



Applying Behavioural Insights to Transportation Demand Management

A report by Alta Planning + Design and the Behavioural Insights Team (BIT)



THE
BEHAVIORAL
INSIGHTS TEAM.



WHO IS THIS DOCUMENT FOR?

This report is aimed at the professionals who want to apply evidence-based principles to create more effective and defensible programs. This may be at the policy or funding level, but the information in this report is most directly aimed at professionals involved in program design and implementation. Another group that has understood the importance of promoting more active forms of commuting is employers; major companies, such as Google, have already begun incentivizing more active and shared forms of commuting, for example by paying employees a bonus each year to live close to work and providing flex-time to employees who commute by carpool. Employers are an important part of this equation, but we will focus here on ideas for professionals involved in the design and implementation of public transportation programs and systems.

The report starts with the assumption that while some single-occupancy trips are, in fact, necessary and well-considered, others are simply being made out of habit where a better option

exists. This report focuses on those “less-necessary” vehicle trips, and assumes that applying behavioural principles may provide the nudge that helps people make a change.

There are also supply-side solutions to effecting behaviour change - such as providing more frequent transit service, or building new cycle infrastructure - but supply-side solutions can be expensive, time-consuming, and politically charged. Demand-side interventions have tremendous potential to deliver results quickly and economically, and can serve as the perfect complement to supply-side work. In many cases, demand side interventions are underused despite having the potential to be impactful and low-cost. This report will therefore focus on the demand side of the equation, and the ways in which behavioural insights can be applied. The application of behavioural insights to Transportation Demand Management (TDM) is still an emerging field, so ideas put forth here should be rigorously tested in context before being scaled.

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INTRODUCTION

How can we encourage people to make use of the transportation systems in place - to improve transit ridership and, in turn, to improve the health and happiness of our societies?

4 OF 5 

Canadian commuters use private vehicles to get to work¹

23% 

of people take public transit to work in Toronto¹

19.7% 

of people take public transit to work in Vancouver¹

Introduction

Four out of every five Canadian commuters use private vehicles to get to work. Even in metropolitan areas where other forms of transportation are more accessible, only about 23% of people take public transit to work in Toronto and 19.7% in Vancouver, for example.¹ Yet we know that commuting by car has serious drawbacks. Car commuters have significantly higher levels of reported stress compared to train commuters;² they report lower levels of life satisfaction and an increased sense of time pressure.³ Indeed, driving to work each day is associated with an increased risk of developing high blood sugar and cholesterol, ultimately putting people at increased risk of cardiovascular death.⁴

At the same time, when too many people drive alone, communities suffer: we see impacts on congestion, pollution and greenhouse gas emissions, crashes, and impacts on emergency responders, to just name a few. Because of these societal impacts, agencies like TransLink have set a policy to reduce drive-alone mode

share. Commuting by taking the bus, train, biking, walking, and carpooling with colleagues are all forms of commuting that are associated with reduced stress, increased well-being and improved physical health. The important question behind this report is: How can we encourage people to make use of the transportation systems in place - to improve transit ridership and, in turn, to improve the health and happiness of our societies?

Historically, policies and systems have been designed under the assumption that people are rational actors, capable of making complex calculations and tradeoffs to optimize their own well-being. In the context of transportation, this assumption would lead us to conclude that the vast majority of people choose to drive alone because, objectively viewed, it is the mode they have determined is the best equipped to maximize their happiness, health, and financial goals. This leads many to assume that only large and costly improvements to public transportation supply, could induce more people to switch modes. Even when considering demand-side options,⁵ many employers and public agencies offer financial incentives such as a discounted transit pass or an incentive (such as a coffee card) for biking to work, assuming that

1 Turcotte, Martin (2016). *Commuting to work*. Retrieved from https://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-012-x/99-012-x2011003_1-eng.cfm

2 Wener, R. E., & Evans, G. W. (2011). *Comparing stress of car and train commuters*. *Transportation Research Part F: Traffic Psychology and Behaviour*, 14(2), 111-116.

3 Hilbrecht, M., Smale, B., & Mock, S. E. (2014). *Highway to health? Commute time and well-being among Canadian adults*. *World Leisure Journal*, 56(2), 151-163.

4 Hoehner, C. M., Barlow, C. E., Allen, P., & Schootman, M. (2012). *Commuting distance, cardiorespiratory fitness, and metabolic risk*. *American journal of preventive medicine*, 42(6), 571-578.

5 TDM strategies are designed to reduce single-occupancy vehicle trips and encourage the use of active and shared modes.

Humans often have enormous difficulty making decisions that require any type of calculation, and even more difficulty taking action when a behaviour is not yet a habit.

individuals will calculate the financial benefit and, because of that, change their behaviour. However, it turns out that humans often have enormous difficulty making decisions that require any type of calculation, and even more difficulty taking action when a behaviour is not yet a habit. Even when it comes to matters as impactful as our retirement savings or whether we will be organ donors,^{6,7} we are notoriously bad at making the best choices for ourselves. We rely on mental shortcuts to help us make decisions in a busy world where a plethora of choices have to be made every single day. Seemingly innocuous and unimportant factors, such as where a product is located in the store, can be as influential a factor in our decision to buy a specific product as the price itself.⁸

By blending cutting-edge insights from psychology and economics, behavioural science researchers have helped reveal the often hidden forces that shape our decision making. Behavioural science offers explanations for how we can reduce procrastination, why we like lotteries, how to get ourselves to the gym, and what the best time is to try to break a bad habit. Decision makers are already using insights from behavioural science to influence the actions of consumers, residents, the internal government, and the public at large through “nudges,” the popular term coined by Richard Thaler and Cass Sunstein in their seminal work, “Nudge.”⁹ In short, nudges can be thought of as non-intrusive strategies for modifying behaviour without restricting choices, by accounting for behavioural biases.

The goal of this report is to explore how we can use and test behavioural insights as a way to nudge people to try alternatives, such as transit, more often. While the majority of the report outlines specific ideas that can be put in practice to improve demand-side management, the broader approach to applying behavioural insights can be used for a host of different interventions.

This approach includes three key stages:

- Mapping out behavioural touch points
- Designing an intervention
- Testing whether the intervention worked

6 Benartzi, S., & Thaler, R. H. (2013). Behavioural economics and the retirement savings crisis. *Science*, 339(6124), 1152-1153.

7 Johnson, E. J., & Goldstein, D. (2003). Do defaults save lives?. *Science*, 302(5649), 1338-1339.

8 Sigurdsson, V., Saevarsson, H., & Foxall, G. (2009). Brand placement and consumer choice: an in store experiment. *Journal of Applied Behavior Analysis*, 42(3), 741-745.

9 Thaler, R. H., & Sunstein, C. R. *Nudge: Improving Decisions About Health, Wealth, and Happiness*.

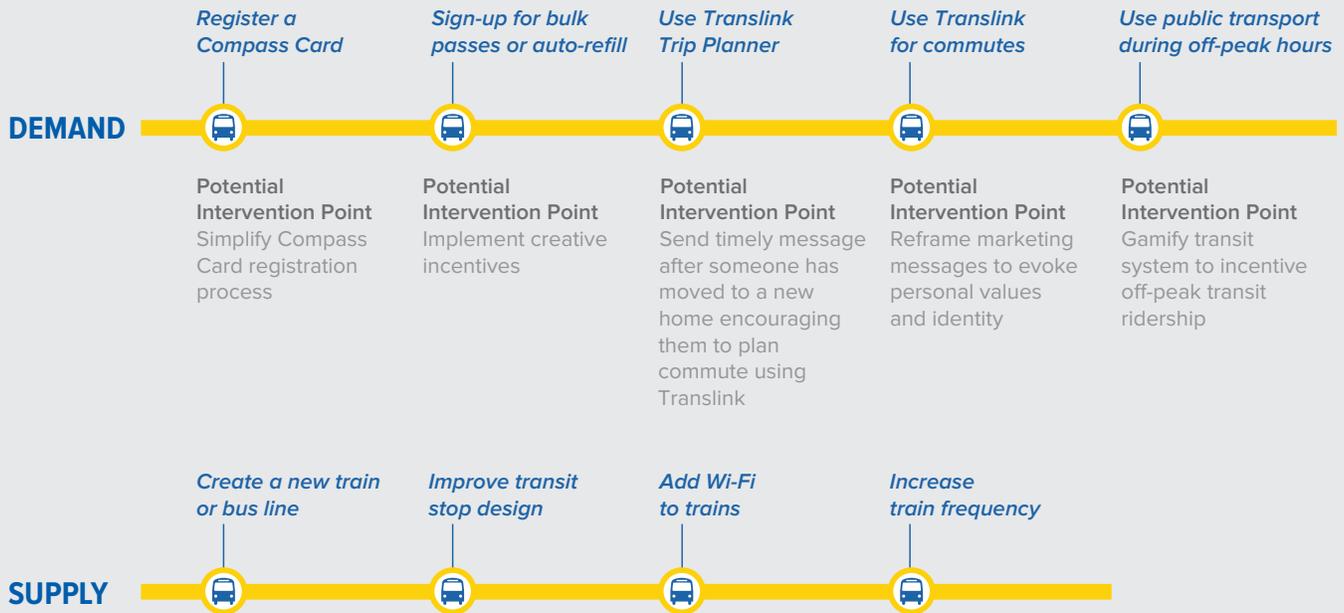
Step 1: Mapping out behavioural touch points

