

The Importance of Timing for Breaking Commuters' Car Driving Habits¹

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A large sample of Copenhagen car drivers were randomly assigned to either receive a free month travel card for public transportation or serve as a control group. As predicted, the free travel card neutralized the negative effect of car driving habits and made the use of public transportation more consistent with the traveller's conscious intentions. However, the behavioural effects of the free travel card appeared only among individuals who had recently relocated residence or workplace, prior to the intervention. This suggests that timing is essential when designing interventions to promote alternatives to car-driving.

Introduction

The growing number of cars contributes to serious problems all over the World, including congestion, air pollution and noise at the local level and climate changes at the global level. In their struggle to solve these problems, governments and NGOs promote alternative means of transportation, including walking, cycling and using public transport, but mostly with little success. This paper reports from a study designed to test an innovative way to assist consumers who want to change commuting mode from car to public transportation.

Mounting evidence suggests that at least part of the reason why it is so difficult to get drivers out of their cars and use other travel modes is that the choice of travel mode tends to become habitual (e.g., Gärling, Boe, & Fujii 2001; Thøgersen & Møller 2008; Verplanken, Aarts, Knippenberg, & Knippenberg 1994; Verplanken, Aarts, Knippenberg, & Moonen 1998). This has profound influence on the effectiveness of interventions that might be considered for influencing travel-mode choice (Assael 1987; Ronis, Yates, & Kirscht 1989; Aarts, Verplanken, & Knippenberg 1997).

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Especially, it means that drivers are unlikely to search for – or even contemplate – new information before choosing a travel mode (Verplanken, Aarts, & Van Knippenberg 1997). Hence, in order to be noticed at all, persuasive information needs to be obtrusive and to be perceived as personally relevant (Dahlstrand & Biel 1997; Hoyer & MacInnis 2006).

According to psychological theory, individuals form a habit when a behaviour is repeated frequently in a stable context and leads to rewarding outcomes (Ouellette & Wood 1998), something which is true for most everyday travel mode choices (Thøgersen 2006). For example, the daily commute is usually performed frequently and extensively in stable surroundings, and the car-commuter usually reaches the destination in a timely and comfortable manner.

Following Verplanken and Aarts (1999), a habit is defined as a learned sequence of acts that has become an automatic response to specific cues and is functional in obtaining certain goals or end-states. Frequent repetition in a stable context facilitates the learning of a habit. The instigation of a new behaviour is usually volitional and intentional, but subsequent repetitions may eventually be performed in an unintentional, habitual way (Ouellette & Wood 1998; Verplanken & Aarts 1999). Before a habit is formed (i.e., learned) several repetitions are usually required, however. With repetition, each step in the execution of the behaviour can be done with less effort and less conscious awareness (Ouellette & Wood 1998; Thøgersen & Ölander 2006). Eventually, even the initiation of the behaviour may become automatic, triggered by the stimulus cues that normally precede it (Bargh & Barndollar 1996). Because of its obvious advantages, most frequently repeated behaviours are habitual. Hence, when people are in situations they have encountered and acted in many times before, their actions tend to be automatic repetitions of their previously repeated behaviours.

It follows from this that people's stated intentions are good predictors of their behaviour only under conditions of weak habits while intentions are a bad predictor of behaviour when habits are strong (Triandis 1977). Hence, habits moderate the influence of behavioural intentions on behaviour. For example, in the field of travel-mode choice, Verplanken et al. (1994) found that the correlation between the attitude towards using a specific travel-mode option and travel-mode choice (for shopping trips to either of two cities located approximately 5 miles away and where a realistic public transport option existed) was significantly weaker for strong than for weak habit individuals.

As strongly emphasized by Bargh and Barndollar (1996), a habit is not a static behavioural response, however. A habit is a mental system that interacts with environmental information and which requires input from the environment in order to operate. Many established behavioural routines in daily life, such as car use,

have both volitional (e.g., planning to go somewhere) and automatic elements (e.g., picking the car, driving). Hence, Bargh and Barndollar (1996) consider the learning of habits an automated strategy for dealing with the environment to affect desired goals.

A habit that was functional in obtaining some goal(s) at the time when it was formed may lose its functionality if the goal(s) change at a later point in time, however (Verplanken & Aarts 1999). In such cases, the habit may become counter-intentional. Counter-intentional habits are particularly prevalent when the behaviour is based on short-term, hedonistic motives at the expense of long-term goals (Verplanken & Faess 1999).

For example, habitual travel mode choices are often found to deviate from the person's expressed intention. In practice, the deviation is usually in the direction of a higher-than-intended use of private cars and a lower use of public transportation, bicycling and walking (Møller & Thøgersen 2008; Verplanken et al., 1994; Verplanken, et al. 1998; Aarts, Verplanken, & Knippenberg 1998). This means that it is possible to achieve a more desirable modal split (from a societal point of view) by just helping individual travellers to act according to their expressed intentions.

