THE ROLE OF INTERACTIVE EFFECTS IN MODE CHOICE: Understanding automobile ownership through qualitative research.

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Abstract

Many of today's environmental problems are tied, in part, to society's over-reliance on the automobile. However, efforts to bring about modal shifts typically have had limited success. Building on a growing body of mode choice and planned behaviour research, this study explores the factors influencing automobile ownership. A grounded theory approach is used to identify the factors associated with travel-mode change. Semi-structured interviews were conducted with 20 driving members of a car-sharing organization, located in a mid-sized Canadian city, who made a decision to go car-lite (car-sharing is their additional vehicle) or car-free (car-sharing their primary vehicle). Findings underscore the complexity of modal shift decisions and highlight the need to account for life events.

RESEARCH PROBLEM AND CONTEXT

There is abundant evidence that the North American transportation system is not sustainable. The auto-centric living style has produced significant concerns about the health of our cities and the planet. In response, there is now growing interest in policy interventions and planning strategies that shift travel away from automobiles. Using a qualitative approach, this paper illuminates the factors involved in a shift away from automobile reliance for a small

sample of citizens who have chosen to live either car-lite (car-sharing is their additional vehicle) or car-free (car-sharing their primary vehicle).

Transportation demand management and behaviour change

Transportation demand management (TDM) is the umbrella term for a variety of strategies intended to achieve "specific objectives such as reduced traffic congestion, road and parking cost savings, increased safety, improved mobility for non-drivers, energy conservation and pollution emission reductions" (VTPI, 2006). Many TDM strategies are mode-specific, such as programs that support carpooling/sharing or investments that encourage transit use or bicycling. Others focus on reducing the number or altering the timing of trips, for example through flexhours, the compressed workweek, and telework. A third group of strategies seeks to systemically change travel patterns by altering the urban character through land-use policies and urban design. While work-based initiatives, such as on-site bicycle parking and carpool ride-matching services, may be implemented as stand-alone projects, TDM programs often involve a combination of initiatives and multiple agencies.

While there are some TDM success stories (e.g., City of Portland's Lloyd district and Canada's York University (VTPI, 2006)), TDMs often are criticized for their lack of documented impacts (Giuliano, 1992; Shiftan & Suhrbier, 2002). Of importance, however, are the ways in which TDM outcomes are measured. Indeed, TDM strategies are often not evaluated at all or are assessed in terms of their implementation rather than their effects (Stewart & Pringle, 1997; Environment Canada, 2005). When they are evaluated in terms of modal shifts, results are often disappointingly low (Shiftan & Suhrbier, 2002; Ogilvie *et al.*, 2004; Cao & Mokhtarian, 2005), but these evaluations are typically based on measurements over short time periods (Stewart & Pringle, 1997; Jones & Lucas, 2000; Transport Canada, 2002; Finke & Schreffler, 2004). It is reasonable to argue, that major changes in lifestyle and travel behaviour should not be expected to materialize immediately. Rather these changes occur over longer periods of time and require multiple factors to be

altered, because of the complex ways in which decisions about automobile ownership are made.

Understanding change

Research into behaviour change has evolved considerably in the past few decades, especially in the discipline of pyschology. From a theoretical perspective, the most referenced conceptualizing of behaviour change is Ajzen's widely accepted theory of planned behaviour (Bamberg *et al.*, 2003). It states that behaviour is assumed to be guided by an individual's attitudes, subjective norms and perceived ability to perform the behaviour, which together create an intention to behave and lead to realized behaviour in accordance with their beliefs (Bamberg & Ajzen, 2003). Alternatively, other researchers argue that travel behaviour is less planned and more habitual in nature and requires new situations in order to change behaviour (Aarts *et al.*, 1997). Despite the divergences between these two schools of thought, the majority of research identifies that (a) very little travel behaviour change is decided upon for solely altruistic reasons (Klockner & Matthies, 2004; Anable, 2005) and (b) the factors that affect modal change do not act independently, as suggested by traditional modal choice models (Gunnar Roe, 2000; Cao & Mokhtarian, 2005). Rather, changes in modal choice reflect a complex combination of attitudes, norms, external constraints and habits that often act in synergistic ways (Nilsson & Kuller, 2000; Klockner & Matthies, 2004; Cao & Mokhtarian, 2005).

