Design of change in cycle commuting

Meeting Auckland’s regional cycle commuting aims for 2016

Stephen McKernon

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Abstract

Cycle commuting is well-recognised but marginal in most English-speaking countries, following considerable popularity in the first half of the twentieth century. In recent decades, it has found favour among transport policy makers as a part solution to problems arising from the dominance of the motor car. As a mode of urban transport, the bicycle offers public health, economic, social, ecological, and quality-of-life advantages to both users and non-users. Auckland was one of the first New Zealand cities to have a cycle strategy, but has seen a slow decline in cycling since then. This thesis investigates the nature of cycle commuting as a social phenomenon, using the social systems theory of Niklas Luhmann to develop an analysis of its culture and social dynamics in New Zealand. It then deploys a range of systems design tools, including scenarios, causal loop diagrams, and system dynamics modeling, to develop an understanding of how to foster cycle commuting in Auckland. The final output is a set of recommendations towards doubling the proportion of cycle commuters by 2016.

Acknowledgements

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WHAT IS THIS THESIS ABOUT?

The Auckland Regional Land Transport Strategy (2005) estimates some 340,000 people (equivalent to the population of Christchurch city) will have moved into the Auckland region by 2016. If car ownership remains as high as now, there will be 195,000 more cars. Traffic could increase by nearly 25 per cent, and congestion, pollution and other motor-related problems would then also increase.

The Strategy states cycling has significant benefits as a mode of transport, particularly for shorter journeys. About 18% of trips to work in Auckland are less than 2km, and 60% are less that 7km, meaning these are potentially cycling trips. However, more than half of Aucklanders describe cycling as unsafe, and only about 1% cycle to work.

The Strategy argues that building a comprehensive network of safe, pleasant, and direct cycle links is crucial. About 4% of Auckland’s land transport budget to 2016 is allocated to cycling via travel demand management, and the expected increase in cycle commuting from this budget is about 63% (corresponding to a growth rate of about 5% from 2006 to 2016). The national budget for cycle commuting is less than 1% of total transport budgets, so Auckland is making a significant commitment to cycling. The vision is to make cycling:

- Safe, direct and pleasant
- A natural choice for short journeys
- An increasingly popular mode (by numbers)
- An increasingly safe mode
- A mode with good infrastructure

Auckland Regional Council shares this vision and has set the aim of doubling the proportion of cycle commuters (adults traveling to and from work by cycle) from 1% of all commuters in 1996 to 2% by 2016 (though noting some documents use 2010 as the target date).

The Auckland region was one of the first in New Zealand to develop a Cycle Strategy, and this has been in operation since about 1980. But only about 1% of people in Auckland commute by cycle, half the national average. Any aim to increase cycle commuting in Auckland must acknowledge the slow decline in cycle commuting in spite of the Strategy.
Cycle commuting is of interest exactly because it is both familiar and marginal. Adult cycle commuting is chosen because they represent the smaller group of cycle commuters (children and youth being larger), and offer an avenue to reduce numbers of commuting car drivers. As a result, this thesis explores the issues raised by design of change in adult cycle commuting. It is distinctive in that it approaches cycle commuting:

- As a social phenomenon by asking ‘what is the culture of cycle commuting?’
- More specifically, through communication. It asks ‘how does cycle commuting organise itself through communication as a social system?’
- As a design problem, asking ‘how can cycle commuting be designed to optimise its culture and recruit new cycle commuters quickly?’

This thesis begins by formulating the problems posed by design of change in cycle commuting. The chapter outlines the current state of cycle commuting in Auckland and identifies the key challenges faced in trying to double the proportion of cycle commuters by 2016. A critical task identified here is the need to understand the culture and social dynamics of cycle commuting. It then explores design theories and research tools appropriate to design of change in cycle commuting and to understanding its culture, before identifying Design Research as the appropriate methodology. The social systems theory of Niklas Luhmann is then explored to theorise the culture and social dynamics of cycle commuting, and to identify opportunities for change.

The Design Research methodology starts with a social systemic analysis of the history of cycling and cycle commuting in New Zealand. This is followed by profiling of the specific causes for the increase and decrease of cycle commuting, and a study of the experiences of Auckland cycle commuters today.

The thesis then integrates these various research steps in change simulations, which model changes in cycle commuting as a social system, with emphasis on exploring interventions, identifying those most likely to contribute to the culture and dynamics of cycle commuting, and on those increasing the proportion of cycle commuters.

The final section integrates these various learnings into a four-part design for change in cycle commuting. This section and the thesis finish with specific recommendations for design of change in Auckland.
WHAT IS THE BEST WAY TO FORMULATE THE PROBLEM?

The sections that follow explore the challenges, theories, and analyses required to understand cycle commuting’s culture and how it can be influenced.
1. What is the status of cycle commuting today?

Most New Zealand commuters will have heard of cycle commuting, but only about 3% of all commuters nationwide cycle to work with any regularity, and only about 1% of Auckland commuters do so (Statistics NZ, Census 2001).

The table below compares different types of cycling in New Zealand in 2001, the first time in New Zealand that such detailed data is available. It combines Census Travel-to-Work data and SPARC (2003) leisure cycling data.

### Figure 1: Cycling in New Zealand

<table>
<thead>
<tr>
<th>% Commuters/ Cyclists</th>
<th>Percent of Total Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>Adults</td>
<td>7%</td>
</tr>
<tr>
<td>Men</td>
<td>9%</td>
</tr>
<tr>
<td>Women</td>
<td>4%</td>
</tr>
<tr>
<td>18 - 24 yrs</td>
<td>8%</td>
</tr>
<tr>
<td>25 - 34 yrs</td>
<td>7%</td>
</tr>
<tr>
<td>35 - 49 yrs</td>
<td>7%</td>
</tr>
<tr>
<td>50 - 64 yrs</td>
<td>9%</td>
</tr>
<tr>
<td>North Island</td>
<td>5%</td>
</tr>
<tr>
<td>South Island</td>
<td>10%</td>
</tr>
<tr>
<td>Greater Auckland</td>
<td>3%</td>
</tr>
</tbody>
</table>

The table shows about 15% of adults cycle on-road for recreation (as opposed to competitive riding), and roughly half this number again cycle off-road. This brings the total proportion of adults who cycle to 22%. About 7% of adult cyclists also commute by cycle, and this equates to about 1% of all adults (or about 3% of all commuters). Cycle commuting is a marginal activity, even among cyclists. Cycle commuters tend to be male, younger (under 35), and to be South Islanders.
The table below shows the percent of authorities (of total regional, distinct, city authorities) with a Cycle Strategy or significant transport plan for cycling, against the percent of cycle commuters and cyclists (as a percent of total populations). The red shaded cells are those that fall below the national average for that column. The table combines SPARC data (2003) with a review of authority websites for cycle strategy/transport planning documents (conducted March 2007).

The table indicates about half of the authorities (49%) have a cycling strategy or cycling-oriented transport plan. These plans are strongly oriented to urban transport, so travel demand and cycle planning is typically based on the 1.5% of adults who commute by cycle, rather than the 21% of adults who ride recreationally.

Note that authorities with strategies tend to be in regions where percentages of cyclists are lower, and vice versa. So for example, all the authorities in Auckland have cycle strategies and include cycling in their transport planning, though both commuting and recreational riding are well below the national average.

**Figure 2: Cycle strategies in New Zealand**

<table>
<thead>
<tr>
<th></th>
<th>% Authorities with Cycling Strategy</th>
<th>% Commuting/ Total Population</th>
<th>% Cycling/ Total Population</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New Zealand</strong></td>
<td>49%</td>
<td>1.5%</td>
<td>21%</td>
</tr>
<tr>
<td><strong>North Island</strong></td>
<td>47%</td>
<td>0.9%</td>
<td>19%</td>
</tr>
<tr>
<td><strong>South Island</strong></td>
<td>38%</td>
<td>2.5%</td>
<td>26%</td>
</tr>
<tr>
<td><strong>Greater Auckland</strong></td>
<td>100%</td>
<td>0.6%</td>
<td>18%</td>
</tr>
</tbody>
</table>

The first chart below (Figure 3: Changes in commuting 1971 – 2006) shows key changes in commuting over the years 1971 – 2006. The key changes are: (a) an increase in private car use (pink line), with (b) a decrease in public transport use (green line) and most other transport modes.

The second chart below (Figure 4: Summarising changes in commuting since 1971) shows the 35-year change (subtracting 1971 figure from the 2006 figure) is smallest for cycle commuting. That is, relative to other modes, cycle commuting appears the most stable over time.
Figure 3: Changes in commuting 1971 – 2006

Figure 4: Summarising changes in commuting since 1971
Data that is more detailed is only readily available for the late 1980s to the early 2000s. Statistics NZ Census data (1986 – 2001, the only years this data is available) show:

- An increase in the proportion of male cycle commuters – from 68% to 77%
- An increase in the proportion of cycle commuters 35 and over – from 29% to 46%
- An increase in the proportion of cycle commuters who are professionals – from 25% to 32%

Ministry of Transport Household Travel Surveys (1989/90 and 1997/98) also show increases in cycling among older men, as well as increases in average distances cycled. While the total number of cycle commuters has been relatively stable over the last 35 years, there are signs of a shift within cycle commuting towards proportionally older, wealthier males in professional roles. This might arise through the stabilising of cycle commuting around a core group, exacerbated by a steady drop in the number of younger cyclists starting to ride to work.

The above profile is consistent with broad shifts in cycle commuting in other English-speaking European countries including Canada (Pucher and Beulher, 2005), the United Kingdom (Department for Transport, 1996), and the United States (Stinson and Bhat, 2003; Pucher, Komanoff, Shimeck, 1999; Moritz, 1997). For example, in Canada leisure cycling among older age groups doubled from 1991 to 2000 (Pucher & Beulher, 2005).

These countries share with New Zealand the difficulties of developing and implementing cycle strategies. For example, cycle strategies are common but significant funding of cycle commuting projects is minimal and sporadic. The highest levels of cycle commuting in these countries are associated with mixed-use development, which reduces motorised traffic, enables use of cycles for the shorter trip distances, and then encourages provision of cycling infrastructure. It appears these two factors interact, and for example, cycle commuting is three times higher in the intensified development patterns of Canadian cities than in the more expansive cities of the United States (Pucher & Beulher, 2006).

Non-European countries such as China and India have enjoyed considerable emphasis on cycling as a mode of transport for lower-income communities, and for example, in China in the late 1980s bicycles outnumbered cars by 250 to 1, though the ratio has dropped since (Peng, 2004). Cycling in these countries is socially and economically important in ways that make direct comparisons with New Zealand difficult. For example, in some Chinese cities private and public transport have been promoted at the expense of cycling (Zacharias, 2002). This thesis therefore focuses on comparison with European countries, and English-speaking countries particularly.
2. What are the challenges of increasing cycle commuting?

In a recent review of major European energy-related social change programmes, Greer, Jonkers, Smits, Gorts, Papadopoulou, and Begley (2001) report that about 75% claimed some form of success, but less than 20% were based in any theory, set of design principles or relevant research, and under 10% contributed to theory in any way. Most ceased after a few years, and very few measured their specific impacts. Overall, a commitment to design of the programme itself was important in less than 5% of the programmes. In this sense, it is worth questioning what sorts of success these programmes claim: in fact, most define success as an appearance of the programme in mass media and/or assumed public awareness of the programme. That is, success expressed via measured programme outcomes is rare.

A systemic review of programmes to promote travel behaviour change found similar results, suggesting that targeted behaviour change programmes are most effective among commuters who are already motivated to change. Of the programmes studied, 18% achieved a significant positive effect: the successful programmes saw increases in journeys made by bike of 5% at a population level, and the more usual rate was closer to 1% per year (Ogilvie, Egan, Hamilton & Petticrew, 2004). That is, the available measures of success suggest rates in the order of 1% increase in cycle journeys per year might be expected.

This suggests the Auckland Regional Council’s aim of doubling (increasing by 100%) the proportion of cyclists by 2016 is very ambitious. The aim is achievable at a 5% growth rate per annum from 2001 to 2016, but anything less than this falls short. And in fact, since 1981 cycle commuting’s growth rate in Auckland has been -1.9%. The challenge is not only to achieve a significant growth rate, but to achieve this from a context of decline.

2.1 What are cycle commuting’s current influences?

Studies of cycle commuting in European countries suggest three factors influence the level of cycle commuting:

- Transport infrastructure (such as road design, road signs, and road rules),
- Transport strategies and their implementation, including those specific to cycle commuting as well as those relating to reduction of motorised traffic, and
- The characteristics of cycle commuters themselves.
The table below uses two research summaries to present key influences in cycle commuting today, using arrows to denote whether a specific variable increases or decreases cycle commuting (and a double-headed arrow where the direction of change depends on other variables).

**Figure 5: Influences within cycle commuting**

<table>
<thead>
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<th>Factors Influencing Cycle Commuting</th>
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<tr>
<td><strong>Transport infrastructure</strong> ¹</td>
</tr>
<tr>
<td>† Cycle infrastructure funding</td>
</tr>
<tr>
<td>† Pro-cycle road design</td>
</tr>
<tr>
<td>† Cycle-specific lanes/ paths</td>
</tr>
<tr>
<td>† Pro-cycle road traffic laws with</td>
</tr>
<tr>
<td>enforcement</td>
</tr>
<tr>
<td>† Work facilities (e.g. showers)</td>
</tr>
<tr>
<td>† Parked cycle security</td>
</tr>
<tr>
<td>† Mixed-use urban development/</td>
</tr>
<tr>
<td>population density</td>
</tr>
<tr>
<td><strong>Transport strategies</strong> ³</td>
</tr>
<tr>
<td>† Cycle policy/ strategy</td>
</tr>
<tr>
<td>† Promotion of cycle commuting</td>
</tr>
<tr>
<td>† Restriction of car use</td>
</tr>
<tr>
<td>† Pro-cycle motorist education</td>
</tr>
<tr>
<td>† Non-cyclist perception of risk</td>
</tr>
</tbody>
</table>


↑ denotes a factor that increases cycle commuting
↓ denotes a factor that decreases cycle commuting
↕ denotes a factor that has varied impacts

In general terms, cycle commuting literature is strongly oriented to evaluating methods of increasing the safety of cycle commuting, design of transport infrastructure (such as path or road design), and promotional campaigns. In parallel, the social change thinking of transport and local authorities has been oriented to increasing cycle commuter numbers through provision of infrastructure that improves safety and convenience. Cycle strategies worldwide are generally focused on cycling as transport – of which youth (school) and adult (work) cycle commuting is an
important part. That is, strategies focus on the peak hour, on-road risks of cycling. In Auckland, this currently translates into building cycle lanes and paths, adding signage, and providing maps.

However, an American study (Nelson & Allen, 1997) on the impact of new cycle paths and lanes on cycle commuter numbers suggests a 0.069% increase in cycle commuters per 100,000 people for every mile of cycle path or lane built. In the Auckland context, and assuming similar causality, this would mean an increase of 67 cycle commuters for every new kilometer of cycle lane or path, or an increase of about 1.1% by numbers of cycle commuters. To date, Auckland’s infrastructure consists of some 20 km of disconnected paths and lanes, though current and future programmes will improve its continuity (Auckland Regional Land Transport Strategy, 2005).

There have been some shifts in recent years. Last year (2006) saw New Zealand’s first Community-Based Social Marketing conference for the transport sector specifically1. This milestone event signals increasing acceptance of social change (as opposed to infrastructure) programmes within transport planning. Parallel evolution in transport strategy is occurring at the national level: for example, the country’s first national walking and cycling strategy was formalised in 2005. Called ‘Getting There: on foot and by cycle’, it included a marketing and communications task force, charged with promoting walking and cycling to local authorities in the first instance. Further, specific districts, such as Christchurch and Taupo, have had specific, area-wide pro-cycle and cycling safety marketing campaigns, though Auckland has yet to witness the equivalent. It is not yet clear how such programmes might be deployed to build cycle commuting in Auckland.

Cycle commuting has been relatively stable for the last 35 years: as noted above, it is the most stable of all the modes since 1971. In the language of sustainability, this group has ‘made a difference’ for its whole history in New Zealand, and more recently this has been against all trends in transport and in spite of minimal support. Today’s cycle commuters appear to be a self-generating, self-maintaining group, albeit one with apparently minimal in-group social interaction. Existing cycle commuting is therefore interesting for its stability alone, but it also offers the chance to learn about evolving a more sustainable transport sector from people who are doing it already.

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2.2 What is the key problem on which to base design of change?

The key problem of interest in this thesis is therefore to study and understand cycle commuting’s stability, and in this context, to understand how best to increase the numbers of commuters significantly without compromising its stability.

Two recent sociological studies suggest such stability is a product of cycle commuting’s own internal culture, and this culture must be understood to influence change successfully.

Ebert (2004) shows cycle commuting in Holland has always been underpinned by strong links between cycling and national identity. This resulted as a natural outcome of cycling’s popularity, and at times from deliberate moves by cycling organisations and successive governments to embed cycling in Dutch culture. Dutch commuter cycling is a national icon with ongoing social, political and institutional supports, such that Dutch commuter cyclists enjoy an identity celebrated internationally. But it is also worth noting that even Dutch cycle commuting has been threatened by the rise of the motor car. It survived the worldwide decline in cycling from the 1960s to 1980s through the activity of the Dutch Union of Cyclists (ENFB), formed in 1975 to lobby for cycling and against motorcar use. As a result, Ebert notes about 30% of Dutch commuters now cycle to work.

That is, Dutch cycle commuting’s culture is paradoxically both a focus for nationalism and activism. In general terms, the pattern worldwide suggests it is the activism that has the greater effects and holds more promise for cycle commuting. For example, Sirkis (2000) alludes to the Dutch experience in noting the constant pressure of green and NGO lobby groups was the key to development of cycle commuting infrastructure in Rio de Janeiro.

Cox (2005a) analyses cycling in the United Kingdom’s to argue that cycling policy is at odds with cycle commuting’s culture, and this limits the success of current social change programmes. Cox begins by identifying four distinct cultures within cycling: children’s cycling, adult recreation, adult competition, and adult commuting. He points out the dominant culture by weight of numbers is the recreational, though competitive cycling has a major influence through equipment and the popularity of amateur events. Cox then suggests the culture of cycle commuting is one of relative drudgery and mundane routine, so providing no powerful appeals in comparison to other cycling codes. He suggests that top-down policy-driven attempts to promote cycle commuting miss this issue entirely, so placing policy in conflict with the culture of cycle commuting.

To extend Cox’s argument, though policy-makers and cyclists agree on the need to increase numbers, policy-makers are promoting the benefits of cycle commuting to people who see it as
dangerous, and worse, as boring and frustrating. The cyclist’s own agenda might therefore be to make cycle commuting easier and much more interesting and enjoyable than at present. Policy-makers would need to ask, why would anyone want to cycle to and from work in peak hour traffic in Auckland? Why exactly has cycle commuting remained attractive to a small group of cyclists in Auckland for over 35 years? How can cycle commuting be made more enjoyable?

In this context, if the culture of cycle commuting is unclear, current programmes promoting cycle commuting must also be in doubt.
3. How can design of social change be theorised?

Systems theorist Glanville (1999) argues that design disciplines are pivotal where social issues feature complexity and changes over time in the problem, the solution, the social environment, and potentially, specific outputs. Design is critical because its role is to anticipate changes in complex systems, and to design interventions that achieve desired outcomes in a context of change. For example, in a complex environment interventions can have unintended consequences including resistance to change. Design disciplines therefore invoke an appreciation of complexity and interdependence, and are necessarily oriented to exploring the best means to achieve desired changes.

This notion of design directs social change designers to ask how complex systems can best be understood. Social phenomena have interactions that can be discerned, for example, as patterns of causes and effects over time, some between the phenomenon and its environment, others within the phenomenon itself. An important issue is how the workings of these causes and effects can be represented. This notion also asks how complex systems can best be influenced: the effects of interventions within the system need to be explored before the optimal combinations are selected.

Design theorist Simon (1996) argues for a design as a ‘science of the artificial’, namely a science which recognises that all social phenomena are ‘artificial’. Social systems are not fixed or given, but are constructed through social change processes over time. Design of social change is then a discipline for anticipating a more productive future configuration of a social system. In design of social phenomena, Simon argues for ‘design without goals’, by which he means design in longer-term, complex, changing, and interactive social systems where interim goals must constantly be updated.

In the context of cycle commuting, a ‘science of the artificial’ first means acquiring knowledge about cycle commuting as a social phenomenon to build an understanding of how its own versions of change work over time. It then means exploring how cycle commuting can best be influenced to increase the numbers of people who participate, while also remaining self-sustaining.

Simon proposes a design process beginning with the constructing of realistic futures to profile the desired outcome, assess the conditions for its success, and identify unexpected and/ or limiting consequences. Simon emphasises the future of a social system is always uncertain, but its most likely configurations can always be profiled. Given adequate knowledge of its likely future
configurations, he recommends developing a range of initial design criteria to span different future scenarios. Design of interventions can then take place, based on these criteria, that also respond to shifting social conditions over time. For example, such interventions might include programmes to increase cycle commuting where cars switch from fossil to more sustainable fuels, and thus where the case against the 'unsustainability' of cars might be significantly weakened.

Banathy (1996) takes up these themes in suggesting that social phenomena are best approached as 'systems'. He draws on Checkland (1981) to characterise social systems as those in which human activities are coupled with processing of information (about these same activities), so creating a social structure defined by purposes, communications, activities, and effects. Banathy notes that social systems tend to express more purpose and better effects for their activities than might be found in the real world. In this sense, social systems are communication systems: they organise and communicate the purpose, value, and effects of their activities, even if these effects are not fully realised. Banathy recommends a multi-dimensional approach to social change, in which impetus for change is built across a number of projects focused on critical points and paths of change. Where social phenomena are complex and change slowly, change programmes must offer an equivalent complexity.

### 3.1 What systemic frameworks are available?

A number of frameworks are available for conceptualising change in social systems. Two early systemic templates for change remain useful. First, Watzlawick, Weakland, and Fisch (1974) draw on Gregory Bateson's (1972) seminal applications of systems thinking to social phenomena. They propose four different operations, namely ones that:

- **Add or increase the level of components** (such as adding new workplace and roading provisions for cycle commuting, or removing central city car parks)
- **Change the sequence in which components are combined** (such as demoting funding of infrastructure for cars, and promoting funding for other modes)
- **Make no difference** (such as promoting cycle commuting in the absence of any other changes - perhaps to appear active while actually continuing the status quo)
- **Subtract from or cancel out others** (such as promoting both city car parking facilities and cycle commuting, in which case the dominance of car commuting is further supported by car parking facilities, and effectively prevents or cancels out any increase in cycling)
Design of Change in Cycle Commuting

- Change the way the system itself is organised (such as changing roading criteria or the way cities are designed)

A difficulty with this approach is that it is oriented to interpersonal relationships within families and other small groups, and does not provide tools for analysis of the culture and dynamics of larger groups. Drawing on ecological theory and systems studies, Meadows (1977) suggested nine different leverage points within a system, listed below in order from easiest to hardest to achieve:

1. Component parameters (such as increasing the total budget for cycle commuting projects, or increasing the petrol tax)
2. Stocks and flows (such as increasing the numbers of cycle commuters)
3. Regulating negative feedback loops (such as lowering the urban traffic speed limit, so regulating the dangers to cycle commuters)
4. Driving positive feedback loops (such as promoting the physical, social, and economic benefits of cycle commuting, so building positive feedback about existing cycle commuters)
5. Building information flows (such as increasing technical and public information about the unsustainability of cars available within the transport sector)
6. Changing the rules of the system (such as introducing tax incentives for cycle commuters)
7. Enhancing self-organisation (such as enabling cycle commuters to specify and obtain the roading and workplace facilities they need)
8. Changing the goals of the system (such as setting the goals of attaining a specific level of sustainability in transport, and of increasing the transport sector's sustainability by a specified increment each year)
9. Changing the mindset of the transport sector (such as shifting away from a pro-car commuter transport mindset)

The difficulty with this approach is also that it provides no tools for understanding social phenomena so as to identify points of leverage. This means both approaches offer significant frameworks for managing change, but lack the tools for applying them to social phenomena. As noted, this exact problem characterises social change programmes worldwide (Greer et al., 2001; Banathy, 1996).

Organisational change practitioner and theorist Argyris (1980) argues that a central problem in design of social change is actually the poor understanding of what constitutes a robust theory of
social change. Argyris’ argument turns on his observation that the theories of social change people use in reality embed the same social dynamics that keep problems stable, namely:

- Unilateral definitions of the purpose or goals for change, resulting in ambiguous notions of change (rather than definitions that are collective and so transparent to all concerned)
- Winning in debates and conflicts to assert control over change (rather than discussing to consensus and managing change collectively)
- Suppressing negative feelings about change to mask defensiveness and resistance, and the fact that the masking itself is taking place (rather than opening change to resistance and evolving transparency)
- Emphasising rationality in learning about the unilaterally-defined change (rather than learning about how change might work on emotional, social or political dimensions)

To paraphrase Argyris’ observation, interpersonal competition and organisational politics prevent or divert meaningful change. Argyris distinguishes between two types of change theories: a theory-in-use (a theory that embeds the above problems) and a theory-in-action (a theory that exposes and deals with them). His notion of an action theory therefore turns on double-loop learning, or learning about the ways change itself is conceptualised and managed, and so learning about the ways it can be understood and managed better. The key criteria for a well-developed action theory for a given change programme are therefore (1) that any/all topics can be discussed, and (2) any/all learnings about the ways changes can be understood and managed are also discussed.

Argyris’ approach to change is therefore strongly social and strongly oriented towards understanding and managing processes of communication. However, there are two practical difficulties in applying his approach.

First, in the context of cycle commuting, a range of transport authorities are involved, including central government (Transit NZ, Ministry of Transport, Land Transport NZ) and local government (regional, district and city councils). This makes the task of developing an action theory complex, especially as a government-sponsored change programme might be highly vulnerable to the same problems with the change process that it sets out to manage.

Second, Argyris’ work is also difficult to transfer fully to social phenomena such as cycle commuting, where the desired actions (such as more people riding to work) occur in the absence of a
coherent social group, defined social infrastructure, or forum for communication. That is, the problem with understanding cycle commuting as a social phenomenon is again at issue.

3.2 What systemic framework should be central?

A different approach to the problem is provided by von Hippel's (2005) work on user-based innovation, in which innovations developed by existing product/service users are made freely available to others.

Von Hippel's initial studies showed that user-based innovation in commercial markets was economically significant (though hidden), very productive when fostered by businesses, and provided a more effective innovation process than confidential commercial approaches.

He then argued that user-based innovation is more economically and socially sustainable because its core drivers are user problem-solving, inter-user communication, and user benefits (rather than business profitability), and these drivers constitute a robust business model in themselves. He has developed the concepts of 'democratised innovation' and 'innovation community' to highlight design as a collective, collaborative, and communication-centered process.

One small example of this approach is Electra Bikes' (see www.electra.com, accessed March 2007) design of commuter cycles to allow riders to place both feet on the ground without getting off the bike, so making stopping and starting at lights much easier and safer. Observation of cyclists trying to stop/start would be enough of a clue to the issues involved, and Electra's whole range of stylish urban bikes is based on this simple innovation. Use of web-based contact databases and communications means Electra Bikes can manage an innovation community relatively easily.

Von Hippel's notions of democratised innovation and an innovation community provide a systemic framework for exploring design of social change, in the full sense of anticipating the future of a social system, because his approach provides a methodology appropriate to engaging with social phenomena in ways consistent with Argyris' notion of a theory in action.

The one difficulty with von Hippel's work is his notion of an innovation community does not include the culture or dynamics of the community – in this case, of cycle commuters – because his focus is product and service development. That is, the recurring problem across all these approaches is how to understand the workings of a social group with regard to creating change in the group.
For example, there are some 5,000-odd cycle commuters in Auckland today, but it is not clear how these people initiate or maintain their cycle commuting, how they resolve problems, and what social or technical ‘innovations’ they have made to keep their commuting stable, nor whether they have shared this with others. It is also not clear how an increase in cycle commuters affects its initial stability. For example, might a sudden increase lead to longer-term instability? Understanding the culture and social dynamics of Auckland’s existing cycle commuters is an important way of learning how to help others take it up more quickly, easily, and safely. It is also critical if change is to be designed in ways that contributes to cycle commuting’s longer-term culture, dynamics, and numbers.

If von Hippel’s design framework is to be central, this thesis needs a means of theorising and analysing social phenomena with respect to change. As a result cycle commuting is approached through the work of Niklas Luhmann (1927 – 1998), the quintessential German social systems theorist. Luhmann (1995) defines social systems as social phenomena constituted in and by communication. Social systems are not passive, but are actively designed through communication about their own social function and meanings, and through the system’s own reflections on this communication, and so also through a self-induced evolution of its own meanings for itself.

Luhmann’s communication-centered approach is useful because it allows exploration of the evolution of cycle commuting from a primary mode of urban transport to the marginalised mode it is today. This historical approach can highlight why cycle commuting is marginalised, not just in comparison to motorised traffic, but in relation to other forms of cycling as well. It can also identify the range of changes and change processes already available within its social system. Luhmann’s approach also provides a set of social change design concepts, including the central notion of autopoiesis (which denotes a self-generating evolutionary social system).

From Luhmann’s perspective it is quite possible that cycle commuting already ‘knows’ how to increase the numbers of people who participate in it as a system: the issue is how to mobilise this knowledge for people within the system, and to translate it for people outside the system. In other words, Luhmann’s approach is highly productive for understanding and organising systemic change.

The section that follows details a methodology appropriate to design of social systems.
4. What is the appropriate methodology?

The aim of this study is to design change in cycle commuting in Auckland to support a doubling of the proportion of cycle commuters by 2016. Three key research questions are therefore:

- How does cycle commuting work (as a social system)? What drives change in the system?
- How can change be designed and directed in cycle commuting?
- What specific changes should be targeted to achieve the aim of doubling the proportion of cycle commuters by 2016?

In approaching these questions, it is important to note the problems of research for design of social change parallel the problems of theorising design and change. Research for design of social change needs to encompass the complexity of a social system, enable exploring of its workings and potential change processes, allow for changes in the social system over time, and enable assessment of the impact of interventions within the system. It also needs to include single- and double-loop learning about research itself. This calls for a research methodology that uses different methods, in that the range of tasks involved cannot be addressed with one method alone. As Simon (1996) notes there is a good case for avoiding reliance on one method in research and design of complex social phenomena, as a range of design problems will be presented, and the design process should not be guided by choice of a single research method.

In recent decades a generic methodology has evolved to serve research for design of social change, a methodology sometimes referred to as ‘design research’ (Cross, 1999). Design research differs from conventional research in two ways. First, it is a collection of methods serving the activities of design. These methods are ultimately creative – they are oriented to understanding how to design optimal solutions. Second, it does not seek to predict outcomes. Rather, it seeks to understand processes, and how change processes arise, and can be designed and managed.

For example, this approach may lead to a social change programme that reinforces changes promoting desired outcomes, while limiting changes that might prevent them. That is, the outputs are systemic (they match the complexity of the system in question), strategic (focusing on points of greatest leverage), and flexible (the specific focus may change as initial measures succeed, or as the system’s environment changes, or as the programme learns to manage change better).

