Practice-oriented Design for Lifestyle Change: Trialling as a Means of Enabling Transition

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Practice-oriented design for lifestyle change: Trialling as a means of enabling transition
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Brett Leber

A thesis submitted to the School of Design, Carnegie Mellon University, for the degree of Master of Design in Interaction Design

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Over time, our lifestyles accrete habits and become more rigid. Major life events tend to provide opportunities for reflection and change, but are infrequent. When looking at a problem like commuting — the health, environmental, and economic effects of the majority of commuters driving alone — we tend to see big yet difficult solutions: changes in infrastructure and policy (like more convenient bus routes, more separate bike paths, and more expensive gas), it is often argued, will convince us to try something else. But other ways of enabling lifestyle change are possible.

This thesis is an exploration of the potential for small-scale, design-enabled experimentation in daily life to lead to change — not only in incremental behaviors but in more significant practices (recognizable, routinized patterns of behavior, embodied in the things we do and say — ways of commuting, for instance). By drawing on social practice theory, recent work on practice-oriented design, and service design, I explored how trialling different ways of commuting can enable practice transition — from driving alone to biking, walking, carpooling, or taking public transit. The output of this work was two complementary service offerings, one of which I evaluated within the context of a local organization, as well as the furthering of a dialogue on what it means to perform practice-oriented design.
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Definition

BARriers

time
trail availability
traffic
weather (clothing)
lack of safe route
got to work sweaty/tired
Bike

gas/parking FREE!
PMA

warm up before work
environmentally sound decision

Mobility (avoid congested areas)

intensely aware of weather + daylight
full sensory experience - sounds, smells, tactile

exercise
cost effective

life
This project is about design for shifting behavior. But it is less about small-scale, incremental behavior change and more about the larger lifestyle changes that are hard to break into smaller pieces. For example, taking the bus to work when you are used to driving alone is a significant change that restructures your schedule as well as other areas of your life (what you can carry, how you dress for the weather, how you negotiate routine and breaks in routine). Further, there is not a version of taking the bus that resembles driving alone or incrementally modifies it. (You can of course drive some days and take the bus other days, but the unit of change—the transportation mode—is a fundamentally different practice.)

To design for this type of change, I focused on social practices and the process of trying out, or trialling, new ones. Social practice theory describes how the activity of individuals is made up of semi-conscious routine doings and sayings that are recognizable between individuals: taking the bus, applying makeup, cooking with fresh food, writing a thesis document — all are practices. From an understanding of practices, I followed an intuition that adopting different practices is more likely only after we have experienced them. Through low-risk, design-enabled experimentation in our daily lives, might we find new ways of living that work but were previously hidden to us?

My reason for focusing on behavior change generally and this type of change in particular is one of values. A growing body of research suggests that sustainability is tied to our consumption via lifestyles, and to make significant reductions to our resource consumption and carbon emissions, more of us need to adopt more sustainable lifestyles; doing slightly less or more of something we do already is in most cases not going to result in significant enough change. Activities involving trialling or experimenting are recognizable in the world today, from workplace energy-use challenges to personal living experiment blogs and dieting plans. But often there is little (designed) support for mediating the type of change happening, or there is an over-reliance on incentives or disincentives (a focus on extrinsic rather than intrinsic motivations).

To explore behavior change through trialling, I chose as my domain commuting to and from work, advocating a shift from driving alone to using active transportation (walking or biking), taking public transit, carpooling, or a combination of these. There are a number of environmental, economic, social, and health arguments for why driving less is important:

- in the United States, personal transportation use—driving cars, trucks, and SUVs for trips to and from work and other destinations—contributes about 20 percent of all greenhouse gas emissions (Perks & Raborn, 2013)

- AAA (2013) estimates the average annual cost of owning and operating a sedan at over $9,000, while a recent report estimates that the cost of sitting in traffic (in gas and lost productivity) is $1 billion per year for Pittsburgh alone (WESA. fm, 2013)

- a 2013 study examining the health effects of commuting mode found that cyclists were about 50 percent less likely to have diabetes compared to drivers, while people who walked to work were 40 percent less likely to have diabetes and 17 percent less likely to have high blood pressure compared to those who took their cars (CBS News, 2013)
But there are other reasons for why focusing on commuting practices was useful in the context of this project. It was worth exploring to what extent we commute the way we do because of habit or routine, and how we might break out of these routines and into new ones. While the existing infrastructure and policies surrounding transportation do encourage a kind of “lock-in” that privileges driving (here in Pittsburgh but in many other places as well), a focus on practices reveals that these factors are also accompanied by social and cultural concerns, the meanings we derive from commuting a particular way, the skills we have or do not have in relation to commuting, social influences at work and at home, and the objects in our everyday life. For instance, we might eschew biking to work because of cost, distance, and lack of cycling infrastructure, but other factors include the routines we have developed in relation to the car; the normality we perceive in arriving at work as others do; a lack of practical skill for biking on the road; or not knowing how to deal with hygiene as a result of biking for transportation. We might need more information, but we equally (if not more) need to negotiate these concerns by developing bodily skills and experience.

In addition to behavior change for lower-carbon transportation practices, this thesis is also about the role of design practice in relation to trialling change. What are the design methods and approaches that are most effective for doing this kind of work? How must the designer operate differently when taking a practice-oriented approach? If attempting to do this work in a way that involves local organizations and people outside of academia, how is the design process re-shaped? This project also provides insight into responding to these questions.

A note on personal experience as research
There is a risk in designing for oneself, but there is also a risk in ignoring personal experience while researching or designing. I did not design for myself, but I did draw on my experience as a multi-modal commuter in Pittsburgh throughout this project.

Transportation behavior change is a complex topic, with many factors influencing our daily experiences; each person has different constraints, goals, and sociocultural factors affecting what they do. Nonetheless, I gained insight by using my own experience as a source of data, experimenting with carpooling, taking the bus, walking, and biking. There was likely nothing prototypical about my experiences, but pain points and positive experiences served as windows into more universal experiences when trying to change how we commute.
Goals and Scope

I proposed the following goals for this thesis:

1. Define a practice-oriented approach to behavior change (a methodology), informed by a thorough literature and precedent review. What are the tenets of this unique approach and how do they relate to design?

2. Situate the research and “solutions” I generate in Pittsburgh and existing local communities. The resulting work should be useful to Pittsburgh and similar cities, and make sense given existing organizations working in this space (promoting sustainable personal transportation).

3. Discover appropriate design methods for enabling trialling in everyday life. Do they resemble existing methods in co-design or service design?

4. Conduct a study that involves participants trialling different ways of commuting. Can this approach live outside of a research project? Would it work in other domains? How effective might it be at moving commuters who typically drive alone to use less carbon intensive alternatives?

Given these goals, some aspects of behavior change for transportation were outside the scope of this project. I focused on the value of experimenting in everyday life as a change device for encouraging more sustainable ways of commuting in a city like Pittsburgh, given its current infrastructure and characteristics (e.g., limited bike lanes, uneven bus coverage, variable weather, and varied topography). Better transportation infrastructure and urban design, while critical components for encouraging active transportation, were outside of this scope.

I also limited my target audience to adults with some interest in driving less and the means to do so. I did not attempt to change attitudes or values directly, and instead chose to build on existing ones. To some extent, I was relatively agnostic of values—whether someone was interested in biking, for instance, for reasons of cost, health, or environment was not of much concern. Attitudes may have changed in the course of participating (for instance, from an attitude of concern about riding a bike to work to one of appreciation) but they were not approached head on.
Project Timeline

Fall 2012
Began background reading

Spring 2013
Thesis proposal, faculating meetings, parking permit review

Jun 2012
SCORAI Conference, Interviews with cyclists and bus riders, initial conversation with BikePGH, started designing for trialling study

Begun meeting with E Liberty company as potential site for study; distributed survey to employees

Jul 2013
Survey distributed to CSC staff

Aug 2014
Collected flyers at company

Sep 2013
Started designing study materials and activities

Oct 2013
Opening workshop; study begins

Nov 2013
Closing workshop; study ends

Dec 2013
Begun concept generation

Jan 2014
Met with CSC leadership

Feb 2014
Began design

Mar 2014
Experience/service prototyping

Apr 2014
Buddy service design

May 2014
Interviews for buddy service design

Poster session

This document is printed
The process I used for this project appears to differ somewhat from that used in the traditional master of design thesis project at Carnegie Mellon:

Common Thesis Process

Students typically sample methods from each of these three main phases — exploratory, generative, and evaluative. Additional phases typically include an early literature review; concept generation and (quick) evaluation preceding the evaluative phase; and a potentially a longer designing phase before or after evaluation.

My Thesis Process

I chose to skip the generative/co-design phase and instead went into designing materials for study. At the conclusion of the study, I went back to a more generative phase (informed by the study and new exploratory research), where I prototyped a service experience.

One reason for the early designing and study phase is that I was inspired by some early readings to focus on the idea of trialling with commuting practices. If I was going to have participants try out different ways of commuting like biking or taking the bus, I wanted to make sure they could do that when the weather was still conducive to these activities. This necessitated a study in the Summer or Fall, as waiting until it warmed up in the Spring would have left me little time to respond to what I learned.

My literature review (covered in detail in the next section) began with a focus on practice theory, automobility (the dominant form of mobility that is based on car travel), behavior change, and experiments in daily life. One text in particular detailed a study that combined a focus on practice theory with experimentation in bathing practices (Scott, Bakker, & Quist, 2012), and gave me a starting point for thinking about trialling different ways of commuting. Another article that was critical of a focus on persuasion common to many design and HCI projects around pro-environmental
behavior (Brynjarsdottir, Håkansson, Pierce, Baumer, DiSalvo, & Sengers, 2012) helped me distinguish my approach and served as a corrective throughout the project. An on-going survey of precedents also informed my work.

By June 2013, I had started exploratory research. In addition to reading, I began interviewing regular bike-commuters and bus-riders to get a sense for how they transitioned to driving less. At this point, I had assumed that I would recruit and work with Carnegie Mellon participants from across the university who would experiment with biking, carpooling, taking the bus, or walking, but a meeting with BikePGH, the local bike advocacy group, revealed a new opportunity: doing my study within the context of a local organization.

BikePGH was embarking on a similar project that involved engaging with local companies. Building on their successful Car Free Fridays program, BikePGH was planning to pilot a project that would enable a local organization to engage their employees to try alternatives to driving alone. After discussing my project with me, BikePGH offered to let me use my design-study approach with their organizations. Thus began a parallel process of designing materials and process for a study, reviewing related work, and engaging a local East Liberty organization. This initial engagement would falter in the early stages, leading me to propose my project to the Carnegie Science Center, another BikePGH contact.

With September coming to a close and the weather starting to become cooler, there was little time for delaying the study. I finalized the materials I had been preparing and began working with Science Center staff to engage employees. This engagement and successful study would take me through mid-November and into the December poster session.

I mention this part of the process and the months involved to give a sense for the time required to do this type of work (design research where successful recruiting is not a given) with local organizations. Had I opted to do the study at CMU, I could have started as soon as my materials were ready. Instead, I was engaging one company in September and another in October. In hindsight, this gamble was well worth the risk — I built relationships with local organizations and situated my research in a real organization/workplace — but at the time it was unclear whether I would succeed in doing a study resembling the one I proposed.

In the Spring semester, I reevaluated my work in the context of some local initiatives, but was hesitant to engage with local organizations further given limited time. I was also unsure of whether the research I had done was a solution unto itself or grist for further designing. After generating a variety of design ideas, I decided explore a related service concept, a commute buddy service. This necessitated further exploratory research, followed by service prototyping.

My process was at times non-linear, looping back to exploratory methods, and often necessitated doing design and outreach work in parallel. This approach somewhat problematizes the boundaries of phases within an exploratory-generative-evaluative process (Hannington, 2007). I believe this is an important distinction between design research isolated from organizational practice and a more social-innovation-oriented approach that places student research within the context of an organization. While it is possible that the non-linearity may be unique to my exploring two related design concepts, the extra time required to work with existing organizations is likely not. This additional work and occasional uncertainty, however, was well worth the effort.
Behavior Change or Practice Transition?