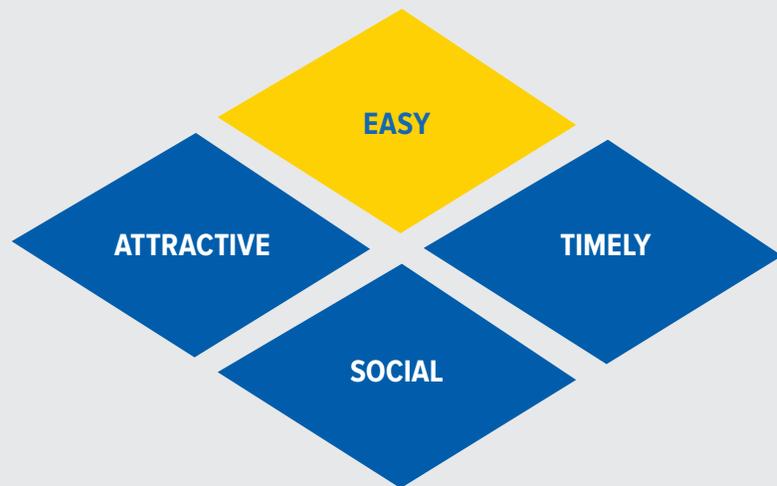
In order to identify key behavioural touch points in the public transportation process, it is helpful to create a “behavioural map” which lays out the entire range of behaviours that contribute to the overall objective. By breaking down the problem into these “micro-behaviours,” we can identify the points in the process where there are psychological or behavioural barriers keeping people from using public transit. This allows us to target behavioural interventions at exactly

the right points, unlocking demand without necessarily adjusting supply. Below we outline a non-exhaustive behavioural map which presents examples of the types of interventions TransLink and municipalities in metro Vancouver might consider in the demand-side management space. The rest of the report outlines these and other touch points in more detail, depending on the existing ridership habits of different groups.

GOAL:

INCREASE RIDERSHIP OF TRANSLINK





Step 2: Designing an intervention

After identifying key touch points through the behavioural map, we create behaviourally-informed solutions to address demand specific to that touch point. For decision-makers, BIT's EAST framework (described below) can provide a good starting point for brainstorming how to leverage behavioural insights to create new TDM strategies.

Based on the academic literature and on experiments done in collaboration with organizations across the world, the Behavioural Insights Team (BIT) developed a simple, memorable framework to help decision makers think about effective approaches for changing behaviour. Simply put, in order to encourage a behaviour, make it Easy, Attractive, Social, and Timely (EAST).¹ "Easy" tells us that identifying and reducing friction points can reduce the "hassle factor" of a behaviour, thereby increasing uptake. "Attractive" tells us that capturing our attention can help us hone in on something in a busy world

with lots of stimuli. "Social" is about leveraging the direct and indirect social pressure and norms that drive so much of our behaviour. "Timely" considers the importance of the timing of an ask in determining the response. EAST can provide a good basis for thinking about the behavioural barriers to using transit and how to address them, but for a specific transit system, it would be useful to do a more exhaustive analysis of the entire transit process from the user's perspective in order to identify the full range of "friction points" and other areas where behaviourally-informed solutions could smooth and improve the process. Throughout this report, there will be references back to the EAST framework and how it could be incorporated into TDM strategies.

TDM practitioners have been using many of these strategies already: access to real-time arrival information makes non-driving modes easy to understand, congestion pricing makes driving less attractive, and gamification adds a social aspect to

travel choices; these are all examples of behaviourally-informed ways to encourage use of public transport. People's reasons for not using public transportation could vary widely, so it is crucial to design interventions with human behaviour in mind and to consider the specific needs and the potential psychological biases of key high-interest groups. More importantly, it requires clarifying what behaviour we are actually asking of people, and which groups of people we are asking to make that change. Depending on current ridership and agency goals, the "behavioural ask" may be quite different. This report aims to present approaches to nudge people to:

- **Try it Again** if they are low-frequency users,
- **Make it a Habit** if they are mid-frequency users, and
- **Use it Well** if they are high-frequency users.

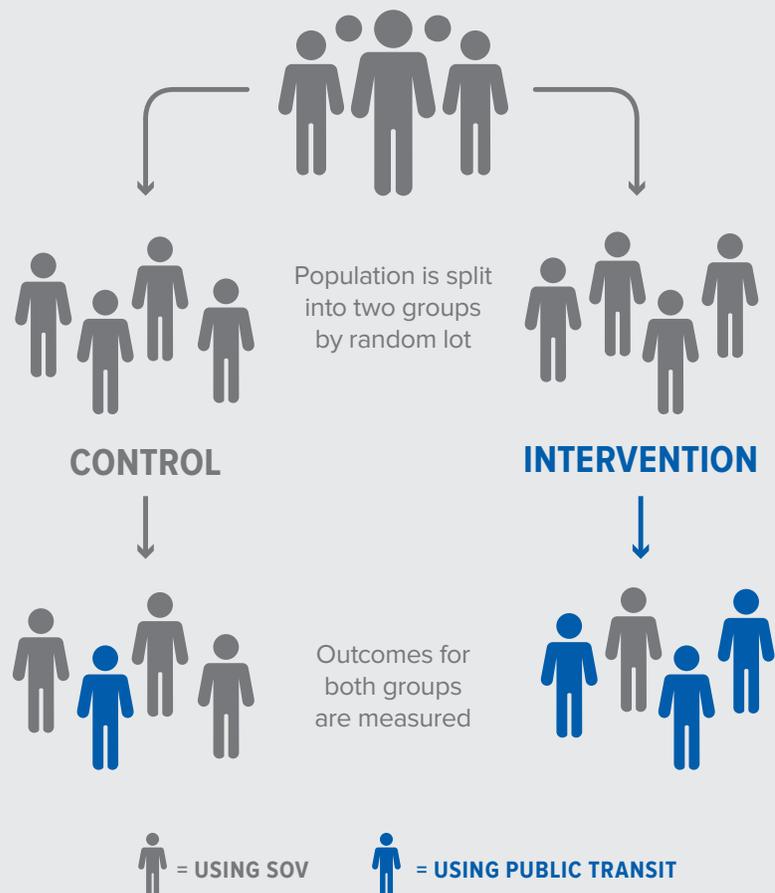
¹ Insights, B. (2014). *EAST: Four Simple Ways to Apply Behavioural Insights*. London: Behavioural Insights.

Step 3: Testing what works

A core aspect of the Behavioural Insights Team’s methodology is to rigorously test which interventions are most effective. Randomized Controlled Trials (RCTs), widely used in fields from medicine to international development, are the best way of determining whether a policy is working. For online platforms, A/B testing can act as a simplified version of an RCT by comparing two versions of a web page, for example. An RCT works by randomly splitting groups into at least one treatment group that receives the program or policy -- and a comparison group [see visual representation of RCT below]. Because the two groups are split at random, if the groups are large enough, they should look statistically similar on any characteristic - the number of men and women, the average age, the number of unmotivated and motivated people, or any other observable or unobservable characteristic. The only difference between the two groups should be that one group received the program or policy, enabling one to compare the effectiveness of an intervention against what would have happened if nothing had changed (“business as usual”). This comparison between randomly assigned control and treatment groups eliminates a whole host of biases that normally complicate the evaluation process. For more information about RCTs and this core feature of the Behavioural Insights Team’s methodology, see the “Test, Learn, Adapt” report.¹

The ideas presented in this report are based in rigorous behavioural science and experience in other fields, but they are largely untested in the transportation realm. Even interventions with a strong track record can fail or perform differently in a new context, making testing especially important. Therefore, we strongly recommend rigorously testing any ideas laid out in this report, especially in light of the scarcity of behavioural literature and successful trials in the realm of transportation.

Technological solutions mean that RCTs are no longer as expensive or time-consuming as they once were. Emails, text messages, and online platforms often make A/B testing (the simplified version of an RCT) seamless. Moreover, a well-conducted RCT allows organizations to meaningfully measure the return on investment of any given tweak. In doing so, they help organizations use their existing data more effectively.



¹ Haynes, L., Goldacre, B., & Torgerson, D. (2012). *Test, learn, adapt: developing public policy with randomised controlled trials*. Cabinet Office-Behavioural Insights Team.

TRY IT AGAIN

Market research released in December 2014 of Metro Vancouver area transportation habits revealed that people who use transit very infrequently (less than yearly/never) cite a few major barriers:

**20%**TIME CONSUMING/
SLOW ¹**20%**ACCESS ¹**15%**UNAFFORDABLE ¹**83%**

of this group said they were **DEFINITELY** or **PROBABLY** willing to try transit if primary barrier was removed.

Try it Again

Although most people have used public transportation at least occasionally, the potential market of low-frequency, high-interest users consists of people who use public transportation very rarely, but have interest in using it. While this group probably has the most entrenched resistance to using public transportation, it may also present the greatest opportunity to increase overall ridership. Behaviourally-informed interventions can be used to help those in this group overcome psychological barriers and inaccurate perceptions to increase the frequency with which they ride public transportation. Market research released in December 2014 of Metro Vancouver area transportation habits revealed that people who use transit very infrequently (less than yearly/never) cite a few major barriers: time consuming/slow (20%), access (20%), and unaffordable (15%).¹ 83% of this group said they were “definitely” or “probably” willing to try transit if primary barrier was removed.