In the context of this thesis, the methodology involves four key steps, as outlined below.
1. Problem formulation - exploring the system to understand how the problem is defined and arises for the social system

2. System analysis - exploring the workings of the system to understand the problem’s causes, effects and changes over time

3. Change simulation - developing a realistic working model of the system, including how different changes might work within the system and what their consequences might be

4. Change programme synthesis - designing a programme of change appropriate to the system, the problem and the desired outcomes

The methodology also provides a range of methods, such as those outlined below, in their rough order of relevance within this thesis:

- Problem structuring processes – organising the problem in terms appropriate to the social system and the desired outcome (Checkland, 1981; Jonassen, 2001)
- User research - exploring the problem, system and potential solutions from the experiences of current system participants (von Hippel, 2005)
- Visible thinking - using interview learnings with participants to validate researcher learnings and leverage double-loop learning within the interview context (Bryson, 2004)
- Social system research - how the system arose and why it works the way it does, how the problem arose and how past attempts to resolve it have failed, and what resources, ideas or solutions are already available within the system (Luhmann, 1995)
- Causal loop models – using research to build a conceptual model of a system’s internal causes and effects, including those for possible social change processes (Anderson and Johnson, 1997)
- Dynamic system models – using research to build a data-based stock-and-flow model of a system’s existing workings, including possible social change processes and outcomes (Sterman, 2000)
- Scenarios – using research to build a set of equally realistic futures to profile the future conditions, strategies and outcomes for change initiatives (van der Heijden, 2005)
- Learning – formalising and updating theories-of-action to ensure double-loop learning is enabled (Argyris, 1980)

The design of the overall methodology and use of other specific methods is outlined below.
4.1 What design research methods should be used?

As noted, the overall aim is to double the proportion of cycle commuters by 2016. That is, the key outcome is a doubling of the proportion, and the key output of the study is design of a strategy for achieving this goal.

As noted in the previous section, a key gap in the cycle commuting literature is the lack of understanding of cycle commuting as experienced by existing cycle commuters. In this sense the literature is not clear why people cycle commute now, how they manage their cycle commuting, and what social innovations are already available to help increase the proportion of cycle commuters.

The first major question is therefore ‘how does cycle commuting work (as a social system)? What already drives change in the system?’ To address this question, the thesis first details Niklas Luhmann’s (1995) theory of social systems to enable appropriate analysis of cycle commuting as a social system. It then constructs a brief history of cycle commuting in New Zealand and provides the results of qualitative research with existing cycle commuters (von Hippel, 2005) to formulate the problems posed for cycle commuting in detail (Checkland, 1981). It also helps identify social innovations - resources, ideas, and solutions - already available within its system (von Hippel, 2005).

The second question to address is then ‘how can change be designed and directed in cycle commuting?’ To address this question, the thesis then develops causal loop diagrams (Anderson and Johnson, 1997) to model the dynamics of change within the system of cycle commuting, and to identify points of leverage. The study also develops three brief scenarios to explore the conditions for success in Auckland’s future transport environment. These are integrated in a full causal loop model detailing the workings of the transport sector in relation to change in cycle commuting. A small system dynamics model (Sterman, 2000) is also developed to simulate cycle commuting’s social system and explore how specific interventions impact. That is, the system dynamics model allows testing of change strategies and learning about optimal configurations.

The last question to address is ‘what specific changes should be targeted to achieve the aim of doubling the proportion of cycle commuters by 2016?’ This question is addressed by first re-visiting the initial research aim and questions to engage double-loop learning and evolve a more robust theory-of-action. Learnings from throughout the study are then integrated to suggest a final design for change in cycle commuting as a social system.

The specific research methods used in this study are detailed below.
4.1.1 Researching scenarios

There is no central source of data on cycling and cycle commuting in New Zealand. A database of cycling and cycle commuting in New Zealand was developed by sourcing primary data on manufacturing and imports from New Zealand Yearbooks and New Zealand Censes since the introduction of cycling in the 1870s. This was cross-referenced against ad hoc city council surveys and anecdotal industry information about numbers of cyclists and cycle commuters, also from the 1870s onwards. The New Zealand Census also introduced a Travel-to-Work question in 1971, providing more accurate assessment of numbers of cycle commuters since that date.

This enabled development of two types of scenarios. The first are historical profiles of the numbers of cyclists and cycle commuters in New Zealand and in Auckland, providing a robust base for understanding the history of cycling in New Zealand, and modeling the dynamics of cycle commuting as a social system. The second are the three future Auckland transport scenarios developed to provide a realistic context for any changes in cycle commuting.

An important resource for these tasks was Kennett and Kennett’s (2005) milestone work Ride: The History of Cycling in New Zealand. It approaches cycling systemically, tracing its development across community, industry, technology, and policy, and providing a wealth of primary statistical and cultural evidence.

The second are the explorations of Auckland’s future transport dynamics in the later chapters of this thesis. Three basic scenarios for cycle commuting to 2016 were developed as an extension of the historical profile, and with best case/worst case Auckland transport futures in mind. Analysis of long-term patterns suggested the rate of change from 1996–2006 is an accurate approximation of the likely rate of change from 2006–2016, and this is corroborated by projections in Auckland’s Regional Land Transport Strategy (2005).

4.1.2 Researching current cycle commuters

Qualitative research (Willig, 2001) was used to explore the experiences and ideas of existing cycle commuters, and to ground Luhmann’s theory of social systems in the observations and language of Auckland cycle commuters. The approach below was approved by both Unitec Research Guidance Committee and Unitec Ethics Committee in 2006.

Ten Auckland cycle commuters were recruited for this part of the study. Of the ten, five were established (long-term) cycle commuters, and five were more recent adopters. Seven were male
and three were female, and ages ranged from the late 20s to the late 50s. These cycle commuters represented a mix of routes within Auckland, commuting by cycle from the North Shore, Titirangi, St Heliers, Remuera, Onehunga and Mount Eden.

These people were recruited using simple invitation advertisements in cycle shops, invitations attached to parked cycles in Auckland city, and a personal invitation while waiting at traffic lights on Tamaki Drive (east side of city), Broadway (Newmarket) and Great North Road (Point Chevalier). They were provided with an overview of the study and agreed to the conditions of the study by signing a consent form prior to the interview.

They were interviewed in person and each interview took about one hour. Interviews were conducted at a time and place that suited the participant. It was audio-recorded with their consent and notes were made of these recordings. Their experiences and suggestions are provided in the chapter entitled How do Auckland’s cycle commuters experience commuting by bike? (p. 130). No tokens of thanks/koha were offered, but the researcher agreed to provide a one-page summary of the results.

The initial questions asked are provided below: note that follow-up questions were used to explore points in cyclists' experience that were useful for the study.

- How did you start cycling to work? What started you off?
- How does your cycling work - how do you organise it?
  - How do you know when to cycle and not cycle? What makes you and prevents you cycling?
  - How do you organise it day by day (or week by week)?
  - What things have you tried out to make cycle commuting work better for you?
- What are the effects of your cycling for you?
  - What are the effects of your cycling for others at work and at home?
- What would it take for you to cycle to work every day? What would you need to make this possible?
  - What would you need to be able to convince others to cycle to work every day?
- What would make cycling work better for yourself and others, from your own experience?
As noted above, causal loop diagrams and visible thinking tools were used with participants during the interview to help visualise the workings of cycle commuting and any changes they suggested. They were also asked to comment on researcher learnings, reflect on what they and others had said, and draw conclusions about cycle commuting overall. That is, every attempt was made to make researcher learnings explicit, validate and evolve these through double-loop learning processes within the interview.

4.1.3 Researching cycling as a social system

This task was carried out in two phases. First, the work of Niklas Luhmann was explored and a summary of his concepts and analysis/synthesis tools developed. The history of cycling and cycle commuting in New Zealand was then analysed using Luhmann’s tools to develop a detailed account of cycle commuting as a social system.

This required analysis of historical sources spanning New Zealand, the United Kingdom, and the United States. New Zealand data from Kennett and Kennett’s (2005) history of cycling in New Zealand and from the New Zealand Yearbooks, Censes and ad hoc surveys (outlined above) were also integrated. A review of media advertising was conducted through analysis of spring and Christmas (November and December) advertising for cycles in the New Zealand Herald in the census years from 1871 to 2006. This provided specific detail on cycling’s portrayals in New Zealand over time.

4.1.4 Developing causal loop and dynamic system models

The above data and analyses were used to develop a causal loop model of cycle commuting as a social system, to show how the system worked, how change arose and how causes and effects worked. This model was then evolved into a dynamic systems model, a key step being the integration of data from Censes and survey sources. This enabled a fuller simulation of the workings of cycle commuting as a social system, including exploration of interventions with the most significant impact.

4.1.5 Integrating learnings

The final section in this report integrates learnings about design of change in cycle commuting, covering both learnings about design and research, as well as learnings about influencing change in cycle commuting. As noted, the methodology strives to build double-loop learning by use of methods that integrate and evolve learnings.
5. How are social systems theorised?

The section that follows describes Niklas Luhmann’s social systems theory. It begins by introducing Luhmann’s work and then outlines the key concepts used in detailing his social systems theory. It then discusses his methodology and tools for analysing social phenomena. Examples from cycling are included throughout to build an initial understanding of cycling in the social systems context.

5.1 Who was Niklas Luhmann?

Niklas Luhmann (1927 – 1998) was born into a middle-class family in Lüneberg, Germany. Following high school he was conscripted in 1944 and taken prisoner of war by the American Forces. From 1946 to 1949 he studied law in Freiberg, and then worked for ten years as an administrative lawyer in Hanover. In 1962 he gained a scholarship for Harvard and studied sociology under Talcott Parsons. In 1968 he was appointed professor of sociology at the newly established University of Bielefeld, where he remained until his retirement. When pressed by colleagues to describe his research programme, his now-famous answer was ‘the theory of modern society: duration 30 years; no costs.’ In 1997 he published his final work, entitled Die Gesellschaft der Gesellschaft (The Society of Society). He died in 1998, a year later, having published over 14,000 printed pages on social systems theory during his career (Bechmann & Stehr, 2002).

5.1.1 On reading Luhmann

There are three major issues with reading Luhmann in the context of this thesis. It seems sensible to highlight these prior to discussing Luhmann in more detail, in part to guide reading of the sections that follow, but perhaps more importantly, to forestall some objections to Luhmann himself.

First, Luhmann’s programme involved him in a style of reasoning and an evolving of philosophical distinctions uncommon in sociological literature, especially where his concern was to provide a terminology appropriate to a new theory of modern society. Luhmann is remarkably widely-read, drawing on a wide range of theoretical resources, and his argumentation as a result is often sophisticated. Having said this, his arguments and occasional examples provoke remarkable insights, and his examples in particular are laced with an unexpected, wry humour.

The penultimate sentence of his final work refers to ‘sacrificing the pleasure of familiar ideas for the rigour of theory construction judged on its own terms’ (cited in Lee, 2000, p. 330). This sentence is
telling in relation to much criticism of his work, as many prefer to admonish, re-formulate or extend his work ‘from the pleasure of familiar ideas’.

Second, most of his books were written in German, a language the author does not understand. Most of Luhmann’s key articles and books have been translated, but his last two-volume work has yet to be (and by all accounts it is a final summary of his thinking). Much of the significant literature on Luhmann has also been in German, including many contemporary web-based resources. His major commentators can thankfully now be found in English, though many seminal and historically useful commentaries are still only found in German.

The most direct approach to Luhmann’s theoretical work is his Social Systems (1995), which is reportedly a full and accurate representation of his ideas (Lee, 2000). These are extended through his more practically-oriented studies, of which English translations of Risk: A Sociological Theory (2005), The Reality of the Mass Media (2000), and Love as Passion (1998) are most relevant to this thesis (so leaving aside his studies of law, for example). This reading has been supported by recourse to other works, such as Art as a Social System (2000) and Ecological Communication (1989) to explore specific concepts.

Finally, the third issue with reading Luhmann is how to best articulate and apply his social systems concepts and tools to increasing cycle commuting in New Zealand. The problem is not whether Luhmann’s theory is the right one for the task, as this is relatively easily addressed. The more important issue is the best way to apply the tools he details in his more practical works. In particular, Luhmann’s work does not lend itself to optimistic views of social change; rather, it demands a level of discipline in working through how change actually works in a given system.

Luhmann’s conceptualising of social systems is sophisticated and complex, and in this context, is encumbered by difficulty understanding his nuances via translation. So it may be surprising that once mastered, his tools are remarkably simple to apply and adapt to as small an issue as the future possibilities of cycle commuting in New Zealand. Luhmann’s more practical case studies (see above) provide a methodology, a range of research strategies, and a set of foreseeable outputs.

5.1.2 An overview of Luhmann’s theory

In a 1991 lecture, Luhmann (2006) summarises his theory of social systems through four concepts:

- The system is the difference between system and environment
A social system arises in distinguishing a difference between system and environment, and its primary concern is to continue reproducing this distinctive difference. In making the system/environment distinction, it creates distinctions about its environment, so enabling it to close its operations (operational closure) and self-reproduce (autopoiesis).

- **The system can be defined through a single mode of operation**

  A social system is oriented to reproducing its system/environment distinction (or else it ceases to be). Social systems construct and re-produce this distinction in communication. As an operation, communication gives rise both to the distinction and to its reproduction. Communication produces more communication, and this single mode therefore defines the system.

- **Every social system observes internally its own system/environment distinction**

  In making the system/environment distinction in communication, a system creates internal distinctions about its environment. This internalising of its environment enables it to close its operations (operational closure) and self-reproduce (autopoiesis). Observation is the operation whereby it makes reference to itself within itself (in relation to its own environment), and makes reference to other systems within itself (filtered through the distinctions available within itself).

- **Every social theory is part of what it observes**

  A given social theory and/or system can only observe via the distinctions and communications arising in the reproduction of its own system/environment distinction. It can only observe itself and other systems via these distinctions. In observing other systems, it is therefore already part of what it observes: there is no ‘outside itself’ from which to observe itself or other systems.

In this sense Luhmann’s social systems theory can be elaborated through the three core concepts of distinction, system and operation (including communication and observation). However, this produces an overly technical account for the purposes of this thesis, and a more narrative approach is preferred by the author to ensure the final output is accessible to readers who are also newly acquainted with Luhmann’s work.

Luhmann’s social systems concepts are first described in more detail below, followed by a description of the method by which these are applied in analysing social systems. This account is
largely based on Moeller (2006) with reference to more theoretical commentators where appropriate.

5.2 What are Luhmann’s key theoretical concepts?

This section details Luhmann’s key theoretical concepts. The first section below provides a general discussion of social systems. It traces key ideas and uses cycling in two ways: first, as an example to show how a social system might work, and second, to frame general questions about cycling if it is to be understood as a social system in Luhmann’s sense.

These questions are then explored in more detail in the more technical sections on Autopoiesis (p. 41) and onward. Examples from the transport system are used throughout to illustrate how key concepts work and how transport might be constructed as an autopoietic social system and how cycle commuting might fit within this. The section entitled What are the key criticisms of Luhmann’s theory? (p. 56) then outlines the major criticisms of Luhmann’s theory and its outcomes for thinking about social systems and social change.

The aim of this approach is to unfold the social systems perspective by moving from simple to more sophisticated concepts and arguments. This involves some repetition, and also risks the criticism that transport and cycle commuting are being constructed as social systems by stealth. To avoid this conclusion, the argument for cycling’s status as a social system is left open. Having said this, it is also possible to argue, following King and Thornhill (2003), that if it cannot be proven that cycle commuting is autopoietic, there is still much to be gained by treating cycle commuting as if it is.

This thesis makes every attempt to provide a robust explication of Luhmann’s theory, and to relate this in detail to the transport system and cycle commuting, to show cycle commuting’s workings as a social system.

5.2.1 Social systems

A system is a set of interacting, interdependent elements that form a complex and unified whole. Intangible systems, such as organisations, social systems or society are comprised of intangible elements such as processes, relationships and information flows (Anderson and Johnson, 1997).

A number of commentators (Baeker, 2001; Chernilo, 2002; Clam, 2000; Vanderstraeten, 2000) have noted the tensions between Luhmann’s theory of social systems and the prevailing concepts of
sociology during the late 20th century. Luhmann himself was very aware of his radical departure from well-established doctrines in both sociology and systems theory.

5.2.1.1 Action, systems and communication

During the second half of the 20th century, mainstream sociology had continued to theorise organisations, social systems or society as the products of people’s collective actions, stabilised and co-ordinated by social structures such as values, norms and identities. In aggregated form, and in conjunction with group, organisation, and geo-political boundaries, these actors and their actions were held to produce a complex society. This has been termed action theory and has been the general theoretical framework in both sociology and social psychology (Kampmann Walther, 2005).

Systems approaches in sociology have also been important since the middle of the 20th century, and it is possible to characterise sociology as a debate between action and systems theory. However, Stichweh (2000) suggests that the polarisation of action and systems theories really only serves the purposes of controversy, and the theoretical context is rather more nuanced.

First, he argues it is more accurate to say that ‘systems theories seem to presuppose a microstructure of actions and action theories presuppose a macrostructure of systems’ (p. 7). He cites Coleman (1990) as an example of a well-elaborated action-based theory in which rights of control over actions are embedded in a social system that creates, legitimates, and institutionalises control over action. In parallel, Giddens (1984) proposes the concept of structuration, in which ‘the rules and resources drawn upon in the production and reproduction of social action are at the same time the means of system reproduction’ (1984, p. 19). These explanations involve intangible ‘structures’ (rules, values, social identities and other intangible controls) that guide individuals and their actions and provide order, harmony and consensus in ways that reproduce the social system, and thereby also reinforce the structures.

Second, Stichweh argues that action theory can be more clearly contrasted with communications-based theories, and a history of sociology would more properly contrast these two. It is for this reason that Luhmann’s theory finds itself radically opposed to action as a basis for sociological theory.

In arguing against action, Luhmann first debates whether social systems can be accurately understood as ordered by values and norms, or that these exist in a consensual enough form to provide for a broad social order in modern society. Examples suggesting the contrary are not hard
to find, though sociology historically treated these as deviance from norms (in which the norm was order and harmony). In this way, Luhmann suggests, sociology smuggled appeals to metaphysical concepts (such as transcendental values) into scientific discourse, leading to weaknesses in theory (because of the need to resort to metaphysical concepts such as harmony), stagnation in theory development (such as the long orientation to action-actor theory), and contradictions in practice (such as the smuggling of normative cultural biases into studies).

Second, he suggests that trying to explain society by aggregating the qualities of its individual members and their actions leads to a theoretical dead end. For example, as discussed below in relation to Talcott Parson’s initial concepts for social system, actions do not necessarily produce further actions, thus making it difficult to provide a systemic account of society or social systems from action as a founding element. Luhmann makes tongue-in-cheek reference to thus saving himself the need to account for the individuality and actions of the world’s 5 billion-odd people (Moeller, 2006, p. 231).

Third, Luhmann argues that theorising of society and social systems is more reliably founded in events (events describe what actually happens) and communications, because communications can be shown to generate further communications, and so a fully systemic theory of society can then be theorised. This is explained in detail in the sections that follow.

Finally, Luhmann’s theoretical shift away from action towards communication involves a deeper shift from theories of identity (based in elemental units such as persons, objects, actions and tangible boundaries) towards theories of difference (based in difference, processes, communication, and intangible boundaries). This shift was not unique to Luhmann and in many respects is typical of a broad shift to post-modern/ post-structural/ systemic frameworks (though Luhmann debates these specific terms).

To illustrate how Luhmann’s theory might approach these issues (and following Moeller, 2006, p. 6-7), imagine a cyclist on a Friday morning, paying silently for a post-ride latté in a café, while arranging via her mobile phone to meet up with a friend that evening.

In Luhmann’s view, the payment takes place in an economic system, via its network of computer-based electronic transactions connecting business, customer and respective banks. The mobile call takes place in a telecommunications system, invoking the mobile telecommunications network and its two erstwhile callers. The cycling takes place in the transport system, involving complex and specialised communications such as road markings, signs, and road user signals. These systems
communicate within themselves via types of information specific to that system only: the information in the economic system makes no sense in the transport system. Their outputs are configured to enable human communications (and the systems depend on humans to trigger them in this sense), but humans do not actually figure as working parts in the system. Controversial as it is, Luhmann would argue the woman cyclist would be outside these social systems, and would only participate in them on their terms – as a customer, caller and/or cyclist.

An action-based theory would theorise the woman as the central actor and her actions as framed by the norms of cafés, telephony and cycle commuting. This would provide a fairly common-sense account of the woman as a part of the transport and economics systems, and would treat EFTPOS machines, mobile phones and cycles as technologies (rather than components of social systems) in the first instance. However, this approach may have some difficulty accounting for the woman’s simultaneous identities as customer, caller and cyclist. In particular, the woman’s individuality might be under challenge, not because she is multi-tasking, but because the notion of multiple, simultaneous, partial, decentralised identities (invoking multiple interactions, norms, relationships and so on) would prove problematic: What organises these identities? How are they organised?

5.2.1.2 Sense-making systems

In detailing social systems Luhmann explains that biological systems (bodies) and sense-making systems are two distinct types: the first is a ‘living’ (in the biological sense) system, while the sense-making systems are not. Luhmann is concerned with two specific sense-making systems, namely the psychic and the social. Social systems occur in at least three major forms: interactional, organisational and societal, representing a range from least to most fully formalised (see Section entitled Types of autopoietic social systems, p. 53 below).
In Luhmann’s view, psychic and social systems share a common orientation to making sense: minds make sense of the world (via thoughts and feelings), and so do social systems (via communication). In particular, psychic and social systems are coupled through sense-making: thinking makes sense that irritates communication, and vice versa. The more complex our thinking, the more complex our communication. Both thinking and communicating use sense-making as a medium to locate and orient a system (where it actually is/ what it actually means) within a horizon of meaning (where it could be/ what it could mean) (Moeller, 2006).

Making sense therefore invokes selection of actual meanings from possible ones, whether in making a distinction or trying to understand one. Sense-making also invokes a distinction between self-reference and other-reference: as a sense-making system builds references to what makes sense to itself, it also accrues references to non-sense, not-self and so to other systems. A mind or a system can therefore distinguish between itself and its context, but only as far as it can make its own sense of its context. Sense-making frames events in its context in two different ways – as actions arising within the system (things done by the system) or as experiences arising in the environment (things happening to the system).

In making sense of its Self, the system re-enters the difference between Self and Others into its references to itself. For example, it does not just refer to itself as different from its environment or other systems, but includes a description of this difference in references to itself. That is, it can treat itself as both an ‘it’ and a ‘self’. As Moeller notes, ‘sense-making systems make sense by making sense of the difference between themselves and their environment, by making sense of the difference between the ‘it’ that makes sense and this “I” that makes that sense.’ (p. 67). Luhmann comments, ‘the difference system/ environment occurs twice: as the difference produced by the

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Figure 6: Types of systems

![Diagram of system types](image)

system, and as the difference observed within the system.’ (1997, translated and cited by Moeller, p. 68, Luhmann’s italics).

For example, if the transport system’s core means of making sense is through vehicle movements, then a distinction such as moving/ not moving is pivotal. Such a distinction re-enters the system as a self-reference to the movements (effectiveness) of the system at a given time, in which ‘not moving’ is both the ultimate negative (as in gridlock) and a key means of managing movements (such as with traffic lights, and give way/ stop signs). In parallel, speeding, running red lights, abusing other drivers, and driving a car without passengers in rush-hour traffic are all justified with reference to freedom of movement, though these actually contribute to the ineffectiveness of the system. In other words, the re-entry of a simple binary distinction can result in a very rich set of sense-making system distinctions.

5.2.1.3 Operational closure

The sense-making operations of the psychic and social systems are closed to their environments: events stimulate sense-making but do not make the sense for the system. Rather, events are treated as information – as surprises and irritations – which must be processed as information for these systems to make any sense of them.

To follow Luhmann’s formulation, psychic and social systems are operationally closed, but informationally open. This allows them to evolve their internal operations and so achieve stability (albeit provisional) at much higher levels of complexity. So for example, the operational closure of psychic systems enables specialisation in thinking and feeling, and so encourages elaboration of highly nuanced feelings triggered by other feelings, and uninterrupted by the operations of other systems. But this also means the psychic system only observes itself and its environment in its own terms – in terms of what can be thought and felt.

In parallel the closure of social systems means they are composed of communications and nothing else. Its communications become highly specialised and self-referential: one communication triggers off other communications. So for example, the woman cyclist in the example above can only communicate in the economic system with transactional data, and in the transport sub-system with movement-related information (such as hand signals). Hand signals have no currency in the economic system, and so in part define the operational closure of cycle commuting. A system’s communications can only communicate and generate more communications within the system: hand-signals will never pay for a coffee, but they will get her to the café.
5.2.2 Autopoiesis

As discussed above, the operational closure of systems enables them to self-regulate, evolve increasingly elaborate operations, and so re-reproduce themselves further in their own communications. Luhmann borrows the idea of autopoiesis from Humberto Maturana (1992) to articulate such self-reproducing systemic processes.

Autopoiesis was derived by Maturana from the ancient Greek words auto and poiesis. Moeller (2006, p. 12) notes that Maturana was aware of Aristotle’s distinction between praxis and poiesis. The first refers to a process that produces something external to its self (including actions undertaken to achieve an end), while the latter refers to a process that is satisfying in itself and has no further required outputs. Auto-poiesis therefore refers to processes for generating outputs that are the same processes that generated them.

For Luhmann autopoietic social systems are not created by people or organisations but emerge within communication as distinctions that are capable of reproducing themselves, such as the distinction between system and environment. The distinction is therefore a key concept.

5.2.2.1 Distinction

The concept of distinction is central to Luhmann’s work and its uses throughout are sophisticated. Luhmann articulates his central ideas of difference or ‘differential thinking’ through George Spencer Brown’s Laws of Form (1969). Differential thinking enables Luhmann to switch the focus of analysis from ‘what is identity?’ (the central pre-occupation of mainstream sociology) to ‘how does identity arise?’ (Luhmann, 1994).

Following Spencer Brown, Luhmann argues that an identity (the unity or whole of a system) arises in the forming of a distinction, and by the reproducing of this through time. This is illustrated in the diagram at right, which draws on Spencer Brown’s own diagrammatic language of calculus. A distinction is made (green line) between one meaning (left side of line) and all other meanings (right hand side of line. An indication or mark is also implicitly made (red line) to identify which side of the distinction is being used: that is, it is not possible to make a distinction without having already taken sides.

In a social systems context, the founding distinction marks the system’s difference from its environment, so the system must continue making and elaborating this distinction or it will...
disappear. The system’s distinction also indicates or marks itself as a system, and in doing so, also distinguishes an unmarked side as all other meanings – as everything that it is not.

A common misconception is that Luhmann uses environment to mean everything outside the system. To be precise, an autopoietic social system’s environment is not located outside the system: when it is, the system is better understood as an open system, and cannot be self-reproducing because it is completely vulnerable to changes in the environment. An autopoietic social system is also not closed, in that it has not excluded the environment completely, but has created an internalised environment that corresponds to its founding distinction.

The diagram at right illustrates how this works. First, the system/environment distinction locates the system (in red) on the indicated (left) side of the initial distinction. Second, the system’s communications over time attribute further distinctions to the system/environment distinction, so building an increasingly complex and stable system and more nuanced versions of its own environment.

To illustrate this further, Environment (with a line through it) is shown in grey on the right of the initial distinction to mark what the misunderstanding represents. An autopoietic social system’s environment is the one it creates and elaborates for itself within its own communications over time. Social systems do not arise within a broader social environment, such as society. Society is comprised of a number of social systems, each with its own system/environment distinction, and each referencing other systems within their environments. But note there is no shared or background environment across these systems.

Luhmann’s particular theorising of the system/environment distinction and related organisation of social systems often gives rise to much confusion (Mischeva, 2002), and Luhmann’s English interpreters are at pains to explain the concept as clearly as possible. Moeller (2006, p. 68) says, ‘sense-making systems make sense by making sense of the difference between themselves and their environment’. King and Thornhill note (2003, p. 283), ‘the system’s environment is in essence internal to the system but the system sees it as external and delimits what is system and what is environment’.

Figure 8: System/ environment
In the context of cycle commuting, a key question in determining whether it is an autopoietic social system is whether and how it references itself in relation to such an environment. For example, does cycle commuting understand itself as part of the urban transport system, or is it operationally closed and self-reproducing? Is cycle commuting’s current marginal position an indication of its openness to the impact of other modes of transport, or of its closure and internally-driven evolution?

5.2.2.2 Communication

Mainstream social action theories define the minimum requirements for communication as two actors and a communication act (the sending of a message): communication takes place when a sender sends a message to a receiver. The receiver may then reply (as represented by the dotted line in the diagram below), so becoming the sender and reversing the process. However, this view does not describe how the sender and receiver construct a message that both can understand.

Figure 9: Views of communication

In Luhmann’s view communication is not an act but a set of relationships structured as a self-reinforcing loop, in which communication generates further communication. A background of understanding is required to achieve communication, which is then comprised of the combination of understanding, announcement and information. Announcement signals that communication has been initiated by selecting information, which is shared (rather than sent). That is, for Luhmann communication pre-supposes understanding of distinctions within a system.

Further, Luhmann is at pains to emphasise that communication is an operation of a system, and that it need not involve people and/or language. For example, the cyclist above does not communicate within the banking system (e.g. by radiating electrical signals), but triggers its communications with her EFTPOS card.

To describe cycle commuting as a social system in Luhmann’s sense would therefore mean giving up the view that it is made up of people riding cycles. Rather, understanding cycle commuting would mean understanding how it communicates. The emphasis in analysis would shift from questions about cycling’s identity such as ‘who are cycle commuters?’ and ‘how do they behave?’ to questions about its operations, such as ‘what distinctions distinguish cycling
commuting from its environment?’ and ‘how does cycle commuting communicate its difference from other systems?’ As noted, Luhmann (1994) positions the shift from questions of identity to questions of difference as a paradigm shift in sociological theory, and this shift produces questions of a unique nature.

Stichweh (2000) notes that Luhmann draws on Talcott Parsons’ (1937) notion of ‘double contingency’ to theorise communication in this way. Parsons had been preoccupied with the difficulties of theorising social order from action alone, and had developed the notion of double contingency to model the problem of action and theorise a solution.

His notion of double contingency describes a social situation in which two or more people are in communication. If the choices of action of one person are in any way dependent on the choices of others, then the mutual-interdependence of choices might result in a stalemate: that is, in the choice to take no action at all. Parsons then argues that social order does not necessarily arise within a purely action-based theory, and no order (i.e. chaos) is the more likely result. In other words, action-based theories fail to theorise social order effectively. Any notion of social action is clearly contingent on a background understanding of social situations, which as Luhmann also argues, then invokes communication as central to social order, and not action.

Parsons argues that a background of mutual understanding is required to structure meaningful action, and in this sense, action might then also be construed as a form of communication. Stichweh notes Parsons’ ‘action frame of reference’ is systemic, in that it is comprised of five elements: ends, conditions, means, norms, and actors. These produce an act only in combination, and for example, the actor is clearly not the sole originator. In later work Parsons (1978) changed his formulation to four subsystems of action – the behavioural system, personality, the social system and culture: again, all four subsystems had to be involved for action to arise. To describe Parsons’s theory as fully systemic would be misleading, and it is clear that Parsons did not proceed to then base his theory on communication per se. However, Luhmann’s reliance on Parsons is significant in this context.