In general, people reserve deliberation and conscious decision-making for novel situations and for when new problems arise in old situations, such as situational barriers (e.g., a freeway closure blocking one's usual commuting route; cf. Fujii, Gärling, & Kitamura 2001) or major life changes (e.g., residential relocation; cf. Bamberg 2006; Verplanken, Walker, Davis, & Jurasek 2008). Hence, the key to changing habitual behaviour is to create conditions that, for some reason or other, make the automatic execution of the habit impossible or at least unattractive (Ronis et al. 1989) and which give individuals sufficient motivation and ability to make a deliberate choice (Fazio 1990). The challenge is to design interventions that are effective in producing this outcome, yet politically and individually acceptable.

In this connection, change agents may take advantage of people's habitual patterns being more vulnerable to influence attempts when major changes happen in their lives (Andreasen 1984). Specifically with regard to travel mode choice, it has been suggested that people's car-driving habits can more easily be influenced when they have recently changed residence (Bamberg 2006).

The approach

The approach proposed here to make car-drivers voluntarily change their everyday travel mode choices is similar to the way newspapers, telecommunication services, and other goods and services that are bought on a subscription basis are often

marketed to new customers: by means of a temporary promotion offer, typically including a trial period for free or at a substantially reduced price. The promotion is intended to create sufficient initial interest to entice new customers to try the product or service, and it is hoped that the experience creates a positive attitude and perhaps a new habit that secures repeated purchase after the trial period. In order to avoid misuse, it is customary to restrict the promotion offer to people who have not been subscribers to the product or service for some time. To my knowledge, there have as yet been only sporadic attempts to promote public transportation this way, in spite of the obvious similarities between the areas (Thøgersen 2007).

It is an important assumption behind this kind of intervention that at least some of the receivers of the promotion will continue using the service more than before the promotion period, even though they have to pay full fare again. In the travel-mode choice case, there are at least two reasons for expecting such a long-term effect. One reason is that some car-drivers may hold unjustified negative expectations about public transport. Hence, trial-based experience resulting from the promotion period would result in more favourable attitudes towards using public transport (Bamberg & Schmidt, 1999). Another possible reason is that some car-drivers have a vague (but not necessarily negative) perception about how it would be to use public transport. Using their car works for them, so they have not bothered to seriously consider alternatives. Also, even a relatively small cost in terms of time and effort needed to investigate and possibly test alternatives seems to be an insurmountable barrier. Hence, any means that could make them try public transport would increase the quality of their knowledge of this alternative and some would realize that for them using public transport is actually preferable to using the car, at least for some purposes.

Method

We tested the price promotion in a field experiment with car-drivers in the Greater Copenhagen area fulfilling certain screening criteria. The basic idea was to make car-drivers, many of which were assumed to choose travel mode habitually, “an offer they could not resist,” and thereby motivate them to deliberate about their travel mode choices, and in fact try public transport.

Participants

Data were collected by means of telephone interviews carried out in October and November 2002 and April 2003.² Subjects were a random sample of car-owners

² The data were collected by TNS Gallup.

in the Greater Copenhagen area fulfilling the following screening criteria: have a driver's license and a car at their disposal, commute to job or study at least once a week, and not having been a monthly travel card holder for mass transit in the Greater Copenhagen area for at least a year. Also, traveling salesmen and others that are dependent on a private car for their job were excluded. If more than one person in the household fulfilled the criteria, the "next birthday" method was used to pick the participant for the study.

Of those meeting the screening criteria, 1071 agreed to participate in the first wave, resulting in a response rate of 75 percent of those qualifying. Thirty individuals were excluded because letters with experimental treatment material were returned by post due to incorrect addresses, because they claimed that they had not received the experimental treatment material, or because of errors in the administration of experimental treatments during the telephone interview.³

The screening criteria did not take into account that some live so close to their workplace that they have no need of motorized transport for commuting. As a crude measure it was judged that everyone who in Wave 1 reported having commuted by foot more than once or by bicycle more than four times out of the last ten times fell into this category and they were excluded from the study.

The allocation to experiment and control groups followed a somewhat complex design: First, participants were randomly assigned to either experimental treatment (70%) or control group (30%). In the experiment group, subjects were then assigned to one of several treatments.

Those expressing any intention to use mass transit in the near future were randomly assigned to one of two treatments: (a) a planning exercise alone or (b) a planning exercise plus a free month travel card. The planning exercise consisted in asking subjects to plan their next trip by mass transit (when exactly they would go, from where to where, using which bus or train connection, see Bamberg 2002).