¹ Mustel Group Market Research. (2014, December). *TravelSmart Mobility Management Near Markets Research*. Retrieved from TransLink.

Behavioural barriers to trying it again

Using public transportation can be a complex process full of friction points, especially for those who do not use it often and are not comfortable with it. From filling up your fare card to understanding how often the bus comes, almost every aspect of the transportation experience could be confusing. In behavioural terms, **cognitive load** refers to this phenomenon as the total amount of mental effort being used in the working memory; small details that make a task more challenging or effortful cause higher cognitive load.² Making a behaviour simpler and easier to undertake reduces the cognitive load and makes it more likely that a person will actually make a behaviour change.

For those who have always gone everywhere by car, the **status quo bias**³ - our tendency to keep doing what

² Chandler, P., & Sweller, J. (1991). *Cognitive load theory and the format of instruction*. *Cognition and instruction*, 8(4), 293-332.

³ Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). *Anomalies: The endowment effect, loss aversion, and status quo bias*. *The journal of economic perspectives*, 5(1), 193-206.

Box 1: EFFECT OF STATUS QUO BIAS ON ELECTRIC POWER CHOICE

A survey of California electric power consumers asked them about their preferences regarding service reliability and rates. Respondents fell into two groups, one with much more reliable service than the other. Each group was asked to indicate a preference among six combinations of service reliabilities and rates, with one combination designated as the status quo. Results demonstrated a significant status quo bias, with 60.2% of the high reliability group selecting the status quo option, although they had the option to switch to the low reliability option for a 30% reduction in rates. Of the low reliability group, 58.3% decided to stay with their status quo, with only 5.8% selecting the high reliability option at a proposed 30% increase in rates.⁶

we have always been doing - could be a significant psychological blocker preventing infrequent or inexperienced users from giving public transportation a try. The existing social and institutional structures in many countries, implicitly and explicitly nudge people in the direction of using cars; our TV shows are punctuated by frequent commercials for new and exciting cars, and many of our governments invest more heavily in highways than in public transportation. The status quo bias affects us in many other contexts, which is part of the reason that **defaults** are so effective; when there is a default option, we are much more likely to stick with it than to select a different choice. For example, in a large-scale experiment in New Jersey and Pennsylvania, drivers were given two car insurance options: a cheaper policy that restricts the right to sue, and a more expensive one that maintains the unrestricted right. What differed was the default: in New Jersey, motorists were offered the cheaper policy as the default option, with the opportunity to pay extra to acquire the right to sue with the higher priced insurance policy. In Pennsylvania, the default option was the expensive policy, with an opportunity to opt for the cheaper one. Citizens of both

states chose the default option; 79% of New Jersey drivers chose the limited right to sue, while 75% of Pennsylvania drivers chose the full right to sue.⁴ This result has been replicated in a controlled experiment, as well.⁵ [See *Box 1 for additional Status Quo bias example*]⁶

Another potential psychological barrier stopping people from trying public transportation may be **ambiguity aversion** - people prefer known risks (e.g. normal weekday traffic if they drive) to unknown risks (e.g. a bus or train breaking down or operating less frequently than expected).⁷ This dislike of ambiguity can be seen in the Ellsberg paradox, an experiment that revealed that people prefer to bet on

the outcome of an urn with 50 red and 50 blue balls to betting on one with 100 balls (out of which the number of blue and red balls is not known).⁸ Indeed, in multiple contexts, individuals are willing to pay significant amounts of money to avoid ambiguity in favour of equally risky but known processes.⁹

Real and perceived unreliability of public transportation options has been shown to be an important factor when people plan trips. In the case of one study, car drivers were shown to perceive that public transit travel time was double the amount of time for the same trip by car.¹⁰ For rare users, who have learned to estimate car traffic through trial and error, but who fear the ambiguity in public transportation travel time, this aversion may lead them to avoid using public transport all together. From a behavioural perspective, it is the *perception* of unreliability that is

4 Hardman, D. K., & Hardman, D. (2009). *Judgment and decision making: Psychological perspectives* (Vol. 11). John Wiley & Sons.

5 Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). *Anomalies: The endowment effect, loss aversion, and status quo bias. The Journal of economic perspectives*, 5(1), 193-206.

6 Hartman, R. S., Doane, M. J., & Woo, C. K. (1991). *Consumer rationality and the status quo. The Quarterly Journal of Economics*, 141-162.

7 Carrel, A., Halvorsen, A., & Walker, J. (2013). *Passengers' perception of and behavioural adaptation to unreliability in public transportation. Transportation Research Record: Journal of the Transportation Research Board*, (2351), 153-162.

8 Ellsberg, D. (1961). *Risk, ambiguity, and the Savage axioms. The quarterly journal of economics*, 643-669.

9 Trautmann, S.T., Vieder, F.M. & Wakker, P.P. *J Risk Uncertainty* (2008) 36: 225. doi:10.1007/s11166-008-9038-9

10 Nicolaas Jacob Arnold van Exel, Piet Rietveld. (2010). *Perceptions of public transport travel time and their effect on choice-sets among car drivers. Journal of Transport and Land Use*, 75-86.



serving as a barrier; ensuring that public transportation is perceived as more reliable requires framing it as such and giving people tools to manage the variables under their control, as much as it requires improving the actual reliability (e.g. bus frequency and dedicated transit lanes).

Negative perceptions of public transportation may also be fueled by the **availability heuristic**, a mental shortcut where people rely on immediate examples or stories that come to mind when making a decision. If people have ever had one bad transit experience, or heard a public transit “horror story” from a friend or acquaintance, these rare occurrences can be top of mind as people make their transportation decision. On a related note, infrequent but emotionally salient events, such as a child getting sick, can have an outsized impact on how people make decisions. The desire to have the agility of your own car in those rare times can overshadow the benefits of using public transportation for the majority of uneventful journeys, especially since support programs can often fill in the gap in those emergency situations.

Both status quo bias and ambiguity aversion apply to many behaviours, including outside of public transport. Yet there may be specific misconceptions or attitudes towards public transport that cause (or justify) infrequent use. Much of the research on converting habitual drivers to public transit users finds that attitudes and perceptions about public transportation are just as important, if not more important, as attributes like accessibility and reliability.^{11,12} In behavioural terms, the decision to always drive may be spurred by the **halo effect**, a cognitive bias whereby people use an evaluation of one characteristic to make judgments about other specific traits.¹³ The halo effect has been identified in a number of realms, such as how we judge others based on attractiveness. In one study, when participants were shown three

different photos of individuals of varying attractiveness, they overwhelmingly said more attractive subjects had more socially desirable personality traits, would lead happier lives in general, and would have more career success than the average attractive or unattractive subjects.¹⁴ The world of branding offers other examples: at a restaurant perceived of as “healthy,” consumers underestimate the caloric content of its dishes.¹⁵ Positive feelings about cars, such as a sense of high status, modernity, individuality and autonomy, may overshadow specific negative attributes, like high gas costs and time spent sitting in traffic. The halo effect may also cause these positive properties of the car to be transferred to the traveller, giving the user a sense of identity - albeit at a subconscious level - that embodies these positive features. Driving a car is associated with being in control (“being in the driving seat”) and feeling empowered

¹¹ Spears, S., Houston, D., & Boarnet, M. G. (2013). *Illuminating the unseen in transit use: A framework for examining the effect of attitudes and perceptions on travel behaviour*. *Transportation Research Part A: Policy and Practice*, 58, 40-53.

¹² Redman, L., Friman, M., Gärling, T., & Hartig, T. (2013). *Quality attributes of public transport that attract car users: A research review*. *Transport Policy*, 25, 119-127.

¹³ Thorndike, E. L. (1936). *The relation between intellect and morality in rulers*. *American Journal of Sociology*, 321-334.

¹⁴ Dion, K., Berscheid, E., & Walster, E. (1972). *What is beautiful is good*. *Journal of personality and social psychology*, 24(3), 285.

¹⁵ Chandon, P. & Wansink, B. (2007). *“The Biasing Health Halos of Fast-Food Restaurant Health Claims: Lower Calorie Estimate and Higher Side-Dish Consumption Intentions”*. *Journal of Consumer Research*. 34 (3): 301-14.

(Toyota: “Let’s go places,” “Drive your dreams;” Honda: “The Power of Dreams”).¹⁶ Indeed, there is emerging research suggesting that car pride may be serving as a barrier to public transit use.^{17,18} Negative perceptions about public transportation can cause a “negative halo effect,” whereby people feel that negative perceptions of that mode of transportation reflect negatively on them.¹⁹ Researchers have found evidence that people are continually managing their self-concepts, seeking to affirm valued personal identities, so using public transportation could feel to some like a behaviour that is not affirming their core identity.²⁰

16 *Automobile Slogans*. Retrieved 2016, from <http://www.advergize.com/slogans-list/car-slogans>

17 Moody, J., Goulet-Langois, G., Alexander, L., Campbell, J., & Zhao, J. (2016). *Measuring Explicit and Implicit Social Status Bias in Car vs. Bus Mode Choice*. In *Transportation Research Board 95th Annual Meeting* (No. 16-5014).