Broadly speaking, two ways to effect sustainable change in the realm of personal mobility are through technological change (e.g., more fuel-efficient personal vehicles) that take current behavior as a constant, and efforts to influence human behavior (e.g., encouraging shifts in how people get to work). As a change mechanism, technological improvements in efficiency have been criticized as susceptible to undesirable outcomes through the rebound effect (where gains in efficiency in one area are offset by a user’s less efficient behavior elsewhere), unintended behavior change, and product misuse (Scott et al., 2012).

Under the umbrella of design for behavior change, a variety of research threads exist—economic incentives, design scripts, affordances, and persuasive technology, to name a few (Jelsma & Knot, 2002; Fogg, 2003). Yet each of these approaches, to varying extents, is an effort to co-opt users into a certain type of behavior change, often without a concomitant change in attitudes or values. Persuasive technology is perhaps the exception, defined as “an attempt to change attitudes or behavior (or both)” (Fogg, 2003). But as Brynjarsdottir et al. (2012) argue, persuasion via technology is a limited way of understanding behavior change and sustainability: it reduces sustainability to small, incremental, measurable actions; it is instantiated in products that often attempt to persuade with information (assuming a rational actor model of human behavior); and it is often “too distant from lived use” (p 952) in that it does not account for the particularities of everyday life.

Another approach to behavior change, articulated in Scott, Bakker, and Quist (2012), builds on concepts of social practice, co-design, and co-creation. In this framework, participants work with designers to reevaluate existing practices and experiment with new ones. Their evaluations of new technology and behavior are wholly conscious and explicit.

Scott et al. cogently change the terms of design for sustainability from “designing for behavior change” to “practice-oriented design” by reviewing theories of practice and showing how they apply to design.

Simply speaking, practice-oriented design means shifting the focus from products to practices; not cars, but commuting; not microwaves, but cooking; not beds, but sleeping; not showerheads, but bathing. This approach prioritizes ordinary, routine consumption and the roles of conventions, habits, and conceptions of normality in shaping resource intensive behaviors over efforts to make individual technologies or behaviors more efficient. (p. 283)

This framing also puts consumption at the forefront. Moreover, consumption is not just of goods and resources directly, but through our participation in practices that fulfill needs and desires: we do not just consume water, we bathe a particular way. Therefore, an important way to consume less is to adopt more sustainable practices in our daily life.

As different versions of “practice theory” exist, various definitions of practices exist as well, but a simple definition is that a practice is a recognizable, routinized pattern of behavior, embodied in the things we do and say. Riding a bike for transportation is a practice in that it is recognizable (there is such a thing as riding a bike for transportation and we can identify it); it is routinized (at some level you just do it without consciously evaluating how it is done); and it is embodied in doings and sayings (how to do it, how we talk about it, etc.).
Other aspects of practices are important as well, such as the fact that they are inherently social even though they are performed by individuals in unique ways — practices are learned from others, and norms emerge and evolve (Scott et al., p. 281); and practices change over time.

More theoretical definitions of practice exist, but a simple schematic is offered by Shove, Watson, Ingram, and Hand (2008) (illustrated at right). The account given by Warde (2005) is also helpful as a primer.

Scott et al. advocate practices as a fundamental unit of design — a practice-oriented design — in which designers play an active role in helping innovation in practice occur. In their study of bathing practices, they draw from co-design by using designerly interventions to assist a group of people in exploring bathing as a practice — how it is done, what it means, how it feels, what kinds of products and resources are used. In the study I conducted on commuting practices in the Fall of 2013, I drew heavily on the methodology described in this paper, including the idea of experiments in practice. Some notable differences, however, include my hesitance to discuss practice-theoretical terms (like the elements of the model at right) with participants, and my de-emphasizing co-design (for innovating novel practices) and instead focusing on adapting existing commuting practices into daily life.

Experiments, Trialling, and Living Labs

Scott et al. also introduce the notion of “living labs” by reference to their parent project, the EU Living Lab project. The concept of a living lab is useful for understanding what it might mean to experiment in everyday life.

**What is a practice?**

Based on the practice theory of Shove et al. (2008)

**The practice of biking for transportation**

bikes, roads and infrastructure, cars (parked and moving), accessories, other cyclists, maps, bike tools, bike shops, clothing, buses, racks on buses

biking is healthy, staying dry is preferable, identifying with other cyclists is nice, too much biking tires the muscles, driving is more prevalent than biking, sweating is sometimes a result of cycling and needs to be managed

balancing, steering and turning, navigating, planning, signalling, maintaining the bike, using bike locks and racks, positioning on the road or trail, knowledge of own skill, preferences for routes

links between elements are continually made or broken through performance

skill

meaning

stuff
A living lab is “an experiential environment where users are immersed in a creative social space for designing and experiencing their own future” (McPhee, Westerlund, & Leminen, 2012). The degree to which users are in a “creative, social space” or “designing their own future” varies to the extent co-design is employed by the living lab’s organizers.

Some living labs are large, coordinated research efforts that aim to discover product and service innovations by having participants live with those products or services. The EU Living Lab project, which combined modular test homes with living lab projects, was an example of such an effort. But small-scale design projects can also use this model.

In the case of Scott et al., two notable differences from more typical living labs were that (1) the researchers had no access to individual’s homes, but were able to learn through participant journalling activities and workshops; and (2) the “innovation” that participants were living with was neither a product nor a service but a bathing practice that they defined. Nonetheless, the notion of the “living lab” is a useful way of thinking about what it means to experiment.

A related concept is that of the “sustainable living experiment” (Marres, 2012), which is an individual’s attempt to trial living differently and meticulously record the process and results. This type of experimentation is done for personal learning (and sometimes publicity), but the parallels with living labs are evident. The description of an experiment in living as “undertak[ing] the modification of habits and habitats according to a fixed procedure ... a way of implementing changes in everyday routines and living spaces according to a protocol” (p. 4) is quite similar to (though more rigid than) the experimentation by participants in Scott et al.’s study, and a concept that resonated with me as I defined my approach.

**Mobility**

Sociological and philosophical accounts of (auto)mobility (Featherstone, 2004; Urry, 2004; Bergmann & Sager, 2008), driving (Dant, 2004; Thrift, 2004), and biking (Ilundáin-Agurruza & Austin, 2010) helped me gain a better conceptual understanding of these systems and practices — how they work in society, what they feel like, what they do for us, how some forms are dominant, how they might exist in the future, how they structure our notions of space and time. When designing the trialling study, these texts aided me in thinking through prompts for participants.

Less conceptual than the above, WWF’s One Planet Mobility report (2008) provides the context for why mobility is a growing concern for a planet with finite limits, and how efficiency gains are being outstripped by increasing demand. While there is a call for better infrastructure, there is also an understanding that behavior change alone is valuable.

**Transportation Demand Management**

Also known as “mobility management”, transportation demand management (or TDM) is both “a program of information, encouragement and incentives provided by local or regional organizations to help people know about and use all their transportation options to optimize all modes in the system” — in other words, efforts to decrease the number of people driving alone — and a philosophy behind “designing our transportation and physical infrastructure so that alternatives to driving are naturally encouraged” (Mobility Lab, 2013).

As shown in the above definition, TDM often relies on “information, encouragement, and incentives” to stimulate change. While information may be necessary to inform travel decisions (like a bus timetable), there are a number of critiques of the use of information and incentives to encourage behavior change. In a review
of consumer behavior models, Jackson (2005) argues that more information as a behavior change strategy is likely to be ineffective; habit, automaticity, emotion, and social factors all interfere with the “rational choice model” of human behavior. Incentives as a change mechanism are also subject to critique. In *Why We Do What We Do*, Edward Deci (1995) describes how incentives (a form of extrinsic motivation) can erode intrinsic motivation (wanting to do something for the experience of doing it itself) over time; remove the incentive, and the desire to do the behavior disappears as well — even if it was present before the incentive was added.

These critiques aside, successful TDM work is useful to review as it is essentially the corrolary to my project for how transportation behavior change is currently practiced at a city or regional level.

One type of TDM strategy more relevant to this thesis is individualized marketing, or marketing on an individual basis. For the Whatcom Smart Trips organization in Bellingham, Washington, this approach means “People in a targeted area are contacted at home and engaged in their own educational process, with the result being that they discover their own internal motivations for walking, bicycling and riding transit” (2012). In 2008, Whatcom Smart Trips carried out their individualized marketing campaign. Notably, only those who responded that they were interested in learning more received more attention. The result of this individualized marketing approach was double-digit increases in walking, biking, and bus trips, and a double-digit decrease in vehicle trips, through essentially encouragement alone.

By similarly working with interested (motivated) individuals but focusing on the trialling of different ways of commuting, I hoped to effect transitions in practices.
Exploratory Research
Semi-Structured Qualitative Interviews

In early interviews, I talked with people who regularly used active transportation for commuting. My focus was both on how these people currently commute and how they transitioned to relying primarily on active transportation. I interviewed 5 people who regularly rely on public transportation, walking, biking, or a combination of these modes. I learned that:

- **Most learned to take the bus, bike, or combine the two in their commute by doing it with someone else.** Transitioning to using these modes was not the result of spontaneous personal trialling, but a consequence of conversations with peers. For bus riders, public transportation served as a common space where they talked to other riders, some of whom were cyclists who were using the bus as part of their commute, and discussed experiences of biking or made plans to ride together. From these conversations, they learned that cycling was a viable option, and that there were some tips for doing it successfully.

- **All acquired skills and routines for dealing with weather, clothing, and hygiene.** The new constraints of active transportation, and the skills and routines adopted to deal with them, are very different from those required for driving. The weather becomes a factor, as does exertion, nutrition, and hygiene. Each respondent had developed ways of dealing with these challenges—for instance, leaving work clothes at work, freshening up at work without taking a full shower, or waiting for heavy rain to pass.

- **Most bike or bus some of the time, and drive when necessary.** Most people I spoke to used a car they owned when it was especially useful, and varied between biking, taking the bus, or combining the two.

- **Being multi-modal is an advantage: take the bus or be a pedestrian with a bike.** As opposed to considering multi-modal transportation as an inconvenience, respondents viewed this as an advantage. They could take the bus if something went wrong with the bike or the weather changed, or act like a pedestrian with their bike when road conditions were hazardous. If something went wrong with the bus, they would simply wait for another bus. Being without a car was described as advantageous.

- **Motivations vary, but almost all find rewards intrinsic to the activity.** Respondents talked about the intrinsic enjoyment they got from cycling, and how walking feels great and provides time for reflection.

It would later occur to me that what I had been learning from these respondents could be the basis for a communication design that revealed aspects of what these commuters think about and do. I would make what I called “personality cards”, combining portrait photographs, edited interview snippets, and commute details on print cards.
Talks with advocates

Early in my process, I also talked with local advocates for biking (Bike Pittsburgh), alternative transportation (CommuteInfo). As mentioned in the process overview, my conversations with Bike Pittsburgh were pivotal to my project, shifting my focus from an on-campus study to an in-situ “program” at a local organization. By talking with Bike Pittsburgh, I was compelled to articulate the approach and process I had been considering — the idea of a study (or “program”) in which interested commuters, guided by a workshop and designed artifacts, would try different ways of commuting over the course of a few weeks.

These early conversations also revealed a larger transportation community to me, including transportation management associations (TMAs), the field of transportation demand management, and other local organizations.

CommuteInfo is an organization that promotes and enables commuters to use alternatives to driving alone. A program of the Southwestern Pennsylvania Commission (SPC), CommuteInfo provides resources and support to individuals and organizations in the 10-county SPC region. Their main product/service is the “commuting options report”, used to enable ride-sharing, discussed in the following section. While I did not partner with CommuteInfo, I referenced their work frequently throughout my project.
CMU Parking Permit Analysis

Early in the project, I made an assumption that not only are there people who want to be more sustainable but are not, but that there are people who want to carpool, walk, bus, or bike to work, have the means to do so, but currently driving alone. For walking, biking, and bus-riding, I wondered about distance to work in particular. Are there really people who drive regularly but live nearby? It seemed likely but I did not know.