While an extensive list of factors affecting mode choice has been identified, there remains a lack of understanding as to how to assess their combined impacts on changes in mode choice. This limits our ability to predict the effects of TDM strategies on both short- and long-term travel behaviour. The current study attempts to provide a more holistic interpretation of how change occurs. This should facilitate the development of more appropriate evaluation methods for TDMs, including metrics that would allow practitioners to document changes in attitudes and norms, which are the first step to long-term behaviour change (Bianco, 2000).

METHODOLOGY

To improve our understanding of the processes involved in adopting a lifestyle that is less automobile intensive, a qualitative and inductive approach was adopted. The study was designed to enable an in-depth experiential understanding of the decision-making processes of individuals with respect to automobile ownership. Within the general population, individuals with experiences that could contribute to this research—those who have made a conscious modal shift—are hard to identify. Thus, purposive sampling was used to isolate a sample population and select participants (Neuman, 2003, 213). After exploring several possible recruitment strategies, a decision was made to focus on members of a car-sharing organization. Car sharing members have chosen a car-lite/car-free lifestyle. With less-than-average car use per year, they are frequent users of alternative modes and TDM initiatives (Millard-Ball *et al.*, 2005).

Participants were recruited from a car-sharing organization through their newsletter and email list-serve. Potential participants were screened to ensure they fit the criteria as follows: they are driving members of a car sharing organization, had sold a vehicle without replacing it or decided not to purchase a vehicle (either sole or secondary vehicle), were able financially to keep or buy the said vehicles at the time of their decision, and lived within the research area, a Southern-Ontario mid-sized city. To explore the decision to go car-lite/car-free, it was important that a choice was involved, i.e., participants' financial situation did not dictate their mode.

All respondents who qualified were interviewed. A total of 20 individuals representing 17 memberships participated in 18 interviews. The participants represented a diverse group of members including 8 females and 12 males (n=20). With the exception of two, all were working. While 8 of the participants were adults living alone, others provided a wide range of household arrangements including single parents (n=1), couples without children (n=3), couples with children (n=4) and households with 3 or more adults (n=1).

Participants of this study (n= 17 memberships) are representative of the membership as a whole, when compared with the organization's member statistics. Those still caring for children

(30%) and not caring for children (71%) are similar to the overall membership of 35% and 65%, respectively. Likewise those participants identifying themselves as part of a couple (47%) or single (53%) are the same as overall membership characteristics. For this research, participants' status as car-lite or car-free is of utmost importance. Car-lite participants are defined as those who own or lease at least one vehicle but use car-sharing vehicles as their additional vehicles. Alternatively, car-free participants are defined as those who do not own or lease their own vehicles and use car-sharing vehicles as their primary vehicles. Participants include both car-lite memberships and car-free memberships, 18% and 82%, respectively, which is very similar to the overall car-sharing organization (16% and 84%, respectively). Additionally, 47% reduced the number of vehicles they owned when they joined as opposed to 53% who did not own a vehicle in Ontario prior to joining; the equivalent percentages of the entire membership are 40% and 60%, respectively.

The approximately hour-long semi-structured interviews, designed to be open and non-directed in nature, were used to interpret the experiences and processes of mode choice and discover the meanings related to the factors involved. The interview transcripts were coded using *NVivo* software. In keeping with grounded theory, coding began with open coding to create initial themes commonly found in the participants' experiences of the decision-making process. Subsequently, axial and selective coding refined and identified overriding themes, and illuminated relationships and patterns (Strauss & Corbin, 1998). Throughout, constant comparison between and within themes and participants was used to saturate and refine themes, and analytical notes were used to enhance the credibility and support the development of themes and theory (Neuman, 2003).

FINDINGS

Five main interconnected themes on the factors involved in mode choice emerged from the analysis. They are: finances; personal values and attitudes; personal history; perceptions of accessibility; and, situational life events. Each theme is discussed in detail, including illustrative quotations.