18 Zhao, J. (2009). *Preference accommodating and preference shaping: incorporating traveler preferences into transportation planning* (Doctoral dissertation, Massachusetts Institute of Technology).

19 Kenyon, S., & Lyons, G. (2003). *The value of integrated multimodal traveller information and its potential contribution to modal change*. *Transportation Research Part F: Traffic Psychology and Behaviour*, 6(1), 1-21.

20 Bryan, C. J., Walton, G. M., Rogers, T., & Dweck, C. S. (2011). *Motivating voter turnout by invoking the self*. *Proceedings of the National Academy of Sciences*, 108(31), 12653-12656.

Box 2: MOVING TO A NEW HOME AS AN OPPORTUNITY TO CHANGE COMMUTING HABITS

Using longitudinal data from a multi-year survey on the daily lives of almost 20,000 UK residents, researchers measured how long it had been since residents had moved homes, their normal mode of travel to work, and the strength of their environmental attitudes. Results supported the hypothesis that eco-minded people would use cars less, but this was only true for those who had recently moved. The study found that an eco-minded person’s chances of commuting by car were lowest immediately after moving to a new home, independent of age, gender, income, and geographic location, but this effect decays as the time since moving home increases and people become more set in their habits.²²

Behavioural solutions to try it again:

Behaviourally-informed solutions can be instrumental in helping people overcome seemingly deeply-rooted psychological biases, like the affinity for the status quo or aversion to behaviours that are overly complicated or confusing. Behavioural insights can be applied to craft the content, framing, and the timing of messages and programs to encourage this population to give public transportation another try.

Nudge people at opportune moments.

One pillar of BIT’s EAST framework is that making a message timely can increase its impact; we are particularly likely to change our habits during periods of transition and change, such as after getting married, having a child, or starting a new job.²¹ In the case of people hesitant to use public transportation, a move to a new home or a new job can present an opportune

moment to nudge them in the direction of changing their transportation habits. A short message shortly after the move can provide the impetus, during a time when behaviours are changing anyway as a result of circumstances, to explore public transportation options that were previously not considered. [See Box 2]²² On a shorter term scale, specific days of the week or times of the day may offer opportune moments to send a message; for example, a texting service could message people on weekday mornings, suggesting that they leave the house to catch their bus on time. A study conducted by the Behavioural Insights Team with the UK Courts Service showed that sending people a text message prompting them to pay their court fines 10 days before bailiffs were due to arrive increases payment rates by two to three times (depending on the specific message).²³

21 Thompson, S., Michaelson, J., Abdallah, S., Johnson, V., Morris, D., Riley, K., & Simms, A. (2011). *“Moments of Change” as opportunities for influencing behaviour*.

22 Thomas, G. O., Poortinga, W., & Sautkina, E. (2016). *Habit Discontinuity, Self-Activation, and the Diminishing Influence of Context Change: Evidence from the UK Understanding Society Survey*. *PLoS one*, 11(4), e0153490.

23 Team, B. I. (2012). *Applying behavioural insights to reduce fraud, error and debt*. Cabinet Office, London, 185, 186.

Re-frame and promote the opportunity for real time trip tracking.

One of the key concerns people have about public transportation is that it may be time-consuming, and a significant part of the time associated with using public transit can be waiting for buses and trains. Furthermore, people hate the ambiguity associated with waiting for a bus or train and having no idea when it will arrive.²⁴ In order to target these concerns, it is important to re-frame the message, to show that public transportation offers an opportunity to have more certainty about the time a trip will take versus a car. Where real time arrival information and planning is available, messaging around that option could be framed as allowing people to “know for sure” how long the trip will take, while driving puts them at the mercy of traffic, crashes, and other uncertainties which could lengthen the time a trip takes. [See Text Message 1].²⁵ This opportunity for real-time tracking has the twofold benefit of helping people more precisely plan their public transit journeys (thus spending less time waiting), and reducing the uncertainty when people are waiting at bus or train stations. One study measuring actual and perceived wait times at Seattle-area bus stops found that perceived wait time is longer for riders without real-time information compared to riders with it. Actual wait time for real-time information users was 7.5 minutes versus 9.9 minutes for others. The addition of real-time information decreased the perceived

²⁴ How to Make Waiting for the Bus Feel Much, Much Shorter. (2016). CityLab. Retrieved 18 August 2016, from <http://www.citylab.com/commute/2014/01/why-technology-forever-changing-psychology-waiting-bus/8158/>

²⁵ Please note that these are sample template messages. Specific messages should be tailored and rigorously tested in the specific context before being scaled.

Box 3: IMPACT OF REAL-TIME BUS INFORMATION ON RIDERSHIP IN CHICAGO

The Chicago Transit Authority (CTA) created a real-time bus information system called CTA Bus Tracker, which was incrementally implemented on different CTA bus routes from August 2006 to May 2009. Using longitudinal data over that period allowed researchers to implement a quasi-experimental design with statistical controls to examine changes in monthly average weekday ridership, before and after the Bus Tracker was introduced. The study found that the provision of Bus Tracker service does increase CTA bus ridership, although the average increase was modest. Researchers noticed a trend suggesting this attraction rate will rise over time, with awareness about the service.²⁸ These results suggest that real-time transit tools might serve not only to improve commuter experience of existing riders, but also to entice new ones.

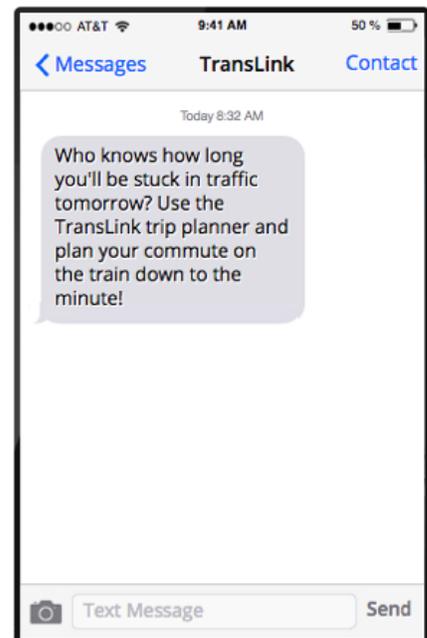
wait time by 0.7 minutes.²⁶ Aside from these tangible differences, riders not using real-time information also felt more anxiety and aggravation using public transportation. Another study used a simulation model to quantify the impacts of unreliable service on generalized transit user costs, indicating that increasing reliability of arrivals at a station can encourage people to select public transit, and that reliability should be included in travel forecasting models to more accurately predict travel choices.²⁷ On a more system-wide level, placing screens with real time arrival information at stations (and publicizing the availability of these screens) could help ease the fear of uncertainty and encourage more of this population to try public transportation. [See Box 3]²⁸

²⁶ Watkins, K. E., Ferris, B., Borning, A., Rutherford, G. S., & Layton, D. (2011). *Where Is My Bus? Impact of mobile real-time information on the perceived and actual wait time of transit riders.* *Transportation Research Part A: Policy and Practice*, 45(8), 839-848.

²⁷ Nour, A. (2009). *Quantifying the Impact of Transit Reliability on Users Cost-A Simulation Based Approach.*

²⁸ Tang, L., & Thakuriah, P. V. (2012). *Ridership effects of real-time bus information system: A case study*

Text Message 1:



Research has shown that people who express support for an idea or concept are more likely to then remain consistent with their prior action by committing to it in a more concrete way.

Implement/re-frame “try before you buy” incentives.

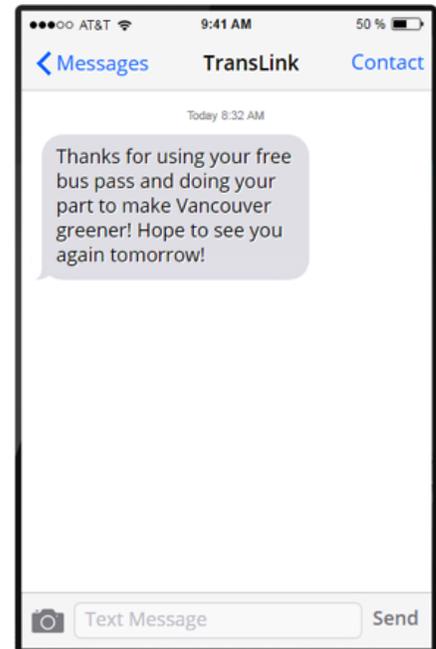
Behavioural research has shown that getting users to try a service can be a powerful first step towards getting them to adopt new habits.²⁹ It is common practice throughout the private sector to try to attract new users and consumers via some type of free trial or customer referral; this method is used in industries as diverse as video streaming (e.g. Netflix and Hulu) and telephone operators (e.g. AT&T). Public transportation agencies could target potential riders with “try before you buy” vouchers or passes, promotional codes to cover a few rides, or free fare days to make it even easier to take advantage of the trial. This strategy would allow people to try public transit for free, disrupting the status quo and introducing people to a new experience (and hopefully dislodging any misconceptions they may have held).