It may be worth noting at this point that navigating across the roads of a city at rush hour requires intensive communication to co-ordinate the movements of pedestrians and a wide range of vehicles. Both pedestrians and road users need a significant understanding of road signs, markings and user signals (including those not proscribed in the Road Code) to co-ordinate their own movements with those of other road users. The question ‘how does transport work?’ fairly clearly invites the answer ‘through various forms of communications’ (which might also include other
technical communications in relation to transport policy, road engineering, roading project management, and so on). But this would be to state the obvious, and a more difficult but important question is, ‘how is transport continually re-produced within its communications?’

5.2.2.3 Observation

In Luhmann’s notion of a social system, its communications select and assign meanings to the system and its environment through the operations of the system and over time.

The process of distinguishing system-specific distinctions is called observation: this involves making parallel distinctions between observer and observed (systems), and between what is observed (marked) and what is not observed (unmarked). As illustrated in the diagram below, observation is an operation of autopoietic systems, and Luhmann is at pains to point out that, like communications, it is not necessarily carried out by people, or by the psychic system. Observation is a systemic operation working from and with other operations, such as communication.

Figure 10: Observation system

Observation distinguishes and assigns meanings to the system and its environment by attributing further meanings to each over time. In particular, observation plays a role in identifying and attributing environmental changes as ‘causes’ for system changes, and so justifying extensions in the distinctions deployed in system communications (that elaborate system/ environment distinctions).

In this way a system’s self-observation increases the sensitivity of its system/ environment distinctions by creating for itself an increasingly complex environment, and an important effect is to increase its internal flexibility, options and resources. Because making an observation involves making distinctions, the observed is not a given reality, but a product of the distinctions available within the system. In this sense, observation produces the real by elaborating on system/ environment distinctions.

Luhmann also distinguishes between first and second order observations. First-order observation is observation of system operations (in relation to events), as described in communications. Second-
Design of Change in Cycle Commuting

order observation is observation of these communicated descriptions. That is, second-order observation effectively observes and communicates how first-order observation is constructed within/ by the system. There is no difference in the organisation or truth of first- and second-order observations, though Luhmann notes second-order observations involve more complex distinctions than those of first-order descriptions in communicating the construction of reality within the system. In this sense, second-order observation might be described as ‘observing communication’, in which ‘observing’ doubles as an adjective and a verb.

For example, a first-order observation in transport might involve a cyclist seeing a red light and stopping. A second-order observation might be a cyclist commenting that ‘all the lights are against me today’. Neither red light nor comment is any more or less true, and both arise from a system/ environment distinction (such as moving/ not moving).

Luhmann also notes that all observation produces a blind spot: in observation, an observer (system) cannot also observe itself observing. So for example, and paradoxically, second-order observation can observe that first-order observation cannot observe itself when observing, but it cannot observe the same of itself. In a broader sense, the distinctions specific to a system (via elaborations of its system/ environment distinction) are blind to the distinctions not made/ not observed by the system. For example, in making the comment above the cyclist is blind to all the lights that are not against her.

This gives rise to the distinction between self-observation and other-observation. As noted, self-observation is a central operation of an autopoietic system and contributes to both its closure and its evolution. A system can also observe other systems, though it can only do so via the distinctions available to it via its own system/ environment distinction, and in this sense, it can only observe systems that appear within its environment via events that disturb its operations. Such disturbances give rise to distinctions, and so to first- and second-order observations about these, that may in turn orient the system to select different distinctions to describe its own operations. In this sense self-observation orients a system to adopting different distinctions, and observing their effects as changes in its internal complexity and configuration, so influencing evolution in the system.

Note that autopoietic social systems do not provide an ‘outside’ from which to observe the system. First, there is no shared or background environment outside the system, and second, observation is an operation of and in the system, and arises through the distinctions and communications afforded by the system. This means observation and evolution are both internally-constructed processes.
This is an important point of difference from Maturana’s autopoiesis, which conceptualises observation as outside a system, and as giving rise to primary distinction that distinguishes a system from its environment (Maturana & Varela, 1992). Maturana’s view arises in the context of human observation of non-human biological systems. Luhmann revises this to deal with the problem of having to theorise observation of society from outside society. Given that there is no environment or system ‘outside’ human society from which to observe, Luhmann’s social systems self-observe, and can observe other systems only when constituted as part of their own environment.

In relation to modern autopoietic social systems, Luhmann suggests that second-order observation is only possible where communications take place via mass media (ranging across newspapers and magazines, advertising, radio, film and later television), and where a given system can thus be readily observed describing its own operations and communicating with and about itself.

As noted in a previous section (see section entitled Sense-making systems, p. 38) Luhmann also notes that a system’s self-observations give rise to the re-entry of system/environment distinction into the self-referential communications of the system. This re-entry represents a key paradox, which in Luhmann’s view, gives rise to a plethora of self-descriptions, self-deceptions and self-justifications to which the system itself is blind, and versions of which can only be seen by external observers of the system (via their own system distinctions).

So for example, car-oriented advertising communications attribute speed, freedom, status, relaxation, and privacy to car driving. This is obviously paradoxical within a transport sector oriented to efficient movement of huge volumes of vehicles, and characterised by all sorts of stoppages and delays. That is, transport resorts to leisure concepts and transcendental experiences to re-describe a slow-moving, annoying, wasteful pastime as a beautiful experience. Transport tells itself lies and deceives itself, to which it is willing to turn a blind eye in the interest of continuing its own existence.

5.2.2.4 Structural coupling

In discussing operational closure, Luhmann refers to the ‘interpenetration’ (from Talcott Parsons) or structural coupling (from Humberto Maturana) of social systems. Coupling refers to a relationship of mutual disturbance between two systems, the most important in his view being the coupling of the psychic and the social. As systems they are in the environments of each other, and to this extent depend on each other as environments.
The internal structures of coupled systems mean one can trigger changes in the other (without disrupting its closure). Coupling presents a problem to a system: it is linked with another system that does not operate in the same way: it cannot make sense of or integrate the operations of the coupled, annoying system, other than to use its own way of making sense of the link.

In this sense the coupling irritates the system into making internal changes that make sense of the coupling within its system, so adding to its internal complexity. Note that coupling works both ways – it irritates both coupled systems – and so coupled systems may resonate with particularly significant mutual irritations. In this sense coupling explains how systems can co-evolve into increasingly complex inter-dependencies.

Luhmann speaks of couplings as loose or tight. By loose he means a wide selection of coupled systems – a coupling in one system connected with many other systems. By tight he means a few, select coupled systems. For example, the economic has couplings with many systems: this may give economics the appearance of dominance, though Luhmann argues interpreting its loose coupling as dominance would be reductive (in the sense that Marxism, for example, would frame social dynamics largely in terms of economics).

So for example, the woman cyclist may derive benefits from the physical exercise of riding, including increased endorphins (biological). These endorphins make her feel good in herself and about herself (psychic), so stimulating her to continue riding, or even ride more. The ‘irritation’ of her biological system (sometimes literally) would result in increased conditioning and riding performances, with an increased ‘feel good’ factor. This would mean a tight coupling between the biological and psychic systems in the context of riding.

The more she enjoys riding and feels good about herself, the more confident she is in talking about riding (social), and so over time she learns more about cycling, gains friendships, and gains a reputation through numerous successes in endurance cycling events. This means looser coupling between the psychic and social systems as enhanced feelings about herself contribute to a range of effects. The subtle shifts in the three operationally closed systems relating to the woman’s cycling are enabled only by their coupling.
5.2.2.5 Identity

Notions such as ‘identity’ and ‘individuality’ may appear problematic to Luhmann’s social systems theory, in that it locates people in the environments of social systems, rather than in the systems themselves. In Luhmann’s work, identity is the sense a given system makes of the people or groups it recruits to trigger its operations. A person is a cycle commuter only in as much as he/ she engages with cycle commuting as a social system, and for example, his/ her identity as a cycle commuter is dropped when it comes to love-making (or it should be). That is, Luhmann explains identity via the coupling of psychic and social systems (through the medium of language), and in this sense, an individual person’s identity spans social, psychic and biological.

The coupling process is assisted by the semantics of individual identity, where the semantic (set of meanings) is the self-descriptions communicated within a social system. Self-socialisation means social systems make their complexity available to people for coupling their individual psychic systems over time (such as during maturation). Note that socialisation of individuals is not achieved by external impositions or education, but by ongoing shifts in self-reference accruing from the coupling of the psychic with the social. On the other hand, inclusion means psychic systems make their complexity available to people for constructing identities within social systems (such as when loving cycle commuting rather than car driving). A semantics of identity provides communications that make self-socialisation and inclusion meaningful for an individual.

The semantics of individual identity may be organised in time as schemata (as frameworks for making sense of information and selecting one identity over another) and may then be described through historical and evolutionary patterns. A study of a system’s semantic and schemata over time generates a second-order description of the evolution of its self-descriptions (semantics and schemata) over time.

For example, in a rather startling work on intimacy, Luhmann (1982) traces the evolution of the distinctions used for interpersonal intimacy from a loose semantics in the 12th century to a formal semantic code by the 18th century, and then through to the codification of intimacy in the modern autopoietic social system of marriage. Love, lover and beloved moved from being courtly literary references, to figures in extramarital affairs, to modern identities integrating sexuality, romance, and marriage in the one schema.

Luhmann also argues modern functionally differentiated systems foster a semantics of inclusion to describe themselves as enabling individual access to systems, and to construct identity-specific careers (involving system-specific, individually specialised knowledges and roles – such as that of
different types of lawyers, doctors, trades people, professional cyclists and so on). However, he points out that inclusion also invokes exclusion, as when individuals are unable to access a system as its would-be recruits. He also suggests that exclusion from one system – such as the economic system – is likely to invoke exclusion from others – education, health, law and so on. In other words, a semantic of system-specific individual inclusion masks a broader problem with multiple possibilities of individual exclusion.

For example, the semantics of transport constructs viable identities and careers for car drivers, from initial training through grades of licensing to a full licence and beyond (into more specialised training/ licenses such as truck driving and car racing). By comparison, it presently provides no such semantic for cycle commuting; its semantics typically constructs cycling as an irritant to motorised transport.

5.2.2.6 Symbolic generalised communications media

To understand autopoietic social systems, Luhmann evolved a specialised notion of communication he termed ‘symbolic generalised communication media’, a term he borrowed from Talcott Parsons. Luhmann distinguishes three forms of communication in autopoietic systems, namely:

- **Speech**
  
  Speech arises where people are present for each other (including telephony) and so invokes interaction systems in the first instance.

- **Dissemination**
  
  Dissemination arises where mass media technologies (such as books, television and the internet) announce information (with the likelihood that it may only be partially understood, and/or that it will select for people that understand it through the specific configuration of the media employed). Dissemination arose with the development of the printing press and later communications technologies, and is linked with the emergence of functionally differentiated social systems.

- **Symbolic generalised communication media**
  
  Symbolic generalised communication media refer to the specific media deployed by functional systems. In context of a functionally differentiated system, a medium is whatever the system uses to reduce uncertainty. In this sense, a system’s media are specific to that system, and may include, but are not restricted to forms of language.
Symbolic generalised communication media are typically far more than language: for example in the economic system a promise (language) of payment is not the same as payment (through the electronic media specific to economics). That is, the symbolic generalised communication medium of economics is transactions (in cash or electronic transfer). In this instance, the promise has a tenuous status within the economic system (though it might work well enough in pre-election politics).

Luhmann distinguishes between medium and form. For example, the medium of economics is money, but this clearly takes different forms – hard cash (coins, paper), cheques, electronic transactions, and so on. Luhmann also notes that symbolic generalised communication media produce greater opportunities for understanding, but by their specificity also increase opportunities for exclusion. Further, increases in the complexity of a system’s distinctions (the evolution of its differentiation) tend to produce more opportunities for both.

For example, the medium of transport is motion, and the forms to achieve this in cities have evolved in rough order through travel by foot, horse-drawn vehicles, steam-driven vehicles, bicycles, petrol-driven motor cars, and now electricity-, hydrogen- and ethanol-driven motor cars. Barring horses and steam, these modes may all co-exist on the roads within a decade, but the dominance of petrol-driven cars means the other modes will be understood as mere ‘alternatives’, and some will be too expensive for mass consumption for a while to come.

5.2.2.7 Function
The function of an autopoietic social system is not to be understood as a purpose or requirement. Rather, its function is a description of how it operates it through time. The function is not a given and does not imply reification of the system, but is constantly re-produced afresh in the system’s operations. A social system is what it is (it has no implicit purpose in this sense), so the notion of function is a means of distinguishing one system from another at a functional level.

In beginning analysis of a social system it may be useful to ask ‘what is its function?’ as a provisional question towards noting whether it is a functionally differentiated system or another type of system. But Luhmann’s question would actually be ‘how do we know it is functioning - what are the observable operations/ communications that produce its autopoiesis?’

For example, the function of transport is to eliminate differences in time and/ or space. Driving to work occurs in modern functionally differentiated society because work (economic system) and home (as the primary site of consumption, also part of the economic system) are differentiated in
time and space. Further, geographical obstacles such as hills, seas, and large distances create physical problems in the elimination of time and space differences.

The challenge for transport is therefore to resolve the problem of time/space by trying to eliminate it. This means workers take highly regulated amounts of time to traverse highly regulated spaces—broadly known as ‘rush hour’ (time) and ‘traffic jam’ (space).

5.2.2.8 Efficacy
The efficacy of an autopoietic social system is a description of its success (and lack of success) in relation to its function. A social system simply does what it does, so the tool does not assess its efficiency but the effects (effectiveness) of its functioning.

In analysing a social system it is useful to ask ‘how are its operations effective (in relation to its functioning) in re-producing itself?’

For example, the efficacy of transport arises in its resolution of time/space differences by moving huge volumes of people and goods as quickly as possible. Its efficacy is therefore judged as timely and undamaged arrival (for example).

5.2.2.9 Code
An autopoietic social system’s code is the system/environment distinction by which it constitutes itself, communicates and operates (through self-observations, self-descriptions, communications and so on). A code is binary, having a positive and negative value, and its simplicity belies the richness of analysis that becomes available.

Analysis of a social system involves asking ‘what is the system/environment distinction and how does this appear in (re-enter) the communications and operations (such as observations) of the system?’

For example, if transport’s system/environment distinction is moving/not moving, this would also be its code. The moving/not moving distinction would re-enter transport via notions of fast/slow, arrival/non-arrival, on time/not on time, safe/damaged, and so on, so generating a rich semantic around the distinction moving/not moving. Note that in these binaries, the first term marks the system’s side of the distinction, and the second term marks the meanings the system attributes to its environment.
5.2.2.10 Programme
A social system’s programmes are distinct sub-systems emerging within a system through increasing internal differentiation and through couplings with other systems.

For example, two key transport programmes might be passenger and freight, or within passenger, public and private transport. Commuting then results from the coupling of passenger transport to the economic system.

Each programme evolves its own distinctions and self-descriptions. For example, mass urban passenger transport, both public and private, is dominated by the unhappy semantics of peak hour traffic: ‘rush hour’, ‘congestion’, ‘dangerous driving’, ‘road rage’, and so on. In this sense it is useful to think in terms of the culture and social dynamics of a programme – how the programme evolves its own self-observations and self-descriptions, and how these organise the identities and communications (including the variously communicative actions) of people recruited into the programme.

5.2.3 Types of autopoietic social systems
In his overview of modern social systems, Luhmann identifies three major types: the functional, the organisational and the interactive, and in later works adds protest/activist movements. He emphasises the list is simply a function of available research rather than theoretical prescription.

5.2.3.1 Functional Systems
Functional systems such as law, art, politics, and the economic system arise as functions performed within society. Luhmann’s treatment of functional systems makes it clear they are purely modern phenomena. There is no pre-determined underlying order, central, organising system, or stability – these systems simply are what they are as a consequence of the evolution away from hierarchical societies to societies organised around functional specialisations. Each functional system continues to ‘evolve’ through its autopoiesis, and modern society is comprised of coupled functional systems with no central governing system, though systems such as economics or politics may appear to dominate others.

Functional systems can be analysed with regard to their functions, efficacy, codes, programmes, symbolic generalised communications media and so on. The table below summarises some of the functional systems detailed in Luhmann’s own work (based on Moeller, 2006, p. 29).
### Figure 11: Luhmann’s functional analysis framework

<table>
<thead>
<tr>
<th>System</th>
<th>Medium</th>
<th>Efficacy</th>
<th>Code</th>
<th>Programmes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Law</td>
<td>Jurisdiction</td>
<td>Regulating conflicts</td>
<td>Legal/ illegal</td>
<td>Laws, constitutions etc</td>
</tr>
<tr>
<td>Politics</td>
<td>Power</td>
<td>Applying binding decisions</td>
<td>Government/ opposition</td>
<td>Political parties, ideologies</td>
</tr>
<tr>
<td>Science</td>
<td>Truth</td>
<td>Supplying knowledge</td>
<td>True/ false</td>
<td>Theories, methods</td>
</tr>
<tr>
<td>Religion</td>
<td>Faith</td>
<td>Serving spiritual and social needs</td>
<td>Immanent/ transcendent</td>
<td>Holy scriptures, dogmas</td>
</tr>
<tr>
<td>Economy</td>
<td>Money</td>
<td>Satisfying needs</td>
<td>Payment/ non-payment</td>
<td>Government budgets etc</td>
</tr>
<tr>
<td>Intimacy</td>
<td>Love</td>
<td>Satisfying isolation</td>
<td>Love/ not love</td>
<td>Relationships</td>
</tr>
<tr>
<td>Transport</td>
<td>Motion</td>
<td>Delivering people/ goods</td>
<td>Moving/ not moving</td>
<td>Passenger, freight etc</td>
</tr>
</tbody>
</table>

Each of the major systems is differentiated in relation to a particular function and its efficacy judged accordingly. The symbolically generalised media within each functional system shape its functionality through a code and a number of programmes operating via a medium.

#### 5.2.3.2 Organisational Systems

Luhmann argues that organisations have co-evolved with functional systems and are relatively new. For example, the modern economy co-evolved with the legal, economic and managerial organisation of companies, corporations, industry associations and so on.

Organisations are not necessarily confined to the communication of one function system: for example, academic institutions commonly function as both educational institutions and businesses. In parallel, function systems do not operate via one kind of organisation: politics is not confined to political parties, economics to companies, nor education to schools and universities. A number of functional systems may be engaged within the communications of organisations.
Luhmann characterises organisations through two key elements in its communications. First, membership of the organisation is carefully controlled and invokes a range of system-specific conditions, such as legal (e.g. confidentiality, restraint of trade), economic (e.g. higher pay rates for more senior staff), functional (e.g. advancing a career within a sector), and media relations (e.g. only the most senior members can make media statements). Second, decision-making is a central operation of organisations, and Moeller refers to organisations as ‘systems of decision’ (2006, p. 31), in which the communications of organisations are primarily about decisions, in which one decision generates other decisions (in an endless array). So for example, strategic decisions are typically made in the context of communicating the need for further tactical decisions. The autopoiesis of an organisation thus becomes the autopoiesis of decisions.

For example, as a social system cycling includes a wide range of organisations. These may include national performance sport coordinating body BikeNZ, competitive cycling bodies such as CyclingNZ and Mountain Biking NZ, advocacy bodies such as Cycling Advocates’ Network, clubs such as the Manukau Veterans Cycling Club, importer and marketer organisations such as Sheppard Industries and retailers, cycle strategy and implementation bodies such as City or District Councils, and cycle policy and funding bodies such as the Ministry of Transport and Land Transport NZ.

5.2.3.3 Interactional Systems

Not every communication can be classified in relation to a functional system: for example, a casual chat with a stranger at a bus stop is not an operation/communication within transport.

Luhmann notes that autopoietic communications also emerge outside functional sub-systems. Luhmann explains this by saying that a trivial, brief and episodic differentiation of an autopoietic social system can emerge simply through an experience of double contingency (when two or more people communicate in ways that produce a provisional social order). These ad hoc interaction systems are largely reliant on personal presence and may occur within or outside functional systems. (Note that different types of systems are not mutually exclusive, and may be loosely or tightly coupled with other systems). A chat with a stranger on a bus might give rise to an interaction system in this way (outside the transport system), while a chat to the bus driver over fares would be an interaction within transport.

Such interactive systems are all-pervasive and Luhmann refers to them metaphorically as ‘a sea of small-scale subsystems that are continuously newly built and then dissolved’ (cited in Moeller, p.
30). Moeller extends this by calling interaction systems ‘the communication sea on which the function systems float’ (2006, p. 31).

Figure 12: Cyclist hand signals

For example, by appearances cycle commuting is a fairly solitary pursuit. But when more experienced commuter cyclists meet, an ad hoc interaction system may arise: the practice of riding in a bunch and drafting.

Drafting arises when cyclists take turns riding one behind the other to minimise the significant impact of wind drag on each rider. The further back down the line a cyclist is, the less he/she can see ahead, but the more sheltered he/she is, and the more he/she enjoys the benefits of drafting. To move this fast while close together, cyclists communicate via shouts and coded hand-signals about relative positions and speeds, glass on the road, parked cars, drains, changes of direction, and so on. The leader provides a signal and this is immediately passed down the line by imitation in rapid succession. In context, bunch-riding is an interactive system: it depends on a background understanding and constant communication, but only arises with available cyclists.

5.3 What are the key criticisms of Luhmann’s theory?

The task of assessing Luhmann is made difficult as his writings are relatively new outside Germany and Scandinavia. While many of his major European critics can now be found in translation, many English commentators demonstrate a poor knowledge of his theoretical context and concepts.

As one commentator notes (Misheva, 2002), it has been fashionable to criticise Luhmann for not including people, cultures, struggles and the socially excluded within social systems, and ample examples of this are available (Misgeld, 1993; Mathur, 2005). One major effect is the relatively frequent use of the straw man ploy, whereby a lightweight, flexible version of Luhmann is erected

3 Citation appears to refer to Baraldi, Corsi, Esposito (1997). Glossar zu Niklas Luhmanns Theorie sozialer Systeme. Suhrkamp. Frankfurt/Main, p. 812.
so as to be set alight and burned to the ground, or alternately, improved by the superior logic of the commentator.

It is also difficult to appreciate Luhmann’s commentators without some awareness of Luhmann’s strong (and sometimes provocative) criticisms of mainstream sociology. Perhaps the most accessible example can be found in his final work The Society of Society (Luhmann, 1997), which rather bluntly castigates sociological theory for perpetrating four unscientific myths about society. The four myths Luhmann singles out for censure (cited in Lee, 2000; quoted at length in Moeller, 2006, p. 229-239) are social systems:

1. Are composed of concrete individuals and relations between them
2. Are consequently stabilised or integrated by consensus between people
3. Are distinguished by political or geographical boundaries
4. Are understandable from outside their own boundaries

Luhmann’s criticisms capture the degree to which his theory is at odds with mainstream sociology. It may not be surprising, then, to find the straw man ploy is often used to criticise Luhmann for holding these views and/or defend mainstream sociological constructs. It is therefore difficult to find genuine critics—commentators discussing Luhmann on his own terms—and easy to find would-be censors and improvers.

Luhmann’s best-known and most astute critique is Jurgen Habermas, a critical (pro-Marxist) social theorist, who interestingly enough, collaborated with Luhmann at various times to progress their respective social theories. Habermas’ theory of communicative action falls within mainstream sociology in proposing communication as an action: Habermas holds that language is a system that organises relations between people to constitute social identities, actions and intersubjectivity. In contrast, Luhmann sees communication as the system per se, language as its medium, identities as a system’s reflections on itself, and people as outside the system (ed. Roberts, 1995). Habermas’ central objection to Luhmann is the latter’s ‘de-humanising’ of society, and much of Habermas’ critique flows from this. Habermas’ central points of debate with Luhmann are therefore his exclusion of people from social systems, his consequent reduction of social complexity to systemic operations, and his obscuring of possibilities for resistance, social change and revolutionary action (Habermas, 1987).
The strongest recent commentator to be found in English is perhaps Mingers (1995, 2002), who has written extensively on autopoiesis from Maturana and Valera’s formal definitions. His critique of Luhmann echoes that of Habermas, in that he finds Luhmann’s autopoiesis highly problematic. He details five major criticisms:

1. He does not show how social systems reproduce themselves, and in particular, how communication can do so without people. ‘Without human activity there would be no communication’ (p. 290).

2. He does not explain how such systems can achieve operational closure (and autopoiesis) through communications alone, as people communicate and communications often belong to more than one system.

3. He does not show how systems interact – Mingers feels coupling is not a sufficient explanation of complex interactions between people in complex social networks.

4. He does not attend to the constituting in language of subjects and intersubjectivity (as a background to acts of communication).

5. His functionalism requires an ‘incredibly reductionist view’ (p. 291) of rich and complex social interactions.

But it is evident from Mingers’ language that he has not engaged with Luhmann and is criticising him from within mainstream sociology. King and Thornhill (2003) suggest that Mingers’ rejection of Luhmann arises from his ‘anthropocentric analyses’ (p. 277), which inevitably culminate in misleading disparagement of Luhmann, and are ‘based precisely on that type of unreflected concept of human agency which Luhmann’s sociology calls into question’ (p. 277).

They suggest with some concern that Mingers misrepresents Luhmann completely, pointing to a basic misunderstanding of the system/ environment distinction in Luhmann’s work. In their view, this results in a number of basic misunderstandings, namely: (1) the assumption that social systems share a background social environment, (2) that social systems are both organisationally and informationally open, and (3) that people are or should be a part of social systems, and so on.

It is also worth noting here that Mingers’ difficulties with Luhmann’s ‘social’ autopoiesis may arise in part from the language of ‘biological’ autopoiesis. Maturana and Varela (1987) coupled cognition with action (‘knowing is doing’, p. 27 and ‘knowing is effective action’, p. 29), communication with people and actions (‘everything said is said by someone’, p. 27), and argued communication is ‘behavioural co-ordination’ (pp. 195 and 210). Their terminology closely resembles the language of
action-cantered sociological theory, and indeed, makes it hard to conceptualise social systems in any other way. Given Mingers’ preference for ‘biological’ autopoiesis, it is perhaps not surprising that he should then argue that Luhmann misapplies the concept of autopoiesis to social phenomena.

A similar difficulty with Luhmann’s concept of the system/environment distinction arises in the arguments of other commentators, such as Mathur (2005) who somehow argues both for Luhmann as an exemplar in theorising media treatments of ecological problems, and against Luhmann for omitting people from social systems and for muddying evolutionary discourse by positing environment as internal to social systems (so positing internally-driven social evolution).

These kinds of problems are reproduced in various ways by other commentators. For example, one critique is that Luhmann does not sufficiently analyse misunderstandings in communication, and is then blind to the undermining of autopoietic systems by uncertainties in communication. At an extreme, Thyssen (2005) paints Luhmann as ‘a philosopher who, having proved that the outside world and the other mind do not exist, rushes to make his knowledge public’ (p. 8). These critiques tend to propose that ‘properly’ theorised, Luhmann’s theory could be significantly improved (Leydesdorff, 2000; Grant, 2004; Thyssen, 2005).

Another critique is that Luhmann fails to deal adequately with power in social systems and institutions (Rempel, 1996). He argues for linking Luhmann’s theory of social systems with Michel Foucault’s theorising of power and authority. Rempel’s view is broadly Marxist and he rejects the autopoiesis of social systems as ‘misguided’ and ‘unlikely’ (p. 64), without providing a substantive argument. It is therefore not clear how adding Foucault’s concepts of power and knowledge would provide a theoretically sound corrective and/or alternative construct to Luhmann’s autopoiesis.

In a parallel vein, though with far more sophistication, Teubner (2001) plays Luhmann’s autopoiesis off against Jacques Derrida’s deconstruction, suggesting that both accounts serve to highlight the blind spots of the other. Unlike Rempel’s approach, this view is quite instructive, making it clear that Luhmann’s avoidance of metaphysical concepts is theoretically useful but may not fully acknowledge the recourse to metaphysical concepts evident in the semantics of the legal and economic systems. He uses the example of gifting as a paradoxical non-transaction in the economic system to explore the possibility of analogous interactions in the legal, such as the notion of pardon.
This argument is particularly interesting given transport’s appeal to transcendental notions such as freedom, individuality, power, status, privacy and enjoyment in constructing a semantic around commuting. In parallel, this helps explain the difficulties of a similar (and prior) semantics for cycle commuting.

With similar sophistication, Gumbrecht (2001) argues that Luhmann’s conceptualising of temporality is largely conventional and in particular lacks the radical treatment of futurity afforded to other areas of his theory, such as communications and observation. Gumbrecht suggests Luhmann could have explored the future as ‘doubly contingent’ – as an uncertain notion in itself, and as framed by the semantics of risk (contingency) management in modern society.

This view is interesting for theorising design within Luhmann’s social systems approach. Design clearly invokes future- and risk-oriented distinctions and a semantic of productive anticipation. For example, a central notion in design is the selection and integration of distinctions fitting best with the anticipated future of a given system. The notion of time here is apparently simply future time.

However, this ‘future’ is distinguished within design’s own system of distinctions, and is the second-order, observed future distinguished in design, not the first-order future distinguished in the target system. The problem of temporality is therefore both a problem of the uncertainty of time and a problem of the uncertainty of observations of other systems, from which there is no escape. In this sense, design operates with a paradoxical notion of time, in that it anticipates a future for another system of its own making, but cannot acknowledge the fiction without undermining its own autopoiesis as design.

In parallel, La Cour (2005) suggests Luhmann’s theory of coupling lacks detail and can be operationalised further by proposing the distinction between penetration (linking of resources in constructing interdependency) and coupling (linking information in constructing certainty). This distinction gives rise to more nuanced second-order observations of the irritations and subsequent changes afforded by penetrations and/or couplings.

The argument here aims to re-distinguish two overlapping terms used by Luhmann towards a richer description of perturbations within social systems, and may be interesting for theorising design of specific interventions in future work.

A small number of commentators are concerned with explicating specific concepts in Luhmann’s work. For example, Clam (2000) argues Luhmann’s theory of the operation is ‘protological’ and
involves challenges to the methods of both philosophy and sociology. He provides a highly insightful and occasionally critical perspective on Luhmann’s theorising of the operation, and his handling of problems arising from this in both philosophy and sociology. Where Thyssen (2005) argues that Luhmann fails to front up to weaknesses in his philosophical arguments, Clam argues that Luhmann resolves these via a specifically systemic mode of argumentation (namely protologic). Other commentators clarify specific aspects of Luhmann’s work, such as Vanderstraeten (2000) on self-socialisation, Chernilo (2002) on symbolic generalised communications media, and Hendry and Seidl (2003) on strategy development within organisational systems.

This chapter has attempted to outline Luhmann’s theory of social systems towards articulating how change occurs within cycle commuting, and how design of social change in cycle commuting can be achieved. The next chapter analyses cycling and cycle commuting in detail using Luhmann’s approach.
HOW DOES CYCLE COMMUTING WORK AS A SOCIAL SYSTEM?

The sections that follow explore the workings of cycle commuting as a social system, exploring the ways in which cycle commuting has evolved over time, and tracing the opportunities and points of leverage this system makes available for promoting an increase in numbers of cycle commuters.
6. How has cycle commuting become a social system?

This section is organised by the need to explain the history of cycling and cycle commuting through Luhmann’s theory of social systems. A chronologically-based approach presents difficulties for both writer and reader, as it involves simultaneous detailing of historical shifts and their significance within cycling as a social system, and results in a heavy burden on the reader.