Does it make financial sense?

> *"Was it really worth that much of your income and your life to a car? It really isn't worth it." [P16[1]]*

For many, the question of mode choice began and ended with: Is a car-lite or car-free decision an economically viable option? For all participants this theme emerged strongly from their narratives. It began with an articulation of the cost and time involved in owning and operating a vehicle, and then evolved into a reflection over the worth of owning a vehicle.

> *"Getting rid of it, my truck, felt like a huge weight off my shoulders, because it's such a pain to maintain and to pay for and look after." [P9]*

Participants highlighted the importance of making a fiscally responsible decision. For many it was evaluating the frequency of use and the necessity of using a vehicle for those trips.

> *"Well financially, to invest in another car when we weren't using a car very much, we just thought well there are probably better ways we could be spending our money" [P8]*

But the decision to go car-lite/car-free did not end with it making financial sense. Indeed, if economic rationality prevailed, society would be much less auto-dependent.

> *"I think if it was just about saving money there are plenty of people who still wouldn't do it." [P17]*

There are clearly many considerations involved in automobile ownership and mode choice.

Living within my values - Personal attitudes and values

> *"It reflects our values and I feel good that we can integrate our values with our daily life." [P17]*

Throughout the analysis a dominant factor affecting mode choice was personal attitudes and values. All participants explained

[1] To ensure the anonymity of the participants each participant [P] is referred to by their number (e.g. P14).

how these were the prime motivation for considering alternative forms of mobility.

> *"But there was also, a philosophical decision. That we wanted to reduce our dependence on vehicles." [P18]*

For many participants, an underlying concern was the negative impacts of the automobile on the environment and their community. A car-lite or car-free decision was their contribution to addressing this issue.

> *"… my driving principle . . . not wanting to pollute the environment with car emissions more and not wanting to have more car in the dump, you know after they rust and they age. And tires in the dump and batteries and all those things influence my decisions." [P11]*

A few participants did not specifically identify the environment as a factor but did identify the need to reduce consumption. In this vein, some articulated that the norm of one vehicle to one person is an irresponsible use of resources..

Others identified a car-lite or car-free decision as something that enabled them to achieve a quality of life they value. More specifically, a few participants identified the need for a healthy and active lifestyle.

> *"The primary one was probably lifestyle. I actually, I never walked, never biked when I had a car and I felt like crap when I was at the end of that year. I felt slow. I felt kind of heavy." [P2]*

Still others focused on simplifying the way they live, illustrating this point by noting that being car-lite or car-free does not allow you to pack one's schedule so tightly.

Personal history

> *"It's a personal decision. It's just based on experience, it's based on research." [P5]*

Personal histories provide the foundation upon which personal values and perceptions of accessibility are built. Indeed, all interviewees linked their decision to live car-lite/free to influential

past experiences. Four main themes emerged: growing up, experiencing other cities, knowledge, and travel habits.

Many spoke of family values when they were growing up. Early exposure to a set of values about the environment, social justice, religion and fiscal responsibility contributed to thinking about mobility options.

> *"Well for me I think it's my upbringing too—just being raised. My mom … instilled in us to try to be aware how lifestyles impact others people." [P8]*

Additionally, where an individual grew up had a profound impact, whether it was growing up in a city:

> *"I grew up in <major Canadian city> so it's a very bad idea to own a car if you live in <major Canadian city. It's impossible to park and drive. We don't, we just don't use car that much. So for me it's just natural." [P6]*

Or in the country:

> *"I grew up in the country where I think sometimes you're much more aware of the impact that you're having on the environment around you." [P18]*

The impact of past experiences in other cities or countries also were noted.

> *"Living in a city that had a lot of resources taught me initially how to get around. . . . It was an entry way. And then when I moved here, and it was less easy, at least I had the experience and I could piece it together." [P11]*

Everyday knowledge acquired over the years also informed their assessment of different mobility options. Knowing that services exist and knowing how to use them were key.