While many public transportation authorities are already using some

type of free voucher, the challenge is to frame the free service so that it becomes a “**foot-in-the-door**.” Research has shown that people who express support for an idea or concept are more likely to then remain consistent with their prior action by committing to it in a more concrete way. An example of this effect was shown in California, where two groups were asked to place a large, obtrusive sign in their front yard reading “Drive Carefully.” One group had previously been approached to put a small sign in their front window reading “Be a Safe Driver.” Of the group who had previously been approached about the small sign, 76% agreed to post the large sign. Fewer than 20% of the “control” group who had not been previously approached agreed to post the large sign in their lawn.³⁰ If the initial voucher or promo code could be accompanied by messaging communicating that the participant is “the kind of person who uses public transport,” or to group them into a social group that “contributes to making our

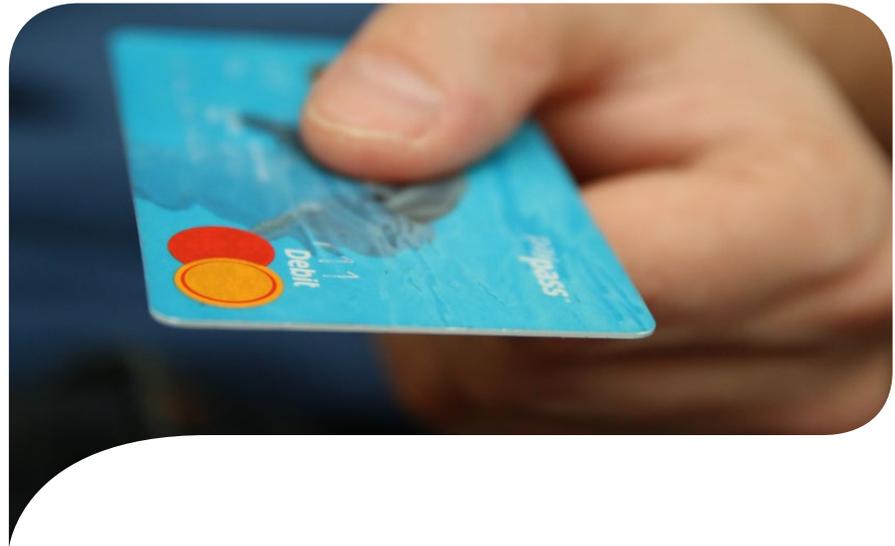
city green,” they may continue to the behaviour to remain consistent with their previous actions. [See Text Message 2]

Text Message 2:



²⁹ Datta, H., Foubert, B., & Van Heerde, H. J. (2015). The challenge of retaining customers acquired with free trials. *Journal of Marketing Research*, 52(2), 217-234.

³⁰ Freedman, J. L., & Fraser, S. C. (1966). Compliance without pressure: the foot-in-the-door technique. *Journal of personality and social psychology*, 4(2), 195.



Target messaging at negative perceptions of public transportation.

Apart from getting people to try it out themselves, it is also important to employ messaging to change negative perceptions around public transportation. Messaging could target the attributes and motivations that cause people to select driving as their mode of transportation. For example, if comfort and convenience are major motivations, create messaging that highlights the possibility of reading the morning newspaper or having some “me time” to pursue a hobby while riding to the office. If personal safety is a motivation, messaging could focus on safety measures within the public transportation system. If independence and autonomy are important attributes of driving, publicize the availability of real-time transit arrival information and emphasize the many services that can

provide a backup plan if needed (e.g. take a one-way carsharing trip if an urgent family matter comes up during the day). If agility and spontaneity in case of an emergency is important, messaging could focus on the presence of “Emergency Ride Home” and similar programs, which can provide support in those rare circumstances.

Simplify the payment process.

To encourage a behaviour, you should make it easy. Whether payment is made through a card, token, cash, or any other means, there is often an opportunity to simplify and streamline the way that people pay for public transportation. A few examples of ways to streamline are:

- Provide clear and simple information on how to add money to your card. Potential ways to do this could include prominently featuring a button to add card value on the public

transportation homepage or printing simple step-by-step instructions for adding money to the card on the card itself. While these may seem like small tweaks, the findings of dozens of trials that the Behavioural Insights Team has conducted with UK government departments have showed that making letters really easy to understand often results in a 5% or 10% increase in response rates - usually because the main request has been made clearer.³¹

- Simplify fare schedules and remove any superfluous information from promotion materials and website. A study in Haifa, Israel, found that the city’s new, integrated and simplified fare policy (from a historically complex pre-boarding system) negated the downward trend in transit ridership.³²

³¹ Insights, B. (2014). *EAST: Four Simple Ways to Apply Behavioural Insights*. London: Behavioural Insights.

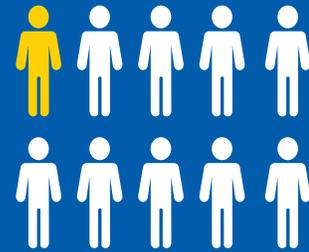
³² Sharaby, N., & Shiftan, Y. (2012). *The impact of fare integration on travel behaviour and transit ridership*. *Transport Policy*, 21, 63-70.

MAKE IT A HABIT

Current positive associations with public transportation are: convenience and affordability, and to a lesser degree, its worry-free and environmentally friendly nature. The main deterrent is the time-consuming aspect, but also cost and lack of convenience and access.

11%

of Metro Vancouver population currently use public transportation a moderate amount, but have a high interest in using it more (a “near market”).¹

**THIS TARGET GROUP USES PUBLIC TRANSIT****2-3** DAYS PER MONTH TO JUST A COUPLE TIMES PER YEAR**100%**

of this group said they would **DEFINITELY** consider using transit more often.

Make it a Habit

One high-potential group to target is those who currently use public transportation a moderate amount, but have a high interest in using it more (a “near market”). This group is somewhat familiar with the public transportation system, but needs to be nudged to make it a habit, potentially thinking of it as their standard mode of transport for everything from social occasions to a daily commute.

In the case of Metro Vancouver, 11% of the population falls into this target group, according to market research released in December 2014.¹ The current frequency of public transit usage ranges from 2-3 days per month to just a couple times per year. Everyone in this group said they would “definitely” consider using transit more often. Current positive associations with public transportation are: convenience and affordability, and to a lesser degree, its worry-free and environmentally friendly nature. The main deterrent is the time-consuming aspect, but also cost and lack of convenience and accessibility.

¹ Mustel Group Market Research. (2014, December). *TravelSmart Mobility Management Near Markets Research*. Retrieved from TransLink.

Behavioural barriers to making it a habit

Some people in this category may only be using public transportation for their commute, but not for any other transportation needs. For these types of users, the behavioural barrier to overcome is mental accounting. **Mental accounting** describes the finding that we mentally allocate money to discrete bundles or “accounts” in our mind.² If our weekend “fun” mental budget is in a separate category from our work commute expenses, this may explain why we are willing to splurge for driving and parking on weekends but not on weekdays.

People in this mid-frequency user category may also be falling into the trap of the **sunk cost fallacy**, wherein people consider costs that have already been incurred and cannot be recovered in making future decisions.³ For example, if someone owns a car (a sunk cost) they may feel they are “wasting” resources by choosing to use public transportation for more trips.

² Thaler (1999) *Mental Accounting Matters*. *Journal of behavioural Decision Making*, 12: 183-206.

³ Arkes, H. R., & Blumer, C. (1985). *The psychology of sunk cost*. *Organizational behaviour and human decision processes*, 35(1), 124-140.

Box 4: **INCREASING TAX COLLECTION RATES BY CHANGING THE DEFAULT WEB-LINK**

In a series of trials that the Behavioural Insights Team ran in the UK, the simple act of directing tax collection letter recipients straight to a specific form rather than the web page that included the form increased response rates from 19% to 23%.⁶ These types of small tweaks can have an unexpectedly large impact, so rethinking even seemingly unimportant features of the online reloading of public transportation cards could lead to higher usage.

Behavioural solutions to make it a habit

Outlined below are common features of public transportation systems that could potentially be improved using behavioural insights, in order to encourage the mid-frequency group to use it more. For specific public transit systems, it would be useful to do a more exhaustive analysis of the entire transit process from the user's perspective in order to identify the full range of "friction points" and other areas where behaviourally-informed solutions could smooth and improve the process.

Leverage defaults.

The payment process is a natural place to harness the **power of defaults** by creating automatic features for reloading funds on a card and re-upping a weekly or monthly plan for the following time period. The strong tendency to stick with the default option has been shown to exist across a wide range of realms, from pension plans to organ donation programs.^{4,5} Defaults, coupled with the sunk cost fallacy, means that if money is already pre-loaded on the transit card, we feel like we are "wasting" money if we do not use it in the future. This is another area where we can learn from the private sector; many entities, from gyms to online TV streaming services, create a default option that they want to push users toward, requiring extra effort for people to make a different choice. [See Box 4]⁶

4 Benartzi, S., & Thaler, R. H. (2007). *Heuristics and biases in retirement savings behaviour*. *The journal of economic perspectives*, 21(3), 81-104.

5 Abadie, A., & Gay, S. (2006). *The impact of presumed consent legislation on cadaveric organ donation: a cross-country study*. *Journal of health economics*, 25(4), 599-620.