Those expressing no intention to use mass transit in the near future were randomly assigned to one of three treatments: (a) a customized timetable alone, (b) a customized timetable plus a free month travel card, or (c) a free month travel card alone. The customized timetable treatment consisted in sending subjects a customized timetable for his or her daily commute based on information about home and work given during the first interview. Free month travel cards and customized timetables were sent to participants by ordinary mail immediately after the first interview.

³ The excluded subjects did not differ significantly (the 5 % level) from included subjects on any of the target variables in the first wave.

Neither the planning exercise nor the customized timetable produced an increase in commuting by public transport over and above the control group (Thøgersen & Møller, 2008). For this reason, and because the focus here is on the effects of the price promotion, experimental subjects not receiving a free travel card were excluded from this study. Hence, the final sample consisted of 597 car-owners living in the greater Copenhagen area and being in employment or under education, who (apparently) did not live too close to work to need motorized transportation for commuting, serving either as experimental subjects (373, receiving a free month travel card) or as members of the control group (224).

The gender distribution of the participants was 56/44 percent males/females. The average age was 43 and the age range 18 to 71. Seventy-five percent were living with at least one other adult and 43 percent had children under the age of 18 in the household. Forty-seven percent had a college or university degree. Forty-nine percent lived in a house, 49 percent in an apartment and 2 percent in other types of homes. None of these descriptors differed significantly between the experiment group and the control group.

Measures

In all three waves, answers were obtained to questions about travel behaviour and a number of beliefs and psychological constructs regarding traveling. Participants were also asked questions about major changes in their lives in the last three months before filling out the first questionnaire, including whether they had changed residence and/or workplace. For the analysis presented in this paper, this latter information was used to classify participants. Besides this, only the frequency of using public transportation is used. The wording and scale of this measure are explained in the note to Figure 1.

Previously reported results

Results of the wider study have previously been reported in several published papers:

In Møller and Thøgersen (2008), the implications of car use habits for drivers' use of public transportation is analysed. A relatively low percentage of the drivers in this study (10-20%) considered commuting by public transportation in the near future. A hierarchical analysis, where use of public transportation was regressed onto intentions to do so, car use habit, and the interaction between the two, confirmed the theory-derived hypothesis that car use habits act as a moderator of the intention-behaviour relationship for public transportation. In other words, car

use habits are an obstacle to the transformation of intentions to commute by public transportation into action.

Thøgersen and Møller (2008) extended these results by the field experiment where a free month travel card was tested as a tool to persuade drivers to skip the habitual choice of the car and consider using – and to try – public transport instead. As predicted, the free month travel card had a significant impact on drivers' use of public transport and it also neutralized the impact of car-driving habits on the intention-behaviour relationship for public transportation. However, according to the calculations reported in this article, in the longer run (i.e., four months after the experiment) experimental subjects did not use public transport more than control subjects.

In Thøgersen (2009), these data were reanalysed. After excluding participants that had no need of motorized transportation for commuting, based on their pattern of walking or bicycling to work or study, a significant long-term effect of the free month travel card was revealed. Four months after the free travel card had expired, those that had received it and actually needed motorized transportation for commuting still used public transportation significantly and substantially (40%) more than at baseline.

In sum, we have shown that:

- strong car-driving habits are an obstacle for converting intentions to use public transportation into action,
- a free month travel card can remove this obstacle, and
- among drivers with a need for motorized transportation, there is still a significant and substantial effect on their use of public transportation four months later.

This study

In this paper, we study whether the effects of the intervention are contingent on specific context factors. Specifically, we study whether people's habitual travel-mode choices are more vulnerable to influence attempts when major changes happen in their lives (Andreasen 1984). Major life changes that may have implications for travel mode choice include change of residence and change of workplace (Bamberg 2006; Verplanken, et al. 2008). Hence, I test the following hypothesis:

Hypothesis: The effect of receiving a free month travel card (i.e., the experimental treatment) on the use of public transportation for commuting is stronger for people

who have recently changed residence or workplace than for who people who have not.

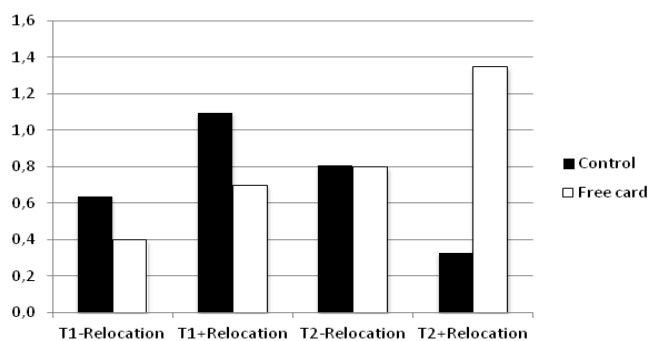
Operationally, “recently” is defined as the last three months before the intervention. Since relocation is assumed to influence people’s receptivity to influence attempts, the effect should show up in the near term. Hence, the hypothesis is tested by comparing the pattern of travel mode choice reported at baseline (i.e., before the intervention) and at the second interview (i.e., during the intervention).