After talking with the parking and transportation director at Carnegie Mellon, I was able to obtain parking permit data for the University in the form of an anonymous list of zip codes, one per permit holder. From this list, I found the number of occurrences per zip code. I then used Google to translate each zip code to a neighborhood or township name and find an approximate distance to campus. Of 1,980 permits, of the 75 most common zip codes, 565 permit holders (29%) lived within approximately 5 miles of campus; 433 (22%) were within 4 miles; 339 (17%) were within 3 miles; and 272 (14%) were within 2 miles. This was both encouraging and depressing! While the data did not speak to attitudes (would they consider not driving?) or entirely of means (could they ride a bike, walk, or find a carpool partner? They do have university-provided bus passes.), it did reveal that many are within an eminently bike-able distance: 5 miles at 10 mph is a 30-minute bike ride.

While distance is obviously not the only factor affecting bike-ability — there are myriad reasons why biking even 3 miles in Pittsburgh is a challenge, not the least of which is topography, ability, confidence, or lack of traffic-separated bike lanes — distance is an obvious barrier. To know that many commuters lived nearby was encouraging from the point of view of behavior change.

I initially found it surprising that hundreds of parking permit holders lived within a few miles of campus yet were not likely taking the bus, walking, or biking (I did not request data on carpooling); but in addition to the barriers just listed, I needed to consider the car culture in Pittsburgh, historically underfunded cycling and transit infrastructure, and social factors like the normality of driving. (A brief practice-theoretical account of all of these modes of commuting would reveal many other differences that complicate the idea of these modes as interchangeable ways of getting around.)
Commutes 84 miles by bike.

How is it riding the bus with a bike?
People have asked me about the bike racks on the bus— is it easy to get your bike on and off? Yes it is, really. I used to worry about my bike escaping from the rack but one time the driver did have to do an emergency step and my bike was just fine. Thankfully.

What's the biggest benefit of biking?
It helps me cope with being indoors! If I've not enough exercise in the morning, I don't spend the rest of the day inside. I'm not restless. And cycling is fun.
Commuter Science

Today I commuted by...
Introduction

To conduct a study that involves participants trialling different ways of commuting entailed designing both the recruitment and audience, and the study process, communication, and materials. These two threads would inform one another and occur somewhat in parallel. To conduct the study off-campus in a real organization, I changed my study location (and audience) twice. This chapter details that process in the hopes that it will be useful to other students who are interested in doing similar work.

Based on my literature review, I established some guiding principles for this work.

The study would structure support for participants in the form of four key elements.

The study would involve a group of people all experimenting with different ways of commuting on a similar schedule. It would likely be book-ended by workshops. Questions of duration and audience were still very much open.

To successfully run the study I was envisioning, I needed to cover:

- **Recruitment**
  - Audience
  - Plan
  - Materials (flyers, emails)
  - Compensation
  - IRB

- **Study process**
  - Duration and timing
  - Sensitizing participants to experimenting
  - Workshops
  - Method for documenting what happens

- **Tool(s) for enabling experimentation**
  - Either something I created for use during the study or something that would be co-designed toward the end
  - A way to coordinate multiple people experimenting over time
  - Way to provide requisite skills for commuting an unfamiliar way

**Guiding Principles**

1. Be open and explicit about motives; do not co-opt participants into a certain type of behavior change.
2. Work with motivated people — persuading unmotivated people through information is unlikely to be effective.
3. Support interaction between people trying to change commuting practices over time.
4. Mix reflection and sensitization with trialling different modes.
5. Advocate a type of change that is desirable (biking, walking, transit, and carpooling).

**Key Elements Afforded by Study Experience**

- **community of peer experimenters**
- **reflection space** for examining current and alternative practices
- **method** for trialling change
- **push** to try alternatives
Recruitment

I began with determining an audience for the study and designing the recruitment materials. I initially assumed a local CMU recruitment pool, hoping this would simplify IRB requirements and recruiting. More specifically, my audience was:

- **Adults (over 18 years of age)**: IRB considerations make it simpler to work with adults
- **Current drivers**: I wanted to help shift behavior from a carbon-intensive transportation mode (driving alone) to a more sustainable one (biking, taking the bus, walking, or carpooling)
- **Those who have a bike**: I began with the idea that participants would experiment with biking exclusively, though later dropped this requirement; providing a bike was a logistical and liability issue
- **Diversely motivated individuals**: Motivations to drive less include desires to lose weight and be healthy, save money, save time, and reduce environmental impact. All are valid motivations, and different recruitment materials would speak to each audience.

I designed a variety of recruitment flyers, each tapping into a different motivation to try alternatives to driving. I would continue to revisit these as the location and audience of my study changed.
Defining the study

Drawing on my familiarity with the Living Lab concept and Scott et al.’s practice-oriented experiments in bathing, I sketched out ideas for a study.

Assuming a small group of participants, an opening workshop would introduce participants to the idea of the study and focus on deconstructing the current practice of driving. A mapping exercise would have participants map their current commutes on large sheets of paper and discuss alternatives. Lastly, participants would receive materials for the study and make the commitment to participate. A separate safe biking workshop could help participants become more familiar with the skills needed to ride safely on the road.

An experimenting portion of the study would entail participants trialling a different way of commuting, documenting what they have done, and reflecting on the experience.

I was intrigued by the possibility of using a blog or other digital tool (such as a device for experience sampling) for recording experience, but settled on the idea of a paper journal. A blog had the potential to be social, but it would require participants to remember to log in and participate, whereas the physical journal might remain more present. For some of the types of reflection I wanted to elicit, reflecting soon after the time of the experience was important, and a physical journal could enable that kind of reflection due to its portability. Scott (2008) also noted in her thesis how although participants were prompted through both a physical journal and a blog, participation on the blog was limited.

Experience sampling required development and hardware requirements that I was unfamiliar with, and I was less interested in random sampling of experience than participants’ reactions at times of commuting.

The critical component was to use a small amount of a participant’s time each day for reflection, as they would already be interrupting their routines by using a different commute mode.

A final workshop would enable participants to discuss what was learned and share experiences with their peers. I considered including a co-design session (for designing future experiment-like studies, improving commuting using various modes, or improving the form of the city), but felt this was somewhat unrelated to the idea of focusing on practices and trialling. Scott (2008) noted in her thesis how participants in her co-design session had narrowed in on social networking website concepts for trialling that were very similar to the experience they had just had, which was not particularly useful. I was more interested in eliciting feedback on the experience of trialling than on how to make bike or bus services (for instance) better in Pittsburgh.
Leaving the CMU bubble

As conversations with BikePGH progressed, it became clear that my work could form the basis for an intervention at a local organization. Using a BikePGH lead, we engaged a small manufacturing company in the East Liberty neighborhood of Pittsburgh. After negotiating the use of employee time for the study, I turned to recruiting.

Framing the study
I framed my study as a “pilot program” for helping employees “explore transportation options that can help [them] save money and better enjoy [their] time spent commuting.” I felt that the study would be more attractive if it appeared as a developed and professional program. Toward this end, I branded the program as “Commuter Science” and designed a playful logo. I also included logos from BikePGH and Car Free Fridays (a BikePGH initiative for encouraging people to bike to various events), as BikePGH is a well-known Pittsburgh organization.

Recruitment via survey
To recruit participants, I used a BikePGH “commuter profile” survey as a starting point, and modified the questions to include a prompt for participation:

If you drive alone to work, would you be interested in participating in a commuter choice program hosted by your employer? This 3-week program would provide incentives & resources to help you explore the possibility of integrating biking, transit, walking, carpooling, or vanpooling into your daily commute—see attached page for more info.

- Yes, I’m interested in the program
- No, but I’m interested in obtaining more information about alternative ways of commuting
- No, I’m not interested in the program or obtaining more information

The goal of the survey was for me and the company’s management to develop an understanding of how employees commuted to work and from where, and what their attitudes were toward other ways of commuting.

The survey and accompanying one-page “program overview” (see Appendix) were given to the employer electronically to distribute on paper to employees, many of whom had no email on record and did not use computers at work. Given these constraints, I also decided more quickly to use paper-based journals and materials.

I had assumed that surveying employees about transportation habits would be straightforward, but I quickly realized I had made the wrong assumptions. I envisioned (but did not request) that the survey would be given to employees with some kind of verbal requirement that they complete and return it. Instead, the text-heavy program overview I designed was stapled to the top of the survey, which was distributed with paychecks without any note (verbal or otherwise). The majority of employees ignored the survey.

I received 9 responses out of roughly 75 employees, all of which were from office staff or management; none of the employees who worked on the manufacturing side of the building responded. None of the 9 indicated being interested in the program. While the responses were somewhat informative, with 4 of 9 expressing an interest in receiving more information about alternative ways of commuting, there was not enough interest to guarantee a study would be successful.

I quickly made an attempt to recruit participants at the company using a flyer that advertised compensation—previous materials did
not mention compensation at the urging of the company’s owner, who worried I would get too many responses from people who only wanted the compensation—but this received no responses either. With no clear way forward at this organization, I had to regroup and find another option.

**Commuter Science at the Carnegie Science Center**

BikePGH quickly coordinated a conversation with the Carnegie Science Center on Pittsburgh’s North Shore. After getting the go-ahead, I provided both online and paper versions of the survey, which I learned were the best ways to contact employees and volunteers who might not have email. A local champion at the organization made sure word got out about the survey, advertising it both in weekly all-staff emails and meetings.

I framed the survey as relevant for all commuters — this was not a “biking survey”, to be taken by cyclists, but a short survey about how you get to work, to be used by your employer “for planning parking and transportation initiatives in the future”. The survey was again my primary recruiting mechanism: a question advertised the “program” I was running, with a link to a one-page website.

**Survey Results**

The response rate at the Science Center was an encouraging 34% (34 responses out of roughly 100 employees), with responses from across the organization. 9 respondents were interested in the program, with 6 requesting more information.

Some findings:

- Many commuters are motivated to learn more and interested in active transportation
- People drive alone for many of the reasons we expect them to
- If driving alone is (perceived as) cheaper and faster, change is an uphill battle (parking cheaper than a bus ride)
- “Bad” neighborhoods worry potential walkers and cyclists
- Multi-modal commuting might not be a first choice for many, but when asked about it, people have specific ideas and plans

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**How respondents get to work**
One-page website describing the program. This was linked from the survey.
Recruit via Survey

Survey

Opening Workshop

Guided journal activities, bulletin board

Day 1

Commute Diary (sensitizing)

Day 6

Experiment with different way(s) of commuting

Bike commuting skills workshop (offered, but none sign up)

Day 14

Check-in with participants (semi-structured interviews)

Day 17

Closing Workshop
In the months leading up to the contact with the Science Center, I continually refined my materials and a plan for the study.

I began with a single concept, the print journal. The goal of the journal was to guide participants through a multi-week experiment process, providing a task each day. I wanted to provide enough structure and support so that participants would remain engaged each day; having workshops alone, for instance, seemed to guarantee that few would follow through with changing how they commuted.

I settled on a duration of three weeks by considering:

- participant time and willingness to commute using an unfamiliar mode;
- what it would be like to try another way of commuting while at the same time documenting the experience; and
- the weather and changing seasons (we were starting mid-October).

The objective was to sustain some amount of focused trialling without burning out participants. Three weeks is not anywhere near long enough to form a new transportation habit, but it is likely enough to become intimately familiar with another way of commuting.

**Week 1**

The first week would be a time for participants to sensitize themselves to the idea of trialling and examine their current way of commuting. They would become more aware of their everyday routines while commuting by recording commute details for a few days. By documenting their commutes and answering related questions, I hoped to raise participants’ routines from practical to discursive consciousness (Jackson, 2005), where they could be reflected on. I did not think this awareness alone was something that would cause participants to rationally examine their routines and modify them as a result. I merely hoped that this awareness would reveal to what extent these everyday patterns were unconscious, what they were composed of, and that they were changeable.

At the end of the first week, the journal would ask participants to make a specific pledge for the week ahead: which days would they try something different and how would they commute those days? I hoped to build on the plan-making effect, in which people are more likely to follow through with doing something when they make a specific plan.

**Week 2**

In the second week, participants would try a different way of commuting in earnest, according to their plan. They would record what they did, and continue to reflect on the experience. Toward the end of the week, I would check in with participants and interview them. At the end of the week, participants would make another pledge for the final week ahead.

**Week 3**

In the third and final week, participants would continue trialling but the requirements for written reflection would be eased.
Journal
The journal guides participants through a multi-week experiment process.