6 Insights, B. (2014). *EAST: Four Simple Ways to Apply Behavioural Insights*. London: Behavioural Insights.

For systems with some type of refillable card, there are several ways to reduce the effort associated with paying for transportation:

- Automatically enrol people in online reloading when they first get the card
- Direct people to an enrolment form that is already filled in with as much information as possible
- Prompt people to automatically reload the card when it reaches a low level (or automatically renew bulk plans, such as weekly or monthly plans). If possible, create ways to simplify the reloading process (e.g. send a text message and refill the card if they reply with a "1").

Implement creative incentives to encourage more usage.

Making riding public transit a more attractive option is another way to encourage occasional users to ride more. Research by BIT suggests that there are creative ways of structuring financial incentives to maximize their effectiveness. For occasional users, nudging them in the direction of bulk weekly or monthly passes could help encourage them to use public transportation more often. Another potential approach is to use what we know about loss aversion to create

the incentives; **loss aversion** refers to people's tendency to prefer avoiding losses almost twice as much as acquiring equivalent gains.⁷ Public transit agencies could encourage participation in "try-before-you-buy" type programs by putting credit (for example, for \$5 or \$10) on people's public transit cards and having that credit expire (and be "lost") after a specific timeframe. The loss aversion literature indicates that the prospect of losing this credit will be a greater incentivizer than just giving people the equivalent amount as a prize for undertaking a specific action.

Public transportation systems could also experiment with "gamifying" financial incentives. The behavioural literature shows that people are notoriously bad at estimating small probabilities and overestimate the possibility of a rare positive event happening to them (**the optimism bias**), so an effective way to structure these incentives may be a lottery sweepstakes, where people get one entry per public transit ride and have a chance at a large prize (a month of free rides, for example). In a BIT study on increasing voter registration, London

7 Kahneman, D., & Tversky, A. (1984). Choices, values, and frames. *American psychologist*, 39(4), p.341.

residents were offered either no lottery, or told that one resident would win £1,000 if they registered before a certain date, or that one resident would win £5,000 if they registered before the same date. Both lotteries, irrespective of monetary value, made people register faster; 44.7% of the control group was registered by the deadline, compared to 46.2% and 46.7% in the lottery groups respectively.⁸

Evoked personal values and identity in messaging.

Behavioural research has shown that subtle linguistic cues invoking the self and identity can encourage behaviours by fostering the perception that a behaviour reflects an identity.⁹ For example, a study found that exposing children to the idea of "being a helper" (noun invoking the self) caused them to help significantly more across four tasks than children exposed to the idea of "helping" (verb condition).¹⁰ Messages

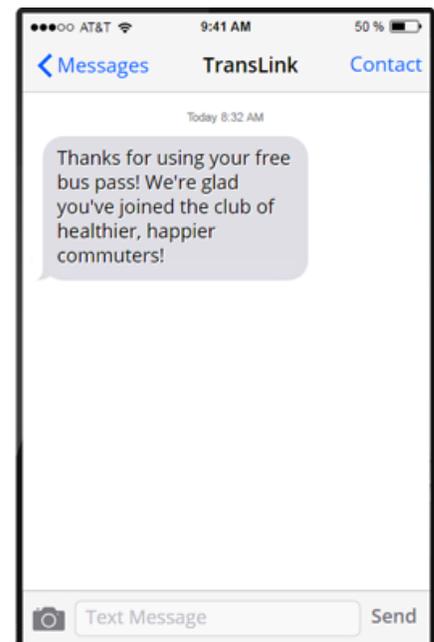
8 John, P., Macdonald, E., & Sanders, M. (2015). Targeting voter registration with incentives: A randomized controlled trial of a lottery in a London borough. *Electoral Studies*, 40, 170-175. doi:10.1016/j.electstud.2015.08.007

9 Bryan, C. J., Walton, G. M., Rogers, T., & Dweck, C. S. (2011). Motivating voter turnout by invoking the self. *Proceedings of the National Academy of Sciences*, 108(31), 12653-12656.

10 Bryan, C. J., Master, A., & Walton, G. M. (2014). "Helping" versus "being a helper": Invoking the self to increase helping in young children. *Child development*, 85(5), 1836-1842.

that frame riding public transportation as a way to affirm personal identities and values may resonate more and prompt increased ridership. [See *Text Message 3*] If riders in a target area care about their physical health, an effective strategy for encouraging ridership could be to highlight the health benefits of taking transit and frame the rider as "being a healthy commuter," for example.

Text Message 3:





Research also suggests that framing messages to highlight personal benefits, such as financial savings, can promote helpful actions, such as donating to charity and recycling—to the extent that these benefits align with the values and identity of the consumer. It is crucial to test messages framed in different ways to understand what works for a specific population. One study found that appeals for donations to a charitable organization differed in effectiveness for wealthier and less wealthy individuals depending on how they were framed. Participants were randomly assigned to view an appeal for a charitable organization that emphasized the pursuit of personal goals or the pursuit of shared goals. Wealthier individuals reported a greater willingness to give in response to appeals emphasizing individual action, whereas less wealthy individuals reported a greater willingness to give in response to appeals emphasizing collective action.¹¹

¹¹ Whillans, A.V., Caruso, E.M., Dunn, E.W. (Working Paper). *Both selfishness and generosity start with the self: How social class mindsets shape charitable giving.* University of British Columbia.

Increase salience of messaging.

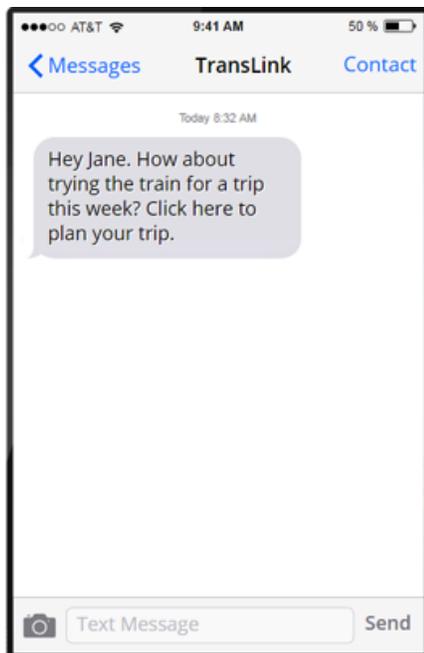
In our everyday lives, humans are bombarded with stimuli, messages, and signals. As a result, we consciously and subconsciously filter out much of that as a way to cope and focus our attention on things that are important. For messages to cut through all that noise and to matter to us, they must be salient; salience can come in many forms from a message in flashing lights to a simple snappy slogan. Work done by BIT indicates that personalized messages tend to attract our attention. For example, simply adding someone's name to an otherwise generic text message increased the amount of money paid in a BIT trial conducted with the UK Courts Service.¹² In the context of public transportation, people may be more likely to increase their ridership if they receive personalized messaging, materials, or prompts. Combining this personalization with our knowledge that the timing of messages makes a significant difference in their reception, texts or emails could be

¹² Insights, B. (2014). *EAST: Four Simple Ways to Apply Behavioural Insights.* London: Behavioural Insights.

Box 5: SOCIAL NORMS IMPACT ON ENVIRONMENTAL CONSERVATION IN HOTELS

One of the most widely cited studies in the field of employing social norms to motivate behaviour change looked at the effectiveness of signs requesting that hotel guests participate in an environmental conservation program. Signs describing that the “majority of guests reuse their towels” were more effective than the more traditional appeal hotels use that focuses solely on environmental protection. Even more effective than the descriptive norm above was a sign even more specific to the sign reader: “the majority of guests in this room reuse their towels”.¹⁵

Text Message 4:



sent to potential riders at opportune moments and be personalized to attract more attention. For example, if Sunday evenings are a time period when many people are planning logistics for the week ahead, that may be an opportune time to send a “nudge” encouraging people to try public transit in the week ahead. [See Text Message 4] If there was a day with extra congested traffic around specific lines, a message could be sent that evening to the relevant population encouraging them to avoid traffic by taking public transit.

Invoking **social norms** - informing people of the true proportion of people doing a specific behaviour - is a strategy that has proven effective in a variety of contexts, especially when the expectation about the norm is different from reality. BIT has conducted multiple trials that use social norms to increase tax payment rates, for example, and others have used similar messages

to reduce overall energy usage and increase seatbelt usage, among other examples.^{13,14} It has not been widely tested in the public transportation sphere, but there is potential to encourage people to use public transportation by making them aware of the habits of their fellow city residents. In past studies, social norm messaging has been shown to be the most effective when it is as specific to the recipient’s social groups as possible. [See Box 5].¹⁵ There are several ways to design social norm messages to try to target specific social groups. Messages could go out to people in a neighbourhood, postal code, or specific region saying “X% of the people in your neighbourhood took the train to work today.” Messages could target employees at a specific

¹³ Hallsworth, M., List, J.A., Metcalfe, R.D. & Vlaev, I. (2014). *The behaviouralist as tax collector*. NBER Working Paper no. 20007.

¹⁴ Allcott, H. (2011). *Social Norms and Energy Conservation*. *Journal of Public Economics*, 95(9-10), 1082-1095. Ayers, I. (2009). *Evidence from two large field experiments that peer comparison feedback can reduce residential energy usage*. Working Paper No. 15386. Cooney, K. (2011). *Evaluation Report: Opower SMUD Pilot, Year 2*.