> *"It's more than life-stage, it's simple an experience level." [P16]*

Past travel habits also entered into their decision making. Many participants, who previously owned vehicles, were not frequent drivers. Among the participants there was also an awareness that once travel habits were established they were much harder to break.

> *"If we had two cars sitting in the driveway you can bet that the both of us would probably be driving to work every day . . . So this sort of doesn't allow you that opportunity so you just do it." [P18]*

Perceptions of accessibility

"I can do that, but I'm not out to make myself a martyr" [P13]

In addition to personal values and experiences, interviewees made it clear that accessibility was still an issue.

> *"I can still have these values but it doesn't mean that I'm this perfect person who does all these simple-living, environmentally appropriate things." [P11]*

In transportation planning, accessibility is both "the impedance factor, reflecting the time or cost of reaching a destination, and an attractiveness factor, reflecting the qualities of the potential destinations" (Handy, 2002). Participants illustrated an evaluation of accessibility by pitting the relative ease of getting to where they needed/wanted to go against the level of perceived hassle they would be willing to live with. As one participant stated:

> *"I knew that any place we went to <regional area> we could get to if we wanted to get to." [P14]*

But as another car-lite participant indicated, the question was at what expense:

> *"So I have an infant and a 4 year old and I have to go shopping, taking them both by trailer to the car location. And then having to carry the kids and the groceries home . . . My life was stressful enough. I didn't need that kind of hassle." [P17]*

Participants identified locations of home, work, and the shared cars in relation to the city core/amenities; the presence and level of transit services; and the relative inconveniences of scheduling and attending to family responsibilities as the factors involved in assessing accessibility. For some, the equation of these factors resulted in their ability to be car-free:

> *"We decided to live in <city> so that we could be close to shopping and <Husband's> job. We will probably continue to do so because it's a nice area, the school's good, everything's close by." [P7]*

However, accessibility is not a constant, and later during the same interview the above participant defined a scenario where the decision to be car-free could be reversed:

> *"Maybe we'll revisit it again when the kids are a little older and they get more involved in things that are far away . . . that kind of thing where the bus service is really terrible up there and you can only bike." [P7]*

Most often, being car-lite/car-free was described as not being easy. Both car-lite and car-free participants identified a car-sharing organization as an important factor in maintaining their car-lite or car-free status.

Situational life events

> *"… the big turning point, when my daughter left. Then I definitely didn't have an excuse to have a car standing in drive way" [P15]*

The four themes discussed above illuminate a set of precursors that set the stage for people considering their current lifestyle, but the behaviour shift also required a push.

> *"I got laid off from my last job so that was the trigger" [P9]*
>
> *"If the car hadn't broken down . . . I guess that gave me the push, it did give me that push." [P1]*
>
> *"the second car our son had. And when he left, is when we decided" [P13]*
>
> *"<husband> got rid of his car in '96 when he moved to <US city>." [P7]*

These situational life events, including losing a job, children moving out of the home, retiring, moving locations, and, for the majority, a car breaking down, provided people with an opportunity to reassess their travel needs. The sentiment of 'just try it' was often used as a means of describing the final decision-making.

"well just try it <P1>. What is the worst thing? You'll go buy a car if you hate it! So I did, I finally did." [P1]

Of particular interest is the time between first consideration and actual joining the car-sharing organization. Participants admitted that the length of time separating these two events ranged from a month to almost 9 years, with the average being 2 years.

"So I was aware of it since day one . . . it <car sharing organization> got going in '98, April of '98. It would have been fall, late summer, early fall of 2003 because it was that fall we got rid of the car." [P8]

Also of interest is the fact that individuals feel as if they are have the freedom to change their decision at any point. Indeed, several participants who did not own a vehicle prior to joining the car-sharing organization explained how they could envision their car-lite/car-free decision being reversed by a future situation life event.