Guidelines for the journal
• Make it unlike homework — keep it interesting
• Require 5-10 minutes each day of participant’s time
• Include activities that go beyond writing
• Ask participant to write what they’re going to do, then record what they did (plan-making effect)
• Focus on engaging the senses

To keep participants engaged, I kept the journal playful, using icons, factoids, and encouraging text. I used generous amounts of white space, and encouraged various activities outside of the book.

Other items in the kit:
Poncho, breath mints, river trail map, bike map, info sheet on commuting alternatives, pen.

Items in a “Car Free Fridays” tote bag:
Energy bar, athletic socks, bike bell, reflective ankle strap
Commute Diary

The commute diary is a tool for recording information about each commute. It aims to sensitize participants to various aspects of their commuting practices.

Commute Cards Activity

The commute cards and stickers (to the left) are used together: participants put a sticker representing their commute mode on a card, write an adjective, and place the card on a communal bulletin board. Anyone can participate.

The goal of the commute cards is to start a conversation about commuting within an organization by making contributing fun and easy.

Personality Cards

The personality cards are based on interviews with local commuters who walk, bike, or take the bus (and often a combination of all three) to work. The cards use personal stories to inspire and provide practical advice.
Personality Cards
I was inspired by the commuters I interviewed earlier in the year, and thought participants trialling change would be similarly inspired.

The commuters featured on the cards had found ways of making biking, taking the bus, and walking to work entirely normal and routine, and successfully innovated to find ways of making this work.

By combining portrait photographs, edited interview snippets, and commute details on print cards, I hoped to share their stories in a way that informed and inspired participants.

Commute Diary
Part of the advantage of using print materials is that they can be tactile and fun in their form. Originally part of the larger journal, the commute diary pages were moved into a separate artifact with a different form, one resembling a reporter’s notebook. I then referenced the diary from the journal, reducing the amount of journal content.

Commute Card Activity
Inspired by an online system that was part of the Carbon-Culture project (Lockton, Cain, Harrison & Nicholson, 2013), I developed a bulletin board activity with materials that would allow anyone to share a thought or feeling about their commute.

Here the goal was to encourage a dialogue in the organization, and let any member of the staff playfully share information about how they commuted.

My contact at the Science Center found the only truly common space in the building, the hallway past security where all employees enter, for placing the bulletin board.

Participant Kit
I was inspired by the style of the cultural-probe kits that Kate Herd designed and shared online (2008), and found similar semi-transparent cases that advertised the kit’s contents.

Cultural probes are often used to collect data that inspires designers to design. While the kit I created resembled a cultural probe for eliciting feedback from participants, its purpose was primarily to help structure the experiments for participants and keep them engaged; the writing participants did was designed to be useful to them, not to inspire me as a designer. To some extent, seeing the results of the journals was secondary to the effect it had on participants.
Findings

Workshop

7 employees attended a 75-minute workshop. We learned about each other’s commutes, brainstormed barriers and benefits of using various commute modes, and closed with a discussion of motivations. Two participants signed up for the study that night, and a third followed shortly after.

It was difficult getting many employees to attend this after-work event. Although I had employer buy-in, varying staff schedules meant the best time for the event was just after 5pm. Holding such an event during a staff retreat might be a better way to get more participation.

A number of attendees were already commuting by bike or using transit, revealing a form of self-selection bias; advertising an event about commuting alternatives seems to bring in people who are already using alternatives to driving alone. Three participants, however, drove frequently, and two of those three opted to participate in the study.

Despite these concerns, the workshop went remarkably well. I divided the hour-and-fifteen-minute session into three activities, plus time at the end for working with only the people who wanted to participate in the three-week Commuter Science program.

If you haven’t already, please take a couple minutes to complete this short survey about how you get to work. The Science Center will use the results of the survey for planning parking and transportation initiatives in the future.

For those interested in biking, carpooling, taking the bus, or walking to work: question 6 on the survey is an opportunity to participate in a new program being piloted here called Commuter Science.

You know about the benefits of walking, biking, taking the bus, and carpooling. But making a change to the way you commute is tricky stuff! Developed by a Carnegie Mellon design student in collaboration with BikePGH, Commuter Science is designed to help you discover what works for you by giving you helpful guidance and providing time to experiment. It’s a fun way to meet and interact with co-workers, learn by doing, and provide feedback to your employer.

(And for those who already bike, carpool, take the bus, or walk to work: the organizers would love to have you participate in the program as mentors.)

RSVP requested.
Activity 1: Build a bar chart of commute distances. Place sticky notes in a row, one per mile you travel one-way on your commute, then write on the sticky notes your name and the time it takes you to commute. After we build the graph, each person will introduce themselves, say which neighborhood they commute from, and say something interesting about their commute or something they do while commuting.

Activity 2: On 5 large pieces of paper, one per commute mode, write the barriers to you using this mode, as well as the perceived benefits.

Activity 3: Let’s talk about motivation. Why did you attend this afternoon? What motivates you to try something other than driving alone?
Participant contributions during workshop.
Commute Cards Activity

More than 21 people participated over 3 weeks by posting a total of 46 cards on the bulletin board.

Each week, I came in and rearranged the cards to make room for more contributions. This curating was likely obvious to participants — someone was paying attention to what they were doing — and encourage further participation.

At the end of the 3 weeks, I designed and posted a summary of the contributions (show at upper-right), including categories such as “most common commute mode” (biking), “most modes used in one commute” (4 — walk, bus, car, light rail), “number of cards about temperature/weather” (10), and “mode most often described as ‘OK’” (driving alone).

The participation overall showed a willingness and interest in sharing commuter experiences across modes. Translating this interest to experimenting with more sustainable commute modes will require future work.
3-week commuting experiments

Guided by the materials, three employees tried different ways of commuting over three weeks. Two had only ever driven alone to work, while one had carpooled and combined biking and driving.

Of the two full-time employee participants, two experimented substantially: one who had only ever driven experimented with both biking and carpooling; one who had experience carpooling and cycling but primarily drove did both during a time of the year when they had not biked previously. A third part-time employee participant tried biking once just before the study began and another time during the study to a second job.

During check-in interviews and the closing workshop, participants spoke of how the designed artifacts were engaging and effective in getting them to reflect on the everyday experience of commuting and try things they would not have tried. Their written notes in the journal and commute diary reflected this engagement.

The question of desirable difficulty came up in the context of the commute diary. In learning science research, it is sometimes desirable to introduce difficulty intentionally for better learning. One participant suggested easing the recording process by making the diary a phone app that could automatically record commute details. But by removing the labor involved, would there be less reflection on commuting?

While the response to the materials was strong, I did learn that the tote bag with various accessories seemed fairly superfluous. The same might be said of the poncho and breath mints, though not every component needed to be instrumental.

“I really like the journal. The journal is really good about getting me to think about the week in advance and really plan. It gives me a goal—something to stick to.”

“The commute diary was good because I never really looked at how long it would take me to commute, or how many stops I would make on the way. I noticed a lot of little things.”

“The cards with the people’s stories—I found those really interesting, to see what other people do. It was inspiring.”

“The most problematic commute may actually also have been my most enjoyable. Although I got a flat and was forced to ride my neighbor’s bike, the commute was rich with new experiences.”

“Thank you for this opportunity. I don’t think I would have committed to riding/experi-menting if not for the journal & diary, etc. Now that the experiment is over, however, I am sure that I will supplement my commute habits to include carpooling and biking over the long term.”
Using your senses

Describe or draw something you saw

new tree planted on bike trail near Dogpatch light

Describe or draw something you smelled

fresh mints

Describe or draw something you heard

factory echoing & the harbor

Day 11. My pledge for the final week

This is the second and final week to challenge yourself. What do you think is a reasonable commitment for the week?

This week, I will ______ for ___ days instead of driving.

- bus / bike / carpool / walk

I will try this on: ( ) M ( ) T ( ) W ( ) Th ( ) F ( ) Sa ( ) Su

What I’ll do the same:

What I’ll do differently:

Not forget lights!

Tell a story about your best commute this week

(e.g., I walked all the way to school & then took the bus 45% of the way back. The walk took an hour but it was luxurious. I was happy when I arrived though. Proud of myself for remembering to wear the right shoes)

You made it to Friday—fantastic! Put an X in the box for each day you commuted by bike, bus, carpool, or walked.

Tell a story about your worst commute this week

(e.g., I got a flat on my bike and had to walk a half mile to the bus stop.)

The bus didn’t come at 6:47 or 1:50 as scheduled. It came at 2:10 & that’s when I supposed to arrive for my workshop.
From the Fall to the Spring

While I was encouraged by the results of the 3-week living experiments, my enthusiasm was tempered by the relatively low number of participants in an organization where the culture seemed like an optimal fit for the intervention.

On the bulletin board, 21 different people had participated, many of whom were driving alone; in my survey, 9 were interested in the program and 6 wanted more information about alternative ways of commuting (which I did my best to provide). I began to wonder if a smaller commitment would be more amenable to more people. (This was not to assume that a high-commitment intervention was not worthwhile, as any approach needs to be evaluated in terms of how effectively it enables practice transition — see the conclusion of this book for more on the commuting practices of the three participants six months on.)

I also reflected on whether the study enabled participant interaction. These participants happened to know each other and felt comfortable talking, but that might not be the case in other contexts. Could a community of commuters at a workplace be enabled through a web application or mobile app? If so, this might provide the much-needed social norming of active transportation.

Relatedly, I also wondered whether gaps in skills were provided for. I had offered a bike commuting skills workshop to the three participants, but none signed up. If a reason that some are not biking or taking the bus is that they do not know how to do it (safely) — and this may be a latent need, as it did not come out in the survey — targeting that need by helping to build skills could enable more to use alternatives.
Why might it work?
One reason more employees do not use active transportation may be that organizational culture too often supports driving. Subtle examples of this include emphasizing employee time and punctuality in an inflexible way that dissuades employees from biking or taking the bus; not rewarding or recognizing those who use active transportation; and parking pricing schemes that penalize (instead of reward) those who drive fewer than five days per week by charging a flat rate.

There are various places where a champion might intervene:

- **information**
  - carpool coordination
  - bus schedules

- **infrastructure**
  - on-site showers, lockers
  - bike racks

- **(dis)incentives**
  - pay bike commuters
  - increase parking cost

- **practices**
  - memo to employees
  - about flexible time
  - lunch presentation by bike commuter

Concept 1
Toolkit for a champion at an organization to promote a cultural shift toward supporting active transportation

What form could it have?
Deck of cards or website, but needs to be customizable to the audience — not all types of interventions make sense.

Is it worth exploring further?
Potentially useful, especially to organizations whose building owners are participating in the Pittsburgh 2030 District (a collaborative of organizations committed to a 50% reduction in water and energy use and transportation emissions), but too far removed from idea of trialling for behavior change.

Recruiting interested participants and encouraging participation on a timeline was a challenge. This was necessary so that the community of participation could be built, but it was also a limiting factor. Would a more asynchronous kind of participation be effective too?

At the start of the Spring semester, I brainstormed a variety of service and interaction design concepts. The first two shown here push on the social aspect of commuting culture, while the third lowers the barrier to trialling and provides direct support for building skills.
Concept 2

Commuter diary / tracking app for recording, visualizing, and sharing commute info

Why might it work?
There are many popular mobile apps for recording activity — fitness, sleeping, traveling. What about one geared toward commuting?

My Fall study revealed the extent to which people are interested in sharing how they commute — the commute card bulletin board was used daily. Like the bulletin board, an app could reveal how others at work are commuting. And if others are using active transportation, it might make these practices more normal.

An app could allow for the aggregation and sharing of information about commutes — cost, emissions, non-car days, and time could all be graphed and compared between employees or even organizations.

An app could also be used in the context of trialling, replacing the paper commute diary. This might add a social element that was missing somewhat in the analog version I piloted.

Lastly, could an app introduce micro-experiments or challenges — a lower-commitment version of trialling?

What form could it have?
Information could be recorded via one channel (mobile app, kiosk) and revealed back to users via another (web application, kiosk, a peripheral/calm display).

Is it worth exploring further?
Despite potential for increased sociality, this idea relies very much on persuasion through information, an approach to behavior change that I chose not to use in this project.