The approach taken is therefore to provide a brief historical overview before moving into an explanation of the autopoiesis of cycling and cycle commuting, using Luhmann’s analytic terms to organise the text. The result more directly reflects the previous chapter on Luhmann, so lessening the burden for the reader. It is therefore important to note the chapter provides neither a comprehensive nor balanced history of New Zealand cycling or cycle commuting, and the reader is referred to the works of Herlihy (2004), and Kennett and Kennett (2005) for fuller accounts.

The first section below provides an initial overview of cycling’s history in Europe and New Zealand, followed by an overview of its commercialisation. These overviews are provided with minimal comment as key events and interpretations are discussed in detail in later sections.

6.1 What is cycling’s historical context in New Zealand?

The timeline overleaf provides an overview of cycling’s history and associated innovations, based on Herlihy (2004) and Hudson (2005). Events are listed under the 5-year period in which they occurred to match New Zealand census dates, making it easier to link this with the NZ Census-based measures used to build a database in later sections of this report.

The history of the bicycle conventionally starts with the invention of the velocipede in 1817, but this chapter argues the commercialisation of the safety cycle during the 1890s marks the operational closure of cycling and its initiation as an autopoietic social system.

The first recorded cycle appears in Auckland in 1869, with races taking place in Christchurch in the same year. From then on cycles increase rapidly in numbers through import and local manufacture. Cycle commuting peaked in New Zealand in the 1940s and has been in slow decline to the present day. The 2006 Census featured the lowest ever level of cycle commuting recorded since Census measures started in 1971. Having said this, leisure cycling continues to grow at a high rate.
Figure 13: Key events in cycling’s history

<table>
<thead>
<tr>
<th>Year</th>
<th>Events European Cycling</th>
<th>New Zealand History</th>
</tr>
</thead>
<tbody>
<tr>
<td>1816</td>
<td>• Baron von Drais (Germany) invents Velocipede</td>
<td></td>
</tr>
<tr>
<td>1821</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1826</td>
<td>• First internal combustion engine</td>
<td></td>
</tr>
<tr>
<td>1831</td>
<td>• Steam railways developed</td>
<td></td>
</tr>
<tr>
<td>1836</td>
<td>• Treaty Of Waitangi signed (1840)</td>
<td></td>
</tr>
<tr>
<td>1841</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1846</td>
<td></td>
<td></td>
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<tr>
<td>1851</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1856</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1861</td>
<td>• Jacques Lallement (France) invents Boneshaker</td>
<td></td>
</tr>
<tr>
<td>1866</td>
<td>• Pierre Michaux (France) makes Boneshakers</td>
<td>• First electric telegraph line and steam railway</td>
</tr>
<tr>
<td>1871</td>
<td>• High Wheeler developed in UK</td>
<td>• Vogel’s roading and railways programmes start</td>
</tr>
<tr>
<td>1876</td>
<td>• Vote given to males over 21</td>
<td>• First Boneshakers built, first races held</td>
</tr>
<tr>
<td>1881</td>
<td>• First car and motorcycle patents</td>
<td>• Military engagement with Maori ends</td>
</tr>
<tr>
<td>1886</td>
<td>• John Starley Kemp (UK) invents the Safety Bicycle</td>
<td>• High Wheeler imports start, first cycle clubs formed</td>
</tr>
<tr>
<td>1891</td>
<td>• Women cyclist numbers increase dramatically</td>
<td>• City councils begin to regulate cyclist behaviour</td>
</tr>
<tr>
<td>1896</td>
<td>• Modern bicycle design complete</td>
<td>• Safety cycle appears in NZ</td>
</tr>
<tr>
<td>1901</td>
<td>• Car production escalates</td>
<td>• Vote given to women</td>
</tr>
<tr>
<td>1906</td>
<td>• Bicycle prices fall allowing working classes to buy</td>
<td>• First women’s cycling clubs, first professional riders</td>
</tr>
<tr>
<td>1911</td>
<td>• Peugeot markets the Recumbent cycle</td>
<td>• First Boneshakers built, first races held</td>
</tr>
<tr>
<td>1916</td>
<td>• World War I starts (1914)</td>
<td>• First Boneshakers built, first races held</td>
</tr>
<tr>
<td>1921</td>
<td>• Availability of cars increases rapidly</td>
<td>• World War I ends (1919)</td>
</tr>
<tr>
<td>1926</td>
<td>• Depression takes hold</td>
<td></td>
</tr>
<tr>
<td>1931</td>
<td>• Schwinn markets fat-tyred, robust boys cycle</td>
<td>• Depression ends</td>
</tr>
<tr>
<td>1936</td>
<td>• Standard working week set at 40 hours for most</td>
<td>• World War II starts (1939)</td>
</tr>
<tr>
<td>1941</td>
<td>• Cycle commuting peaks worldwide (decline starts)</td>
<td>• Depression ends</td>
</tr>
<tr>
<td>1946</td>
<td>• Universal family benefit introduced</td>
<td>• World War II ends (1945)</td>
</tr>
<tr>
<td>1951</td>
<td>• Car ownership booms worldwide</td>
<td>• Universal family benefit introduced</td>
</tr>
<tr>
<td>1956</td>
<td>• Cycle industry shifts focus to leisure, children, teens</td>
<td>• Prolonged Waterfront Dispute and state of emergency</td>
</tr>
<tr>
<td>1961</td>
<td>• Alex Moulton (UK) markets small-wheeled bicycles</td>
<td>• Auckland Harbour Bridge opened (no cycle lanes)</td>
</tr>
<tr>
<td>1966</td>
<td>• Specialised markets mountain bike worldwide</td>
<td>• Morrison begins manufacture</td>
</tr>
<tr>
<td>1971</td>
<td>• Ten-speed launched worldwide</td>
<td>• Healing begins manufacture</td>
</tr>
<tr>
<td>1976</td>
<td>• Modern mountain bike developed</td>
<td>• Oil prices go up – car fuel crisis</td>
</tr>
<tr>
<td>1981</td>
<td>• Specialised markets mountain bike worldwide</td>
<td>• Values Party formed and campaigns against cars</td>
</tr>
<tr>
<td>1986</td>
<td>• Shimano dominates production of parts</td>
<td>• Asian cycle imports dominate others</td>
</tr>
<tr>
<td>1991</td>
<td>• Cycling Advocates Network (CAN) starts</td>
<td>• Carless days start, speed limit dropped to 80km</td>
</tr>
<tr>
<td>1996</td>
<td>• BikeNZ formed</td>
<td>• Peter McDonald’s book Changing Gear published</td>
</tr>
<tr>
<td>2001</td>
<td>• National cycle strategy launched</td>
<td>• Sheffield Industries/ Avanti begins manufacture</td>
</tr>
<tr>
<td>2006</td>
<td>• Cycle commuting lowest ever in NZ Census</td>
<td>• Deregulation begins – cheap car imports rise</td>
</tr>
</tbody>
</table>

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Cycling grew rapidly in New Zealand in the 1870s, at the beginning of a government-sponsored programme of colonisation. Belich (1996) notes New Zealand was characterised in both marketing and published reports from the 1850s to 1880s as a paradise, a land of promise, a wonderland, the Britain of the Pacific, the future of England, and so on. A broad theme was New Zealand’s emptiness, a cause of despair, hope, and a desire to fulfil its promise as a progressive England of the south. New Zealand was to be better than Britain for ordinary people, offering them equality and opportunity in ways alien to British society. It was also to be greater, offering richer resources, the ability to progress more rapidly, and the remote possibility of one day eclipsing its parent.

But by the 1870s such dreams were clearly unrealised and unrealistic: while most people enjoyed the benefits of the colony’s commitment to egalitarianism and a range of social freedoms, living conditions in New Zealand were harsh. In particular, the colony struggled to establish a stable economy and a socio-political framework that met the expectations of settlers, and to a lesser extent, tangata whenua.

The 1870s marked the beginning of the government’s drive to develop the country’s transport and telecommunications infrastructure: the government’s efforts were closely matched by private corporations. Mythologies aside, most towns and cities were in reality established to grow and service agricultural activity: if local farming succeeded, so did its urban counterpart. Belich characterises this period as a ‘quadruple assault on nature, natives, emptiness and distance, each of which served the others’ (p. 351).

It is not clear how cycling contributed to colonisation, if at all, other than as a leisure accessory for wealthier gentlemen. Yet the overview above suggests synergies between the colony’s emerging character (Belich, 1996) and the freedom-favouring, egalitarian, inclusive nature of cycling.

It is clear cycling in New Zealand arises as a European consumable and cultural export arriving via the United Kingdom. In context, there is nothing to indicate that New Zealand cycling was any different from other European countries or their colonies.

On the other hand, it is possible that cycling’s global meanings had a unique fit with the colony’s egalitarian and lifestyle aspirations. It is therefore also possible that cycling is historically and culturally nuanced for New Zealand conditions. Unfortunately such questions are not the immediate concern of this thesis: they have been approached by a few authors including Simpson (2001) and Kennett and Kennett (2005), but merit further exploration.
Cycling is largely absent from Auckland’s official history and identity, except for a few odd facts. For example, the first recorded cycle in New Zealand was made in Queen Street and ridden down Greys Avenue in 1869. The first new cycle path in late twentieth-century New Zealand was opened along Tamaki Drive in the late 1970s. What sense did Auckland make of cycling, such that it appeared to ignore it while achieving these various ‘firsts’? Such questions form a background to exploring the culture and social dynamics of cycling and cycle commuting in New Zealand.

6.2 How was cycling innovated and commercialised?

Hudson (2006) emphasises (with others such as Herlihy, 2004; Tobin, 2004; Kennett and Kennett, 2005; Norcliffe, 2006) that the major design elements differentiating cycling were assembled by the late 1860s, and were configured in their present form by the late 1890s. Hudson also suggests that cycling’s history is better understood as an aggregation of many small innovations into ‘milestones’. The advantage of this view is these milestones are typically the forms then marketed to the public.

The diagram below provides an overview of cycling’s technological innovations (based on Herlihy, 2004, and Hudson, 2006, as in the timeline above). In this diagram, the green line shows the number of significant innovations in a given decade. The red line provides a cumulative tally of these innovations, and so identifies the major innovation milestones as they arose.

**Figure 14: Overview of cycle innovation and commercialisation**
The diagram suggests there have been two major phases (judged as six or more innovations per decade) and four minor phases of innovation (judged as five or less innovations per decade). The two major phases coincide with the launch of the safety cycle (late 19th century) and the mountain bike (late 20th century).

The first phase leads up to the launch of the Safety cycle and its subsequent refinement over the next few decades, driven by demand for a cheap, efficient, fast, flexible form of personal transport for the urban masses. This phase was assisted by improving road networks, by the development of cycling-specific infrastructure such as clubs, routes/paths, maps, service businesses, signs and so on. It marks the functional differentiation of cycling as an autopoietic social system. This phase centers in the development of cycling as a social system oriented to mass personal transport, in which cycle commuting is the dominant form.

Although the second phase (from the 1960s to the 1980s) also suggests significant innovation, it is largely through incremental improvements to and/or commercialisation of old innovations (the exception might be the introduction of completely new technologies, such as carbon fiber and electronic gearing systems). This second phase is marked by cycling’s increasingly close coupling with leisure and youth sub-cultures, as evidenced by the success of a semantics of style, adventure and youthful identity, and with a range of leisure cycles for youth. This represents an evolutionary switch in the autopoiesis of cycling from transport to leisure, ostensibly due to the decline of utility riding (non-leisure riding including cycle commuting), but in reality also due to the blossoming relationship between leisure and consumption.

The four minor phases are detailed in the sections that follow. The next section explores how these phases arose, tracing the co-evolution of cycling in general and cycle commuting in particular, towards explaining the culture and dynamics of cycle commuting itself.

### 6.3 How has cycling changed over time?

Rosen (2002) argues that cycling’s history needs to be understood in terms of the dynamics between technological and cultural change, and within broader debates about modernity and post-modernity.

In Rosen’s view, cycling played a major role in the simultaneous development of mass production technologies, marketing techniques, and consumption cultures, being one of the first worldwide mass consumables. It also enabled freedom of movement at a time when urbanisation placed increasing pressure on older forms of passenger transport, and so helped fulfill modern ideals of
egalitarian social organisation and interaction. Rosen also notes that the semantic of cycling displays ambivalence towards modernity, technology, and urban life, and continually entangles cycling with alternatives cultures, emancipatory protest movements, and anti-car politics.

6.3.1 The emergence of transport

Herlihy (2004) starts his history of the cycle by noting the semantics of self-propulsion begin as early as the late 1600s, when French physician Dr. Elie Richard proposed the conceptual design for a ‘self-moving’ vehicle (illustrated in Jacques Ozanam’s Récréations Mathématiques et Physiques of 1696). In this sense the meaning of an ‘auto-mobile’ (‘auto’ and ‘mobile’ being terms for ‘self’ and ‘motion’ respectively, derived from classical Greek) can be understood as a Renaissance (and later Modern) project to rationalise and democratise mobility, and so to secure social, political and economic progress through advances in the technologies of movement.

However, Popplow (2005) reminds that the semantic of progress in transport needs to be linked to its ecology. Popplow shows that pre-industrial forms of transport (use of horses for personal transport, in coach, goods and postal services, with associated roading systems, plus use of canals where available) had already oriented European worldviews towards the economic and social opportunities of improved transport systems. It had also sensitised them to the risks of economic reliance on a single mode (horse-drawn vehicles) of land transport, and for example, canal-based transport played an increasingly important economic role. An equine transport system was vulnerable to horse condition, the price of oats, infectious diseases, weather extremes, and so on. On the other hand, horses were relatively expensive and personal mobility was a social marker: ownership of horses and carriages for personal transport conveyed social status, and carriages in particular were associated with very high social standing.

Early industrial-era transport was so reliant on horses that Hamer (2005) argues the high price of oats alone prompted German inventor Karl von Drais in 1817 to invent a mechanised vehicle that would replace the horse (see discussion of Drais’ velocipede below). Oats had increased in price due to a series of bad harvests, to raiding by Napoleon’s Army, and to the eruption of Mt Tambora in Indonesia. (This was the biggest eruption in recorded history, killing around 92,000 people, and ejecting so much ash into the atmosphere that average global temperatures dipped by 3 °C. In the northern hemisphere, 1816 became known as the year without a summer.) According to Hamer, in combination these caused an energy crisis of greater magnitude than the oil crisis today.

Von Drais’ motivation for inventing the velocipede was therefore at least partly ecological, and while it could compete with the horse on speed on a good surface, it should be no surprise that the
velocipede did not survive past the recovery of weather and oats market by the end of the next year. Clearly, there was both a crisis and a progressive invention, but neither lasted.

The development in the early-mid 1800s of steam-powered trains for passenger and freight transport and improved roads heralded significant changes in the transport system overall. But by their nature steam-driven rail services suited longer-distance trips in flat terrain, and were less favoured by many city authorities through concerns over performance on hills, as well as the infrastructure costs, noise, pollution, and accidents. Horse-drawn carts, cabs and trams still offered relative flexibility and reliability compared to other types of trams, and their use continued in New Zealand into the early 1900s (Watson, 1996).

But overall the horse-drawn vehicle was not ideal. Cabs were relatively expensive, while the much cheaper horse-drawn trams and buses were slow, crowded, and inflexible. Horses required feeding and stabling, which were increasingly expensive in urban environments, and manure in streets and in stables also became increasingly problematic for health reasons. As the century wore on the ecology and economics of the horse were under increasing pressure.

6.3.2 The emergence of leisure

The notion of leisure as a mass pursuit arises in Western Europe from the 1800s onwards. Leisure’s emergence through shifts in the meaning of time is fairly well-known (Haworth & Veal, eds., 2004). Leisure emerged with the distancing of the human body from dominant forms of labour, and the distinction between spare time and work time (Luhmann, 1995).

As Haworth and Veal (2004) explain, industrialisation initially engendered the need to segment time, bind production activities to deadlines, and routinise tasks to ensure organisational and economic efficiencies. This in turn increased attempts to create a disciplined, clock-watching workforce from agrarian workers used to a shorter working year and working hours based on agricultural sector and season. Increasing urbanisation also meant traditional rural ways of relaxing were no longer possible. New forms of relaxation were needed and framed by the relative unpleasantness of city life and work routines. The result was a cultural orientation to leisure as a restorative, rationalised as necessary to balance out the stresses and nastiness of urban life.

Political, public health and moral movements against industrialised worker exploitation were successful in achieving regulation of working hours, and after initial resistance, industry saw the benefits through increased leisure-oriented consumption, especially by the middle classes. These various shifts framed leisure time as evenings, weekends and holidays: ‘St. Monday’ survives from
these earliest attempts to codify the working week as the day dedicated to the god of hangovers. While these shifts occurred first in the United Kingdom, they were eventually typical of most Western European countries and their colonies. Haworth & Veal (eds., 2004) show the average working week fell from about 3,500 working hours per year in the 1850s to about 2,000 by the year 2000. New Zealand achieved the 40-hour working week as a standard for most sectors in 1936.

Somers (2005) suggests the 19th century can be characterised by the emergence of significant social innovations in casual and commercial leisure pursuits. For example, the growth of relatively cheap railway transport during the late 1800s encouraged weekend and holiday travel, and the United Kingdom’s railway services offered the first packaged holidays in the 1870s. The result was not just the notion of leisure time, but the evolution of journeys, times, spaces, activities and groups constructed specifically for leisure.

Fischer’s (1994) analysis of changes in leisure activities at the end of the 19th and into the 20th centuries supports the view that leisure time was exploited most by the middle classes, who had the means and freedom to trial innovations such as new cycles. However, he argues against the general view that organised or commercial leisure pursuits replaced traditional, casual, self-generated ones. In his view, social innovation needs to be approached as an inherently messy phenomenon, marked by experiments and practices that go un-noticed in the context of familiar routines. Fischer’s analysis suggests cycling was regarded as one more leisure option, and thus only one of many activities people enjoyed. Cycling added to choices of organised (club-based) leisure, but also added recreational and every day cycling to a wide range of other leisure activities.

In Fischer’s view of leisure, cycling would pass through an initial phase as an upper-class ‘craze’, would then be integrated into middle-class personal leisure repertoires, and once the technology came down in price, would finally be popularised as a working-class pursuit. This is easily recognised as the Veblenesque ‘trickle-down’ pattern of diffusion, which relies on aspiration by lower status social groups for the consumer trappings of the group above them. Herlihy (2004) and Rubinstein (1979) note quality second-hand cycles were more important than cheap copies in this regard, in that the former held greater appeal as fashion items, and also lasted longer.

With the opening and expansion of public railways from the 1840s, and beginning in Britain especially, transport played an increasingly important role in enabling leisure to expand its reach beyond the strictures of urban life. Improving transport systems enabled the middle class to create
green suburbs beyond industrialised city centres, so enabling ready access to the countryside. On the other hand, this also created the need to commute increasing distances to work.

As Somers (2005) notes, 19th century urbanisation also produced a ‘counter-urban’ interest in the countryside, and an idealisation of nature, as an escape from urban life. This escape contributed to the polarising of city and country life as unhealthy/ healthy, and gave rise in part to the notion of riding in the country as a form of physical improvement. In this respect the various notions of personal mobility, freedom, enjoyment and escape from the rigors of urban life are closely intertwined.

6.4 How does cycling’s autopoiesis work?

Cycling emerged in a society sensitised to the twin issues of obtaining easy, convenient, personal urban transport and gaining healthy, enjoyable, socially-respectable leisure opportunities.

This chapter argues that cycling emerged as a social system in relation to the dual cultural concerns of personal transport and personal leisure. It suggests that cycling’s autopoiesis is consequently structured by the system/ environment distinction between cycling and other forms of transport, and by an inter-programme distinction between cycling for leisure and for transport. The chapter uses Luhmann’s analytic tools to explore these themes in greater depth.

6.4.1 Function, Medium, Efficacy: human-powered, two-wheeled motion

Given Drais’ initial concept, cycling appears to have had its origins within transport, and certainly as a social system it shares transport’s function, medium and efficacy. However, there are nuances in cycling’s constitution that distinguishes it from other transport modes, and point to the reasons for its autopoietic closure.

Cycling’s function as transport is to reduce spatial and temporal differences – to transport people and goods from one place to another. This is particularly relevant to cycle commuting, which transfers people between home and work. Consistent with its function as transport, cycling’s medium is motion, and its efficacy is arrival (delivery of people and goods to their destination). Cycling is constituted as human-powered, two-wheeled motion. This requires that riders balance and steer while exerting themselves, so resulting in a mode of transport that makes unique uses of the human body.
Industrialisation, urbanisation and the institution of leisure time changed the meaning of the human body and its relation to both space and time. Luhmann (1995, p. 248-249) suggests a shift in meaning from the body as a vehicle for manual labour in field or factory, to the body as the focus for a range of health-related disciplines and practices – and as the focus of consumption. That is, the body shifted from being focused on production, to becoming a focus of consumption.

**Figure 15: Bicycling, USA, 1920s**

Herlihy (2004) emphasises that cycling was first distinguished physically – by the need to balance the body astride the vehicle, and to do so while pedalling and controlling its progress. These skills are almost taken for granted today, but the idea of balancing astride a vehicle was in itself highly innovative, and for its time, completely counter-intuitive.

That such a balanced motion was possible was a mystery to many, and key to the reason for the many cycling schools associated with commercialisation to the late 1800s. That it enabled one of the vehicle’s key attributes, its speed, was part of the mystery. This physicality also contributed enjoyment of speed, and of the sense of freedom that comes with it.

Herlihy (2004) also notes the idea of lifting one’s feet entirely off the ground or pedals to coast along without exertion did not immediately occur to its earliest inventors. Velocipede inventor Drais, for one avoided publicising this behaviour for fear of undermining acceptance of his velocipede, though many riders did lift their feet (and probably some while still stationary), so coming to grief.

The advantage of balancing in this way was the possibility of achieving unheard-of speeds and distances: cycling’s first quest to ride faster, farther, longer. Smith (1972) provides numerous examples of USA riders who moved rapidly from learning to balance to riding hundreds of miles, or for extended periods of time. A New Zealand cycle historian notes the second recorded mention of cycling was in 1875, ‘when a Mr P. J. Horne cycled to Cambridge and back [to Auckland], a distance of over 200 miles, on a bike imported from England’ (cited in Auckland Bicycle Planning

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*Norman Rockwell’s painting evokes the exhilaration of riding: speed, excitement and fear fuse in the act of balancing atop a cycle. The picture appears to have been commissioned as part of an ad for BF Goodrich Bicycle Tires. Image sourced from [www.advertisingarchives.co.uk](http://www.advertisingarchives.co.uk). Accessed December 2006.*
Such extreme physical undertakings were not unusual, and were fostered by the industry as a means of both publicising cycling and testing new technologies.

While there were health concerns associated with these events, the general consensus was that cycling was good for physical and mental health. Initially the medical profession seems to have opposed cycling, but by the 1890s it was recognised as a healthy pastime and more considered arguments were put forward. Smith (1972) notes, for example, the three part argument made in France by journalist Henri Desgranges from 1895: first, cycling takes people away from unhealthy activities, second, it makes them strong, active, energetic, and third, they further reduce unhealthy habits and gain in self-discipline as they continue to enjoy cycling.

On the other hand, cycling’s physical nature has always been highlighted by rider accidents. In the pre-1890s, the risks arose first from cycle design and only second from cyclist behaviour. The semantic of the time was therefore strongly oriented to the safety of cycle forms, so driving cycling’s technological innovations and commercialisation. With the invention of the appropriately-named Safety cycle in the 1880s, the risks from the cycle decreased significantly. But cyclists could then ride faster (albeit in greater comfort), so re-entering speed into cycling as risk of self-inflicted injury. Within three decades cycles were increasingly involved in accidents with motor cars, so further shifting the semantic to emphasise danger from the drivers of motorised vehicles.

Figure 16: High wheeler 'accident' 1870s, USA

In this respect cycling’s physicality encourages considerable risk tolerance. In its male culture at least, riders were and are remarkably sanguine about serious and frequent experiences of injury (Norcliffe, 2006). But more importantly, part of the observable emotionality of cycling is enjoyment of both speed, and of the risk-taking that comes with it. This is obviously not unique to cycling and is also associated with male car subcultures (see discussion of car driving in section entitled ‘Cycling’s leisure programme’, p. 96).

Given cycling’s origins within transport, it should be no surprise that it now shares its broad function, medium, and efficacy with other modes. However, cycling’s differentiation as human-powered, two-wheeled motion renders it unique. The result is a semantic of physical experiences – of efforts,

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health benefits, injuries, and pleasures – within transport. The difficulty, of course, is that the constitution of transport in modern times is such that it can make no sense of these physical experiences.

6.4.2 Code: Fast/ slow

The social system of cycling is based on the distinction fast/ slow, a distinction framed by speed via human-powered, two-wheeled motion. The codification of cycling as fast/ slow invoked a quest for the highest speeds this configuration of person and machine would allow. Because initial prototypes were patronised by wealthy gentlemen, forms that failed were then diverted from personal transport to gentlemanly leisure.

German inventor Karl von Drais’ various proposals for human-powered vehicles in the early 1800s were for four-wheelers, driven by a treadmill or cranks attached to the rear axle. They were designed for use by two people. A servant pedaled at the rear while the owner steered and managed the vehicle from in front: in retrospect, the concept is a charming reflection of the status accorded to personal mobility in 17th century Europe.

One of the issues noted by Herlihy (2004, p. 17) common to early attempts to supersede the horse was the general lack of public interest, and Drais’ initial vehicles suffered the same fate. In use they were probably not very efficient for carrying passengers, and were much less so for carrying goods. The roads were generally harsh on these vehicles, which would inevitably depend on horses to pull them out of muddy ruts and holes.

Figure 17: De Sivrac’s velocipede

Hudson (2006) suggests that cycling’s history from Drais onward is relatively clear (given the usual controversies), but argues that prior attributions are highly doubtful. For example, he suggests the Compte de Sivrac’s horse-styled velocipede 1791 (see image at left below) is a story made up by historian Baudry de Saunier in 1891. Hudson adds that attempts to pre-date inventions were common in the 1890s, fueled by commercial rivalry and personal ambition. Unfortunately, Saunier’s (Sivrac’s) velocipede has often

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passed unquestioned into authoritative cycling histories (see for example Noguchi, 1998). It remains interesting in this context because Saunier called it the *célerître*, from the Latin words *celeriter* (fast) and *ferre* (to carry).

The details of the hoax highlight the codification of cycling via notions of speed, and of tensions between innovation and popularisation. The name alludes to the daring novelty of speed via technological means, but the illustration alludes to the familiar and trusted horse.

**Figure 18: von Drais' velocipede?**

Given prior attempts to drag speed from cumbersome treadle-driven carriages, Drais’ solution to the problem of speed was radically simple. He proposed the *laufmaschine* (running machine), later nicknamed after its inventor as the *draisine*, and also known as the ‘accelerator’, the *celeripede*, and the *velocipede*, the latter neologisms from the Latin words *celer* and *velox* (swift) and *pes* (foot). Drais himself never explained the origins of the design (Herlihy, 2004, p. 24). Rather, he simply emphasised that the velocipede not only assisted but ‘accelerated’ movement by freeing the powerful leg muscles used for gravity for the task of propelling a person forward at speed. The significance of the fast/ slow distinction as grounds for Drais’ invention is well summarised in his patent, which claims that,

- ‘On a well-maintained post-road it will travel uphill as fast as a man can walk [about 3 km per hour]’
- On a plain, even after heavy rain, it will go 6 to 7 miles an hour [10 to 12 km per hour], which is as swift as a courier
- When roads are dry and firm it runs on a plain at the rate of 8 to 9 miles an hour [13 to 15 km an hour], which is equal to a horse’s gallop
- On descent it equals a horse at full speed’ (cited in Smith, 1972, p. 4, square brackets are author’s notes)

The velocipede’s speed was a mixed blessing. It was the first vehicle to rely on human balance to achieve its efficiency: coasting with one’s feet off the ground was entirely innovative. The basic

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skills mounting, balance, steering, coasting, and stopping remained significant problems for many riders. Drais installed a brake and downplayed downhill coasting (to avoid exacerbating the real and imagined problems with balance), but some copyists omitted brakes, and most were less careful about managing rider’s expectations and skills on hills and rough roads. The inevitable results for riders were lower than expected speeds and higher than anticipated injuries.

Initially the media treated the velocipede favorably as a new mode of transport, but within a year were complaining that it depended for its effectiveness on a hard, dry road and on a fit, capable rider. The media also noted velocipedes came into conflict with pedestrians when using footpaths to avoid poor roads. By the end of 1819 the media, mechanics and publics of Europe and America had concluded the velocipede was more limited than at first expected, and had no practical value beyond a pleasant and healthful form of recreation.

The full expectations of mechanised personal transport had not yet been fulfilled: the machine had signaled the potential for speed in transport, though it soon became a rich man’s leisure accessory.

These initial experiences with speed led to a fairly rich semantic development of the fast/ slow distinction in the later 1800s. Speed came to mean physical freedom and implied a range of social and political freedoms arising from enhanced personal mobility. Commentators soon linked the experiences of riding with metaphors of physical transcendence such as ‘floating like a cloud’ and ‘flying like a bird’. For example, the stanza below appeared in The Wheelman, June 1883 (the journal of the League of American Wheelmen).

\begin{quote}
Hurrah, hurrah, for the merry wheel,  
With tyres of rubber and spokes of steel  
We seem to fly on the airy steeds  
With eagle’s flight in silence speed.  
\end{quote}

[in Smith, 1972, p. 12].

Such metaphors appear paradoxical in transport, where efficacy is judged by the timely arrival of people and goods, and so signals cycling’s coupling with leisure. Cycling’s semantics do not seem to make much more of such transcendental distinctions until the 1880s and the appearance of the Safety cycle. To this time cycling had been a leisure pursuit of wealthy young men, who were often vilified as pretentious dandies riding expensive toys at reckless speed through town. From the 1880s a range of metaphors are rapidly deployed in writing (as above) and in advertising imagery. There are at least two important reasons for this.
First, the industry wanted to build uptake as quickly as possible, and so marketed the cycle by the most powerful and appealing metaphors it could reasonably apply. Second, the industry was highly brand-conscious from the very start, and metaphors were an important means of distinguishing the marketer/brand by laying claim to a unique set of meanings (Rosen, 1999).

Figure 19: Safety cycle imagery, France, 1890s

For example, a semantic of flight was used to invoke the physiological sensations of the idea ride – gliding smoothly along a smooth road at speed. It implied a graceful and pleasurable physicality – something beautiful to be respected and admired. Flight also alluded to the freedom from the necessary arrangements and inflexibility of public transport modes, such as timetables, fares and the company of other passengers. It also symbolised social freedoms – the ability to move outside one’s neighbourhood and meet a much wider range of people – so incidentally associating cycling with fast and free morals, and with progress in social and political life. Flight also made sense to riders leaving the anxieties and pressures of the city for healthy relaxation in the countryside. Finally, images of celestial flight helped marketers avoid having to deal with the more practical issues of sharing streets with the much slower horse-drawn traffic and pedestrians.

Branding images such as that at left were constructed through quasi-Classical motifs – the three Fates/Graces/Virtues, the messenger-god Mercury, angels on Renaissance church ceilings, and so on. No doubt such imagery worked as symbols of people’s higher aspirations, but also helped identify young women (and men, though more discretely) as the brand’s target market.