¹⁵ Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). *A room with a viewpoint: Using social norms to motivate environmental conservation in hotels*. *Journal of consumer Research*, 35(3), 472-482.

company, people associated with a specific school, participants in a social media network, or other contextually-specific social identities.

The content of the message is not the only thing that matters; our reaction to messages is often influenced by the messenger delivering it. There is strong evidence that the persuasive impact of close personal relationships on behaviour can be used to deliver messages that seek to reduce criminal activity.¹⁶ People often respond better to a more specific descriptive norm, meaning a norm of a group they identify more closely with. Testimonials on the benefits of public transportation could be delivered to groups by frequent public transit riders who the population will identify with. Testimonials could also help dispel any negative perceptions around public transportation, for example by targeting populations who think no one in their social groups use public transit.

¹⁶ Sampson and Laub (1993). *Crime in the making: Pathways and turning points through life*. Cambridge, Mass: Harvard University Press.

Help people commit to a plan.

One of the potential barriers to public transportation usage is that it requires some advance planning. Unlike a car, where you can just get in and drive somewhere, public transportation may require knowledge of station location, arrival schedules, fares, and service disruptions. For those who do not use public transportation frequently, this planning may serve as a major psychological impediment. In behavioural science, it has been shown that **implementation intentions** (concrete, specific plans that address potential barriers one is likely to encounter and how to overcome them)¹⁷ are an effective way to achieve behaviour change. [See Box 6]

People could be prompted to use online trip planners to plan specific journeys on public transit (e.g. the commute to and from work) and to think about potential challenges, such as a longer than expected wait at the bus stop. For some trips, users could be prompted to think about other aspects of planning beyond the transit trip, such as when to leave the house to arrive at the bus stop on time.

¹⁷ Locke, E. A., & Latham, G. P. (2002). *Building a practically useful theory of goal setting and task motivation: A 35-year odyssey*. *American psychologist*, 57(9), 705.

Box 6: USING IMPLEMENTATION INTENTIONS TO INCREASE VACCINATION RATES

A study of one large employer that offered free on-site clinics with influenza vaccinations to its employees explored the effect of implementation intentions on vaccination rates. All employees received reminder mailings with times and locations of the relevant vaccination clinics. Mailings to the treatment groups additionally included a prompt to write down either (1) the date the employee planned to be vaccinated, or (2) the date and time the employee planned to be vaccinated. Among control condition employees (who received the regular reminder mailings), 33.1% were vaccinated. The prompt to write down the date led to a 1.5 percentage point increase in vaccination rate, and those who received the more specific prompt to write down the date and time had a 4.2 percentage point higher vaccination rate compared to the control group.¹⁸

¹⁸ Milkman, K., Beshears, J., Choi, J., Laibson, D., & Madrian, B. (2011). *Using implementation intentions prompts to enhance influenza vaccination rates*. *Proceedings Of The National Academy Of Sciences*, 108(26), 10415-10420. Retrieved from <http://www.pnas.org/content/108/26/10415.abstract>

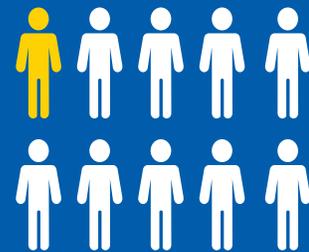
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USE IT WELL

When an activity feels pleasant or positive, people are more likely to engage in that behaviour in the future, thus creating a feedback loop and forming self-reinforcing habits.

12%

of Metro Vancouver population currently use public transportation frequently, but are interested in using it more¹



THIS TARGET GROUP
USES PUBLIC TRANSIT AN
AVERAGE OF

4-5

 DAYS PER WEEK

100%

of this group said they would **DEFINITELY** consider using transit more often.

Use it Well

The population of people who currently use public transportation quite frequently, but are interested in using it more, presents an opportunity because they are likely to be very responsive to small nudges and may become ambassadors for more frequent use in their community. Indeed, social and cultural norms of our peers can have a powerful effect on our behaviours. If members of a community feel public transportation is only for those who have no other means of getting around, for example, this may set out an implicit norm that anyone who can afford other transportation means should avoid public transit. Alongside broader community norms, behaviours within a social network have also been shown to be “contagious,” for example in the realm of obesity. Not only does your weight affect your friends’ weight, it also affects the friends of your friends.¹ People who are already frequent public transit users can serve an important role in making the usage of public transportation a more positive social norm in their networks and communities by being more visible users.

As they are already frequent users, there is a limit to how much more they can use public transit, but small and

inexpensive nudges could lead to increased enjoyment and satisfaction with public transportation, as well as some associated increases in ridership overall within this group. Indeed, improving people’s perceptions of the commute experience is good for all types of users. When an activity feels pleasant or positive, people are more likely to engage in that behaviour in the future, thus creating a feedback loop and forming self-reinforcing habits.^{2,3}

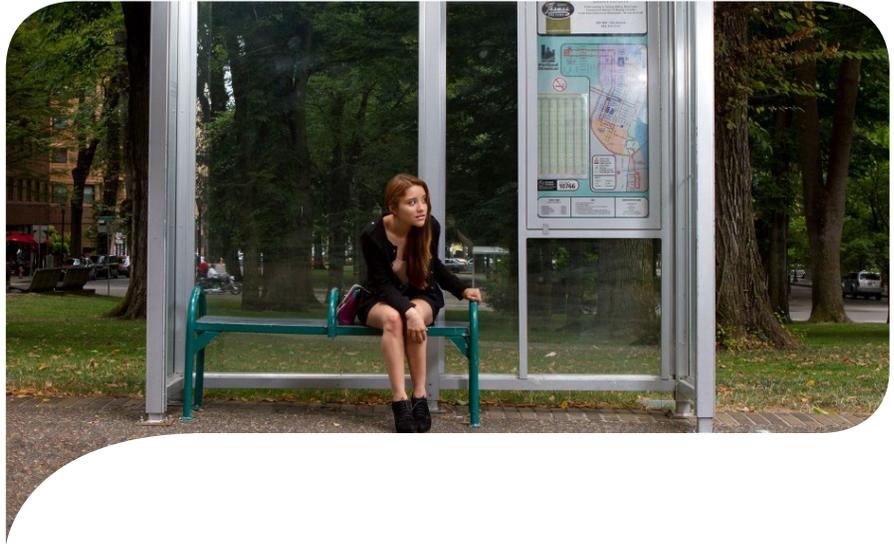
In the case of Metro Vancouver, 12% of the population falls into this target group, according to market research released in December 2014.⁴ The current frequency of public transit usage in this group averages 4-5 days per week. Everyone in this group said they would “definitely” consider using transit more often. Current positive associations with public transportation are: convenience, affordability, not worrying about parking and driving, and the environmentally friendly nature of this mode of transport. The main deterrents are that it is time-consuming and that it can cause personal discomfort when it is crowded or when one is carrying a parcel.

¹ Christakis and Fowler (2007). *The Spread of Obesity in a Large Social Network over 32 Years*. *New England Journal of Medicine* 257: 370-379.

² Seligman, M. E., Steen, T. A., Park, N., & Peterson, C. (2005). *Positive psychology progress: empirical validation of interventions*. *American psychologist*, 60(5), 410.

³ Aknin, L. B., Dunn, E. W., & Norton, M. I. (2012). *Happiness runs in a circular motion: Evidence for a positive feedback loop between prosocial spending and happiness*. *Journal of Happiness Studies*, 13, 347-355.

⁴ Mustel Group Market Research. (2014, December). *TravelSmart Mobility Management Near Markets Research*. Retrieved from TransLink.



Behavioural solutions to using it well:

This population already uses public transportation frequently, so there are likely fewer psychological barriers affecting the transit choice. However, there may still be behavioural reasons that this group uses public transportation only 4-5 days per week rather than every day. Furthermore, this group still has potential to enjoy the public transportation experience more, so this section will focus on ideas for how these users can enjoy public transportation more.

Make the ride social.

Our social networks have a powerful influence over our behaviour. Survey research suggests that people who report socializing more on their commutes also report feeling more enthusiastic and relaxed during their commutes and feel more positive about their commute when asked to reflect on their experiences.^{5,6,7} In order to help people enjoy their ride more, as well as incentivizing public transportation usage spreading through social networks, public transit agencies could implement programs making riding public transit a more social experience, including:

- Referral programs, such as offering free rides in exchange for getting a friend to sign up for a public transit card or to take a ride.
- Incentives for people to send a free voucher (could be virtually) to a friend to let them know about the public transit experience and encourage them to try it.
- Creating programs to encourage more interaction between commuters (e.g. “conversation car”). In a recent study, people who were stopped at the train station and who were randomly assigned to talk to a stranger during their commute reported greater happiness with their commute and greater end of day happiness as compared to a control condition.⁸

5 Ettema, D., Friman, M., Gärling, T., Olsson, L. E., & Fujii, S. (2012). How in-vehicle activities affect work commuters' satisfaction with public transport. *Journal of Transport Geography*, 24, 215-222.

6 Morris, E. A., & Guerra, E. (2015). Mood and mode: does how we travel affect how we feel?. *Transportation*, 42(1), 25-43.

7 Keseru, I., Bulckaen, J., Macharis, C., Minnen, J., Glorieux, I., & Pieter, T. Is travel time wasted? Evidence from a time use survey in Flanders, Belgium.