Participation might need to be incentivized — who wants to record their everyday commuting? — but I also chose to avoid incentives in this project.

It is hard to generate ideas for micro-experiments (trilling small changes) around commuting. As soon as you have left the car at home, you have made a significant change.
Concept 3

Service for trying a different way of commuting with an expert buddy

Why might it work?

Many commuters I spoke with learned to commute by bike or bus by doing it with someone who was more experienced. In as little as one trip, a number of concerns are addressed: route, skills for biking with traffic or catching a bus, confidence, breaking the inertia of using your old commute mode. The social interaction allows for conversation and *in situ* learning.

The act of commuting a different way with someone more experienced is another form of trialling — a “trialling lite” — in that it need not happen repeatedly on any schedule or over a long period of time, but it still involves trying out a practice in an authentic way. This experience of doing it once could be helpful in itself.

What form could it have?

A buddy service, in which the more novice user schedules time with an expert who meets up with them and helps them commute a different way.

Is it worth exploring further?

What makes a buddy service potentially effective as a mechanism for change is not that it provides more information (although information can be exchanged), but that it guides a novice through all of the (bodily) movements of doing a new practice — it shows instead of tells.

Although the concept is not entirely novel — some major cities have volunteer-run “bike buddy” services — it has not always succeeded when implemented (see next section). A more thorough investigation of the service concept might reveal new opportunities.
Commute Buddy PGH
An expert service for practice transition

In a living lab approach to trialling practices, participants need to be sensitized to the idea of trialling, and devote considerable energy to regular experimentation and recording/reflection.

The second approach I explored aims to engage those who have an interest in trying a different way of living but prefer a smaller commitment. It is asynchronous (it can happen at any time relative to others using the service), social, and customized to participants.

As it relates to commuting, the buddy service is a way for a novice cyclist or transit-rider to schedule time with a more experienced rider to try these modes.

I considered the expert buddy service concept as a related and complementary method for encouraging practice transition, not an evolution of the work I did in the Fall. In other words, I felt there might be a benefit to both approaches, which could be used in conjunction or separately, depending on the individual.

As I began investigating this concept in the Spring, I was not sure how the service should be delivered, who should be involved, how it would be framed, or at what scale it might operate. The following sections detail my process for working through these questions.
Exploratory research

To better understand how a buddy service for commuting might work, I researched precedents and spoke with potential users of such a service (both expert volunteers and novices).

Competitive analysis

The concept of connecting a novice bike/transit rider with an experienced one has been adopted as a service model by a number of organizations — Chicago, Atlanta, Austin, Tampa Bay, Santa Cruz, Tacoma, Sao Paulo (Brazil), and Lisbon (Portugal) all have organizations coordinating bike buddy systems. In an even more inclusive variant, Stanford University has a Commute Buddy system that pairs both novice cyclists and transit riders with more experienced cohorts, while organizations in Olympia, Washington and Michigan pair experienced transit riders with student, elderly, and disabled riders.

The service concept is relatively simple and (almost) always offered for free by volunteers: provide some basic information such as your location, availability, and goals, and you will be contacted by an experienced rider who will talk with you about commuting by bike and ride with you on a trip to help you get started. They will not teach you how to ride a bike, but they will talk routes, show you how to load your bike onto a bus or train, give you tips, and show you good form for riding on the road.

Most organizations appear to be geared toward setting up initial contact, with subsequent meet-ups organized by the participants if desired. Lisbon’s system may be the exception: their service links up “a temporary guardian who accompanies the inexperienced user for two weeks (two / three times per week) in the home-work-home paths with the aim to familiarize the new user with the bicycle as a means of transportation in an urban context” (Google-translated from Portuguese at http://bikebuddy.mubi.pt/sobre/).

Given this apparent success, I thought contacting a few of these services to learn more would be easy. Instead, I learned of uneven success but had difficulty finding out why:

- **Austin**: no response; unclear how successful
- **Atlanta**: service no longer being offered; unable to learn more
- **Spokane**: service no longer being offered; unable to learn more
- **Chicago**: modest success first year but increased success in second year; service doing well
- **Stanford**: successful service, but transit planning services used more frequently; volunteers paid for helping

Chicago Bike Buddies (chicagobikebuddies.com), which is now operating in its third year, helps make the connection between experienced volunteers and novice participants. This is done in a relatively low-tech way: after a participant fills out an online form, the organizer provides the details via email to a set of volunteers and the participant, who decide as a group who will work with the participant. Meet-ups are required to include both a talking and a riding component. I wondered if the coordination process could be better designed. I also learned of participant sensitivities to meeting volunteers of the opposite gender, particularly women meeting male volunteers.

With respect to the other organizations with less success, without more information, it was difficult to determine why they had failed. Nonetheless, I was buoyed by the successful stories I had heard and the array of organizations worldwide using a similar service concept.
Interviews

I spoke with four experienced cyclists/transit riders, three novices, and an advocate for cycling in Pittsburgh. My interviews would extend from this exploratory research into the service prototyping I conducted, involving four additional respondents.

All respondents saw value in the service concept, highlighting the benefit both in terms of instrumental skill-building and sociality (meeting and talking with others). Experienced cyclists/transit riders expressed interest in volunteering their time, though some were concerned about time required. One reminded me that although volunteer services have existed, a market-driven model might also have benefits.

Novices and experienced cyclists alike spoke of the anxiety they felt putting their bike onto the bus racks affixed to the front of all Port Authority buses. They described feeling self-conscious, afraid to fumble, and concerned with holding up the driver and other passengers — very real concerns that I have felt myself even though I have used the bus racks countless times.

Two of the experienced cyclists wanted training or resources, not necessarily to build their own skills but to provide more authoritative answers to participant questions on topics such as why helmets are effective and which kinds of bikes are worth recommending.

On the topic of trust, respondents mentioned being more willing to trust a volunteer they did not know if that person had been vetted by an organization (as with the Lyft car service).
Service definition

Informed by my exploratory research, I began to flesh out a service concept for a commute buddy service. I sketched a storyboard and service blueprint to help me better envision how the service might work.

Two goals guiding the designs:

1. Create a professional service experience by focusing on the touchpoints before and after the riding portion of the service so that the service appears legitimate and safe, and also more memorable.

2. Retain a focus on the practice of biking for transportation — skills, equipment, routes, meanings — where possible.

Storyboard

Kevin has considered biking to work in the past but is intimidated by all of the unknowns — route choice, distance, feeling safe on the road, clothing, weather. Still, he sees others biking to work and wonders what it would take for him to do it.

At work, a flyer advertises a volunteer-run service called Commute Buddy PGH. It explains how a buddy will meet up with Kevin, chat with him about his goals and options, and ride with him one day. The route is negotiable and there’s no cost for the service. There’s also an option for learning how to load his bike on and off a bus, something Kevin has wondered about.

On the Commute Buddy website, Kevin enters info about the mode that most interests him, his start and end locations, and his availability. He also fills out a more detailed questionnaire so that the volunteers at Commute Buddy get a better sense for his skills and needs.
Kevin receives an email with a set of suggested itineraries and info about the commute buddy best suited to his location. Kevin emails his commute buddy to set up a time and location they could get together.

On Saturday morning, Kevin meets his buddy, Scott, at Kevin’s house in Brighton Heights. They spend the first 15 minutes getting to know one another, and decide on an itinerary: bike to the Science Center, take a break, then bike into the North Side to catch a 16 bus back home with their bikes.

The biking portion of the trip goes well, and Scott points out how Kevin could either drive to the jail at the trail head or take the bus back, as the hill on McClure Ave takes some practice to get the strength to climb it. Kevin also quickly learns how the bike rack on the front of a Port Authority bus works.

Later that evening, Kevin receives an email from Commute Buddy PGH summarizing the trip he took with Scott earlier that day.

A week later, Kevin tries and successfully completes his first solo commute to work on his bike.
Service Blueprint
Service prototyping

As shown in the blueprint, the service entailed designing both the physical evidence (sign-up website, emails, pictures) and interactions between the service provider (expert) and participant (novice). What would be the appropriate fidelity or prototype method?

I decided to prototype the service by creating the supporting materials and enacting the service with participants who had a genuine interest in becoming more comfortable biking on the road. The interactions between the expert and novice would occur in an authentic situation — by me playing the role of the expert and interacting with less experienced cyclists in real situations.

The fidelity of this service prototype was then very close to a real version of the service. This type of prototype would be much more likely to reveal useful insights than role-playing with less interested participants in a simulated environment that was insulated from the real-life experience of planning, navigating, and traveling in the world with unpredictable events. Given that it would not be too dangerous or expensive to try this out, I chose to prototype as much of the experience as I could.

I conducted 5 buddy sessions with different adult participants:

<table>
<thead>
<tr>
<th>Participant #1</th>
<th>Skill/Experience</th>
<th>Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert</td>
<td>Explore city</td>
<td></td>
</tr>
<tr>
<td>Participant #2</td>
<td>Recreational</td>
<td>Commuting</td>
</tr>
<tr>
<td>Participant #3</td>
<td>Novice</td>
<td>Introduction to biking for transportation</td>
</tr>
<tr>
<td>Participant #4</td>
<td>Limited experience biking for transportation</td>
<td>Route to local destination, bike on bus</td>
</tr>
<tr>
<td>Participant #5</td>
<td>Novice</td>
<td>Biking for transportation to social events</td>
</tr>
</tbody>
</table>

Questions guiding prototyping

- What does the expert need to know from the volunteer before going out? Do the website form and emails capture this?
- How much of the experience can be planned ahead? Or can it be improvised at the time of the meet-up?
- Does the planning require conversation or can it be coordinated through an application?
- Is it critical that the participant have their own bike?
- How does the appearance of the expert affect the participant? Is it better to dress in everyday clothes or cycling clothes?
- What props are useful? E.g., bike map, bike commuting guide.
- What are the physical interactions?
- Is it useful to record the route taken and share this with participants?
Website advertises the service and provides a form for interested participants to fill out.

Using email, text, and phone calls, I scheduled meet-ups. I suggested route options based on interest and location, and shared maps of these.

When we met, we talked about goals, motivations, and concerns. I gave each participant a bike map and bike commuting guide, and used these as props for conversation. Depending on interest and experience, we optionally went over bike maintenance, bike fit, and road safety.
Rides varied in length, route, and terrain, and included a one-way commute by bike, a trip to a friend's house, and a trip to a local destination where we loaded our bikes onto a bus and took the bus home. I used GPS to track the routes we took for sharing later.

In summary emails, I shared online maps of the routes we took by uploading GPS traces to a ride-tracking website. Emails reviewed both the routes taken and the skills covered.
Findings

I found a number of my assumptions to be challenged by the experiences I had. I assumed my survey to be adequate as a quick sign-up form, and although it functioned as such, a number of questions had to be asked of participants before things such as route planning could occur. For instance, I did not ask if the participant owned a working bicycle and helmet, nor did I ask about overall fitness level or comfort riding on the road. I found myself asking these questions during our meet-ups, or in the case of one participant, overlooking the question of fitness entirely.

Fitness

My ride with one participant changed unexpectedly when he over-exerted himself on a hill half-way through our ride. Just prior, I had offered the option of stopping and walking our bikes, but the participant (and I) misjudged his overall fitness level and continued to bike until it was clear that the hill was too much for him. As he felt unwell, he needed to rest for some time, and we walked our bikes to the remainder of the trip.

After this unanticipated riding experience, we talked at length about the topic of fitness and how to gauge it ahead of a bike ride. I should have asked about his overall fitness or activity level, but even though I did not, I did suggest both during the ride and in email ahead of the ride that we walk our bikes over difficult stretches of hill. On the one portion of hill that proved too much, it seemed the effects of exertion snuck up on him.

How could we have negotiated this earlier? If asked, he might have told me his fitness level was not the best or that he was not physically active — had I known this I may have suggested a different route than the one we attempted. But how does the expert gauge what is too much to bike when they are so removed from being a
novice? And how does the novice gauge what is too much to bike when they are not familiar with biking in general? The expert buddy needs to be better aware of biking as exercise and what types of biking activities are potentially exhausting or even dangerous to a less healthy individual.