But the allusion to flight also marks the emergence of socio-political values within the semantic of cycling, such as the right to personal freedom of movement, and the right to protest when denied. In time the re-entry of the fast/slow distinction in cycling would come to be understood as freedom/constraint, so coupling cycling with politics.

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8 See [www.advertisingarchives.co.uk](http://www.advertisingarchives.co.uk), Accessed December 2006.
6.4.2.1 Speed and the motor car

Moser (2003) notes the motor car is also codified via speed, but shows it is easily distinguished from other modes. In particular, the fast/slow distinction re-enters ‘automobilism’ as aggressive pursuit of speed for its own sake, in competition with other car drivers, and irrespective of the safety of other road users.

He argues that in the early 1900s the socio-political conditions in European upper classes predisposed them towards dangerous leisure pastimes, pursed with heroic indifference to danger. These pastimes typically involved the motor car, the speed boat and the air plane, but dueling also enjoyed a brief renaissance. Hyper-masculine ideals such as courting of danger, esteem of courage, ability to prevail through violence, and an idealisation of war framed the semantic and practices of this pursuit.

The motor car was associated with speed for the experience of speed. In the initial semantics of the motor car, driver and car were intimately coupled, hence allusions to semi-mythical creatures such as centaurs – half-man, half-beast. Opposition between drivers and other road users was construed as a battle between progressive drivers and their reactionary opponents. Road and circuit racing construed competition as a battle for supremacy in a pseudo-Darwinian struggle for survival through superior fitness, in which those who were injured or died were honoured as sacrifices to the gods of speed and technological progress. Overall, the car was a vehicle for the (aggressive) modernising of society.

The passion of drivers was construed as a form of intoxication, euphoria, or madness. These various metaphors construed speed as dangerous, but also as exciting and addictive.

Moser notes the skills required in driving were often used as metaphors for those needed to survive in harsh and violent modern times, and points to the close relationship between these metaphors and the discourses framing and encouraging participation in the First and Second World Wars. That is, the semantics and practices of automobilism anticipated the aggression of the Wars.

The distinction fast/slow re-entered cycling as human-powered speed, and so always limited speed per se to the physical capabilities of the rider. This was a great leveler, in that the speeds achieved by the wealthy were no more remarkable than anyone else’s, so orienting cycling to social and political egalitarianism.
6.4.3 Semantic: Free/Constrained

Cycling’s semantic rapidly evolved from distinction of physical freedoms to socio-political freedoms, expressed as liberation, egalitarianism, and social progress. Cycling’s semantic of freedom continually re-produces these values by distinguishing its environment as imposing physical, social, political and economic constraints.

As noted above, cycling constructs the body as the site of intensely physical experiences of mobility, speed and by association, socio-political freedom. Cycling emerged at a time when social reform was a major focus, a facet explored in more detail later in this study. The transference of mobility from the physical to the social domain is easy to trace, in that people in the late 19th century were suddenly afforded the ability to range far more widely than ever before, and very cheaply at that. Physical experiences of free movement were easily re-introduced as the expectation and/or right to freedom of movement. Cycling’s semantic of freedom was soon elaborated and re-produced cycling as liberating, egalitarian, inclusive, and progressive.

Appreciating the wry humour, Smith (1972, p.112) cites a writer in Scientific American in 1896 (p. 391), “As a social revolutioniser it [cycling] has never had an equal. It has put the human race on wheels, and has thus changed many of the most ordinary processes and methods of social life. It is the great leveller, for not ‘til all Americans got on bicycles was the great American principle of every man is just as good as any other many, and generally a little better, fully realised.’

However, Smith also notes cycling in America failed to achieve the level of uptake common to European countries. The dominant League of American Wheelmen (LAW) resisted inclusion of women and blacks, and excluded the latter especially for as long as it could. Patent and licensing wars also kept prices high, so excluding lower-income people (Herlihy, 2004). By comparison, Nicholson (2004) notes of European cycling in the late 19th century,

‘A private machine gave its owner speed and flexibility. Quite suddenly, and for the first time, someone with limited time could wander widely throughout his own or neighbouring countries, free of the rigidity of railways and their timetables. In the same period, opportunities for doing so grew with the spread of paid holidays.’ (p. 181).

In transport contexts the semantic was re-introduced as the right to freedom of mobility, and when obstructed, freedom to protest. For the most part, freedom of mobility was fully realised in the first
half of the twentieth century, when import statistics (Statistics NZ, 2006) show the cycle was easily the most common urban vehicle in most countries including New Zealand. Having said this, with the advent of the motor car, and the construction of cycling as an irritant to motorised traffic, opportunities to notice constraints on cycling and to protest these also increased.

One of the nuances of freedom is cycling’s ‘public’ character. The cyclist is always subject to the public gaze, and so to public admiration and censure. This visibility contributed to cycling’s early recruitment of men over women: the road was a public, male space and cycling a very visible, public pursuit. Reports indicate fashion-conscious young dandies exploited this through to the era of the High Wheeler, when cycling was still elitist and novel enough to figure as conspicuous consumption: the dandies were appropriately vilified (Herlihy, 2004).

Its public nature also engendered cycling’s love of eye-catching riding clothing, a practice first noted in the 1860s in France. City-sponsored public races were held as public spectacles to help promote cycling. Riders in jockey’s clothing paraded down the streets before the race to attract attention and contribute to the carnival atmosphere. Cycling’s public nature provided more contradictory experiences for young women around the 1890s. Ridiculed for both cycling and for wearing the practical dress cycling demanded, some women chose cycling as a means of taking a very public stand on emancipation and/or rational dress (Simpson, 2001). In time public acceptance then meant that women could choose cycling as a statement of their independence and progressive ways. But its public nature also contributed to cycling’s loss of status with the advent of the motor car, which secures privacy and comfort for occupants.

That is, the semantics of freedom contributed to the increasing complexity of distinctions communicated within cycling. These are traced in more detail through cycling’s three major programmes.

6.4.4 Programmes: Utility, Leisure, Protest

Recent historians have distinguished programmes within cycling in different ways: for example, Herlihy (2004) uses cycle types to derive utility, competition and recreation, while Kennett and Kennett (2005) use cycle eras to give revolution (pre-1900), golden age (1900 – 1950), and changing gear (1950 onwards). Smith (1972) distinguishes a number of themes rather than programmes per se. Cox (2005a) notes the tendency to frame cycling as a technology, so basing distinctions on cycle types rather than cycling’s social dynamics. He suggests four categories, namely play (children’s cycling), active pastime, transport, and sport.
These various approaches share a common interest in explaining cycling socially, and are systemic in seeking to integrate inventions, industries, markets, and communications, and so on in a dynamic narrative. This is a complex task and their work indicates a demand for more sophisticated understandings of cycling.

Because this thesis explores cycle commuting as a programme relating to cycling as transport, cycling's programmes take on a particular importance. Herlihy's notion of utility as a programme is therefore of immediate interest, as it captures cycle commuting. However, his distinction between the nuances of competition and recreation is of limited relevance. In parallel, Cox's transport links with cycle commuting, but the remainder of his categories are too specific for this context.

Kennett and Kennett's (2005) notions of revolution and changing gear are of interest for suggesting the socio-political dimensions of cycling. While cycling's implication in social change is often mentioned as important (and sometimes exaggerated), it is not portrayed as central to cycling as a social system. Yet attention to cycling's communications suggests its political dimension is indeed central, though often subtle and culturally embedded. As a result, three programmes are distinguished for the purposes of this study: utility, leisure, and protest.

The first programme, utility, is distinguished as cycling for transport. This is obviously closely related to cycling's originating system/environment distinction as fast/slow. Utility spans a narrow range of sub-programmes, namely commuting, trades/freight, delivery/courier, and every day riding (such as short-distance shopping trips). The common strand in these is the need to arrive somewhere and deliver something—be it oneself, a package or both. Utility riding is construed as a solitary activity and largely in opposition to other modes (multi-modal commuting, for example, is negligible in New Zealand). Utility riding is increasingly closely coupled with roading and urban transport, in that it is framed as a political and practical alternative to the motorcar.

The second programme, leisure, is distinguished through the coupling of cycling with leisure. This spans a wide range of quite distinct (to a cyclist) sub-programmes such as on- and off-road racing, triathlons, touring, eventing (riding in organised public events), and a variety of multi-sport competitions that include cycling. The common strand in these activities is the physical and emotional intensity of the experiences of preparation and participation. Note that being a spectator at events is also included here, though it is not discussed directly. Leisure riding is construed as a group activity, and in a complementary relationship with other transport modes. For example, a car may be used to take bike and rider to an event. Leisure riding is loosely coupled
with health and sports systems: the first emphasising physical health, the second physical performance.

The third programme is protest, distinguished through cycling’s semantic of socio-political freedom. This spans a range of movements and political acts, ranging from cycling’s role in women’s emancipation at the start of the 20th century to the 1979 Auckland Harbour Bridge Assault, in which a small group of Auckland University students tried to cross the bridge to dramatise cyclists’ exclusion. Protest is construed as a group activity, and while associated with group riding, does not require that protestors are actually cyclists themselves. Protest is obviously coupled with the political system, both directly (as protest about cycling), and indirectly as protest in which cycling is symbolic of political conflicts.

The sections that follow explore the three programmes.

6.4.4.1 Cycling’s utility programme
Cycling emerged into the rapid urbanisation of European countries in the late 1860s, and into an urban transport environment characterised by significant tensions between the ecology and economics of transport services. Urban transport required vehicles that could reliably move high volumes of people over short distances in short periods of time. These vehicles needed to be cheap, versatile, safe and clean. The promise of the cycle was not really fulfilled in this respect until the early 1900s and the commercialisation of the Safety cycle, but the cycle continued as New Zealand’s most common urban transport vehicle into the 1950s.

The first recorded cycle in New Zealand was a Boneshaker: it was made in Auckland in 1869 by the firm of Cousins and Atkin, at the Victoria Steam Coach and Carriage Manufactory in Queen Street (Kennett & Kennett, 2005; Auckland Bicycle Planning Committee, 1980). The cycle’s arrival in Auckland heralded its arrival nationwide: the first cycle races were held in Christchurch in that same year, and cycles appeared everywhere in New Zealand during the early 1870s.

This was at a time when military colonisation via road building was still taking place, and at a time when the horse-drawn bus was the main form of urban public passenger transport (though the switch to horse-drawn trams would soon take place). Most of the population was in the South Island and was effectively rural. Watson’s transport narrative (1996) indicates that at this time road building was a central part of New Zealand’s colonisation programme. But cycling’s early profile in New Zealand (as elsewhere) was as a leisure vehicle for wealthy, active young men. While the
second-hand market allowed for lower-income cyclists, leisure uses by the wealthy remained the major focus (Kennett & Kennett, 2005).

Figure 20: Boneshaker, Geraldine, 1870s

Laird, Newman, Bachel & Kenworthy (2001) indicate New Zealand’s settlements were initially designed as walking-based villages (usually locating homes and shops within a five km of each other). Growth added walking-based suburban centres, and movement between was achieved by horse-drawn public transport.

Law (2002) notes this pattern shaped people’s movements into the 1950s, characterising the transport of the time as egalitarian, public and visible, in that people’s trips took place in the public space and gaze, affording high levels of sociability and personal security. This certainly suited cycle commuting and helps explain its popularity in the first half of the 20th century.

The first motorcars were imported in 1898 and the first buses in 1904, with the establishing of bus companies in both Christchurch and Howick (Auckland) in the same year. These early bus services had difficulty competing with trams and so tended to supplement tram routes, including routes outside city environs.

The Safety cycle of the mid-1880s emerged from England after a period of intense innovation in both technological and social domains. In technology, the problems of control were largely resolved through a collection of improvements spanning frame configuration and height, wheel construction, quality of braking systems, stability of steering, and so on.

With this came improved stability and control while mounting and dismounting, at top speed, over hilly terrain, and so on. Its overall design meant cycling could now conform to the notion of achieving fast, cheap, practical, personal transport for all.

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Kennett & Kennett (2004), p. 56. The photo is hand-dated 1866 but the vehicle features the diagonal frame launched in France in 1868, and so it must date from at least a few years later. However, it is also indicative of the speed at which diffusion took place – from France to New Zealand within a few years.
Figure 21: The Rover Safety Bicycle

The first version was John Kemp Starley’s Rover brand Safety Cycle, at left, first appearing at the Stanley Show in 1885 (Herlihy, 2004). Criticised for its weight, inelegant and complicated appearance, and odd steering arrangements, significant improvements to frame configuration and steering were made within the same year. Ongoing improvements meant that by the early 1890s the new cycle had eclipsed all previous speed and distance records.

The Safety seems to have been targeted at the very wealthy tricycle riders in the first instance: tricycles had been claimed by this group as the most dignified and respectable form of cycling for people of elite social standing. The Rover aimed to provide the riding qualities of a tricycle in two-wheeled version, and as such, was conceived as a leisure cycle.

However, two unrelated developments changed the way the market responded to the Safety cycle. First, a shift from craft (local assembly of the whole cycle by a trained craftsman) to factory (local assembly line-based manufacture) allowed for increased outputs and lower unit prices, so also enabling manufacturers to gear up quickly for increasing demand (Rosen, 2002). Second, women quickly found the Safety’s low configuration, comfort, stability, and speed a vast improvement on previous vehicles (Herlihy, 2004; Simpson, 2001). The trend started as planned with the switching of wealthy society women from their tricycles to the Safety, but led very quickly to a demand from middle-class women, and then men.

By the early 1890s, the Safety was eclipsing the High Wheeler in performance, safety, sales, and breadth of market appeal, so revolutionising the industry. Rover sales in America in 1891 were so large they effectively doubled the size of the market in that year. At the same time, a second-hand market burgeoned: new cycles might average £30 in price, while second had models might be priced around £5 (Rubinstein, 1977). By the early 1900s cycling had reached the masses, and could finally fulfill the promise of a cheap, fast, reliable, useful vehicle for all – the realisation of utility cycling.

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Cycling’s semantic of utility

Every day cycle advertising is indicative of the rapid differentiation of the programme of utility riding on the one hand, but its rather mundane semantic on the other. The Safety cycle defined utility cycling to the 1960s at least, while more specialised commuting and carrying cycles appeared around the early 1900s but evolved slowly, if at all.

Figure 22: Utility cyclist, Italy, 1890s

The image at left constructs a charming narrative about the utility of the bicycle by using humour and contrasts of colour to exaggerate its carrying capacity.

It is an ambitious view, and the example here is gently optimistic. The elderly man has packed his humble existence onto his cycle and is moving adventurously onwards, with grandson and dog astride his already-cluttered bike. The narrative manages to simultaneously suggest the cheerful clutter of a life and the nonchalant independence of cycling. As precarious as the clutter is, there are no direct risks implied by the image. In parallel, there are no subtleties of observation required of the viewer: the ad works as an honest, happy observation – a remarkable image perhaps seen by chance while walking down the street.

The ad aims to build a character and reputation for the Bianchi brand, rather than to sell a specific model per se, hence the claim ‘le migliori’ (the best). The ad is typical of the generic European approach to bicycle advertising – aiming to build a strong identity and set of associations with the brand first, and with the product/model of cycle second, if at all. The ad works as an appeal to the emotions – Bianchi brings a view of life that encourages adventure, enjoyment, optimism, and simplicity.

There is a well-established tradition of cycle advertising in major New Zealand dailies up to the 1950s, when ads seem to have shifted from newspapers into more specialised media. The larger proportion of these ads is retailer advertising using text and artwork provided by overseas brands, and many earlier ones are text only. While local brand and retailer ads appeared, their numbers

11 Advertising Archives, see www.advertisingarchives.co.uk, accessed December 2006.
are much smaller and their language and imagery is consistent with overseas rivals. That is, this study can find no evidence for a semantic specific to New Zealand.

For example, the black-and-white newsprint ad below appears regularly in both Wellington and Auckland during the late 1940s, and versions of this ad feature continually in the NZ Herald from the 1920s to 1950s. It was probably supplied by BSA as a stock ad for their standard Roadster model.

The ad is a good example of the textually-oriented approach to cycle advertising preferred by British and American cycle brands. It features an image of an adult male happily riding a three-speed to work, one hand on the handlebar, the other holding a cigarette. The image evokes an unpretentious, casual, male working class friendliness and good humour. Cycle commuting is unremarkable.

The large blocks of text draw the eye to the copy rather than the image, emphasising the exhortation to use a BSA for everyday riding. In comparison to the Bianchi ad above, there is little effort to provide BSA with a distinctive brand identity or imagery. The copy works as a direct call to action from BSA to the riding public, though in fact, the message could come from almost any commodity cycle brand of the time.

Figure 23: BSA advertisement, NZ, 1948

The ad is also notable for its calm, happy image of the male as worker/provider during an era when Depressions and Wars had taken their toll. This ad also appears when cycle commuting had begun to decline in New Zealand (and worldwide). Unlike the Bianchi ad, the BSA ad constructs cycle commuting via pragmatic and rational statements about speed, flexibility, costs, and certainty of arrival. Otherwise, there is no direct attempt to engage the viewer emotionally, or to make cycle commuting anything other than an ordinary and implicitly dull activity.

Even BSA must have realised the tone of mundane pragmatism could not continue: by 1956 its Roadster ads have disappeared and it is drawing on conventional emotionality to target children, offering a Christmas bike as a ‘thrill for every youngster’ (NZ Herald, Dec 11, 1956, p. 23).
By comparison, in the same year UK brand Hercules is offering the ‘ideal gift’, a bike which gives ‘healthy, carefree pleasure’, and is built for ‘strength, reliability, safety, easy running’ (NZ Herald, Dec 10 1956, p. 13). Top-range UK brand Phillips Manhattan offers ‘luxury’ and ‘maximum comfort’ and is ‘finished brilliantly’ and ‘styled beautifully’ (NZ Herald, Dec 10 1956, p. 16). That is, there is a major shift after World War II in both the targeting and the tone of the ads: cycling shifts from being a practical, albeit dull adult concern, to being a healthy, fun, and occasionally luxurious toy. Utility cycling had gone, and leisure cycling had arrived.

**Figure 24: The Carrier Cycle, UK, 1940s**

Between the 1900s and the 1970s utility cycling distinguished a number of forms specifically for carrying freight. There were roughly three formats: robust Safeties with baskets on front and/ or back, two-wheeled carriers with a small front wheel and large basket (as at left), and three-wheeled carriers with large baskets or flat decks. All were painted black. Advertising for these forms typically features the cycle on its own, profiled in black against a white background, and provides technical details. That is, there is an implicit emphasis on the cycle as a well-designed object to be appreciated in life and in print.

Herlihy (2004) and Smith (1972) note the rapid expansion of the cycle into the workplace in the early 1900s. This had begun with use of cycle couriers in France in the 1860s, but it was not till the early 1900s that the cycle was broadly adopted by doctors, sales people, trades people, delivery boys, staff on the production floors of large factories, and so on. For example, in New Zealand police, fire crews, couriers, tradesmen, and district nurses used cycles to assist in everyday duties (Kennett & Kennett, 2005).

One distinct variant was the heavy-duty trade cycle, the most common being the format at left. A version similar to this Royal Enfield was manufactured in New Zealand into the 1970s under the Leader brand, and examples can be seen today at Penny Farthing’s Cycle Shop in upper Symonds Street, central Auckland. The trade cycle indicates some differentiation of utility cycling, but the gradual post-War shift from a manufacturing to a service economy contributed to its

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12 Advertising Archives, see [www.advertisingarchives.co.uk](http://www.advertisingarchives.co.uk), accessed December 2006.
13 Personal communication with proprietor of Mt Albert Cycles and Mowers, December 2006.
gradual demise. These cycles appear to have been last used in New Zealand in the 1970s for delivering groceries.

The most common form of cycle from the early 1900s was the standard British Roadster, designed as a robust, light, reliable cycle for everyday urban use. Unpretentious in its styling, it was superseded in the 1950s by the ‘Sportster’, a lighter version targeted at younger people to try to revitalise the post-War market. Both Roadster and Sportster came in single-speed and three-speed formats, and the latter were available from the early 1900s (Kennett & Kennett, 2005). That is, the ten-speed craze of the 1970s did not result from innovation, but from clever re-marketing of old technologies by Asian manufacturers.

Utility cycling’s mid-century crisis
The changing context for utility cycling is illustrated by the two images of ordinary traffic flow below. The image at left is in 1911 – 12 and shows Courtney Place, Wellington, while the image at right is in 1949, showing Broadway, Newmarket, Auckland. These images illustrate the relative invisibility – the mundane reality – of utility cycling. In the 1911 image there is a cyclist to the left of the tram and at right near the shop awning, both enjoying good freedom of movement. In the 1949 image the cyclist appears at far right, sandwiched between car and curb.

Figure 25: Utility cycling, NZ, 1911 (Wellington) and 1949 (Auckland)\textsuperscript{14}

The images illustrate the nature of relatively pedestrianised traffic in the early 1910s, and the impact on traffic of motorisation by the late 1940s. The available New Zealand data suggests steady progress in urban road building from the late 1800s, with a marked increase rise in new urban road building during the 1960s – 1980s. Public transport (urban road, rail and ferry) use increased rapidly to the late 1920s, then levelled and declined rapidly after the late 1960s. Motor cars increased slowly in numbers to the 1920s and stayed roughly similar to the number of cycles through to the end of World War II, then began to rise rapidly. These patterns are illustrated in the diagram below.

Laird et al. (2001) suggest motor car increases were actually postponed by the Depression and the Second World War, and might otherwise have commenced in the late 1930s. Utility cycling peaked during these decades, and it is also clear use of public transport was highest from late 1920s to the late 1940s (New Zealand Yearbooks 1911 – 1976). With the end of World War II, car use then began to outstrip use of cycles and public transport. This indicates cycles and buses were crucial during times of hardship, providing transport when fuel shortages and poverty restrained mobility.

**Figure 26: Changes in cycle and car ownership, NZ**

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15 From New Zealand Yearbooks for Census years, and import and manufacturing data for cycles.
16 The data for this diagram is sourced from NZ Bluebooks and NZ Yearbooks from the 1870s onwards. Where data is unavailable, such as car ownership from 1898 to 1925, a simple growth curve has been introduced. The data for cycles is discussed in detail in the next chapter.
Improvements in the scale and efficiency of public transport enabled more rapid outward extension along transport corridors, and so growth in the scale of New Zealand cities. From the 1950s cars became a key facilitator of this expansive sprawl as they allowed for flexibility in personal travel, and so for greater flexibility in land use. This enabled homes to be located more flexibly in relation to city centres and workplaces, so encouraging a generally relaxed approach to suburban development. This favoured the car over the cycle.

Law (2002) characterises this latter phase of New Zealand’s transport history as much less egalitarian: access to cars laid open differences between the wealthy and the poor, and reinforced differences between men and women’s access to transport. Motor cars were likely to be acquired as male property, or as family property under control of the male as primary breadwinner. This is evidenced in men’s higher levels of disposable income, car ownership, and driver license acquisition. As urbanisation slowly shifted male work from manual and agricultural labour to factory, trade and office work in the second half of the century, the emphasis on male physicality shifted from labour to other contexts, of which transport was one.

Laird et al. (2001) add that as the travel distances in cities increased, so did use of private cars. People withdrew from the streets, walked less and began to use public transport less, though Law (2002) notes women’s use of these modes became proportionally higher. The ‘gendering’ of transport is still evident in New Zealand Census Travel to Work measures since 1971. These show females are proportionally more likely to ride a bus, be a passenger in a car, and more recently, walk or jog to work. Males are more likely to drive a car, ride a motorcycle or a bicycle (NZ Yearbooks, 1971 – 2001). As far as transport goes public streets and buses belong to women, while the privacy of the motor car is still reserved for men. The cycle’s currently high male patronage is interesting in itself, and is discussed in more detail in the next chapter.

The shift in cycling’s social status is illustrated by the Minhinnick cartoon below. The cartoon uses vehicles to portray the shifts in deprivation from 1928 to 1932 as the Depression takes hold. The various vehicles are used as indices of driver status and consumption, in which the cycle represents the lowest of both.
Figure 27: NZ Herald depression cartoon, 1932

The cartoon portrays the social hierarchy of vehicles in the 1930s, with cycling at the bottom. The far left hand box shows a speeding Rolls Royce with a sign reading ‘Just Married’ hung from its famous winged female bonnet ornament, and an arch of lines to express its luxurious glamour. The far right box shows a rider cycling slowly with a small basket in one hand; an arch of a few lines spreads over his head to express the awkwardness and physical exertion of the ride.

The message about cycling could not be clearer: the cycle connotes financial deprivation and relative social exclusion. Note the semantic occurs at a time when cycles were (still) more numerous than cars (see Figure 26: Changes in cycle and car ownership, NZ, p. 89), and when cycles were in huge demand due to fuel shortages – a pattern that was soon repeated during the War years. In this sense, the semantics of the motor car had already reframed cycling’s freedoms as symbols of social and economic constraint. Utility cycling was already in crisis for both internal reasons (its dull, repetitive practicality) and external reasons (its increasing exclusion from transport and respectable society).

The years after World War II are generally understood as years of decline. The British cycle industry slowed and never recovered (Rosen, 2002), and New Zealand imports slumped for a decade (New Zealand Yearbooks, 1946 - 1966). But the 1960s saw the launch of new globally-marketed cycle forms in direct response to the increasing interest in urban leisure and the problems of traffic congestion (Kennett & Kennett, 2005). These 1960s cycle formats are remarkable for both technological and semantic innovations.

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The re-invigoration of utility cycling

In the late 1930s André Marcelin of France had designed a small-wheel folding bicycle as transport for the Italian army. This design influenced the now-famous English Moulton (launched 1962) and Bickerton (launched 1970) brands, developed as a solution for congested urban traffic. One of Moulton’s self-imposed design challenges was to improve on the diamond-shaped frame that had dominated cycling since the late 1890s. These new frames were designed specifically for adult commuting in heavy city traffic: they were light, strong, comfortable (they incorporated full suspension), multi-gear, and easy to ride, and the small wheels allowed for increased luggage capacity and a low centre of gravity. Some models were foldable to allow for carriage onto buses and trains, while others were configured as trades cycles, racing cycles, and tourers. Apparently their small-wheeled aesthetic was derived from Italian scooters.

Figure 28: The Moulton ‘future cycle’, 1960s, UK

The Moulton emerged in cycling at a time when cycle commuting had been in decline for two decades. Post-War urban communities worldwide were investing in leisure, both from prosperity and from concerns over health. The problem posed by cycle commuting was not a technical one, though technical innovation might help rejuvenate a market dulled by 50 years of Roadsters. The real problem was how cycle commuting could be re-produced as leisure consumable for the first Post-War generation: the Baby Boomers.

The ad at left constructs the ‘now and future’ Moulton through a semantic of social and technological sophistication: its key themes are innovation, intimacy, and exclusivity.

The cycle is placed in the foreground, parked on a stand and features a carry-box over the rear wheel. It sits in an urban setting in front of a young couple in intimate conversation, who incidentally show no interest in the cycle whatsoever. The text’s coloured, curved background provides a central curved, cut-away window, though partially obscuring the cycle.
The combined effect of these representational tactics is to position the viewer as a ‘discoverer’, observing an intimate couple through a stylised cut-away window. The cycle then derives its meanings by association, and with some help from the text. The lovers allude to romance, an exclusive and ‘revolutionary’ relationship made possible through ‘discovery’. The phrase ‘who finds out for himself… that a cycle can be so much more… that it can revolutionise design ideas… and it’s worth finding’ frames the rider’s relationship with the cycle as a quest for love, and frames interest in the Moulton as a kind of intimate personal journey. That is, the ad rather pretentiously invokes a journey of discovery into one’s self, rather than a journey across inner city London at peak hour.

The ad is remarkable for refreshing cycling’s semantics through transcendental ideas (pro-creation, revolution), emotionality (love, desire, pleasure), an attitude (of discovery), and an identity (the lover). Cox (2005a, 2005b) argues this was the first attempt to construct a socially-engaging identity for utility cycling. He also argues that Moulton’s attempt to differentiate utility cycling as a serious adult pursuit was ironically undermined by the industry’s fixation on leisure. From the 1960s, the industry marketed bicycles, including inferior copies of the Moulton, as adult leisure accessories and children’s toys, so avoiding direct competition with cars as urban transport. As a case in point, Raleigh launched the famous Chopper in 1970, a format drawing on American motorcycle culture of the 1960s to evoke youthful rebellion and to target teenagers.

It may be unfair to present Moulton’s project via a single ad about one model, but it is clear the Moulton also drew on 1960s revolution and leisure themes to construct a new semantic. For example, there is no reference to utility cycling. Rather, there are references to youth culture and a series of Zen-like paradoxes meant to build its sophistication and exclusive appeal: you can’t know how good it is till you find it, only certain people can appreciate it, and so on. The cycle is very clearly a branded lifestyle consumable, not a utility vehicle, and its communication as leisure deliberately masks its utilitarian design rationale.

The ultimate impact of the Moulton can perhaps be best appreciated through the success of its cheaper copies in New Zealand. The Raleigh Twenty and the Healing Cruiser and Loline were cheap, low-tech copies. The distinctive design appealed to youth because it was so clearly different from their parent’s Roadsters, and the cycle’s robust build, easy adjustment, compact size, light weight, low price, and leisure connotations constructed a youthful, practical, fun identity. These forms became highly successful cultural and leisure icons for 1970s and early 1980s New Zealand youth.
From the 1970s cycle racing took on a more conspicuous role in the development and promotion of cycling, due in part to significant marketing of the ten-speed worldwide to help make cycling easier, more accessible, and sexier through its links with international racing. One impact was to generate huge interest in participation in public events modeled after races but open to everybody. The iconic New Zealand ride now known as the Wattyl Lake Taupo Cycle Challenge began in the late 1970s. Such ‘event riding’ pushed racing into prominence as cycling’s leading programme, so dominating leisure riding and producing the ‘weekend warrior’ phenomenon worldwide – bright bunches of male adult cyclists riding too fast on city roads on weekend mornings.

More recently, there has been a counter-movement against racing, of interest because it also evinces an important shift in the semantics of utility riding. The ad below was developed by USA’s Electra Bicycle Company, which aims to reproduce European-style every day cycling through easy-to-ride, retro-styled bikes. A key design feature for the company is that the rider should be able to place their feet on the ground while seated on the bike.

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The ad features a hip young male in street clothes and tats in front of a chopper-style cycle reminiscent of the robust, comfortable American designs of the 1930s onwards. The rider looks directly at the viewer and the text acts as his direct speech (including the quote from the cycle’s designer). The ad is direct, casual, immediate, and makes gentle use of irony.

The title ‘Tour de what?’ is a tongue-in-cheek reference to the Tour de France. The ad also alludes to the significant increase in bunches of riders speeding down city streets in training for events. That is, the ad is distinguishing every day riding (Electra call it ‘townie’ riding elsewhere) from eventing. Again, the message is that utility riding is a different programme from leisure riding.

The ad connects directly with the viewer through the persona of the townie, who stands in front of the bike and speaks honestly about biking. Unlike the Moulton ad, the burden of interpretation for readers is minimal: the speaker here has no need to justify riding by association with anything else. The townie is confident, self-assured, cool, contemporary, and positive. The text reads,

“Don’t speed past the girls. Wave a little, and give ’em a big ‘ol smile,” says Benno Baenziger, co-founder of Electra Bicycle Company. See those guys that are all bunched and sweating: they’ve got it all backwards. The Helbily with its high-end, hydro-formed aluminum frame sparkles like a jewel, and girls love that. Plus, the coaster brakes leave bitchin’ skid marks. (You hot rodder you). So unless you ride fast enough to get that yellow jersey – slow down altogether. And give chicks a chance to admire you, and your wicked wheels.”

