating that this model has an overall good fit. In fact, the classification table of observed vs. predicted up-take of TravelSmart shows that the model performs fairly well with 83.3 % predicted cases assigned to the right category.

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 vs 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.

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: $\chi^2 = 2[-LL(\text{all}) - (-LL(0))]$.

In addition to the few socio-demographic variables recorded during the recruitment call, it was also registered if a contact person mentioned having seen the TravelSmart letter without being prompted. Although 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 recruitment call 37.2% contact persons of households with pre-intervention treatment reported to have seen the TravelSmart announcement letter compared to 21.3% of households without pre-intervention treatment. This difference of 15.9% is statistically significant (z -value of $2.204 > 1.96$) at a Confidence Level of 95%.

4.3 Conclusions

Despite the small sample size, there are some promising signs that the persuasion elements may enhance the effect of the TravelSmart intervention in a direct or indirect way. The purpose of the principal field test will be to confirm this hypothesis on the bases of a larger sample size. Also, without an extensive before and after evaluation survey, no reliable information is available on how well an individual household already meets the targeted travel behavior before starting with TravelSmart.

The findings of the small-scale pilot test are nevertheless interesting from a practical implementation point of view of a TravelSmart intervention: Language reveals itself to be a major barrier for non-English speaking households, because the recruitment procedure for TravelSmart relies heavily on several communication steps. For suburbs/regions where cultural composition is known in advance, the field team has to be selected accordingly.

5. THE BEFORE TRAVEL SURVEY OF THE PRINCIPAL FIELD TEST

5.1 Main objectives of the before and after travel survey

In the principal field test in order to handle a substantially larger sample size compared to the small-scale pilot, the persuasion elements were combined into one treatment using the Pre-Intervention Phase and the improved TravelSmart Announcement letter. One test group of approximately 800 households was exposed to this “TravelSmart Plus” treatment and will be compared with an equivalent number of control households treated by SocialData Australia with the regular Indimark® program. The results of the principal field test are not part of this paper, as the field test is not yet completed.

Since one of the key targets of TravelSmart is the reduction of greenhouse gas emissions, the present research project focuses primarily on the vehicle kilometers before and after the TravelSmart intervention. To meet this key target, the objective of the before and after travel survey is to provide odometer readings over a week for test and control households of the TravelSmart experiment in two points of time – a few weeks before the TravelSmart program begins and one year later. The reason for the one year interval between the before and after travel survey is to control for seasonality effects and to gain evidence about the medium-term impact of TravelSmart on vehicle kilometers. Also, for the principal field test of this research project it is an advantage to choose for both evaluation surveys the same timing as the official evaluation surveys for the TravelSmart project conducted in the Council of

Darebin. Thus, in addition to intervention up-take that is measured during the implementation of “TravelSmart Plus”, the weekly vehicle kilometers driven by the test and control households and recorded in the before and after survey will allow to measure the treatment effects on vehicle-kilometers at vehicle and 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. In order to measure this effect, the before and after travel surveys are 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 are recorded.

At the current stage, only the before travel survey of the principal test is completed and no data about the TravelSmart effect on vehicle kilometers are available yet. However, the conduct of the before travel survey has already brought forward some important issues with respect to the response rate that will affect the efficiency of this entire evaluation scheme of TravelSmart. The remainder of this paper will therefore concentrate on factors affecting the response rate of the before travel survey.

5.2 Procedural steps of the before 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 updated at each step of the field-work and entered into a data base in order to be able to specify and co-ordinate the tasks for each day at a single household level

5.3 Selected findings: Response to the Before Travel Survey

Analyzing the response to the before travel survey, one must take into account the procedures used in the field test to recruit target households. 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 rate (Axhausen 1999).

Given that the Victorian Department of Infrastructure (DOI) as client of this project sets a target response rate of 60%, intensive recruitment procedures were chosen that include personal contact at delivery of the survey forms and personal contact during a motivational call the evening before the reporting week starts.

During the personal delivery of the survey materials it was found that 68.4% of the households were accepting the forms along with some instructions provided at that first personal contact. In 21.3% 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, during delivery 1.3% of households had to be classified as sample loss.

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 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 (MCALL 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 would 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:

- 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 to understand the conversation and express him/herself in English (ENGL yes/no)

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

Method of analysis:

Since the dependent variable “response to the travel survey” is binomial, binary logistic regression is 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 week” are entered into the model at the same time:

$$\ln\left(\frac{RESPOND}{1-RESPOND}\right) = \alpha + \beta_{DELIVER} + \beta_{MCALL} + \beta_{LONGWKD} \quad (2)$$

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

Results:

As shown in Table 3, the regression results reveal that the predictors “contact at delivery” and “motivational call” are both highly significant (p=0.001 and p=0.00).

Table 3. Analysis of Maximum Likelihood Estimates

Variable	B	s.e. (B)	Wald	df	Sig.	Exp(B)	95% C.I. for Exp(B)	
							Lower	Upper
LONGWKD	0.042	.277	0.023	1	.878	1.043	0.607	1.794
DELIVER	0.894	.274	10.626	1	.001	2.444	1.428	4.182
MCALL	0.983	.233	17.885	1	.000	2.673	1.695	4.217
Constant	-0.695	.316	4.821	1	.028	0.499		

The exponents of the parameter Exp(B) for contact at delivery and motivational call, are indicating a strong relationship with the dependent variable: 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 at 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 (beta = 0) 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.