The effect of this experience on the participant was difficult to determine, but he talked of it being a wake-up call concerning his fitness. This is perhaps a double-edged sword. On the one hand, he realized how unfit he was and how he needs to exercise, but on the other, he was now overwhelmed with the idea of biking (or walking) for transportation: the prospect of combining biking or walking (even with taking the bus) seemed a bit more terrifying and unrealistic. “This is why I drive”, he said soberly, while we were stopped and catching our breath. Did this unpleasant experience reinforce the practice and routine of driving? Did it inspire change to be healthier? It could have done both, suggesting that driving for transportation is normative and that becoming more healthy will entail more trips to the gym.

It is useful to think of alternate experiences given the knowledge of his physical fitness. If we had biked too moderate a route, he may not have realized his need for better fitness or made a connection between biking for transportation and health. He might have assumed biking was easier work than it is. Was there a better way to proceed that would have reinforced the potential for active transportation to be both personally sustainable and healthy?

Ride recording / remembering

I used my bike computer, with built-in GPS features, to capture the actual routes we took, and uploaded this data to Endomondo.com, a website for tracking fitness activity. There I created ride maps and statistics for participants. I also used my phone to take post-ride pictures of me and the participant by standing close and extending
Hi ____,

Here’s a recap of the bike-buddy ride we did yesterday. I had a good time, and it was fun exploring those streets by bike. I hope the rest of the night on bike worked out well (given that it was getting dark when I left)!

Our route

That’s a lot of uphill (but I doubt there’s any way around it). I’m sure our route could have been a little shorter (cutting out part of that loop we did), but I didn’t mind it last night. For comparison, here is the route I took back to your place, all downhill.

Skills covered

• positioning yourself on the road—either in a painted bike lane, share-arrow (sharrow) lane marking, or no lane marking
• signaling your intention when turning—we didn’t cover voice signals but I could send you some info on those
• adjusting seat height on a bike
• wayfinding between Lawrenceville and E Liberty (including Bloomfield, Friendship)
• making left turns through busy intersections

...
I wore jeans, another time no lights, but the rest of the accessories were in place more or less through all three rides. I was hesitant to eschew a bright jacket for attire I consider less safe.

In terms of other gear, I provided a bicycle to participants in two cases. They both owned bikes that were in need of maintenance, but expressed interest in riding a loaned bike. This seemed to work well for the two participants. Instead of renting or loaning bikes via the buddy service, one potential opportunity would be to combine the offerings of a city-wide bike-share service with a buddy service. In Pittsburgh, a bike share service is planned for 2014-15 (www.pghbikeshare.org). Using bike share in conjunction with a buddy service would lower the cost of entry for anyone without bike who was considering whether biking for transportation could work for them.

**Discussion**

It should be said at the outset that it was clear that the service was useful to participants and in different ways. Participants talked of how the buddy motivated them to take the next step with biking for transportation:

“**It takes the coldness of the weather out of it, the fact that someone else is here.**”

“**Ultimately, the best thing was the fact that you showed up at my doorstep. All barriers disappear.**”

“I feel more enabled!”

Often, they expressed surprise at how calm they felt biking with traffic. I, too, have felt this way biking with more experienced cyclists in high-traffic areas.

One participant in particular was able to take immediate advantage of the buddying experience: in the month since we had gone out, she had made weekly trips by bike to the church 2 miles from her apartment. This anecdotal evidence was encouraging.

**Customization**

The service prototype experiences revealed to me how a variety of cycling-for-transportation practices exist and are nothing close to uniform. Fitness level, skill level, material resources, concerns, and motivations were all very different across participants. While it is true that biking-for-transportation was a recognizable practice in all cases, the way this made sense for each individual varied. As a result, the service must be customizable, allowing the expert to work with the participant in ways that make sense to the participant and context. Some guidelines, however, may be necessary to keep the service’s focus on transportation and maintain some consistency or quality. For instance, a checklist of topics to cover, questions to ask, and recommended ways of doing or saying things could be useful during expert training. With so much of the service embodied in what the expert buddy does and says, training is critical.

**Improvization**

Some amount of improvisation in terms of routes and goals was necessary in most of my experiences. In one case, I guided the participant over the first half of the trip and she guided me once we entered a neighborhood she was more familiar with. In another, we negotiated a reasonable route to meet as many goals as we could (biking uphill toward his apartment, not being left on campus without a car). In a third, I provided the bike route while the participant knew which bus would take us back home. While it was useful to prepare routes, being flexible and taking cues from the participant was more important.
**Digital tools**

I had anticipated that a digital platform could help with coordinating experts and participants, but some aspects will need to be “unmanaged”. For instance, software may help with the formatting of email messages (as email templates), but it seems unlikely that software sending messages and coordinating meet-up times will work — the communication flow is too unpredictable to formalize. Rather, the expert buddy (or a buddy dispatcher) should coordinate meeting times and locations.

Useful digital tools included a bike computer (though a smartphone with ride-tracking app would work just as well) and mapping websites (endomondo.com, maps.google.com). There was no need for a more specialized mapping website.

I considered a website feature that would be a collection of ride routes taken, but this did not feel particularly useful, especially in cases where the route was designed to build the participant’s familiarity and comfort with being on the road. It may be useful, however, to plot expert volunteers on a map, along with the areas they know well and the expertise they have.

**Trust**

One opportunity for the website is to address the question of trust: how could one be made more comfortable meeting up with a stranger? Since the participants knew me or were introduced to me through a mutual friend, there were no issues of trust in my prototype. So I asked participants hypothetically what would help. For women, having participants of the same gender was important. Having a clear photo of the expert would also help. In my earlier interviews, respondents mentioned being more willing to trust a volunteer they did not know if that person had been vetted by an organization. Lyft, for instance, performs background and driving-record checks on its drivers. For this potential organization and service, a vetting process might similarly be useful.

One participant suggested rating expert volunteers — assigning a rating out of five stars, perhaps, based on the experience. I asked the founder of Chicago Bike Buddies about this concept, and he was hesitant to support it. I suspect one reason is that the bike buddies participating in his program are volunteers, and one unenthusiastic rating might cast doubt on the buddy entirely.

**Buddy or consultant**

Another question concerns the length of interaction or service being offered. Is it a matter of the expert and participant interacting once or twice, as I had assumed, or something more on-going? Two people I spoke with suggested longer time frames unprompted. “Once you disappear, then my motivation would disappear … It’s almost like a bike consultant rather than a buddy,” was one take. Another suggested multiple encounters, some in person and some over the phone (for consulting when questions arise); the on-call bike buddy might help find trail heads or routes for avoiding traffic, or accompany the client to a bike shop.

To some extent the model chosen depends on whether the experts are compensated for their time — would they be willing to have continued meet-ups or phone calls without compensation? Maintaining a volunteer model seems to have some benefits: a light-weight organization can organize the service, even when use is low; transaction-less meet-ups might engender trust (expert volunteers are helping because they are passionate) and conviviality in a way that is different than if market transactions were involved. These questions require further investigation.
Other areas to explore

Two additional aspects of the service that I considered exploring but were unable to due to time constraints are the extent to which a buddy service can benefit from being branded (in the appearance of the expert in particular); and the design of the organization hosting the service. For the latter, it may be an organization that contracts with local employers to provide their service to interested employees, or perhaps the buddy service is a toolkit and training program that enables employees familiar with active transportation to provide their time to other employees who are less familiar.

Guidelines for the design of a buddy service

The service prototyping experience revealed a number of dimensions that are a part of the design space for a transportation buddy service. The map below shows my intuitions plus variables that could be explored further.

Improvisation

Planned ahead (route, script) → Improvised at time of service

Customization

Bespoke (tailored to participant) → Fixed (offerings to choose from)

Formality/Market Model

Informal (e.g., volunteer-run) → Formal Service (e.g., business-run)

Dress/Uniform

Any clothes → Jacket with logo, flair, a branded experience

Expert in Appearance

Everyday clothes → Cycling clothes and accessories

Expert Trustworthiness / Ratings

Appearance of trustworthiness → User reviews and ratings
Reflections on Designing for Practice Transition
In describing this thesis to friends and colleagues, I often found myself talking about commuting and biking in particular. It seemed that as soon as I mentioned these topics, they became the focal point, shifting to the background any discussion of behavior change, trialling in everyday life, or design practice. People like to talk about biking! — reasons for doing it, reasons for not doing it, infrastructures enabling or disabling it. Bike infrastructure in particular is a topic that is frequently brought up in the context of getting more people to bike for transportation — and for good reason, as research shows that more people commute by bike with safer bicycle infrastructure (Colville-Andersen, 2011). But this project was only partially about biking, commuting, or even transitioning commuting practices. In this conclusion, I will reframe the conversation to include a discussion of design for practice transition (practice-oriented transition design) and how this project revealed a number of insights for doing that kind of work.

**Premise**

The premise of this thesis was that designing for significant shifts in behavior can be approached somewhat head on by conceptualizing everyday behavior as it relates to practices, and scaffolding the trialling of alternative practices for motivated people. In other words, designers can look beyond small, individual actions to the level of coordinated activities (practices), and design systems that enable participants to try out, in a safe and supportive environment, different ways of living. This need not happen in a physically separate space, but can be integrated with daily life as it exists now. Through this type of “practice-oriented design” (Scott et al., 2012), in which practices are the focus and outcome of design, more sustainable ways of living can be found, enabled, or amplified.

My scope of adults exploring different commuting practices allowed me to learn what is involved in doing this kind of work — its methods, possible outcomes, time frames, and challenges. It also furthered a discourse on transportation demand management (the study and practice of decreasing demand for transportation infrastructure) by exploring what it would take to assist someone in changing from commuting by driving alone to using a less carbon-intense (and more active) form of transportation.

**Methods**

I began the “design research” portion of this project with a particular practice-oriented method in mind: a group of people trialling a different commuting practice. Using Scott et al. (2012) as an inspiration, I was able to structure a study protocol that worked on a similar level, weaving sensitization to and deconstructing of current commuting practices with trialling new ones over a period of three weeks. I did not anticipate needing to explore such substantial research in the Spring, service-prototyping a commute buddy service, but nevertheless, having done both I can now compare trialling over time and a buddy service as two distinct methods for enabling practice transition. (A variety of other design methods were used in this project, including surveys, interviews, service blueprints, storyboards, workshops, and semi-participatory methods like the commute cards activity, but I am focusing here on the more novel methods that most directly related to practice-oriented design.)

Trialling over time and buddying with an expert are both curious methods, and probably should not be called methods at all. Service-prototyping is clearly a design method, and an expert buddy service for doing something is an outcome of that method, but the method for enabling the adoption of a particular practice is to design and run a buddy service. Similarly, the trialling study was composed of what appeared to be design methods like a diary study and workshops, but the method for enabling the adoption of a new practice was to design and run a trialling study.
I do not know if these are good design methods — they do not necessarily produce grist for designing future products or services, despite my attempts to design a solution from the trialling work — but they engage practices in a way that other methods likely do not, and have outcomes that concern practices.

Service design is an integral part of each method. To enable a group to experiment with different practices on a similar schedule requires service-designing the experience — crafting the timing and duration of moments for trialling or sensitizing, orchestrating interactions between participants and facilitators, etc. — especially when framing the experience as a “program” offered in a workplace. To feel comfortable experimenting with unfamiliar practices, participants must feel they are being guided and supported in a safe environment, which are aspects that only service and peer support can provide. An expert buddy service for commuting similarly (and perhaps more obviously) requires elements of service. A parallel with both is that the services scaffold experience and enable low-risk exploration. And by bracketing the experience, the services enable participants more space for reflection.

Can these methods exist outside of academia? The buddy service likely can and has done so in various incarnations, from “sponsors” in Alcoholics Anonymous to peer mentors of individuals suffering from serious disease (though both are typically on-going relationships). Successful bike buddy services suggest the method, when designed appropriately for a place, is valuable. The trialling study is less obvious, but my experience at the Science Center and my continued work on a continuation of the Commuter Science project through a local green-practices consultancy suggest it might be a valid method outside of a research context.

**Outcomes**

Practice-oriented design can have as its outcome communications, products, or services that support a particular practice or practice transition, but it can also have more amorphous outcomes — shifts in a community doing things a particular way, an individual living differently, an organization’s culture evolving to support certain practices. Scott et al. (2012) write:

> Whereas the conventional design process focuses on products and services as the final outcome, a practice-orientation redefines the role of products and services as means to another end. However, that end is no end at all, but rather a process of change — change in practices.