The ad’s text is constructed as a guide on how to ride as a male townie (parallel ads provide the female version). Implicit in the narrative is the distinction between riding as a form of conspicuous consumption (riding as training to race or racing to win), and as an everyday, pleasurable, authentic activity. Again, there is no need to justify the pleasure – the ad just reminds readers of the pleasures already available.

The ad reverses the fast/slow semantic to emphasise that freedom and enjoyment are to be found in going slow. Cycling’s fast/slow distinction is re-entered into cycling in reverse, so that going slow means enjoyment, freedom and utility. In this sense, the ad achieves a significant shift in the semantics of cycling through an irony: real, authentic, unpretentious, stress-free cycling is to be found in townie riding – cruising around town doing jobs, checking stuff out, getting to and from work, attracting attention by being nice to people, and chatting up chicks.

As with the Moulton ad, this ad also constructs a semantic of desire, though here it is less cryptic, less concerned with technology, and more tangible in its expression. The ad is selling European-inspired townie riding via a funky urban identity: the particular bike is merely an accessory. The ad draws on leisure and sophistication to re-produce an evolved semantic for utility riding. Like the Bianchi ads there is an underlying confidence and optimism, a freedom from anxieties over one’s self and over cycling in urban traffic. The bike is not a means of transport, but an experience of movement to cherish and enjoy in its own right. In this sense, utility riding is a misnomer – the real aim is to have enjoyable city riding, irrespective of the purpose of any given journey. A better name might be joy riding.

The strategy of reclaiming freedom and enjoyment for every day riding is clearly central to re-constituting utility riding as one of cycling’s key programmes. This does not weaken the case for the distinct programmes, but does indicate the richness of cycling’s underlying semantic of freedom.

The next section explores leisure cycling in more detail as one of cycling’s key programmes at the start of the 21st century.

6.4.4.2 Cycling’s leisure programme

The initial section on cycling (see section entitled ‘Function, Medium, Efficacy: human-powered, two-wheeled motion’, p. 71) ended by observing that cycling emerged in the context of transport but its transport innovations were routinely diverted into leisure uses. The reason for this was cycling’s pleasure paradox: cycling’s physicality offered enjoyment, and whenever cycling failed to deliver on the dream of personal transport, it was easily diverted into leisure uses.
A number of historians (Norcliffe, 2006; Tobin, 2004; Rubinstein, 1977) note cycling had a significant place in the history of the development of leisure industries and their associated components, such as industry associations, clubs, events, and so on.

Norcliffe (2006) indicates the late 19th century was marked by the proliferation of clubs and associations oriented to social reform, albeit as defined by the group. Cyclists in the late 1800s were well-represented by clubs and associations (although these declined in centrality as middle and lower classes took up cycling), and these clubs placed great emphasis on developing various forms of infrastructure for the common good of cycling. A key focus for leisure riding was rural weekend and longer-duration touring infrastructure, such as routes, road quality, and road signage.

**Figure 31: High wheeler cycling club, Auckland, 1885**

For example, Norcliffe (2006) shows how the first and best-organised clubs emerged with the high wheelers of the 1870s – 1890s. These cycles were heavily patronised by men of means, who formed associations in the style of ‘gentlemen’s clubs’ with restricted membership, high fees, rigorously-enforced rules of conduct, and compulsory uniforms.

These clubs were typically wealthy enough to rent their own premises: the best were completed by facilities for cycles, a resident mechanic, and rooms for after-ride functions. Given their social standing members were on the one hand sensitive to any disrespect for cycling, and on the other well-positioned for political advocacy regarding cycling’s rights, roading conditions, laws governing cyclists, and so on. These cyclists were very conscious of the need to give cycling the profile of a dignified pursuit appropriate to people of the respectable middle and upper classes. As a result club rides were carefully organised in the recognition that cycling was still a new and highly visible past time.

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Club rides were modelled on the practices of the cavalry: though riding for leisure, riders rode in club uniform and in close formation through city streets, often with the club’s captain in front and second-in-command taking up the rear. The latter’s role included ensuring that all riders conformed to club rules and riding etiquette, and gave way to pedestrians and other road users as appropriate. In European countries, cycle-friendly routes were formalised to the extent that discounts with hotels and mechanics were arranged for longer routes, so also enabling service businesses such as cycle mechanics and cafés to set up. The clubs were also quick to organise regional memberships, whose roles included arranging for roading problems to be fixed where possible, and arranging route guides and road signage for cyclists from other areas. As cycles developed, the ability of cyclists (in clubs or otherwise) to range widely also grew.

Figure 32: NZ cyclists’ map, ca. 1900

Tobin (2004) argues the popularity of weekend cycling in Britain from the 1880s onwards also led to the first instances of mass tourism. Following the example of railways, many took on weekend leisure cycling and longer holiday tours as their preferred means of escaping into the country (including travelling by train to get to the start of the ride). He notes with irony that one result was the commercialisation of major routes, and with it, the spreading of urban values and comforts into otherwise remote rural and natural areas. One result of the predilection for escaping the city (while retaining as many of its comforts as possible) was the rapid development of cycle touring maps.

Nicholson details how cycling maps had appeared by the early 1890s in most European countries, the earliest probably in the 1880s in the United Kingdom and the Netherlands, with most other Western European countries providing them in the 1890s. Spain and Portugal lagged as the poorest of these, and for example, any maps of Spain were not available till the 1910s and Portugal until the 1940s.

These maps were usually based on official maps in the first instance, typically plagiarised by publishing houses, and later oil companies, to provide touring-scale maps. The better cycling maps

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21 See Kennett & Kennett (2004), p. 136
would include details such as the quality of road surfaces, gradients, danger points, distances between towns and tourist attractions.

In New Zealand cycling maps emerged from the efforts of the New Zealand Cyclists’ Touring Club (NZCTC), formed in 1896 and boasting 740 members within 9 months. Part touring organisation, part advocacy group, it published handbooks, detailed maps and a monthly Gazette providing information on roads, hotels, repair facilities and places of interest, and included member ride reports. The map above dates from about 1900 and is based on New Zealand Government maps of the time. Note the map is not as specific as European maps would have been, but was probably quite adequate for New Zealand conditions. For more extreme tours, the NZTC also published tide tables, ferry, rail, and steamer timetables, checklists for tools and equipment, and other useful travel information.

Another result was the rapid development of cycle-friendly paths, lanes and roading (Briese, 1994). The tensions between early cyclists, pedestrians and road users (horse-drawn carts, drays, carriages and trams, motorised trams and other vehicles) are mentioned in all cycling histories, and cyclists are clearly responsible for many of the conflicts that arose. But the evidence put forward by Briese (1994) for Germany at least, indicates cycle paths were built primarily to foster the ease and comfort of riding, given the deplorable state of roads in most countries in the late 1800s.

The first paths may have appeared in the Netherlands during the 1890s, but the Ocean Parkway dedicated bike path (in Brooklyn, New York) of 1895 is the first documented and is still in existence today. As with other paths of the time, this was built purely to foster the enjoyment of cycling. Briese (1994) also adds there is in fact little evidence that cyclists saw paths as a safety solution until the 1970s, though he notes early paths were also built to protect other road users from cyclists. New Zealand’s early cycle paths were also built in part to protect other road users (Auckland Bicycle Planning Committee, 1980). New Zealand’s Palmerston North installed special lanes along a few of its major streets in 1908: these were separated from traffic by a line of trees, and all but one disappeared in the 1960s to make way for more car lanes (Kennett & Kennett, 2005).

However, in time cyclists began to avoid paths because of their neglected surfaces, slower speeds (an irritation for more experienced cyclists), and because they were shared with pedestrians. As motorised traffic developed in the early 1900s and increased into the 1920s, cyclists and motorists increasingly came into conflict over road usage. Only the Netherlands retained a strongly pro-cycling approach to paths: other countries started to build paths to separate cyclists from motorised road users, as much to minimise the latter’s irritation and to maximise the former’s safety.
Cyclists who refused to ride on paths became a significant issue. Germany’s solution was a regulation of 1926 making it compulsory for cyclists to use the paths provided. Briese (1994) suggests such regulations had become common in most European countries by the 1930s, though problems with cyclists who refused to use them continued.

The emergence of cycling’s semantic of leisure
Before the early 1900s the various forms of cycle were largely associated with young men of wealth who had the money, time, athletic inclination, and love of risk to take on cycling’s newest inventions. As shown in other sections, the first popular leisure cycle was the Rover Safety, significant because it was the first to allow women to ride with ease, and so to encourage a much broader base of riders.

**Figure 33: Victor Bicycles, USA, 1896**

The image at left draws on Art Deco to construct a highly stylised image of femininity, gentleness, physical grace and freedom in cycling. The image portrays a woman in the foreground looking with pleasure and regard at a solitary female cyclist passing by. The image is stripped of any allusions to urban settings, and so emphasises the quiet dignity of a leisurely ride. That is, the experience of leisure communicated by the image is reflective and relaxed; there is no attempt to invoke speed, physical exertion, or stronger emotions such as excitement. The woman in the foreground stands in for the image’s viewer, so directing the viewer’s interpretation of the cyclist, and thus constructing cycling’s leisure meanings “through a woman’s own eyes”. Her gaze conveys a pleased and knowing appreciation of the pleasures of cycling.

These branding/advertising treatments of cycling are important in the transport context for two reasons. First, they represent a sophisticated use of visual marketing techniques in the otherwise mundane transport sector of the time. Second, they center cycling in a semantic of freedom as leisure – as freedom from anxiety and stress – and in this example, freedom as a woman.

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22 Advertising Archives, see [www.advertisingarchives.co.uk](http://www.advertisingarchives.co.uk), accessed December 2006.
The image at left incidentally illustrates the rapid diffusion of cycles worldwide, in this instance safety cycles in both women’s and men’s frames. The image is interesting in the relaxed, causal poses of the young trio, as if caught mid-ride and mid-conversation by a friend along a quiet lane in provincial New Zealand.

The cycles are held between rider and camera, perhaps an unconscious (or understated) deference to the clear significance of the photo – a record of a young, stylishly-dressed, trio sporting the latest in leisure accessories – the new safety cycles – in an antipodean mining town. The image below betrays a similar documentary feel, though constructed quite differently.

Such documentary images do not appear routinely in advertising until 1910, when the Safety was well-established as a leisure vehicle for the middle classes and women (Herlihy, 2004). The image suggests three young, fashionable women have been interrupted mid-ride: two have stopped to talk, while the third rides away (apparently at speed, by the hunch of her shoulders) with an unconcerned glance over her shoulder towards the viewer.

The grouping at the right is arranged to suggest casual street-life observation by the viewer, so much so that the gentleman shows only his back. The advertisement constructs an episode in the culture of cycling – connoting the public safety, leisurely pace, popular appeal, and social opportunities cycling affords to both rider and wheel-less friends. Obviously both images above are concerned to portray cycling as fashionable, social, enabling, and to some degree pleasantly

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24 Advertising Archives, see [www.advertisingarchives.co.uk](http://www.advertisingarchives.co.uk), accessed December 2006.
conspicuous. The cycle is constructed as a social accessory – invoking leisure, fashion and genteel conversation.

A number of important cycle forms also materialised through the construction of leisure in the communication of cycling. These typically introduce innovations as male leisure pursuits, so reproducing cycling’s historical development narrative.

**Figure 36: Schwinn advertisement, 1933**

One common design concept was a rugged, simple, comfortable cycle that can cover any terrain at reasonable speeds. This concept embraces freedom and pleasure, and though its specific forms vary, its recruits and riding practices are relatively consistent: athletic young men.

In the 1930s American company Schwinn introduced highly stylised, balloon-tired, rugged-framed bikes as a form for suburban male youth. The robustness of the form led to its use for both utility and leisure.

The bike was consciously styled to reflect motor car design, and so to appeal to male children and teenagers, a tactic used since the late 1910s. Obviously, the styling also invited comparison with the daredevil masculinity associated with motor cycle and car driving. In this instance, using the semantics of motorised transport to build a style language and a social identity for a cycle was a successful ploy. The ad at left focuses on the balloon tires, an ‘automobile type double-tube, straight-side, cord tire – on a new deep drop centre rim’, apparently the latest feature on offer. The cycle itself features saddle, handlebars, horn, light, a mock petrol tank and front fork stays all modeled on motor cycle design.

Implicit in the design was the promise of a reliable ride, whether delivering newspapers and running errands, or looking for adventure on- and off-road. The ‘super balloon’ tires made it a relatively comfortable, puncture-free ride over any terrain, and the rugged frame, though overly heavy, was

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virtually indestructible. This bike would take a boy on the mission or adventure of his choice, anywhere anytime.

Figure 37: The Hawthorne, USA, 1930s

The ad at left places the cycle in the foreground, emphasising its technological features and placing it between the viewer and the happy gaze of the approaching boy. This well-dressed, middle-class boy approaches with bat and glove in hand, followed by a smiling friend. Although the boy’s gaze appears to be directed at the viewer, his line of sight places the cycle at the centre of his attention. It is obviously the focus of pride and anticipation, and the image constructs a healthy, happy, sociable young male identity. Its context is clearly leisure and the narrative would presumably move onto a fun ride between field and home.

Schwinn’s design achieves a comfortable balance between transport and leisure. The cycle is clearly designed to be seen and enjoyed, but is also capable of being ridden hard on errands and in neighbourhood escapades. The longer-term legacy was to spawn mountain bikes, the first of which were cobbled together 40 years later from old Schwinn’s, motor cycle parts, and other gear as required. The challenge created by the young, male Californian riders was to complete fast, long, downhill rides at high speed (unscathed). By the end of the 1970s a number of riders had developed designs and production techniques well enough to enable commercialisation. Japanese manufacturers were quick to follow with specialised parts including long-arm derailleurs (to handle the wide gear ranges) and strong but light alloy rims. By the late 1980s full-suspension mountain bikes were available worldwide.

Cox (2005b) and Rosen (2002) both note the mountain bike’s incredible success derived from its popularity for male youth as an exclusively leisure cycle. Its marketing evoked nature as both social escapade and a challenge of physical endurance and skill. In mountain bike advertising imagery, riders pit cycle and physique against rugged natural landscapes. These construct mountain biking as participating in the transcendent spirituality of nature while enduring physical hardships, entertaining risks, pursuing freedom, and re-connecting with one’s real self.

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The success of the mountain bike has resulted in a plethora of cheap, simple, formats, and these have become the standard on-road, urban cycle design worldwide. For example, since the late 1980s, virtually all of the 3 million-odd cycles imported to New Zealand have been styled as mountain bikes (Statistics NZ, 2006). Robust, comfortable, and easy to ride (having a more upright rider position), these bikes can be understood as the Roadster of the 21st century. In this respect representing early 20th century, utility-based cycling as the Golden Age of cycling is merely a British construct. The real Golden Age is today’s global leisure cycling industry, which markets robust mountain bike designs, brands cycles for local markets worldwide, and sources cycles from huge manufacturing conglomerates in Asian countries (Rosen, 2002).

Cox (2005a) notes the difficulty late 20th century urban transport policy has in interpreting leisure cycling: the road is conceived in transport as a utilitarian space, designed to deliver people and goods on time. The notion of roads as leisure spaces therefore provokes contradictions and anxieties over safety and responsibility – it irritates and disturbs transport authorities and challenges their dominant view of cycling as utility riding and a marginal activity. Having transport authorities conceive of the joys and needs of touring cyclists, event riders and weekend jaunts is problematic in English-speaking countries worldwide. The notion of designing roads for cyclist enjoyment is completely paradoxical within transport, so these various forms of road riding occupy the equivalent of a transport twilight zone. Cox also notes the opposing paradox marks mountain biking: riders travel great distances by car to off-road locations to ride aggressively over natural landscapes.

### 6.4.4.3 Cycling’s protest programme

In his work on risk, Luhmann (2002) discusses the nature of protest movements as autopoietic social systems. He suggests that protest initially arises as resistance within a system’s own environment, and can become an autopoietic system in its own right when it shifts from ad hoc protest to a protest-based movement. As such it remains closely coupled with the system it protests against, and in this sense, protest should be understood as symbiosis rather than competition.

The function of protest movements is therefore to construct communications that irritate other social systems to distinguish and account for issues, by making new distinctions within their own communications. As Luhmann emphasises, ‘protests are communications addressed to others calling on their sense of responsibility’ (Luhmann’s italics, 2002, p. 125). Luhmann notes that a protest movement’s semantics therefore mixes the language of the offending social system with a

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semantic of risk and responsibility. It needs to communicate via the target systems’ key distinctions, but also needs to engage public support, and as a result, also has to deal with the gap between systemic and public views of the issues. Protest movements survive through issues that are both tangible in the public domain and irritating to the target system. The key to a movement’s success therefore rests on its ability to choose its own topics to engage and irritate respectively.

Luhmann also notes successful protest movements are maintained by sticking to a central topic, ‘using their topic to discover what is to be criticised in society’ (2002, p. 127). In this way a movement can maintain its protest as long as the target system distinguishes the protest’s communications in its environment (and not within the system itself). When corresponding distinctions emerge in a system’s own communications, effective protest ceases, at which point both protest topics and protestors may gain employment within the system (one of Luhmann’s wry jokes, see p. 129).

That is, protest’s autopoiesis rests on differences between itself and the system it opposes. When the movement is successful (when these founding differences cease), its closure effectively ceases.

It is perhaps odd to propose protest and a programme of cycling, in as much as protest is not a form of cycling and vice versa. As a case in point, Kennett and Kennett (2005) can discuss cycling’s local history of protest, its links with non-cycling protest movements and radical politics, and its current marginalisation without viewing protest as a structural component of cycling’s social organisation. Yet the analysis afforded by Luhmann’s theory of social systems suggests that protest is at least central to cycling’s semantics, if not a programme in its own right. Obviously part of the issue is whether cycling’s uneven history of protest-centred interactive and organisational social systems can be construed as one of its programmes.

For example, transport and local authority cycle strategies are focused on commuting, so that any proposed programmes compete internally with other projects for funding, and compete in the public domain with projects favouring motor cars. Cyclists in peak traffic are a significant irritant to motorists, and accidents may be taken as proof that cycle commuting should not be allowed. Cyclists and cycle advocacy groups pressure authorities to implement their strategies and try to educate the public about the benefits of cycling. These dynamics serve to politicise cycle commuting, and to make it impossible to ride without a sense of resisting public opinion, risking life and limb, and/ or ‘making a difference’ in some way merely by being on the road.
The question is not whether cycling involves protest, but how this should be regarded within Luhmann’s analytic framework, and how such an understanding might be used to influence cycle commuting’s appeal and culture. For example, cycling’s utility programme clearly invokes interactional autopoietic systems on the road and organisational autopoietic systems within advocacy. Utility cycling currently drives protest. How and why this is the case is explored below.

First, cycling’s relationship with women’s emancipation movements has been well documented in European countries including New Zealand (Smith, 1972; Simpson, 2001; Lee, 2001). The Safety cycle offered women unprecedented opportunities for freedom and enjoyment: in New Zealand, it took cycling’s approval by upper class women to guarantee cycling would be quickly adopted by their middle class sisters, followed by others (Simpson, 2001). The role of women’s emancipation, such as the suffragette and rational dress movements, was to re-make the cycle as both a technology and a symbol of contention between genders.

Cycling’s technology was contentious in that it required a shift in women’s dress (so-called rational dress, originating in America in the 1850s) on the one hand, and in the configuration of cycles (the woman’s frame, saddle and skirt guard) on the other. Symbolically, women’s cycling challenged the gendering of public spaces as masculine, and of cycling as a male pursuit. And while women’s cycling was controversial, industry and retailers promoted women’s cycling as far as they could for their own interests. For example, New Zealand’s first ads – in the Southern Cross of 1869 – featured women’s models (Kennett & Kennett, 2005, p. 74).

Cycling historians (Smith, 1972; Simpson, 2001; Herlihy, 2004) note women cyclists worldwide were vilified in the media, and were harassed and occasionally attacked by the public. Women racers and the inevitable female long-distance riders were considered both a spectacle and a disgrace. Not only was cycling irritating for other road users, but women cyclists were challenging tradition and social norms, and so were the target for any dissenting male or bored street urchin. For example, members of the women-only Atalanta Cycling Club of Christchurch (formed in 1892 as the first women-only club in Australasia) regularly encountered public hostility and on occasion used male riders out front to ward off stone-throwing objectors (and warn other road users). By comparison, while male cyclists might agree or disagree about women cyclists and their clothing (for example), in practice they shared the same concerns about cycling overall and were supportive of women cyclists.

In this sense, it was difficult for a woman to cycle without being construed by non-cyclists as ‘fast’ (immoral), rebellious and overly-independent, and/or politically active. A woman’s choice of
cycling as protest was framed by the possibility that a politically naïve woman rider might encounter the same level of opposition. This also meant that women’s cycling was marked by internal differentiations: in 1890s Christchurch (New Zealand), women cyclists had choice of cycle styles and types of dress, fostered by commercial interests, plus choices about club membership framed by the politics of protest. For example, the Atalanta Cycling Club, which included dress reformed Kate Wilkinson and suffrage campaigner Kate Sheppard, debated women’s dress and eventually agreed against endorsing rational dress to protect the reputation of the club (Kennett & Kennett, 2005). It follows that a woman’s decisions about choices of cycle, dress and club affiliations constituted her identity as a cyclist. Obviously, as women’s cycling became more popular, such decisions became less politically loaded, and so it also declined as a form of protest.

Kennett and Kennett (2005) note the Atalanta Women’s Cycling Club folded in 1898, six years after its formation, largely because clubs which had been male-only by default and the general public had accepted women’s cycling. On the other hand, they note the long exclusion of women from cycle racing: while the first women’s race was held in 1896 at Lancaster Park, Christchurch, it was not until 1963 that the New Zealand Amateur Cycling Association approved the first women’s racing club (the Invercargill Ladies’ Club), and not until 1981 that the first women’s events were held at the National Road Racing Championships. In this respect cycle racing continued to distinguish pure speed as a male domain and women’s riding was constituted as everyday and recreational riding.

Cycling’s other emancipatory dimensions are perhaps less significant in New Zealand. For example, there is currently no evidence for exclusion of Maori from cycling, and Kennett and Kennett (2005) note a number of famous Maori riders. By comparison Smith (1972) notes the League of American Wheelers excluded black cyclists and resisted women cyclists: in conjunction with industry squabbles over patents, the result was to limit the growth of cycling severely. This needs to be understood in two ways: first, the very real exclusions of black and women cyclists limited uptake significantly, and second, the semantics of male European exclusivity construed cycling as reactionary at a time when social values were being liberalised.

The commodification of the bicycle in the early 1900s resulted in an increase in cyclist numbers, but this only accentuated existing problems with the social organisation of roading. Cycling had already been seen as an irritation by other road users (namely slow-moving pedestrians, horse-drawn public transport and horse-drawn freight vehicles), and conversely, these users probably figured in early cycling as obstacles to speed. That is, there was already a significant history of mutual irritation. New Zealand’s first cycle activists pressured councils in the 1890s to improve road
conditions, and for example, a mass demonstration was held in Christchurch in 1905 (Kennett & Kennett, 2005).

During the 1890s various New Zealand city councils introduced laws to prevent ‘scorching’ (cycles racing down city streets) and set speed limits at about 7 – 10 kms per hour (Kennett & Kennett, 2005). These tensions are also exemplified by New Zealand’s proposed Cycle Traffic Bill of 1897. It never became law because, as a summary of the bill’s failure notes,

‘The gist of the scheme is to tax cyclists, and thereby obtain funds for the alleged purpose of laying down cycle tracks on the public streets within the cycle areas... but while making provision for keeping cycle traffic apart from the ordinary vehicular traffic, does not intimate very clearly, how the vehicular traffic is going to be kept off the cycle track.’ (Auckland Bicycle Planning Committee, 1980, p. 1).

Future proposals featured a similar irritation with cyclists, but fuelled by the interests of motorcar drivers. Queenstown Councilors proposed in 1936 to license cyclists so they could then be fined for riding two abreast (NZ Herald, December 7, 1936, p. 11). The rationale of Semple’s proposed Bill of 1936 was to register cycles so as to bring cyclists under stricter control, as well as helping manage the high numbers of cycles stolen.

That is, from the 1920s cycling figured as an irritation because it obstructed the desired uses of the motor car, even if these uses were dangerous. Watson (1996) notes even early New Zealand motorists saw speeding and drink driving laws as irritating, ‘and breaches as petty offences, even a sort of sport, despite the danger to people and property that was involved’ (p. 201). Because the motor car had replaced the cycle as the transport technology favoured by the wealthy, the cyclist was unlikely going to command the kind of influence that could prevent the need for overt protest. Increasing exclusion of utility cycling had its consequences.

The early failure to regulate individual cyclists and cycles is important in the autopoiesis of cycling, both in re-producing its freedoms on the one hand, and in cementing its place as an irritant to motorised transport on the other. While cyclist behaviours have in various ways been controlled by New Zealand’s Road Code, they have escaped the full controls imposed on other road users by licensing and registration (established for cars in 1925). In this respect, even in New Zealand today cycling is partially excluded from transport’s legal framework, making it as hard to define and enforce cyclist’s rights as their responsibilities.
In his discussion of cycle-oriented activism, Furness (2005) argues that cycling’s technologies, semantic of freedom, and road-related legal freedoms inclined political groups to deploying cycling as a political tool. Cycling ‘aided in the decentralisation of political organisations, which made the job of policing dissidents more complicated and increased the threat of wider political mobilisation’ (p. 405). Furness cites a range of links between cycling and working class labour organisations, such as the Workers’ Cycling Federation, founded in Germany in 1896, which engaged in political campaigning by cycle, and ran a chain of shops, a factory, and a bi-weekly newspaper. The Socialist Labour Party of America founded the Socialist Wheelmen’s Club in 1898 to distribute literature. Rubinstein (1999) notes cycling was fostered by the English labour and socialist movements from the 1890s onwards. There were 76 socialist Clarion Cycling Clubs throughout the United Kingdom. The Marxist Social-Democratic Federation sold its own ‘Liberty’ cycles, and the Independent Labour Party used bicycles in election campaigns.

In New Zealand, 1905 Independent Political Labour League candidate James Thorn rode to his meetings (Kennett & Kennett, 2005). Watson (1996) links cycling and union activists during the 1910s: the famous unionist Jack Harris toured by cycle, and cycling is associated with worker movements during the Waterfront strikes of 1913 and 1951 (in context, it is interesting that the Police used horses and strike-breakers were ferried by covered truck).

Furness (2005) notes the radical Dutch movement known as the Provos (emerging in Amsterdam in the 1960s) focused on cycling as a transport mode, a cultural practice, and a symbol of their emancipatory political ideals. The Provos authored The White Bicycle programme, which called for a ban on automobiles within Amsterdam and a free bicycle programme to replace the car (the cycles were painted white and were to be shared by all). Other measures included free daycare centers, free medical care for women, and heavy taxation for polluters. The Provo’s politicising of the bicycle was central to their broader critique of urban design, transport planning and the resulting quality of life. The success of the White Bicycle programme, and its deployment in other cities worldwide, is now part of the mythology of sustainable transport worldwide.

The Provos’ view of urban design and urban transport has become an important focal point for cycling’s protest groups. The most interesting in this context is Critical Mass, which can best be described as a democratic, leaderless, open network of cyclists celebrating cycling, and reclaiming the roads for cyclists, in regular mass rides through rush-hour urban traffic. It began in 1992 in San Francisco, and has since spawned supporters in almost every country worldwide (see http://critical-mass.info/, accessed February 2007). To quote figurehead Carlsson,
“Even though bicycling in modern cities is extremely isolated and dangerous, every day thousands of people choose to embrace the bicycle as their means of personal transportation. Why? What does it mean that so many people are willing to choose something so discouraged by the structure of society – both its physical layout and its psychological assumptions? What is the meaning of this limited and largely invisible form of social opposition, this growing desertion from the hyper-exploitation of the car/oil nexus?” (Carlsson, 2002).

It was clearly the Provos’ radical re-thinking of urban design and transport that informed the first New Zealand proposal for re-configuring cycling as a mode of transport in New Zealand. McDonald’s (1977) classic Changing Gear became the manifesto of local advocates at the time, and has since influenced both advocacy and cycle-related planning (Kennett & Kennett, 2005). This followed the formation of the Values Party in the early 1970s, whose campaign included anti-car sentiments. In Auckland the late 1970s were marked by campaigner David Calvert’s unsuccessful attempt to get the Auckland Harbour Bridge Authority to add a cycle path, the opening of the Tamaki Drive bikeway (1976), the 1979 attempt to cross the Auckland Harbour Bridge by a group of University of Auckland cyclists, and the establishing of the Auckland Bicycle Planning Committee (1979). That is, the late 1970s was a period of intense re-invigoration of utility cycling in Auckland. This would not have occurred without the direct influence of protest actions and a background of change informed by emancipatory movements.

It may seem odd that cycling strategies since the 1980s have pursued a rationale consistent with the tradition of the Dutch Provos of the 1960s (and indeed, Amsterdam and/or Holland are usually cited as best case examples), as the results to date are negligible. They amount to minor changes in cyclist’s rights and responsibilities (via the Road Code) and infrastructure provision (via roading, signage, and controls of motorised traffic). Given modern cycling policy’s radical and visionary origins, it is surprising that more has not been achieved.

As mentioned above, Sirkis (2000) notes development of cycle commuting infrastructure in Rio de Janeiro has been due to the constant pressure of green and NGO lobby groups. Auckland provides an interesting case in point: it has a 25-year history of cycle strategies but marginal progress in implementation. Kennett and Kennett’s (2005) account suggests New Zealand’s advocacy groups have been pivotal in holding authorities accountable for their own cycle strategies, and it appears a critical decision-making criterion within Councils has been the level of staff and/or public support for and against cycle facilities. Cycle advocacy groups in Auckland have been instrumental in mobilising support.
National body Cycling Advocates Network (CAN) was set up in 1996 specifically to advocate at national level on behalf of everyday (utility) cyclists. This was in part instrumental in recent changes to the Road Code, in the developing of the National Cycling Strategy (2002), and the establishing of the national body BikeNZ in 2003 (although the latter’s emphasis is on sports cycling and its advocacy activities are very limited). Both CAN and the Green Party (the Values Party successor) were important in the developing of the 2005 national walking and cycling strategy, endearingly entitled ‘Getting there – on foot, by cycle: a strategy to advance walking and cycling in New Zealand transport’. The year 2005 also saw the establishing of cycle-oriented advocacy group Slow All Local Traffic (SALT) in Auckland.

Horton (2006) reverses this picture of cycling by noting the debt modern environmentalism owes to anti-car protest movements, including those arising within the cycling community. He points to the emergence of the bicycle in the 1970s as the opposite of the car in transport, ecological, and political discourses. Beginning in the 1970s, the cycle has become a symbol of alternative politics, as it means everything the car does not. The cycle connotes a slower pace of life, a way of making a difference, a mode that is cheap and accessible by all, a simple technology that most users can maintain, a technology with limited impacts on the natural world, a mode that encourages social encounters, a way of improving health, and a visible way of demonstrating commitment to green/sustainable values (2006, p. 45 - 46). Horton argues the bicycle marks out the rider’s politics, symbolises his/ her opposition, and makes a real difference.