Testing the model performance by ways of a comparison of observed and predicted cell frequencies, the Hosmer and Lemeshof Test of chi-square ($\chi^2 = 1.603$, df = 4) does not show a significant difference between observed and predicted cell frequencies (p=0.808). This test result indicates an overall good model fit.

Examination of different models with all three predictors, combinations of two predictors or with one single predictor have shown that the best fit was achieved by the model with contact at delivery and motivational call.

In a second step, only those households were considered where socio-demographic data could be retrieved during delivery contact (N=308). 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.

5.4 Conclusions

The results obtained from the before travel survey demonstrate how important it is to have recruitment procedures in place that include personal contact (at the doorstep or via the phone) with the target households. It seems that in this way, response rates of 60% or more can be secured. Somewhat surprisingly, the long weekend from March 6-8, 2004 did not have a significant effect on the recruitment of target households for the travel survey and the response rate of households contacted over that time period does not differ significantly from other days. This seems to confirm similar results of another study based on the Victorian Activity and Travel Survey VATS, finding no significant difference in the amount traveled on public holidays and regular weekdays (Seethaler and Richardson, 2003)

6. OUTLOOK AND FUTURE RESEARCH NEEDS

In this paper a research project has been presented that studies the systematic use of persuasion techniques from social psychology in community-based TravelSmart interventions. As the main field experiment is still underway, the principal results – the effect of persuasion techniques on TravelSmart uptake and reduction in vehicle kilometers – are not available yet.

However, experience from a small-scale pilot test and the before travel survey of the principal field test reveal interesting issues that need to be taken into account in order to successfully conduct a TravelSmart intervention and its evaluation. With respect to before and after travel surveys conducted to monitor the effect of TravelSmart, personal contact at the delivery of the survey forms in combination with a motivational call seem to be critical in order to achieve an acceptable participation rate.

With respect to the participation in TravelSmart, the multi-cultural context of Australian cities is a major challenge for the recruitment process of this pro-environmental campaign. 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.

The immediate answer to a multi-cultural target population is to reflect the ethnic composition of a study area in the choice of the field staff. 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. 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 R. 2003), and how different ethnical groups respond to persuasion strategies in different ways (Wosinska W. 2001). In light of the increasing

need to promote pro-environmental behavior (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.

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 behavior." *Journal of Research and Development in Education*, 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*, Academic Press, New York.
- 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*, Academic Press, New York.
- Cialdini, R. B. (1993). *Influence: Science and practice.*, Harper Collins, New York.
- Cialdini, R. B. (2001). "Harnessing the science of persuasion." *Harvard Business Review*, 79(15), 71-80.
- Cialdini, R. B., Barrett, D. W., Bator, R., Demaine, L. J., Sagarin, B. J., Kelton, L. V. R., and Winter, P. L. (forthcoming). "Activating and aligning social norms for persuasive impact." *Arizona State University*.
- 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." Department of Infrastructure.
- Department of Natural Resources and Environment DNE (2002). "Victorian Greenhouse Gas Inventory 1999." 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.
- 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 behavior*, Allyn and Bacon, Boston.

- 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 behavior: A synthesis of research results." *Journal of Socio-Economics*, 24(3), 105-127.
- Komorita, S. S., and Parks, C. D. (1994). *Social Dilemmas*, Brown and Benchmark., Madison, WI.
- Mazis, M. B. (1975). "Antipollution measures and psychological reactance theory: a field experiment." *Journal of Personality and Social Psychology*, 31, 654-666.
- McKenzie-Moor, D. (2002). "Guide to community-based social marketing." McKenzie-Mohr.
- McKenzie-Moor, D., and Smith, W. (1999). *Fostering sustainable behavior: An introduction to community-based social marketing*, New Society Publishers, Gabriola Islands, B.C.
- Nisbett, R. (2003). *The geography of thought. How Asians and Westerners think differently ... and why.*, The Free Press/ Simon & Schuster Inc., New York, NY.
- 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.
- 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. and Rose G. (2003) "Application of psychological principles to promote travel behaviour change" . Paper presented at the 26th Australasian Transport Research Forum ATRF, 1-3 October 2003, Wellington NZ
- Seethaler, R.K. and Richardson, A.J. (2003). "Seasonality in Daily Travel Patterns". TUTI Report TR 24-2003, a report to the Victorian Department of Infrastructure
- 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 sign 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, behavior, and attitude change: An analysis of voluntary recycling. Special Issue: Treen psychology." *Journal of Environmental Psychology*, 15(197-208).

- Wosinska, W., Cialdini, R. B., Barrett, D. W., and Reykowski, J. (2001). *The practice of social influence in multiple cultures*, Lawrence Erlbaum Associates, Inc., Mahwah, NJ.
- Yates, S. (1982). "Using prospect theory to create persuasive communications about solar water heaters and insulation. Unpublished doctoral dissertation.," University of California, Santa Cruz, CA.