(p. 284)

It can be a strange feeling as a designer to have not produced a specific, refined thing that will be in the world when the project is complete. Yet this is sometimes the nature of social innovation.
projects: the outcome is a process of change, and the design artifacts are what helped enable or document that process. Accordingly, this process of change takes time.

**Time frames**

Surprising and unpredictable at times, this project revealed the extent to which designing for practice transition requires time and patience. I think this is true of any type of social innovation project, but the involvement with user’s daily lives as they trialled alternative ways of commuting made this particularly true of my project. Given that the idea of designing for practices is fairly nascent, I also spent time gaining clarity on the approach.

One reason design for practice transition takes time is that helping people to change requires the time and energy of human participants. For anyone other than the participants to understand what is going on (and arguably the participant as well), that means some kind of regular recording about what is happening — e.g., writing in a journal or diary, responding to an experience sampling device. It also requires getting access to and buy-in from participants. For Commuter Science, once I had the ability to engage employees in an organization, participants had to be sensitized to the idea of trialling. Starting a conversation about commuting in an organization was challenging enough to design for, let alone recruiting a cohort of participants who would all trial new ways of commuting. (Of course, an alternative brief of engaging individuals regardless of their participation in organizations might entail different methods, but engagement and sensitization would be challenges nonetheless.)

Another reason a lengthy time commitment is required is the complexity of practices. While some behaviors and habits can be acquired in as short a time as 21 days — one study found the average to be 66 days (Dean, 2013) — the horizon of practice transition is likely much longer. One reason is that unfamiliar practices must first be experienced and learned before they become anything like a habit or routine. This integration process could take months or even years. Commuting by bike instead of car, for instance, involves a host of external factors and components of practice that complicate performance — distance, equipment, weather, demands and expectations at home and work, differences in norms between the two modes. Compared with a simple activity like performing sit-ups daily after morning coffee (Dean, 2013, p. 6) commuting by bike entails many reasons progress can be impeded or develop over a longer time frame.

Lastly, defining successful practice transition is also at the scale of months or years, and requires having access to and surveying individuals. For the respondent, recalling what was done when it was done intermittently or semi-consciously can be a challenge. Alternatively, some types of practice transition might be inferred. For instance, consider the practice of cooking with the unpredictable types and quantities of food provided by a CSA (community supported agriculture) organization. By knowing a subscriber to a CSA was a member for 4 years and received fresh food weekly during each year’s growing season, we might be able to infer that they successfully cooked with the local food they received (since they likely would have canceled their subscription sooner if they were not using the food). Nevertheless, longitudinal projects are successfully completed in other fields such as psychology and sociology, just not as frequently in design. The scale of such practice-oriented projects is thus conducive to interdisciplinary multi-year projects and grants, not semester-long (or even year-long) projects.

**Commuter Science, 6 months on**

I was able to contact my three participants 6 months after the initial study in November. Through email, I learned of their com-
muting routines over the winter and their plans for commuting going forward.

- One participant had switched primary jobs, introducing a much longer commute that is no longer conducive to public transit or biking. Recently, she was able to bike to a closer second job (something she tried last November), and plans to do so more regularly this Spring. Leading up to the study last Fall, she primarily drove alone.

- Another participant has been carpooling more often than he had prior, and directly related this to his experience last Fall, saying he has made an effort to carpool in cases where normally would not have. He plans to bike more this Spring — a 5-mile ride each way, a couple days per week — and described his desire to bike being stronger this year also as a result of participating in Commuter Science. Leading up to last Fall, this participant had done some Summer biking and occasional carpooling, and drove alone otherwise.

- The third participant has plans to bike this Spring, 6 miles each way, when the weather becomes more consistently warm, and has carooled a number of times since November. He is considering participating in a regular carpooling program with neighbors. He drove alone exclusively up until his participation last Fall.

### Practice values

While no form of designing is value-neutral — the designer always maintains values that affect her designing — practice-oriented design in particular pushes the designer to take a stance on what practices they want to enable or disable. A focus on transitioning from one practice to another, by definition, implies this hierarchy (the newer being an improvement over the older).

For example, while not a practice-oriented project by name, the Fitwits project (Mcgaffey, Hughes, Fidler, D’amico, and Stalter, 2010) involved the researchers advocating healthy eating and obesity prevention through practices like gauging portion size with fingers. Even in Scott et al., in which a study outcome was novel bathing practices (and concepts for products/services to support practice transition) (co-)created by participants, a pro-environmental value was espoused: use less water while bathing. Similarly, my project advocated for active transportation (biking and walking), transit use, and carpooling (for their environmental and health reasons in particular) over driving.

Designers engaging in practice-oriented design will make these judgements as to what practices or types of practices are desirable, and which are undesirable. Participants (or “users”) will undoubtedly modify and creatively adopt practices in their lives as an outcome of engaging with practice-oriented design. But the effect of the designer should not be discounted.
Project Significance
The thesis demonstrates two potentially viable methods for supporting commuting practice transition from less sustainable to more sustainable options. It suggests that sustainable commuting professionals (those in the field of transportation demand management and others) look for commuters who have in interest in using more sustainable commute options, and engage them not only at the level of incentives, information, or infrastructure but practices: in the case of trialling, by forming a community of individuals and affording them the reflection space, means for trialling, and push to try alternatives; and in the case of a buddy service, by providing the low-barrier access to more-experienced commuters who will help them build the requisite skills and meanings to adopt the practice.

One important caveat to the approach behind these two methods is that in the realm of commuting, infrastructures — the distance from home to work, the form of the city, the availability of safe spaces to bike and public transit to ride, etc. — do very much configure the extent to which biking, walking, and taking the bus are viable alternatives to driving. Given this, it is important to caution against a view that anyone (or everyone) can be commuting more sustainably if only the relevant practices are available to them, and that the obligation of government and stakeholders in planning is any less. Practice theory perhaps accounts for these kinds of infrastructure under the heading of stuff/materials, but this is a subtlety worth making explicit.

This thesis has also contributed to the discourse of practice-oriented design by showing how a practice-oriented design methodology can be (1) usefully customized and deployed in the domain of commuting practices, (2) used outside of academia in a professional organizational context (toward organizational goals — fewer commuters driving alone to work), and (3) used as the impetus for a service concept (expert buddy service for practice transition).

Useful future work includes further developing the two concepts presented here and evaluating their effectiveness in encouraging commuting practice transition; modifying and trying these methods in different areas of life beyond commuting; and discovering new applications for practice-oriented design.
References & Appendix
References


Dean, J. (2013). Birth of a Habit. Making habits, breaking habits: why we do things, why we don’t, and how to make any change stick (pp. 3-7). Boston, MA: Da Capo Lifelong.


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Kevin

Commuter Personality Cards

How do you get started commuting by bike?

Initially, there’s a trepidation—when can you do it, is it going to be safe, what clothes should I wear, what equipment do I need, how do I minimize my chances of getting hurt, what route are we going to take?

It’s very helpful to have someone who’s already doing it explain to you and show you what you need in the way of equipment, routes, and strategies for dealing with traffic—all of the skills you need to have to make it as a bike commuter.

And of course, once I’m doing it, it’s like, hey, this is really cool! I feel energized when I get to work in the morning. I come into the gym where I change clothes and they say “Have a nice workout” and I say “I already did”.

Why is change difficult?

Part of it’s habit. How do you get people to think you don’t need to join a gym—make it part of your daily life. The toughest hurdles are psychological, and nobody likes change. And it’s a major change to change your mode of transportation.

How safe is it riding your bike?

For me, the same cars pass me everyday. So even though they may not like me being there, they’re aware of my presence. And it probably doesn’t hurt that I’m dressed in flourescent green, with blinking things on me, front and back. I’m far more visible than most Harley drivers.

What is your commuting plan?

I either get a ride to the bus stop or ride my bike to the bus stop in the morning. And then I take a bus and ride the bike from where the bus drops me off. If the weather is bad, I’ll get a ride to the bus stop and do the whole trip by bus. On Wednesdays, I drive.

What do you like about taking the bus?

I don’t like driving in traffic, and I don’t like putting gas in the car. I have to put gas in the car no matter what. But I can avoid the driving in traffic, and I can listen to podcasts or music on the bus. I can do other things besides worry about what the other drivers are doing.
People have asked me how easy it is to use the bike racks on the bus. “Is it easy to get your bike on and off?” Yes it is, really. I usually take the bus part of the way home.

On riding the bus with a bike
Commutes 13 miles by bike
If it’s raining in the morning, I’ll take the bus. If the forecast is for rain later, I’ll bike in the morning, and put my bike on the bus to get home. I’ll pack a jacket and make sure I have my bus pass. And that’s only because I live so far away from work. If I only lived 20 minutes away, I’d bike both ways.

How did you prepare for the first time?
I drove in that way really slowly so that I could suss out all the junctions. You can work out a lot on Google Maps beforehand but driving it really helps.

What happens if the weather is bad?
I have a shower kit in my desk drawer. The first thing I do, I go to the bathroom and I wash my face and more. Then I go to my desk and eat second breakfast. Mostly I find that washing in the bathroom is fine. The afternoons are hotter though so I really do need a shower when I get home.

What do you bring with you?
On my bike, I’ve got my bus pass, money, a repair kit, and pump, keys, my cellphone, a jacket in case it’s going to rain or it’s going to be cold, a small snack, plus a clean shirt. In my office, I’ve got a whole drawer full of pants, even a skirt, and some shoes. I keep the big stuff at work, and take it home for washing every so often.

How do you clean up when you get in?
I have a shower kit in my desk drawer. The first thing I do, I go to the bathroom and I wash my face and more. Then I go to my desk and eat second breakfast. Mostly I find that washing in the bathroom is fine. The afternoons are hotter though so I really do need a shower when I get home.

What do you do on the bus?
I read other people’s books! If I’ve planned to take the bus, I’ll read a book or a magazine or work on my laptop. Sometimes I’ll just zone out and look out the window or talk to friends.

What’s the biggest benefit of biking?
It helps me cope with being indoors! If I’ve had enough exercise in the morning, I don’t mind spending the rest of the day inside. I’m not so restless. And cycling is fun. I really like my bike ride, I like the fresh air.

What is it like riding the bus with a bike?
Commutes 14 miles by bike
On my bike, I’ve got my bus pass, money, a repair kit, and pump, keys, my cellphone, a jacket in case it’s going to rain or it’s going to be cold, a small snack, plus a clean shirt. In my office, I’ve got a whole drawer full of pants, even a skirt, and some shoes. I keep the big stuff at work, and take it home for washing every so often.
People have asked me how easy it is to use the bike racks on the bus. “Is it easy to get your bike on and off the bus?” Yes it is, really. I usually take the bus part of the way home.

On riding the bus with a bike

Commutes 13 miles by bike.

If it’s raining in the morning, I’ll take the bus. If the forecast is for rain later, I’ll bike in the morning, and put it away from work. I always try to avoid riding in the rain, but if I only lived 20 minutes by bike, I’d just bike in.

I walk because I am too cheap to pay for parking! I realized that within 40 minutes, I could be at my destination and have saved myself $15 a day.

What I’ve also learned is that walking allows me to clear my head. My walk in the morning is about me getting to work, but my walk home is an unravelling and untangling of the day—just putting the day to rest. It’s my own space, my own time, which I love.

Why do you walk to work?

I walk because I am too cheap to pay for parking! I realized that within 40 minutes, I could be at my destination and have saved myself $15 a day.

What I’ve also learned is that walking allows me to clear my head. My walk in the morning is about me getting to work, but my walk home is an unravelling and untangling of the day—just putting the day to rest. It’s my own space, my own time, which I love.

Do you have to wear sneakers to work?

That was the one thing that took a little bit of time getting used to: leaving the extra shoes at work. Some days I’d be in my classes with big sneakers on, which doesn’t always look so nice with a skirt.

Is it hard to make walking a habit?

The first year was a little bit harder because I could find a way to talk myself out of walking. But the minute you make the decision that you have no excuses—like the weather is not going to hold you back—you don’t really think about it. You just get up and go: you put on your rain coat or your snow boots, and you just do it.