Modern cycling is shaped internally by the tensions between its semantic of egalitarian freedoms and its on-road irritation of motorised traffic. It is also framed externally as a way to signal resistance to the motor car. Leisure and utility cycling are still largely excluded from transport for quite different reasons, but both carry similar physical risks on the road. At any time a well-behaved cyclist may be seriously injured, or may irritate other road users and need to assert his/ her rights, be it in self-defense or in an aggressive manner. While few cyclists would think of this as protest (in cycling’s current self-reference, asserting one’s rights and safety is simply part of cycling), cycling is never far from personal acts that constitute protest by another name.

One obvious consequence is the increasing politicising of cycling in itself, as well as cyclist complaints about motorist behaviours. For example, a recent New Zealand Herald editorial castigates cyclists for their ‘superiority complex’, implying that cycling will soon emerge as the roading equivalent of political correctness (Editorials. NZ Herald. Saturday, February 3, 2007. p. A26).
6.4.5 Identities: Commuter, Off-Roader, Advocate

The diagram below uses Luhmann’s analytic framework to profile the schema and identities available to different cyclists in cycling’s self-referential communications.

Figure 38: Analysis of cycling identities

<table>
<thead>
<tr>
<th>Semantic</th>
<th>Programme</th>
<th>Programme Distinction</th>
<th>Schema</th>
<th>Identities</th>
<th>Identity Distinction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freedom/</td>
<td>Utility</td>
<td>Fast/ slow</td>
<td>Confident</td>
<td>Commuter</td>
<td>Irritating/</td>
</tr>
<tr>
<td>constraint</td>
<td></td>
<td></td>
<td>Independent</td>
<td></td>
<td>compliant</td>
</tr>
<tr>
<td>Enjoyable/</td>
<td>Leisure</td>
<td>Enjoyable/ boring</td>
<td>Enjoying</td>
<td>Off-Roader</td>
<td>Resilient/</td>
</tr>
<tr>
<td>boring</td>
<td></td>
<td></td>
<td>Risk-tolerant</td>
<td></td>
<td>vulnerable</td>
</tr>
<tr>
<td>Risky/ safe</td>
<td>Protest</td>
<td>Included/ excluded</td>
<td>Radical</td>
<td>Advocate</td>
<td>Influencing/</td>
</tr>
<tr>
<td>Irritating/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>confronting</td>
</tr>
<tr>
<td>compliant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table shows cycling’s base semantic (left column) and the three codes (second left column). It provides key distinctions constituting each programme (third column from left). The schema (third column from right) is the base set of identity attributes communicated within cycling. Examples of identities associated with each programme (second column from right) are also associated with constitutive distinctions (far right column). These latter distinctions are hypothesised only and require further investigation.

6.4.5.1 The utility identity

The utility programme’s distinction is fast/ slow, in line with cycling’s emergence within transport. The generic schema is interpreted in utility cycling as the cycle commuter, whose identity is dominated by the irritating/ compliant distinction.

Cycle commuting is historically associated with middle- and lower-income people who use cycles for transport tasks because of their economic advantages. But in recent decades the cycle commuter identity has recruited older, wealthier males, suggesting a significant shift, perhaps influenced by leisure cycling. The cycle commuters identity tends to be confident, independent, have a high risk tolerance (even for cyclists), and are implicitly radical in their road politics (by choosing to ride), if not in their party political stances.
Given the dominance of the irritating/compliant distinction, the commuter cyclist identity is also marked by a politicising of cycle commuting’s marginal status. The paradox for cycle commuters is that irritation marks their exclusion, but also increasingly politicises the problems of unsustainable urban transport. The mark of a cycle commuter is usually practical clothing (free of cycling-related branding), a robust cycle, and a back-pack.

6.4.5.2 The leisure identity
The leisure programme’s distinction is enjoyable/boring, in line with cycling’s historical orientation to leisure. The generic schema re-enters cycle commuting in a number of ways, depending on the specific form, but taking off-roaders as an example, a hard/easy distinction marks physical and mental resilience as key attributes.

Leisure riding is historically associated with middle- and upper-income people who use cycles for relaxation and health, and the industry fosters this by marketing high-end cycles in the mass market. In recent decades the leisure cyclist identity has influenced cycle commuting in the increasing dominance of mountain bike-styled commuting bikes. The leisure cyclist identity tends to be confident and independent, but displays a range of risk-tolerances and radicalisms, from complete avoidance (relaxed weekend riding) to the extremes of risk-taking (extreme downhill riding). The mark of a leisure rider is usually cycle-branded, purpose-made clothing, a specialised cycle, and accessories specific to the leisure code.

6.4.5.3 The protest identity
Finally, the protest programme’s key distinction is effective/ineffective. Again, the identity schema of the advocate is someone who is confident, independent, and (socio-politically) risk tolerant, and radical in his/her politics. Enjoyment of advocacy and ‘making a difference’ is probably also important, given the typically slow rate of change in provision for cycling.

An important identity distinction is the style of advocacy – be it the choice of partnership and gentle influence or an adversarial and confrontational relationship. Note the favoured identity/style of advocacy in New Zealand is the first – influencing authorities by positive and steady means to build relationships where trust is high, and with this, the advocate’s level of influence. This often translates into radicalism in pro-cycling protest and avoidance of anti-car protest. Cycling advocacy in New Zealand is also broadly linked with alternative and Green politics. The mark of the advocate tends to be commuter-style cycling (though some cycling advocates don’t even ride).
7. How has New Zealand cycling changed over time?

Pooley and Turnbull (1999) comment there has been much exploration of the problems of commuting in recent decades, but little understanding of how these problems arose and take their present form. What becomes interesting in this context is the lack of historical and social analysis of cycling, and especially utility cycling, in part because it is comprised of commuting to and from work and of small personal journeys.

The sections that follow outline the available data on cycling and cycle commuting in New Zealand, attempting to construct a more complete dataset, as well as to suggest key patterns and useful interpretations. The data used in this section are provided in Appendix 2: base data, p. 160.

7.1 What are the main changes?

There are a number of sources of data on cycle manufacturing and imports in New Zealand, though most sources are incomplete. The diagram below provides an overview of the cycle market from the 1870s onwards.

Figure 39: Cycle market in New Zealand
The diagram is based on manufacturing and import data sourced from New Zealand Bluebooks, Yearbooks and Censes, with an approximation of the second hand market (based on 50% of cycles lasting between 5 – 10 years, with a 15-year upper limit used for Depression and War years when older cycles were known to be in high demand). The diagram suggests cycling grew in New Zealand over three broad phases.

Cycling’s initial phase carried through to about 1926. Local manufacturing peaked about 1921, while imports were always higher and had become by far the dominant source by 1926. Local manufacturing offered the possibility of cycling with a strong New Zealand character, but was not realised as economies of production in Britain and the United States reduced import prices.

Cycling’s second phase was from the late 1920s through to the late 1950s. This has been called New Zealand cycling’s ‘Golden Era’ (Kennett & Kennett, 2005), and this label reflects the historical narratives worldwide, as noted by Herlihy (2004). During this time British cycle formats such as the Roadster dominated, and most cycling was utility including commuting. British imports dominated the New Zealand market, so the phase may be more properly understood as the Golden Era of British cycling. The decline of the British industry in the late 1960s marks the end of this phase.

In cycling’s third phase, cycle production shifted from European to Asian countries (Rosen, 2002), and especially China and Taiwan. Rather than being built in a single factory and exported worldwide, cycle parts were from now on mainly made in Asia and simply assembled under a given brand in the country of sale. Cycling also re-invented itself by marketing multi-speed gearing (explaining the first peak to the early 1980s in New Zealand) and the mountain bike (the second peak in the late 1990s in NZ). The mountain bike now accounts for most of New Zealand’s present stock of about 1.4 million cycles.

The diagram below illustrates the actual numbers of cyclists involved.
The diagram assumes all cycles are sold within 5 years of manufacture/import, but the proportion of cycles actually ridden over time declines from 80% (first phase) to 48% (third phase). The latter assumption is required to match cycle data with surveyed cyclist numbers. For example, SPARC survey data from 2001 suggests about 15% of people cycle regularly over a year. The result is a clear gap between cycles presumably owned and cycles ridden regularly over a year: this is labelled ‘Garage Cycles’ (cycles that are stored in the garage and not ridden regularly).

The diagram indicates that cyclist numbers increased to about 200,000 during the 1940s to 1960s, after which they declined until the re-invention of New Zealand cycling in the late 1970s. From this time onwards there has been a steady growth in cyclist numbers to about 750,000.

### 7.2 How has cycle commuting changed over time?

Pooley and Turnbull’s (1999) fascinating study of commuting to work in the United Kingdom illustrates the growth and decline of cycling as a transport mode. The first chart below illustrates their findings for the proportion of cycle commuters from the 1890s to the 2000s, with the equivalent estimates for New Zealand. The second chart compares the proportion of cycle commuters to total cyclists over time.
Figure 41: Cycle commuting in the UK and NZ

Figure 42: Profile of NZ cycle commuting
In the first diagram, Pooley and Turnbull's (1999) data suggests that cycle commuter numbers grew from about 2% of all commuters in the late 1890s to almost 20% in the 1930s and 1940s, after which it declined below 5% in the 1990s. A comparable curve for New Zealand would indicate a similar rapid rise from the early 1900s, with a peak in the early 1940s. This is consistent with New Zealand observations of cycle commuting (Kennett & Kennett, 2005), and would match the documented decline to less than 2% of commuter numbers in 2006 (Statistics NZ, 2006).

The second diagram suggests the first half of the 20th century featured significant use of cycles for utility. Prior to this, most cycling was leisure-oriented, and as the chart suggests, from the late 1970s onwards cycling has again been dominated by leisure riding. This profile was constructed by matching New Zealand data on cyclists as outlined above, and matched to NZ Census data for cycle commuters from 1971 onwards.

### 7.2.1 The gendering of cycle commuting

In Pooley and Turnbull’s (1999) data, cycle commuting is typically a male activity, though males start at about 75% of cycle commuters in the 1890s and fall to about 60% by the late 1990s.

**Figure 43: Self-made cycle, Lawrence, 1893**

The context for male cycle commuting cycling is the historical bias towards males in the workforce, though a decrease in the proportion of males in the workforce has been observed across many Western countries (Gershuny, 2000).

So for example, New Zealand Census data shows the proportion of males in the workforce has decreased from about 86% in the 1870s to about 54% today. As a result the dynamics of gender in cycle commuting are somewhat more important historically (albeit more complex) than would at first appear.

The chart below details male and female cycle commuters as a proportion of males and females (respectively) in the workforce. It explores the number of women who cycled to work as a

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proportion of all working women, and compares this to the same relative proportion for men. It is based on the period 1981 to 2006 when reliable data exist for gender\(^{29}\); it then uses New Zealand cycle commuter and workforce data, with the United Kingdom gender data, to suggest likely gender proportions back to 1871.

The chart suggests that for the period from 1981 to 2006 there were proportionally more male cycle commuters in the male workforce than female cycle commuters in the female workforce (red shaded area). But the chart also suggests this is unusual. That is, the relative proportions were probably reversed prior to the early 1980s, and in the 1900s – 1960s the relative proportion of female cycle commuters in the female workforce was higher than for males (blue shaded area). This is supported by anecdotal evidence, such as comments from retailers in the 1950s and 1960s suggesting that women and children were their major customers (Kennett & Kennett, 2005). It is also consistent with known impact of the motor car on male commuting patterns as early as the 1920s.

**Figure 44: Cycle commuter gender by workforce gender**

\(^{29}\) Gender is reported in NZ Census Travel to Work data from 1986, and is also reported in Ministry of Transport Household Travel Survey data.
The picture of cycle commuting that emerges from this analysis suggests the conventional view of cycling as a male activity is misleading. In relation to workforce dynamics, cycle commuting may actually demonstrate a hidden bias towards females, so suggesting a relatively stronger female culture of cycle commuting than might be found among men.

The possible reasons for this have been outlined in part in the previous chapter: the operational closure of cycling in the early 1900s was marked by a switch from being a wealthy male leisure activity to transport for women and the lower classes. This will have marked the decline of cycling as an elite male activity, and motivated male interest in the motor car. But a more detailed explanation may be required.

As noted in the previous chapter, the cycle was established as a symbol of female emancipation (New Zealand included) from the late 1880s, and subsequent commercial activity targeted women specifically. Law (2002) notes the strong links between cycling and the New Woman in urban New Zealand into the 1920s, and others have analysed this in more detail (Simpson, 2001), noting that it was single women who cycled (married women bussed or rode as passengers in the car with their husbands).

Figure 45: Woman’s cycle advertisement, UK, 1920s

For example, female fashions of the 1920s and 1930s, including the ‘Flapper’ style, were portrayed in women’s cycle advertising to reinforce the associations between the freedoms of both. As Law (2002) shows even in mid-20th century’s conservative suburbs of Dunedin, the mobility and freedom attributed to cycling was entirely congruent with the respectable image of a young, independent, determined woman in paid employment.

Second, the gender disparity reflects a broader gendering of transport mode use, in which women are over-represented in public and lower status transport modes including walking (Law, 2002), a pattern still evident in New Zealand Household Travel data in recent decades. In this sense, the increasing male domination of

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cycling could be a deviation from the norm. The gendering of transport modes is likely to have arisen through differences in remuneration and employment patterns.

Third, Pooley and Turnbull’s (1999) evidence is that working women travelled shorter distances. It follows that cycling would have been more attractive than other modes given its flexibility and low cost, and more positively regarded for its health benefits. Finally, households typically owned only one car, and if used for commuting and/or work by the male, any additional commuting would have to be achieved via other modes (Law, 2002).

Finally, as the male workforce declines male leisure time increases, so also supporting increased male cycling. Cycle commuting is in decline, though increasingly supported by well-off male professionals. And as the number of cars approaches two per household in New Zealand, the gendering of the car as a male mode is increasingly less significant. That is, a wealthy male investment in cycle commuting may signal a re-orientation to leisure time, and to re-defining relations between work and leisure. If enough people are recruited, the innovation appears likely to engage cycling as a pursuit integrating leisure-work practices more effectively.

What remains difficult to assess is the socio-economics of cycling in parallel to the gender dynamics noted above. It is clear that from the early 1900s onwards cycling was accessible to the working and lower classes. With increasing access to the motor car, the status of cycling as a personal transport mode would also have decreased, lending it a distinctly lower-class flavour. The advent of the ten-speed in the late 1970s in New Zealand re-opened cycling as a market offering high-end leisure-oriented consumables, first via racing-styled cycles, and then through mountain bikes. It also re-invigorated cycling through event riding, which usually requires dedicated training. In other words, it appears likely the shift to leisure riding has also driven a shift to higher proportions of males, including among those commuting to work.

7.2.2 Cycle commuting accident rates

One of the major rationales for cycling strategies from the 1980s has been the prevalence of cycle accidents (including both injuries and deaths). These are variously expressed as a rate per 100,000 population (showing a slow decline in the rate), as a proportion of total accidents (showing no change), and as a rate per million kilometres cycled. The latter is preferred as it relates accidents to level of exposure.

Cycle commuting-based kilometre data is available in New Zealand through two recent measures, the Ministry of Transport’s 1989/90 and 1997/98 Household Travel Surveys, with the 2003 – 2006
Survey to be released some time soon. The scaling method used (weighting data from a two-day household travel sample to national and annual figures) makes it difficult to analyse in terms of cyclists per year (the weighting process does not equate directly with numbers of cyclists), so making comparison with other data difficult. The Ministry emphasises the Surveys are primarily measures of travel (i.e. utility cycling), and therefore can best be equated with Census Travel to Work figures: like the Survey, these show a decline in cycling commuting over recent decades. The Ministry’s data is used by local/transport authorities to plan all resourcing of all cycling, so effectively under-resourcing cycling by a significant margin. For example, cycle commuters represent about 7% of all cyclists in New Zealand.

Figure 46: Official injury risk for cycling

The Ministry’s Survey data is also used to derive a cycle accident rate per million kilometres cycled (see above). A key problem with this rate is that it is based on cycle travel (so excluding leisure cycling), but counts all cyclist accidents (including leisure cyclists) in calculating the rate. The result is to overstate the accident rate for cycle commuters (by including leisure accidents), while also overstating the total rate (by not including leisure cyclists).

Any attempt to build an accurate picture of cycle commuting’s actual risks is therefore fraught with difficulty. The Ministry has responded to this and other problems by including new questions on annual cycling in the 2003 – 2006 Survey, so in part addressing the issues raised here. On request the Ministry kindly provided calculated equivalents for cyclist numbers for their three Surveys, so enabling the rough analysis provided in the table below.

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32 Personal correspondence with Lynley Povey, Senior Scientist, Research and Statistics, Strategic Directions, Ministry of Transport, November 2006 to March 2007.
Figure 47: Estimating different cycle accident rates for total cyclists

<table>
<thead>
<tr>
<th></th>
<th>Cyclist numbers</th>
<th>Million trip legs</th>
<th>Million hours spent</th>
<th>Million km travelled</th>
<th>Accident rate per 10,000 cyclists</th>
<th>Accident rate per million hrs</th>
<th>Accident rate per million kms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989/90</td>
<td>MoT Travel Survey 135,000</td>
<td>98.3</td>
<td>22.4</td>
<td>233.8</td>
<td>33.6</td>
<td>20.3</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>Estimate 375,000</td>
<td>273.1</td>
<td>62.1</td>
<td>649.2</td>
<td>12.1</td>
<td>7.3</td>
<td>0.7</td>
</tr>
<tr>
<td>1997/98</td>
<td>MoT Travel Survey 82,000</td>
<td>67.4</td>
<td>16.2</td>
<td>206.8</td>
<td>36.1</td>
<td>18.2</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>Estimate 565,000</td>
<td>456.8</td>
<td>110.1</td>
<td>1,402.6</td>
<td>5.3</td>
<td>2.7</td>
<td>0.2</td>
</tr>
<tr>
<td>2003/06</td>
<td>MoT Travel Survey 223,000</td>
<td>183.2</td>
<td>44.2</td>
<td>562.5</td>
<td>25.4</td>
<td>12.8</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Estimate 707,000</td>
<td>580.8</td>
<td>140.0</td>
<td>1,783.5</td>
<td>8.0</td>
<td>4.0</td>
<td>0.3</td>
</tr>
</tbody>
</table>

In this table, the first row for a given year gives the Ministry of Transport (labelled MoT) Household Travel Survey figures for adult utility riding/travel by cycle – effectively the official figures. The second row (labelled ‘Estimates’, in light grey) gives estimated total adult cyclist numbers, based on cyclist data as detailed in previous sections. Travel characteristics (trip legs, kilometres travelled, and adult accident rates) are then estimated for total cyclists simply by using Survey leg, time and distance averages to scale travel characteristics. Note the 2006 figures are based on provisional figures and estimates from the 2003–2006 Household Travel Survey and are included only to complete the picture.

As noted, the Ministry’s data appears to underestimate cyclist numbers by a significant margin, and the Estimate rows (light grey shading) indicate the kinds of figures local/transport authorities should actually be working with.

The diagram below explores cycle commuter accidents over time using the simpler but more robust measure of commuter cyclist accidents per numbers of commuter cyclists. The data dates from 1931 when official road accident statistics became available.

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Note the Ministry advises against the scaling used in rows marked Estimates, as weighting does not equate with cyclist numbers, and utility cycling trip characteristics do not equate with leisure cycling. The row is therefore indicative only. Having said this, the average of 200-odd hours of cycling per person per annum equates closely with the riding of an average leisure cyclist.
Numbers of cycle accidents increased to peak at 1,400 in the early 1960s and declined thereafter (dotted red line, read against right-hand axis). The pattern in cycle accidents per 100,000 population (dotted grey line, read against left hand axis) suggests a relatively high accident rate from 1931 to 1961, after which there is a slow decline, marked by a small increase in the late 1980s.

However, expressed as accidents per 10,000 cyclists, the rate (green line, read against left-hand axis) is high in 1931 declines during the years of Depression and War (when car use was restricted), climbs from the 1950s to the 1970s (the period when car numbers increased rapidly, and also the time most associated with increases in children’s cycling). After this, there is a further overall decline in the accident rate to its lowest ever.

The picture of cycle accidents to this point is problematic as the data includes children and weekend accidents. The more accurate indication of commuter cyclist accident rates is therefore adult weekday accidents per 10,000 cycle commuters (orange line, read against left-hand axis). Note the resulting figures can only be treated as estimates, given that weekday adult leisure riding cannot also be removed from the data. But the data indicates the rate of weekday adult cycle commuter accidents has actually increased sharply since the early 1980s.
The simplest explanation for this is the reverse of the ‘safety in numbers’ effect for cycling (Turner, Rozenberg, 2006). Decreasing numbers of cycle commuters (of all ages) make them less visible to motor vehicle drivers, both individually and collectively, so making cycle commuters increasingly and disproportionately vulnerable.

### 7.3 What are cycle commuting’s main historical influences?

It is now possible to integrate the information from the above chapters to trace the major influences cycling and cycle commuting in New Zealand. The diagram below traces key influences in cycling and cycle commuting over and above population change.

**Figure 49: Changes in cycling and cycle commuting, NZ**

The chart indicates four major booms in cycling, and three in cycle commuting. The booms in cycling are associated with:

- The initial expansion of the market, driven by the novelty of cycling in the first instance, but also by its diffusion into different sectors of society via the feminist movement, the contribution of local manufacture to cycling’s accessibility, and the rapid development of cycling as a social system via clubs, leisure riding (e.g. touring), media exposure, and so on.
The growth of cycling during the late 1920s to the early 1940s – the decades of energy crisis due to Depression and War. This is an era of utility cycling.

A range of powerful energy, economic and political influences from the 1970s onwards. Most significant was the energy-ecological crisis involving fuel supply, traffic congestion and traffic-based pollution, during which time the green movement emerged in New Zealand. The Government’s move to foster the local steel industry, by limiting cycle imports and supporting local cycle manufacture, coincided with the worldwide shift to leisure cycling. (Though local industry was then closed down by economic deregulation in 1983.) The global marketing of the ten-speed, the BMX, and the mountain bike in close succession drove the increasing popularity of training for and riding in amateur events. As noted, this has had a male bias.

The major influences in cycle commuting may therefore be understood as:

- The growth in cycling’s accessibility to women and the working classes from the early 1900s onwards. This would have set the pattern for the gendering of cycling noted above.

- The energy crises of the mid-century Depression and War. Note that cycle commuting was in relative decline prior to the late 1920s, and so the effect of the Depression and War would have been to counter this decline, if only temporarily. It seems a disproportionate number of women were cycle commuting (see analysis above), and it is likely motor car uptake was impacting both on the gendering of cycling, and on total cycle commuting per se.

- The energy-ecology crisis of the late 1970s. Cycle commuting increases disproportionately during the late 1970s only. Perhaps the combination of the new ten-speeds and the Carless Days programme of the late 1970s and early 1980s pushed cycle commuting upwards. Note that increases in fuel prices did not increase cycle commuting directly. In any event, cycle commuting’s increase in the 1970s appears to have been against the overall trend.

Note the suggestion of a return in 2006 to a rate of increase matching population growth.

The next section profiles cycle commuting in Auckland specifically, using the data outlined above.
7.4 How has cycle commuting in Auckland changed?

It is possible to profile Auckland as a region using the combined data above. Note that specific data for Auckland is lacking until the 1980s.

The diagram below provides an overview of cycling and cycle commuting in Auckland. It adjusts the national-level cycling data outlined above using Census data on Auckland’s population, and makes minor adjustments (to within a few percent) using Travel to Work data (Statistics NZ Census data 1971 – 2001) for Auckland, as well as ad hoc studies (Auckland Bicycle Planning Committee, 1980; ARC, 2006; Colmar Brunton, 2006).

**Figure 50: Auckland’s cycling and cycle commuting numbers**

The diagram overleaf profiles cycle commuting relative to its national profile, and relative to leisure riding in Auckland.

These diagrams suggest cycling in Auckland grew relatively slowly to the 1960s, then grew rapidly from the 1980s to its present level of about 220,000, about 18% of Auckland’s adult population. Note cycle commuting (in yellow) has been relatively minor over Auckland’s whole history: it peaks during the early 1940s at about 5%, then declines to the present figure of about 1%. The dotted red
line shows the level of cycle commuting in New Zealand overall, suggesting cycle commuting in Auckland has always been relatively low.

**Figure 51: Cycle commuting in Auckland**

The table overleaf assesses Auckland cycle commuters since 1971, when Census measures of cycle commuters are available, and include an estimate of cycle commuter numbers at about 6,100 for 2006. The figures combine the national cycling and cycle commuting data outlined in previous sections with studies of Auckland cycling from the late 1970s onwards (Auckland Bicycle Planning Committee, 1980, ARC, 2006). These figures compare changes in Auckland cycle commuting with changes in Auckland leisure riding, and cycling overall.

The table suggests Auckland cycle commuter numbers have been relatively stable since the 1970s (echoing the national pattern). However, given Auckland’s rapid population growth, the proportion of Auckland cycle commuters to Auckland’s population is actually -79% of the 1971 level. In parallel, Auckland cycle commuters have declined as a proportion of Auckland cyclists, from about 24% in 1971 to about 3% in 2006.
The picture of cycling afforded by these data suggests Auckland has always been strongly oriented towards leisure cycling, and more so than other major urban centres in New Zealand. The challenge is therefore to build cycle commuting in a city where only limited precedent exists, and where resistance to cycle commuting may also be high.
8. How do Auckland’s cycle commuters experience commuting by bike?

A recurring question in this thesis is why any cyclists commute to work at all, and in this context, why some 5,000-odd Auckland cyclists have continued to ride to work since the early 1970s. This cycle commuting runs against the trends towards increased leisure cycling, motor car use, and use of public transport. This chapter explores the question in more detail.

Von Hippel’s (2005) notions of ‘democratised innovation’ and an ‘innovation community’ require exploring design of social change with users. Luhmann’s work to develop an understanding of cycling and cycle commuting as social systems, and data on cycling in New Zealand was used to profile cycle commuting up to the present day. A background theme was the question ‘why would anyone cycle to work in Auckland today?’ This section discusses what cycle commuting means, how it works, and how it might be changed, from the perspective of people who already commute by cycle in Auckland.

Ten Auckland cycle commuters were interviewed about their experiences of cycle commuting and their ideas for increasing the number of cycle commuters in Auckland. The exact method is detailed in the Methodology section at the beginning of this thesis. Note these cycle commuters were mixed in their levels of experience, and while some valued cycling’s ecological benefits, none regarded themselves as political Greens or as cycling for anything other than personal reasons.

LaChausse’s (2005) study indicates cyclists in general are highly motivated to achieve personal goals and manage health concerns, while non-competitive cyclists are additionally oriented to managing their weight and to socialising with other cyclists.

The table below summarises their experiences of cycle commuting in Auckland. Note these findings are similar to those derived from a study of cycle commuters conducted by research company Colmar Brunton in 2006 for the Auckland Regional Transport Authority (ARTA).

For these cycle commuters, the key motivator for starting and maintaining cycle commuting is the subjective experience of enjoying quality personal time, be it for fitness, relaxation, enjoyment of the weather, time with a partner or friend, or time alone (see first row). Additional advantages are its cheapness, convenience, speed, and low environmental impact.
The gains from these subjective experiences revolve around a heightened sense of self and one’s body (see second row). Qualities such as personal self-confidence, control, freedom, enjoyment, happiness, pride and passion are linked with making time to cycle commute. In parallel, physical gains such as loss of weight, heightened alertness and energy levels, and greater resilience are also important.

Once the cycle commuters have experienced these gains, cycle commuting itself becomes easy and enjoyable (see third row), and cycle commuters then feel more strongly attuned to cycle commuting’s social dimensions. The cycle commuters here do most of their commuting alone, so their increasing interest in a community of cycle commuters and in ‘making a difference’ is indicative of a major shift in focus from the personal to the collective. This focus is primarily expressed at work, where colleagues are encouraged to ride and are usually offered a ‘buddy’ to help them get started.
The major difficulties these cycle commuters have are the volume and speed of traffic, and poor driver behaviour. These factors result mostly in frustration at other road users, with some feelings of fear and lacking motivation. Issues such as poor road design and maintenance or inconsistent cycle lanes are secondary, as are a lack of faculties at work for secure cycle storage and personal hygiene. These were managed by careful riding and by working out solutions with employers.

These cycle commuters demonstrate two broad behavioural strategies for dealing with the problems of traffic and motorist behaviour.

The most common approach is riding with traffic as much as possible – an approach typical of experienced, fit, confident, assertive, male riders. One rider has been more adversarial than assertive: this person had had the most incidents with car drivers and had also been the most aggressive by far. For these riders, fast, skilled, and defensive (or aggressive) riding keeps one safe.

These riders also tend to have higher quality bikes and equipment, and are more likely to experiment with different cycle forms to make cycle commuting more interesting and enjoyable. For example, one rode a single-speed, fixed-wheel cycle (a cycle with no gears or freewheel) to build skills and muscle strength.

The other approach is to ride cautiously around traffic, and to ride as much as possible on cycle lanes or paths. This is favoured by the three less experienced cyclists in the study. Two of these riders note paths are often obstructed by glass and other rubbish, and have to be shared with pedestrians: one suggests cyclists should therefore always use bells when riding on paths. The other noted that as fitness increases, so does frustration with the lower speeds imposed by path design and mixed usage. For these riders, speed is directly equated with risk, but cycle paths offer decidedly mixed results. These riders tend to favour cheaper cycles and equipment.

These cycle commuters value resilience, self-improvement and low-key activism. Resilience is implicit in existing commuters’ high risk-tolerance and ability to manage peak hour traffic with equanimity. Self-improvement is expressed as gains in enjoyment, confidence, freedom, and health. The activism is expressed as ‘making a difference’ for cycling and for the nation’s ecological, health and transport woes, though it is also expressed as aggression on the roads.

8.1 What is Auckland cycle commuting’s key design problem?

The primary concern of the cycle commuters in this study is Auckland’s traffic, which from their point of view, is high in volume, travels fast, and features many drivers unaware of cyclists’ rights
and needs. That is, from existing cycle commuters’ experience, the core design problem – the key issue to resolve in design of social change – is traffic volume and speeds, closely followed by motorists’ driving behaviours, attitude to cyclists, and ignorance of cyclists’ rights on the road.

In this sense, measures to reduce speed limits during peak commuting hours would have the greater impact, followed by measures to reduce traffic volume. (However, note that an experienced commuter suggests traffic speeds would increase with lower volumes, making cycling less safe.) The behavioural strategies of these cycle commuters suggest socialising while riding is not an option in peak hour riding, where cyclists need to concentrate fully on traffic. ‘Buddying’ with others along the route or meeting friends for coffees before work are both viable, and a few of the cyclists were doing this already.

At present a cycle commuter culture is largely absent from Auckland’s roads, and is only expressed in off-road socialising and through friendships at work, where respect for cycle commuters is framed by the friendship. In other words, traffic volume and speed are also primary barriers to development of a stronger commuter culture on and off the road. In parallel, the social dynamics of cycle commuting are focused on motor car drivers when on the road, and on defending cycle commuting when off the road.