Results

I use a 2 (free card vs. control group) x 2 (relocation or not) x 2 (Wave 1 vs. Wave 2) mixed between and within subjects design to analyse the impacts of the free travel card and relocation on participants’ use of public transportation. The means are reported in Figure 1.

According to the GLM analysis, there was no direct effect of the time of the interview ($p = .28$). However, there was a significant two-way interaction between experimental condition (free card vs. control) and time ($p = .001$) and a significant three-way interaction between experimental condition (free card vs. control), relocation and time ($p = .02$). The two-way interaction was produced by the use of public transport increasing more in the experiment group (0.5 trips out of 10) than in the control group (-0.05 trips out of 10), as expected. The three-way interaction was the outcome of this difference in the increase in the use of public transportation between the experiment group and the control group being especially pronounced among those that had changed residence or workplace in the last three months (difference between experimental groups: 1.34 trips out of 10, $p < .001$), whereas the difference in the change over time between experimental groups was small among those that were staying put (0.27 trips out of 10, n.s.). This is consistent with the hypothesis.

Figure 1. Use of public transport by experimental treatment and relocation of residence or workplace at Time 1 (baseline) and Time 2 (intervention period). Means.



Note. Behaviour frequency was measured on a scale from 0 to 10 with the item: “How many of the last 10 times did you use public transport for the trip between home and work/educational institution?” N = 536.

Discussion

Previous studies have shown that some drivers would actually like to use public transportation more, but do not, mainly because of old habits. A price promotion in the form of a free month travel card was offered to a random sample of Copenhagen car drivers. The results were encouraging. The price promotion led to a doubling of the use of public transportation in the experiment group and a significant effect remained four months after the intervention (Thøgersen 2009). As reported in Thøgersen and Møller (2008), the success of the price promotion was partly due to the fact that it neutralized the negative influence of car-driving habits on transforming intentions to use public transportation into behaviour.

However, the results reported in this paper show that the effect of the free travel card was limited to an identifiable sub-set of car-drivers: people who had recently (i.e., within the last three months) changed either residence or workplace. Among those that had not experienced a change in any of these locations recently, the behavioural impact of the free travel card was not significant. This result is consistent with previous research suggesting that individuals' habitual behaviours are more easily influenced under circumstances where they experience major life changes.

Commuters who have not recently experienced a relocation of residence or workplace make their commuting-mode choices in a situation they have encountered and acted in many times before. Hence, their choices tend to be automatic repetitions of their previously repeated choices. They lack the motivation to consider or even pay attention to alternative options. Even a free month travel card is not sufficient to change that. However, the relocation of residence or workplace is usually a sufficiently big life change to motivate people to deliberate and consciously consider their commuting options. Hence, car drivers are more likely to develop an intention to try public transportation for commuting in connection with changes of residence or workplace than under stable conditions. Hence, it is under these circumstances that a discrepancy between intentions and behaviour are most likely to appear. Further, our study shows that drivers who in this situation get the chance to try public transport for free for a month are more likely to increase their use of public transport. A finding that we did not predict is that people who do not receive a free month pass when they change residence or workplace tend to decrease their already low use of public transport.

Results that were not predicted should be interpreted with care until replicated in other studies. However, one may speculate that during relocation, people often feel that the uncertainties of the new situation are uncomfortable. One way of coping with this uncertainty would be to stick to general habits that are flexible enough to

accommodate the new situation. It has been suggested that the habit of using the car for commuting is one such flexible habit (cf., Verplanken, et al. 1994).

The results presented in this paper show that the cost effectiveness of a price promotion in the form of a free month travel card can be improved by targeting it to consumer segments whose lives are undergoing changes that make them more open to reconsider their travel options. Hence, timing is essential when designing interventions to promote alternatives to car driving. This insight adds further refinements to our knowledge about price promotions as a method to make habitual car drivers consider and try public transportation.

After a successful intervention that moves drivers from a habitual to a deliberate mode of decision-making and try, for example, public transportation, a long-term change in the way they commute may result. However, it is an obvious prerequisite that the commuter is satisfied with the tested alternative to the private car. Hence, interventions to break car-driving habits, such as the one discussed in this paper, make little sense unless there are indeed acceptable alternative transport options available.

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