Do you track how much you walk?

I track my steps with this wristwatch. Today, I’ve already walked over 4,000 steps. But health researchers say you need 10,000 steps a day—under 8,000 steps a day is still only “low active”. So walking 40 minutes, twice a day, is still not enough!

Isn’t driving faster?

To walk 2.5 miles, it takes me 37 minutes. To drive, you might get stuck in traffic, park in the parking garage, walk to your office—you’re probably spending 20 minutes. So that time walking is not that big of a deal, in relation to everything else you’re doing. Time yourself. You’d be really surprised!

Can we make walking to work normal?

It’s sort of like when people talk about gardening. Why do we make such a big deal out of growing a vegetable? Or providing kids with apples at lunch? We can just say: this should just be normal practice, it’s not a big deal to do. I just get up and I walk everyday; I don’t think about it.
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**DATE:** ______________  **TIME TRIP STARTED:** __________  **COMMUTE DURATION:** _______

**DAY:**  M  T  W  Th  F  Sa  Su


**Commute mode**
(circle one or more)

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**How much thought went into choosing your commute mode?**

- [ ] No thought
- [ ] A lot of thought!

**If you thought about your commute mode, what went into your consideration?**

**If you commuted by car, did you carpool with another adult?**

(Circle one)  Yes  No

**Make any stops on this commute? If so, where did you stop?**

**Anything notable happen during your commute?**

**What did you do while you were commuting?**

**ADDITIONAL NOTES:**
Commuter Profile and Participant Interest Survey

This survey will help your employer build a workplace commuter profile by collecting information on how all employees commute to the office. It will also give you a chance to participate in an exciting, new initiative to help you explore the possibility of integrating biking, transit, walking, or carpooling into your daily commute.

1. Your Information

Name
Email
Home Zip Code

2. How do you usually get to and from work each day?

☐ Personal car
☐ Carpool
☐ Public transit (bus, "T", incline)
☐ Walk
☐ Vanpool
☐ Bike
☐ Combined modes: ____________________________

3. If you drive alone, what are your main reasons for doing so? Check all that apply.

☐ It’s faster
☐ Travel during work hours for personal business
☐ Travel during work hours for company business
☐ Need vehicle before or after work
☐ Drop off / pick up kids
☐ Public transit is not available
☐ Irregular work schedule
☐ More convenient
☐ Don’t have anyone to ride with
☐ Less stressful
☐ Other (please specify): ________________________

4. How many miles do you travel to work (one way)?

________________

5. If you do drive alone to work, what incentives would encourage you to bike, bus, walk, or carpool? (Would it be discounted transit passes? Convenient, secure bike parking? Reliable carpool partners? Cold hard cash? We’re all ears for any suggestions.)

________________

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Page 1 of 3

Page 2 of 3
6. If you drive alone to work, would you be interested in participating in a commuter choice program hosted by your employer? Commuter Science is a 3-week program designed to help you explore the possibility of integrating biking, transit, walking, carpooling, or vanpooling into your daily commute—see attached page for more info.

- Yes, I’m interested in the program
- No, but I’m interested in obtaining more information about alternative ways of commuting
- No, I’m not interested in the program or obtaining more information

7. If you were to try something other than driving alone, what would be the mode you would likely choose?

- Bike
- Walk
- Transit
- Carpool
- Combined modes
  Describe modes that you would combine

What is the biggest barrier to you trying this mode of commuting?


Please return this survey by the end of the week.

If you indicated wanting more information about alternative ways of commuting, we will gather information specific to your interest and route and get it to you as soon as possible.

Thank you for taking the time to respond!
Thanks for agreeing to take part in this program! Your participation will help in the design of future services to support alternative transportation in our region. We also hope that the experience is useful to you in terms of finding a better way of commuting—one that is healthier, cheaper, more sustainable, and more enjoyable.

How this journal works
Each day, you will be asked a set of questions or given a prompt for something to do or try. Your responses in the journal will be kept confidential—only the team at CMU will have access to it in its current form. (Anonymous snippets may be shared with others after the program.) As nothing will be shared with your name on it, you are encouraged to write openly about your daily experiences.

Your completed journal should be handed in at the end of the 3-week program at the closing workshop on November 1.

Welcome!

What’s included?
- this journal
- commute diary
- cards & stickers for the bulletin board
- map of Pittsburgh
- personality cards
- rain poncho
- breath mints (in case you meet someone new)

Questions?
If you have any questions about anything in this journal or the process overall, feel free to get in touch with the program organizer, Brett.

Brett’s phone: (412) 760-3389
Brett’s email: bleber@andrew.cmu.edu

What’s excluded?
- personal data
- contact information

Your responses in the journal will be kept confidential—only the team at CMU will have access to it in its current form. (Anonymous snippets may be shared with others after the program.)

As nothing will be shared with your name on it, you are encouraged to write openly about your daily experiences.

Your completed journal should be handed in at the end of the 3-week program at the closing workshop on November 1.
About You

First Name: ____________________________________________

Age: ________________________________________________

Who lives with you?

Occupation: __________________________________________

Days and hours you typically work: ________________________

Do you have any pets? __________________________________

It’s day 1 of the program.

Your goal for the next 3 days is to fill out pages in the Commute Diary included in your kit. Put the diary in the bag you take with you when you go to work. It won’t take more than a couple minutes to fill out a page after each commute.

Filling out your Commute Diary

Complete one page for each one-way trip you make. If you can’t remember some details of your commute, take your best guess or leave the field blank. You can use approximate commute times and durations.

Note: You don’t need to change how you commute just because you are keeping this diary. If you were going to take the car, take the car. If you were planning to go by bus, go by bus.
Day 2. Commute Diary continued

For today, continue documenting your commutes.

Did you know?

36 Pittsburgh neighborhoods rank as a "walker’s paradise" or "very walkable" in an analysis at walkscore.com, a site that rates how amenable American cities are to pedestrians. A walker’s paradise means residents do not need cars, and four neighborhoods make the list: Central Business District, South Side Flats, North Oakland and Lower Lawrenceville.

A "very walkable" neighborhood means most trips can be made on foot. Rounding out the top 20, these neighborhoods are, in order, Bloomfield, Allegheny West, Uptown (Bluff), Oakland, Strip District, Allegheny Center, Shadyside, West Oakland, Polish Hill, Central Lawrenceville, Friendship, Crawford Roberts, Central North Side, East Allegheny (Deutschtown), East Liberty and Squirrel Hill North.

— Post-Gazette, Pittsburgh scores high on walkscore.com, November 22, 2010

Day 3. Commute Diary continued

Today’s the last day to document your commutes.

Did you know?

Each generation has produced more women who are riding and spending money on bicycles. Currently, 44% of Generation X bike owners and 60% of the Millennials who own bikes are women.

— http://urbanvelo.org/women-mean-business
Day 4. Time to reflect

Looking back at the last 3 days, what factors most often influenced your decision to choose your mode of travel? For example, if you usually drove, why did you drive?

Did you notice any days where you could have used a different mode of travel? Which days were they and why?

How do you think walking, biking, sharing a ride, or riding the bus will be different from driving? Choose a mode that interests you to compare with driving.

Choose 3 words to describe your commuting the past 3 days, or add your own.

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<td>Slow</td>
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References & Appendix

Day 5

Day 5 (part 1). Your experiment

Over the past four days, you’ve reflected on your current way of commuting. Now it’s time to shift gears and start thinking about your experiment.

For your experiment, what would you like to try and why?

Is this something you’ve tried before or thought about trying?

Describe a past experience where you tried this mode of transportation. What happened?

What expectations do you have about trying this mode of transportation?

How do you think using this commuting mode will affect your everyday activity?

Bike Commuting Skills Workshop

If you participated in the bike commuting skills workshop, how do you think your skill as a commuting cyclist is coming along? Please rate the following by circling a dot.

My ability to...

- do a pre-ride bike check
- repair a flat
- identify road hazards (car doors, potholes, etc.)
- give hand signals while riding
- position myself well on the road
- load my bike on and off the bus

Almost done! Keep going to the next page...
Did you know?
Every year, the typical Pittsburgh commuter loses $826 and wastes 39 hours sitting in traffic.
—Post-Gazette, February 5, 2013

Day 5 (part 2). My pledge for the week ahead

The time has come to try something new. What do you think is a reasonable commitment for the week?

This week, I will ________ for ___ days instead of driving.

bus / bike / carpool / walk

I will try this on:  M  T  W  Th  F  Sa  Su

The biggest barrier might be:

The biggest reward might be:
Day 6. Time to experiment!

This week, document 3 of your commutes in the Commute Diary. Try to include a couple days where you commute by bike, bus, walk, or carpool.

If you drive alone on a given day, think about what influenced your decision.
Using your senses

Describe or draw something you saw

Describe or draw something you smelled

Describe or draw something you heard

Day 7. Talk to a cyclist/bus-rider/walker/carpooler

Find someone at work who is using the mode of transportation that you are experimenting with. Ask them how long they have been using that mode and how they like it. Do they have any tips for you?

Notes about your meeting
Day 8. Bulletin board

Add a new commute card to the bulletin board at work (in the hall where everyone first walks in through security). There are some cards and stickers next to the bulletin board, and some came with your kit.

P.S. - You can add one of these cards whenever you feel like it, even if you drove alone.

Did you know?

A recent study examining the health effects of commuting mode found that cyclists were about 50 percent less likely to have diabetes compared to drivers, while people who walked to work were 40 percent less likely to have diabetes and 17 percent less likely to have high blood pressure compared to those who took their cars!

—CBS News, August 6, 2013
Did you know?

Marchetti’s constant is a term for the average amount of time spent travelling each day, which is approximately one hour (or 30 minutes each way). Even since Neolithic times, people have kept the time at which they travel per day the same, even though the distance may increase. So even though some people travel faster than others (by car instead of by foot), the distance varies so that they still spend the same amount of time travelling. How would you like to spend your 30-minute commute?

—Wikipedia

Day 9. Keep it up!

Add a new commute card to the bulletin board at work.

Don’t forget to record at least 3 commutes in the Commute Diary this week.
Day 10. T.G.I.F.

You made it to Friday—fantastic! Put an X in the box for each day where you commuted by bike, bus, carpool, or you walked.

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Tell a story about your best commute this week
(e.g., I biked to the bus stop a mile from my house, put the bike on the bus, and took the bus in—no problems.)

Tell a story about your worst commute this week
(e.g., I got a flat on my bike and had to walk a half-mile to the bus stop.)

“Change and growth take place when a person has risked himself and dares to become involved with experimenting with his own life.”
—Herbert Otto

Using your senses

Describe or draw something you saw

Describe or draw something you smelled

Describe or draw something you heard
Did you know?

Transportation accounts for more than 28 percent of America’s energy consumption and more than 25 percent of its air pollution. —pocommutes.com

Day 11. My pledge for the final week

This is the second and final week to challenge yourself. What do you think is a reasonable commitment for the week?

This week, I will _______ for ___ days instead of driving.

bus / bike / carpool / walk

I will try this on: M T W Th F Sa Su

What I’ll do the same:

What I’ll do differently:
Day 12-16. Think outside the book

From now through Thursday, focus on:

- Making any changes to your commute you think are useful for your final week of experimenting. Do you want to try a different mode or combine modes? Change when you leave home? Find and a different route to use?

- Check the bulletin board every couple of days, and add a commute card or two.

- Check in with some coworkers who are also participating. Ask them how it’s going.

Reminder
On Monday at noon, please join me for a special treat at the Science Center to check in and see how things are going.
Congratulations, and thank you!

Please take a few moments to provide feedback on this program. This can be about the journal, commute diary, workshops—anything from the past 3 weeks. You’ll also have the opportunity to give feedback during the final workshop on Friday, November 1.

Notes

Day 16. How’d it go?

Your second week of experimenting is almost over, and tomorrow’s the final workshop. Put an X in the box for each day where you commuted by bike, bus, carpool, or walking.

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Take your best guess for Friday (tomorrow).

Reminder

Final Workshop
Tomorrow!
Friday, November 1, 2013
12pm

Please bring this journal and your commute diary!

Almost done! Keep going to the next page.