8 Epley, N., & Schroeder, J. (2014). Mistakenly seeking solitude. *Journal of Experimental Psychology: General*, 143(5), 1980.

Redistribute demand using gamification.

One of the concerns of frequent users is the personal discomfort of overcrowding. Gamification or lottery-style incentives could help nudge this group of frequent riders to shift their usage to off-peak times and/or underutilized routes. [See Box 7] Public transport authorities often have data on peak usage, and can inform frequent users about alternative options. Timely messages that suggest leaving 10 minutes earlier or later may significantly impact overcrowding given that in many cases, an overcrowded bus is literally a matter of 10 minutes of behaviour change.⁹ If effective, this could have the dual benefit of improving their experience and improving the efficiency with which the public transit system is being used (potentially opening it up to more new riders).

⁹ Li, R., Rose, G., & Sarvi, M. (2006). Using automatic vehicle identification data to gain insight into travel time variability and its causes. *Transportation Research Record: Journal of the Transportation Research Board*, (1945), 24-32.

Box 7: SINGAPORE’S TRAVEL SMART REWARDS

Singapore’s Travel Smart program aims to reduce demand for peak hour travel and encourage the use of more sustainable modes of travel. Through this program, riders earn rewards points every time they take the train, and extra points if the trip is during off-peak commute hours. Points can be redeemed for money or a lottery for random prizes. The government has also partnered with several companies in Singapore to offer their employees extra rewards.¹⁰ These forward-looking, “smart” public transportation incentives could be a model for potential ways to “game-ify” and attract riders to a public transit system.

MONDAY - FRIDAY	BRONZE	SILVER	GOLD	PLATINUM
Before 6:15am <i>off-peak</i>	1x	1x	1x	1x
6:15 - 7:15am <i>decongesting</i>	3x	4x	5x	6x
7:15 - 8:45am <i>peak</i>	1x	1x	1x	1x
8:45 - 9:45am <i>decongesting</i>	3x	4x	5x	6x
After 9:45am <i>off-peak</i>	1x	1x	1x	1x

¹⁰ www.travelsmartrewards.sg/learn_more

Rethinking your commute.

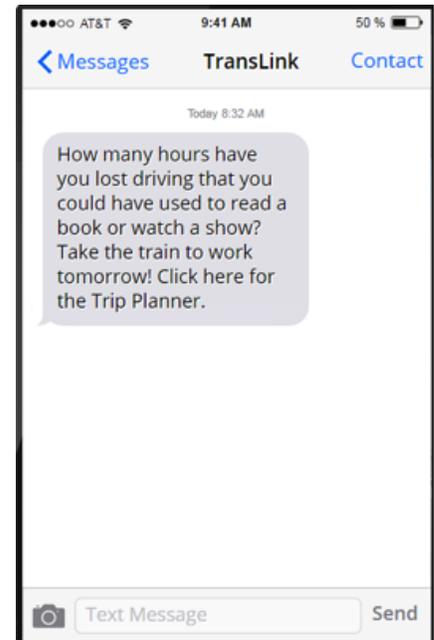
Driving is one of the most stressful forms of commuting.¹¹ In contrast, commuting by taking the bus or train are forms of transportation that are associated with reduced stress, increased well-being, and improved physical health. For example, in a 2011 study comparing almost 300 commuters travelling from their homes in Northern New Jersey to their jobs in New York City, people felt significantly less stressed after taking the train to work than after driving. These differences emerged in part because train travel required less mental and physical exertion and offered more predictability than driving.¹²

New research suggests that simple interventions can improve the satisfaction that people derive from their commutes. As part of a study from the Harvard Business School, researchers who were randomly assigned to think about what they were about to accomplish at work during their commutes reported significantly higher levels of job satisfaction and reduced fatigue over a 6 week study, as compared to a control condition.¹³ These findings point to the possibility that simple reframing strategies can be

leveraged to improve the commuting experience.

Concretely, any activity that changes people's perception that their travel to work has had benefits beyond simply getting from point A to point B is linked to greater commute satisfaction.¹⁴ Reminding commuters of the fact that their commute offers them free time that they could spend doing something else that they might not otherwise get a chance to do - such as learning a foreign language or socializing with a friend or colleague - increases the chance that people take transit. It might also improve their perception of their commute - both during the trip and when they are thinking about how to commute to an upcoming event - by reducing perceptions of **opportunity costs**, the idea that the commute is taking away precious time that people could otherwise spend doing something else.¹⁵ [See Text Message 5] By reframing the thinking around commuting time from wasted hours in the car to productive hours on public transportation that can be spent to pursue our interests, even transit trips that may take longer than the equivalent car trip may become the preferred option.

Text Message 5:



11 Legrain, A., Eluru, N., & El-Geneidy, A. M. (2015). Am stressed, must travel: The relationship between mode choice and commuting stress. *Transportation research part F: traffic psychology and behaviour*, 34, 141-151.

12 Wener, Richard E., and Gary W. Evans. "Comparing Stress of Car and Train Commuters." *Transportation Research Part F: Traffic Psychology and Behaviour* 14, no. 2 (2011): 111-16.

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CONCLUSION

This report outlined a new way to approach transportation demand management; one that centers on understanding and addressing the individual micro-behaviours or decisions that potential users make on a daily basis.

Map out behavioural touch points

to identify the points in the process where there are psychological or behavioural barriers keeping people from using public transit

Design an intervention

to ensure the solution is targeted at a specific behaviour and group of people

Test whether the intervention worked

to evaluate whether solutions are impactful and cost effective before scaling up

Conclusion

This report outlined a new way to approach transportation demand management; one that centers on understanding and addressing the individual micro-behaviours or decisions that potential users make on a daily basis. A behavioural approach to increasing and improving ridership follows a simple methodology:

- **Map out behavioural touch points** to identify the points in the process where there are psychological or behavioural barriers keeping people from using public transit
- **Design an intervention** to ensure the solution is targeted at a specific behaviour and group of people
- **Test whether the intervention worked** to evaluate whether solutions are impactful and cost effective before scaling up

The past decade has shown us that even simple tweaks or adjustments to existing programs can have significant impact on behaviour, in ways that require much smaller investments than equivalent supply-side changes. Not only can behavioural insights be an instrumental tool for TDM goals,

such as nudging people to switch to underutilized transportation modes and shifting ridership from peak to off-peak times, they can also help highlight when a nudge is not enough. That is, if a low-cost behavioural intervention can move some people to use the bus that would otherwise have taken the car, or shift some daily riders to off-peak times, the approach should free up resources to be spent on those bottlenecks that require significant investment—such as improving frequency or adding more stops to a route.

Ultimately, we argue that demand-side interventions are currently underused, despite their tremendous potential to deliver results quickly and economically. Maximizing their impact requires matching the “behavioural ask” to where users are today in their level of readiness. For low-frequency users, proposals focused on ways to nudge people toward trying public transportation again, overcoming bias toward the status quo and aversion to ambiguity. For mid-frequency users, nudges were targeted at making public transport a habit, in accordance with research that transportation is a

behaviour largely guided by habit.¹ The final section focused on the experience of high-frequency users, and how they can serve as “public transportation ambassadors” in their communities.

We are still at the very early stages of understanding how human psychology affects public transportation decisions. While this report provides many options for infusing a behavioural lens into TDM strategies, it is only through additional piloting and testing that we will be able to fully quantify what works and what works best. Our goal is to use this report as a catalyst for further discussion on how TDM, behavioural science, and rigorous evaluation can come together to meaningfully shape transportation options of the future.

¹ Møller, B., & Thøgersen, J. (2008). *Car use habits: an obstacle to the use of public transportation?*. In *Road Pricing, the Economy and the Environment* (pp. 301-313). Springer Berlin Heidelberg.

Glossary

Availability heuristic - a mental shortcut that relies on immediate examples that come to mind when making an evaluation or decision.

Status quo bias - the tendency to stick to the status quo course of action or avoid making a decision entirely. Diverting from the status quo seems riskier than sticking to the current situation.

Ambiguity aversion - the preference for known risks over unknown risks.

Halo effect - the tendency for an impression of one characteristic to influence opinion of other characteristics.

Cognitive load - the mental strain or effort being used in the working memory.

Optimism bias - the belief that “good things will happen to me, bad things to others.”

Power of defaults - because of our bias toward the status quo, we “go with the flow” of pre-set or default options.

Sunk-cost fallacy - people stick with projects that may no longer make sense because they have already invested non-recoverable costs. This is a form of commitment bias, where individuals make bad decisions in the present to justify decisions they made in the past.

Mental accounting - we mentally allocate money as sitting in different “mental budgets,” and we are reluctant to move money between these mental accounts.

Social norms - the common values, behaviours, and expectations of a particular group.

Implementation Intentions - concrete plans involving a specific situation to help people stick to our behaviour goals. Advance planning helps people respond to challenges “in the moment.”

Foot-in-the-door - compliance tactic, frequently used in the sales world, that involves getting a person to agree to a modest request in order to increase the chances that they will later agree to a larger request.

Loss aversion - people demand far more to give up an object they already possess than they would pay to acquire it. It shows how we are psychologically wired to prefer avoiding losses to acquiring similar gains.

Opportunity cost - the loss of value from potential alternatives when one alternative is chosen.

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