"Something happens in your life and you get married and settle in your routine, and suddenly you get a job somewhere ok and what's that going to do to our transportation issue … [You] kind of work your way up to another level, get into a routine and now we've just reached this baby level . . . You almost get this unsettled part at each new stage where you have to figure out how things work and one of those options that always comes up is do we need a car at this new stage …." [P12]

CONCLUSIONS AND DISCUSSION

The findings of this study reinforce the conclusion that travel-behaviour change is the result of a combination of common, yet complex, factors. For the participants in this study, a car-lite or car-free decision was not undertaken lightly. Using a grounded theory approach, the transcripts were used to uncover the key themes that explained these decisions. The themes of finance; personal attitudes and values; personal history; perceptions of accessibility; and situational life events emerged as the dominant themes. The

study illustrates how these contribute to the decision to reduce or forego vehicle ownership through joining a car-sharing organization. The key conclusion is that many conditions must be met for change to occur, in other words that individual factors are necessary but insufficient to bring about change on their own. By identifying the cumulative or interactive effect between the themes, one can begin to appreciate how a lifestyle that is consistent with the principles of sustainable transportation is adopted.

Given that the study is framed in large part on the social psychological Theory of Planned Behaviour, links between the dominant themes and this theory are elaborated on here. The first three themes—finance; personal attitudes and values; personal history—provide insight into the first precursor to "intension", that being personal attitudes and values. People's attitudes toward what is important and their attitudes toward various travel alternatives set the stage for considering modes other than driving an automobile. The fourth theme—perceptions of accessibility—deal with the practicality of living in a way that is consistent with personal attitudes and values. The practicalities of car-sharing, transit or non-motorized travel are considered given the individual's life circumstances and needs. Finally, the fifth theme—life events—deal with the trigger point where intentions are translated into action. All of these are consistent with findings of previous research on planned behaviour (Nilsson & Kuller, 2000; Bamberg *et al.*, 2003; Klockner & Matthies, 2004; Cao & Mokhtarian, 2005). One significant gap is the theme of social norms, which deals with others' expectations and accepted societal practice. Those who choose to go car-lite or car-free, especially outside of metropolitan areas, are different that the typical North American. While many of the participants talked about living outside social norms, most indicated that this did not influence their decision.

The findings of this study have implications for TDM design and evaluation. First, the data suggest that sustainable transportation decisions are not spontaneous or static. The timeframe between intention and action is far more varied and unpredictable than our transportation models allow for. The 'low hanging fruit', as practitioners often refer to them, are those individuals that are at the right point to make a modal shift when a TDM strategy is implemented and are often the only modal shift that is identified

using short-term measurement timeframes. A longer term, more frequent assessment, such as that used in adaptive management would provide a clearer indication of behaviour change (Stewart & Pringle, 1997; Nobel, 2004). Second, outcome-oriented indicators overlook the key ingredients of mode choice decisions, which pertain to personal attitudes, values, and history/experiences, as well as accessibility factors. Future evaluations of TDMs should broaden their scope to incorporate metrics that monitor changes in attitudes and experiences, as these may well lead to future changes in behaviour (Jones *et al.*, 2003; Finke & Schreffler, 2004).

The importance placed on life events as the trigger for a change in travel habits is also significant for transportation planning. In particular, TDM programs that target life events (e.g., location move of home or work) are often far more successful that those focused on stable conditions (e.g., workplaces trip reduction programs). An example is the implementation of universal bus passes or companies that adopt TDM measures when there is a move (Environment Canada, 2005; Victoria Transport Policy Institute, 2006). TDM strategies should target these situational life events that isolate the 'low hanging fruit'. Alternatively, TDM strategies can be the situational life event themselves. A majority of the participant identified the presence of the car-sharing organization as instrumental in their car-lite/car-free decision. A new TDM strategy or enhancement of alternatives can provide a viable option that was lacking. Alternatively, these programs can provide a negative impetus for continued automobile dependence, e.g., road tolls.

Without an alternative to the automobile, there is no decision to be made. As some participants pointed out, to make car-lite or car-free a viable decision, a city must be planned in particular ways and services must be provided that make alternative forms of mobility viable. Thus there is a need for continued commitment to TDMs, even if conventional evaluations show little short-term effect. The complexity of human decision making coupled with the uncertainty of external factors that may affect the affordability and attraction of automobile dependence, underscore the importance of building resilient cities and fostering conditions that provide individuals with real mobility options.

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