Initiating communications that support a local cycle commuting identity and culture appears to be another important opportunity. The flow-on effect of the social dynamics around cycle commuting would help attract and establish new cyclists. The findings of this small study suggest the power of marketing cycle commuting as an experience of freedom, confidence, enjoyment and respect, and cycle commuters’ identity as alert, happy, proud, passionate and making a difference.
HOW DOES CHANGE WORK WITHIN CYCLE COMMUTING?

The sections that follow develop simulations of change in cycle commuting to study how the system changes and what interventions are likely to strengthen cycle commuting’s culture and increase the numbers of cycle commuters.
9. How does cycle commuting work within transport?

As noted in the methodology section, system dynamics analyses are commonly used in analysing and modelling social systems (Anderson and Johnson, 1997; Sterman, 2000). These analyses have been applied in studying New Zealand transport (Laird et al. 2001; Elias, Cavana & Jackson, 2005).

9.1 What are the broad dynamics of motorised transport?

The diagram below provides the system dynamics analysis offered by Laird et al. (2001, p. 136).

Figure 54: Laird et al.'s urban transport system dynamics model

The diagram shows how increasing car use leads to increasing roading improvements, based on implicitly pro-car evaluation criteria for roading and related infrastructure. Roading improvements lead to increases in traffic speed, which also enable longer trip lengths, so contributing to the spread of the urban area and a reduction in population density.

In this context, increasing car use (and especially traffic speed) discourages existing cyclists and cycle commuters, so reducing both numbers and frequency of riding. Within the diagram there are obviously more ways a car-based system can inhibit cycle commuting, including increasing urban
sprawl, trip lengths, increasing traffic speed, road designs that prioritise cars, as well as the increasing uses of cars for short-trip activities such as dropping off kids at school.

As Laird et al., (2001) note, resolving the issues raised by motorcar use requires a systemic approach. Laird therefore identifies four major ways the urban transport network can be influenced towards better use of public and active (walking and cycling) transport modes. Given their conclusion that car use is the urban transport problem, these are focused on reducing car use:

- Planning of urban development to favour intensification
- Restrictions on car use, such as reducing cars for short trips and reducing suburban traffic speeds
- Taxation of car use that reflects their economic, ecological and social costs more accurately
- Support for other modes of transport (public and active), with special emphasis on rail

The corresponding effects for cycle use would be:

- More reasons for cycling locally, with shorter distances involved
- More certainty of cycling in safety (fewer dangers and therefore accidents)
- A stronger case for cycle use within household budgets
- Support for utility cycling per se

The next section explores the social system dynamics of cycle commuting specifically.

9.2 What are the main dynamics of cycle commuting?

This section uses the information provided in previous chapters to suggest a framework for modelling the social system dynamics of cycle commuting. First, ten key influences are identified in the diagram below (in no particular order).
### Figure 55: Key influences on cycle commuting

<table>
<thead>
<tr>
<th>Cycle Commuting's Key Influences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Use of the motor car</strong></td>
</tr>
<tr>
<td>• The behaviours of motorists in commuter traffic</td>
</tr>
<tr>
<td>• Road space available for cyclists</td>
</tr>
<tr>
<td>• Referencing of cyclists as irritants and cycling as dangerous</td>
</tr>
<tr>
<td><strong>2. Road design</strong></td>
</tr>
<tr>
<td>• Effects of road design for cyclists</td>
</tr>
<tr>
<td>• Effects of cycle lane presence/ design</td>
</tr>
<tr>
<td><strong>3. Workplace facilities</strong></td>
</tr>
<tr>
<td>• Provision of hygiene facilities (showers, clothing storage etc)</td>
</tr>
<tr>
<td>• Provision of cycle facilities (secure cycle storage)</td>
</tr>
<tr>
<td><strong>4. Cycle commuting innovations</strong></td>
</tr>
<tr>
<td>• Innovations in cycle technology, such as the mountain-bike</td>
</tr>
<tr>
<td>• Innovations in the semantics and culture of cycle commuting</td>
</tr>
<tr>
<td><strong>5. Leisure cycling</strong></td>
</tr>
<tr>
<td>• Numbers of leisure cyclists i.e. potential cycle commuters</td>
</tr>
<tr>
<td><strong>6. The recruitment of specific cyclists</strong></td>
</tr>
<tr>
<td>• Gender</td>
</tr>
<tr>
<td>• Income/ work type</td>
</tr>
<tr>
<td>• Riding experience and behaviours (risk-tolerance)</td>
</tr>
<tr>
<td><strong>7. Numbers of cycle commuters</strong></td>
</tr>
<tr>
<td>• Visibility of cyclists</td>
</tr>
<tr>
<td>• Sustainability transport gains from cycle commuting</td>
</tr>
<tr>
<td><strong>8. The culture and social dynamics of cycle commuting</strong></td>
</tr>
<tr>
<td>• Communication of its health benefits, pleasures, freedoms, self-confidence, and ability to make a difference</td>
</tr>
<tr>
<td>• Communication of its risks (in commuter traffic)</td>
</tr>
<tr>
<td>• Communication of a positive cycling/ cyclist identity</td>
</tr>
<tr>
<td><strong>9. The risks of cycle commuting</strong></td>
</tr>
<tr>
<td>• Changes in the accident rate</td>
</tr>
<tr>
<td>• Changes in fears about cycle commuting</td>
</tr>
<tr>
<td><strong>10. Sustainable transport strategy</strong></td>
</tr>
<tr>
<td>• The status of cycling in transport law</td>
</tr>
<tr>
<td>• Cycling-related enforcement</td>
</tr>
<tr>
<td>• Cycling transport data</td>
</tr>
<tr>
<td>• Cycling project budgets</td>
</tr>
<tr>
<td>• Restrictions on car use, such as congestion zones/ charges</td>
</tr>
<tr>
<td>• Ecological and economic sustainability</td>
</tr>
</tbody>
</table>
These elements are integrated into a causal loop diagram that shows the causal relationships between them in enough detail to appreciate the workings of the system.

The diagram below builds on Laird et al.’s (2001) work by adding the elements that constitute cycle commuting as a social system. It draws on the influences above to propose a draft model of the dynamics for further discussion and development. The diagram a focus for ‘strategic conversation’ about assumptions, ideas, and insights, and its unfinished status is designed to promote double-loop learning – it is not intended to be final or definitive. For example, it might be workshopped with existing cycle commuters to evolve its structure and tease out nuances, as a way of fostering democratised innovation in von Hippel’s (2005) sense.

Figure 56: Overview of dynamics of cycle commuting system
In this diagram car use, road design and traffic speed (blue square) all contribute to the perceived dangers of cycle commuting. These risk perceptions reduce the appeal of cycle commuting, which in turn decreases the number of cycle commuters attracted to cycling, and this in turn feeds back to increases in perceived risks. In other words, cycle commuting becomes trapped in a ‘vicious cycle’ of unrealistic fears, accentuated by falling numbers of cycle commuters.

On the other hand, innovation (top right) strengthens cycle commuting’s culture, which in turn drives further innovations, creating an innovation-based reinforcing loop. This feeds through to increase the appeal of cycle commuting, which feeds back to strengthen the culture, and also increases the number of cycle commuters. As cycle commuter numbers grow, this stimulates further innovation to create a secondary reinforcing loop.

In parallel, positive media coverage (including both editorial and media-based social marketing campaigns) strengthens cycle commuting’s culture, appeal and numbers. Cycle commuting’s strengthened culture reinforces positive media directly, and cycle commuter numbers do so as well. But positive media is kept in check by negative media, so that the strengthening of cycle commuting’s culture through media may not be as great as through innovation.

The diagram below provides more detail about the relationships between the ten elements and likely systemic interventions as profiled by Laird et al. (2001). Again the diagram is designed as a focus for ‘strategic conversations’, (Van der Heijden, 2005) and as a focus for double-loop learning about the effects of different interventions.

The diagram shows how increasing concern over sustainability problems (in purple at left) in transport drives pro-cycling transport strategies, plans and their implementations, though delays in this overall process may amount to decades. Concern over problems also produces pro-cycling advocacy, with more immediate impacts (fewer delays) than the strategies. Both strategies and protests appear in pro-cycling media, so in turn antagonising anti-cycling comment.

But sustainable transport strategies also promote other modes of urban public transport (in purple at top right), and reduce pro-car transport policy and roading project evaluation criteria, so impacting on use of the motorcar in both numbers and speed. The strategies also promote infrastructure development including workplace facilities for cycles and cyclists. Over time these various approaches increase the appeal of cycling and the number of cycle commuters. The net result is a shift to stronger culture within cycle commuting as a social system.
Figure 57: Detailed dynamics of cycle commuting system
The diagram links with Laird’s analysis of the motorised transport (blue items at right), and links these to the cycle commuting system dynamics as outlined above (green items linked with Strength of Cycle Commuter Culture and Number of Cycle Commuters). Note that links between Number of Cycle Commuters, Pro-Cycling Media and Cycle Commuting Innovations are displayed using secondary labels (in orange) to avoid overlaying too many lines.

The diagram also indicates (lower right, in green) that a lower appeal of cycle commuting recruits more risk-tolerant riders, which contributes to the accident rate, and so also to perceptions of its risk. It also shows that increases in the number of cycle commuters then decreases the number of car commuters, and one effect of this in the long term may be to reduce concern over sustainability in transport.

9.3 What will cycle commuting be like in the future?

Using data developed in during the study, it is also possible to profile and explore the configuration of urban transport in Auckland in 2016, in part to understand the conditions that might shape the success or otherwise of these interventions, and to check what kinds of growth rates might actually be required.

The table below profiles commuting in Auckland from 2006 to 2016 to show how the urban transport environment might change if growth rates for 1996 - 2006 continue unchanged (it also draws on data in the Auckland Regional Land Transport Strategy, 2003). Commuter growth is ahead of population growth and is driven in part by increasing car ownership and use, and in part by Auckland’s urban sprawl, though the scenario assumes no significant increase in urban road infrastructure for simplicity.

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2011</th>
<th>2016</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car commuters</td>
<td>390,400</td>
<td>433,344</td>
<td>476,288</td>
<td>22.0%</td>
</tr>
<tr>
<td>Public transport commuters</td>
<td>44,000</td>
<td>46,200</td>
<td>48,400</td>
<td>10.0%</td>
</tr>
<tr>
<td>Cycle commuters</td>
<td>4,500</td>
<td>3,938</td>
<td>3,375</td>
<td>-25.0%</td>
</tr>
<tr>
<td>Walking/ jogging commuters</td>
<td>36,750</td>
<td>37,669</td>
<td>38,588</td>
<td>5.0%</td>
</tr>
<tr>
<td>Total</td>
<td>475,650</td>
<td>521,150</td>
<td>566,651</td>
<td>19%</td>
</tr>
<tr>
<td>% Cycle commuters</td>
<td>0.9%</td>
<td>0.8%</td>
<td>0.6%</td>
<td>-37%</td>
</tr>
<tr>
<td>% Active transport</td>
<td>8.7%</td>
<td>8.0%</td>
<td>7.4%</td>
<td>-15%</td>
</tr>
<tr>
<td>Congestion index</td>
<td>1.00</td>
<td>1.11</td>
<td>1.22</td>
<td>22%</td>
</tr>
</tbody>
</table>

Figure 58: Scenario 1 - current growth

34 The congestion index here is calculated on one person per car, 30 per public vehicle, 10 cycles for every car space on the road, and assumes walkers have no effect on road congestion.
The scenario suggests car commuting increases at least 22% by 2016, which in turn drives the total growth (given the dominance of car commuting). Public transport also increases in popularity to grow by 10%, and walking manages only 5% growth. But congestion also increases by 19%, in line with the dominance of the motor car. On the other hand, as urban traffic speeds drop (with increased congestion), there might be fewer cycle commuter and pedestrian accidents.

Cycle commuter numbers decrease by 25%. Because cycling and walking both contribute positively as physical exercise to population health, they are often termed 'active transport': as a proportion, in this scenario active transport decreases by 15%. The overall result is more congestion and a less healthy population.

The second scenario below shows what transport might look like in 2016 if current growth rates continue, except for cycle commuting. In this scenario, a variety of social change programmes are deployed to increase cycle commuting at the rate required to double the proportion of cycle commuters by 2016 (the Auckland Regional Council’s aim).

Figure 59: Scenario 2 - meeting cycle commuting’s targets

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2011</th>
<th>2016</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car commuters</td>
<td>390,400</td>
<td>430,416</td>
<td>470,432</td>
<td>20.5%</td>
</tr>
<tr>
<td>Public transport commuters</td>
<td>44,000</td>
<td>46,200</td>
<td>48,400</td>
<td>10.0%</td>
</tr>
<tr>
<td>Cycle commuters</td>
<td>4,500</td>
<td>7,628</td>
<td>10,755</td>
<td>139.0%</td>
</tr>
<tr>
<td>Walking/jogging commuters</td>
<td>36,750</td>
<td>37,669</td>
<td>38,588</td>
<td>5.0%</td>
</tr>
<tr>
<td>Total</td>
<td>475,650</td>
<td>521,912</td>
<td>568,175</td>
<td>19%</td>
</tr>
<tr>
<td>% Cycle commuters</td>
<td>0.95%</td>
<td>1.46%</td>
<td>1.89%</td>
<td>100%</td>
</tr>
<tr>
<td>% Active transport</td>
<td>8.7%</td>
<td>8.7%</td>
<td>8.7%</td>
<td>0%</td>
</tr>
<tr>
<td>Congestion index</td>
<td>1.00</td>
<td>1.10</td>
<td>1.21</td>
<td>21%</td>
</tr>
</tbody>
</table>

The scenario suggests car commuting increases about 21% by 2016, the lowered figure representing car commuters who are now cycling to work. Given this scenario, the row for cycle commuters (italics) shows the growth required is 139%. As a result of this growth, active transport now shows no change to 2016, instead of a decrease as in the first scenario.

This scenario suggests a number of consequences. First, as the congestion index shows, congestion problems continue to increase: increased cycling has reduced congestion only a small amount. Second, with significant funding for cycling, the motor car industry might strongly encourage switching from fossil to more sustainable fuels to justify continued use, which would also detract from cycle use. Third, budget would need to increase significantly (and very quickly) to achieve
cycle commuting’s growth target. This budget would probably be at the expense of public transport and walking, making it both controversial and of marginal utility. Conflicts within the transport sector would be disruptive for transport policy and regular fodder for the media: neither would serve the interests of cycling.

That is, the scenario suggests a number of very real reasons why cycling might never achieve the level of transport, social, and budgetary support required to meet its targets. On the other hand, it shows cycle commuting alone could have a significant impact on population health if given appropriate funding, and if the above dynamics could be avoided.

The table below provides a third scenario. It differs by restricting increased car use to 18% by 2016, with other modes growing to take up the ex-car users. For the sake of comparison, cycling's growth rate is left at 139%, but the result is very different.

**Figure 60: Scenario 3 - traffic calming**

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2011</th>
<th>2016</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car commuters</td>
<td>390,400</td>
<td>425,536</td>
<td>460,672</td>
<td>18.0%</td>
</tr>
<tr>
<td>Public transport commuters</td>
<td>44,000</td>
<td>50,600</td>
<td>57,200</td>
<td>30.0%</td>
</tr>
<tr>
<td>Cycle commuters</td>
<td>4,500</td>
<td>7,628</td>
<td>10,755</td>
<td>139.0%</td>
</tr>
<tr>
<td>Walking/jogging commuters</td>
<td>36,750</td>
<td>37,669</td>
<td>38,588</td>
<td>5.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>475,650</td>
<td>521,432</td>
<td>567,215</td>
<td><strong>19%</strong></td>
</tr>
<tr>
<td>% Cycle commuters</td>
<td>0.9%</td>
<td>1.5%</td>
<td>1.9%</td>
<td>100%</td>
</tr>
<tr>
<td>% Active transport</td>
<td>8.7%</td>
<td>8.7%</td>
<td>8.7%</td>
<td>0%</td>
</tr>
<tr>
<td>Congestion index</td>
<td>1.00</td>
<td>1.09</td>
<td>1.18</td>
<td>18%</td>
</tr>
</tbody>
</table>

First, while congestion problems increase, the index indicates it increases much more slowly (being clearly directly linked to the increase in cars on the road, rather than other vehicles). Clearly, political will and transport policy directives to restrict growth of car use are key drivers. Second, budgets for cycling, walking and public transport all increase significantly to support the switch away from cars. This provides significant economies through the combined provision and promotion of alternatives to the car.

Again, increasing these budgets depends entirely on transport authority willingness to budget and implement key projects within the 10-year timeframe. Third, while the motor car industry might switch to more sustainable fuels, the dominance of the car itself is directly challenged, so enabling the much lower increase in congestion and the much higher uptake of alternatives.
The third scenario suggests it is possible to meet the Auckland Regional Council’s goals for cycle commuting, but the consequences are far more certain and significant when this takes place alongside aligned changes in all other modes. How change is designed and managed in context matters much more than seeking the desired change on its own.

9.4 What are the best ways to increase cycle commuting?

It is now possible to model a number of interventions to see which, if any, will achieve the Auckland Regional Council’s goal of doubling the proportion of cycle commuters by 2016.

Using the causal framework above it is possible to develop a system dynamics model of cycle commuting. This model of the dynamics of cycle commuting as a social system is a working model of the dynamic flow of resources and information within the system (Sterman, 2000). A study of stakeholder dynamics in a New Zealand transport infrastructure development project has been carried out using these methods and has provided useful modeling ideas (Elias, Cavana, and Jackson, 2005).

In this instance, only a simple system dynamics model of cycle commuting is developed (see Figure 56: Overview of dynamics of cycle commuting system), and as in previous sections the aim is to stimulate ‘strategic conversations’ (Van der Heijden, 2005) about the relationship between cycle commuting and proposed interventions.

The aim here is therefore to show how different interventions are likely to impact given the culture and dynamics of cycle commuting’s social system. The method for translating causal loop diagrams is outlined by Binder, Vox, Belyazid, Haraldsson and Svensson (2004). Details on the structure and equations used in the model are provided in Appendix 2: System Dynamics Model.

First, the table below summarises available data on annual rates of change arising in commuter cycling-related programmes. It suggests about 55% of leisure cyclists might be available for cycle commuting under the right conditions: this sets an upper limit to the growth of cycle commuting (though at 7% of cyclists in New Zealand, potential growth in cycle commuting is significant).
This data suggests some interventions are more productive than others, but it is not possible to know how each will perform within cycle commuting’s social system. For example, programme growth rates do not reflect the full contribution of a programme to the culture and social dynamics of cycle commuting over time.

The diagrams below show the outputs of the modeling process for the Auckland data developed in earlier sections of this report. The equations used in the model are available in Appendix 3.

The first diagram gives an example of the output graph of the modeling software. The blue line (bottom right) shows how Auckland cycle commuter numbers will decrease given the current growth rate of about -2% per annum, and in the absence of any interventions. Starting with about 4,500 cycle commuters in 2006, the numbers would be about 3,768 by the end of 2016. The second (red) line shows the impact of running all interventions at once – assuming these are optimally integrated, the line indicates an increase to 6,689 cycle commuters by 2016.

Note the model also features sliders (grey boxes at bottom of chart) for manually re-setting parameters for each intervention. These can be switched off, or set to a range of levels up to the maximum, to enable assessment of the impacts of each intervention alone or in combination.
The table below shows the impacts by the end of 2016 of interventions delivered on their own and/or with others. The term ‘alone’ refers to the impact when a programme is run optimally on its own alone: otherwise, the results refer to the combination of interventions indicated by column and row headings.

Note that the scenarios in the previous section suggested about 11,000 cycle commuters would be required by 2016 to meet the goal of doubling the proportion of cycle commuters against all commuters. This figure of 11,000 is the reference point for judging the results of the interventions provided below.
### Figure 63: Impacts of interventions in different combinations

<table>
<thead>
<tr>
<th></th>
<th>Numbers of Cycle Commuters in 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Marketing of Innovations</td>
</tr>
<tr>
<td>Marketing of Innovations</td>
<td>4,639 (alone)</td>
</tr>
<tr>
<td>Positive Media</td>
<td>5,039</td>
</tr>
<tr>
<td>Infrastructure Building</td>
<td>4,782</td>
</tr>
<tr>
<td>Safety Campaign</td>
<td>4,960</td>
</tr>
<tr>
<td>Traffic Calming</td>
<td>5,658</td>
</tr>
</tbody>
</table>

This table suggests Marketing of Innovations and Traffic Calming are the strongest stand-alone interventions within the dynamics of cycle commuting as a social system. Marketing of Innovations is powerful because it strengthens the culture at a relatively high rate, while traffic calming, though small in rate, has large-scale, direct effects on cycle commuting’s appeal, and indirect effects on perceptions of cycle commuting’s risk.

When combined as pairs, the strongest two interventions are again Marketing of Innovations with Traffic Calming, flowed by Marketing of Innovations with Positive Media. The least effective stand-alone intervention is Infrastructure Building, and the least effective combination is Infrastructure Building with Safety Campaigns.

This exercise shows the Auckland Regional Council’s aim of doubling the proportion of cycle commuters by 2016 is not realistic given the above results, which all fall well short of the target of about 11,000 cycle commuters. This suggests any social change programmes for cycle commuting need to be integrated with programmes for public transport and walking to leverage economies of scale. The exercise also suggests Marketing of Innovations and Traffic Calming are two primary interventions, and will be more effective if used in combination.
The one example of traffic calming that counters the statements above is London’s inner city congestion zone, which increased cycle commuting by 30% in its first year, by 45% by its third year, and has helped increase London cyclists by 72% since 2000. The zone has been so successful in managing congestion that it has been extended further out from the city (Murray-Clarke, 2007). That is, if all else fails, London’s solution may still appeal as a means of doubling the proportion of cycle commuters by 2016.
HOW CAN CYCLE COMMUTING BE INCREASED?

The sections that follow develop a design for change in cycle commuting. The sections are designed to be easily adapted as a stand-alone paper or presentation for disseminating results among transport and local authority decision-makers, among advocacy groups, and among cyclists.
10. A design for change in cycle commuting

The sections that follow integrate and summarise the accumulated knowledge about cycle commuting developed in this thesis. They develop a four-step design for change in cycle commuting and end by making specific recommendations for change management.

10.1 What is the problem?

The initial problem identified for this thesis was how to double the proportion of cycle commuters by 2016. The context for this problem is the marginalisation of adult cycle commuting, and in this sense, the marginalisation is the ‘real’ problem.

Expressed on the roads, the problems for cycle commuters are first motorist behaviour and attitudes, and second poor roading design and maintenance. Traffic volume and speed intensify these issues.

Expressed in cycle commuting’s culture (its autopoiesis), the problem is the very low level of self-referential communications, especially about themes and topics supportive of cycle commuting. This is exacerbated by the fragmented social dynamics the cycle commuter community. It is also neglected in the considerable volume of commercial, industry and consumer communications within the leisure cycling community.

10.2 What are the causes of this problem?

Social system analysis indicates that cycling is historically divided between providing transport and providing leisure. Cycling is also frequently associated with emancipatory politics.

In the transport sector, cycling had dominated personal travel for the first half of the twentieth century: for most of this time, there were more cycles than cars. Cycling was marginalised in transport by the motor car, a shift beginning in the 1930s and completed by the 1960s. Adult cycle commuting’s marginalisation is now about 50 years old. This marginalisation continues at the day-to-day level through both motorist behaviour and design of roading and workplace infrastructure.

Within cycling, cycle commuting was marginalised by leisure cycling from the late 1960s. The demise of utility (including commuter) cycling in the 1950s threatened to end cycling as a whole. But a series of technical and marketing innovations re-invented cycling as youthful leisure, and the
The success of this strategy made cycling one of the top five leisure activities in New Zealand today. This is not to say that leisure cycling is less marginalised than cycle commuting; rather, it suggests the nature of its exclusion is less immediate.

The dual marginalisations of cycle commuting renewed its links with emancipatory politics. In particular, the radical Dutch urban reform movements of the 1960s influenced cycling advocacy worldwide. This lead to cycling movements and protest actions in Auckland during the 1970s, and protest has evolved into advocacy in Auckland and New Zealand contexts. The Dutch reform movements also impacted on transport policy, and Auckland was one of the first New Zealand cities post-World War II to engage in cycle route projects and develop a cycle strategy. Unfortunately, early achievements were not continued, and it is only in recent years that significant infrastructure projects have progressed in planning and implementation.

Among motorists and non-cyclists, cycle commuting is viewed as dangerous, irresponsible and/or an irritant to motorised traffic.

These various forms of marginalisation make it difficult for cycle commuting to communicate its culture. Cycle commuting’s culture communicates some very attractive values and benefits, but cycle commuter interaction is rare, and tends to be limited to swapping bad experiences.

Cycle commuting’s culture values resilience, self-improvement, and low-key activism, the latter sometimes seen as aggression on the roads. Resilience is implicit in existing commuters’ high risk-tolerance and ability to manage peak hour traffic with common sense and equanimity. Self-improvement is expressed as gains in enjoyment, confidence, freedom, and health. The activism is expressed as ‘making a difference’ for cycling and for the nation’s ecological, health and transport woes. These cultural elements – its identity, values, and practices – are the key to any attempt to increase the proportion of cycle commuters.

The crux of any solution is therefore communications that champion cycle commuting’s culture – the elements that re-produce cycle commuting as a social system.

10.3 What are the reasons for the failure of past interventions?

This study suggests any interventions might fail simply because cycle commuting is already marginalised within transport decision-making. Barring advocacy, interventions have relied on a willingness among local and transport authorities to commit significant funding and resources to a marginal mode over the long term, a difficult proposal to justify over the long term.
Transport and local authority planning has been based on estimates of the scale of utility cycling – including cycle commuting. That is, provision is largely based on cycling’s least popular programme, which among adults represents about 7% of all cyclists. This has five implications.

- It splits utility from leisure cycling by orienting any infrastructure development to the former. This would have little impact if utility cycling was more significant, but its effect at the present time is to also restrict provision for leisure cycling.
- It exacerbates the perceived dangers of cycle commuting, in part because any accidents (irrespective of the nature of the cycling) reinforce the view that cycle commuting is dangerous (cycle commuting becomes the default for attributions of danger), and in part because the authorities also misrepresent cycle commuting in accident statistics.
- It makes it easier to prioritise public transport over cycling in funding and implementation programmes, because public transport appears to offer higher commuter transport volumes, though they contribute lower ecological and health benefits, for example.
- It enables authorities to resist making a direct connection between traffic calming and increases in cycling and/or active transport. Traffic calming impacts on all cycling and walking, and so provides much greater benefits than presently calculations based on utility cycling alone.
- Marginal provision for utility cycling’s growth is then justified by its marginality, so locking utility cycling into unwilling unemployment. That is, a focus on utility cycling has the unintended consequence of further marginalising all cycling.

The study also suggests that any promoting of cycle commuting as an activity only has been of limited use. Because the public and motorists regard it as a dangerous, irresponsible and irritating activity, promotions of the activity have a minimal chance of achieving significant change on their own, and might also antagonise cycle commuting’s opponents. While leisure cycling dominates, cycle commuting activity promotions will also be understood by leisure cyclists as pushing a relatively risky and unpleasant way to ride. In both cases, safety campaigns have the side-effect of reinforcing negative views of cycle commuting. Finally, local authorities may be unwilling to promote an activity generally regarded as dangerous. The problems of cycle commuting’s marginalisation need to be addressed more directly, and the most obvious approach is traffic calming.
Finally, the study indicates social change programmes need to run a number of co-ordinated interventions to achieve a rapid increase in numbers, support new commuter cyclists, and achieve economies of scale across interventions.

Given current commitment and decision-making processes involved in provision for cycling in New Zealand, it is likely that these barriers to change will continue and will impact on provision for cycle commuting into the future. That is, the solutions of the past are among the issues that need to be managed into the future.

10.4 What are the best ways to resolve the problem?

There are four design concepts that are central to design of change in cycle commuting.

10.4.1 Talk about the culture, not the activity

Provision for communications is pivotal. Cycle commuting has a contemporary and energetic culture that can have considerable appeal to leisure cyclists. In conventional marketing terms, it needs to be ‘branded’ and marketed via icons of its identity, values, practices, and consumables, plus any innovations within cycling that build its immediate appeal. In social marketing terms, these elements need to be linked to positive actions (that ‘make a difference’) and to focal events that bring the local community together. That is, the meanings of cycle commuting’s culture need to be packaged to appeal to potential cycle commuters and others, such as transport decision-makers, the public, and motorised road users.

Cycle commuting’s self-reproduction rests on communication of its image/brand as confident, independent, enjoyable, risk-tolerant, radical (against the trends), and on communications recruiting people who are common sense, resilient, interested in self-improvement, and committed to ‘making a difference’ (‘mild’ activism).

10.4.2 Talk about all cyclists, not just cycle commuters

Communicating about the needs of all urban cyclists changes the frame of reference of public, media, transport, and local authorities. The potential to increase cycle commuting by improving conditions for all cyclists is significant.

On the one hand, the needs of any urban cyclist are the same, irrespective of the time of day he/she cycles at, and the political case for improvements is enhanced by the greater cyclist numbers and benefits. This also reduces any anxieties between leisure and utility cycling: cycling is always
Design of Change in Cycle Commuting

good, no matter why one rides. On the other, most adult cyclists are also motorists: this engages a much larger group of road users in pro-cycling communications, and helps reduce tensions between these two groups of road users.

If cycle commuting is to become increasingly politicised in transport decision-making, it makes sense to centre debate on the needs of the larger group. The scale of direct benefits to road users, and so indirect benefits to the public, is obviously much larger.

Finally, communicating about the needs of all cyclists draws the cycling industry into communication, as it is in its own interests to be directly involved. While there are many ways this communication might be structured by agreements and support, the key element is promotion of cycling innovations in the context of cycle commuting. Examples such as innovative safety equipment, electric cycles, and stylish accessories can all have impact.

10.4.3 Talk about traffic and behaviours, not just infrastructure

The constant problem for existing and potential commuter cyclists is the behaviour of motorists: irrespective of infrastructure provision, motorist behaviours remain an immediate risk. There are three key strategies here:

- Linking traffic calming directly to cycle strategy makes transport policy more directly accountable, and in prioritising more vulnerable road users, also gives stronger impetus to road safety management.

- Communications about using roads responsibly reassure cyclists and motorists of the safety of cycle commuting. Obviously, these communications need to target motorists and cyclists in equal measure. Enforcement of cycling sections of the Road Code would assist significantly.

- Changes in the legal status of cyclists to assume motorist fault in the case of accidents (as in some Scandinavian countries) would shift the burden of responsibility to the latter.

As noted above, targeting all cyclists has the effect of de-marginalising cycle commuting, and this applies as much to changing road behaviours as to capturing scale effects or ensuring the full benefits of change.

These various approaches give infrastructure the role of supporting growth, rather than leading it. Cycling infrastructure decision-making is made easier because it then responds to demand and/or
volume changes, rather than trying to anticipate fickle demand for a ‘marginal’ mode, or include provision for cycling on principle in projects that are actually of limited interest to cycling.

10.4.4 Talk to cyclists, not just decision-makers or the public

The key group for increasing the number of cycle commuters is leisure cyclists, though as noted, leisure cycling is implicated in utility cycling’s marginalisation. Leisure cyclists live and work in the same places as cycle commuters, and share the same interest in cycling (and many cycle commuters may cycle for leisure). Cycle commuting’s own self-references are appealing and make good sense to leisure cyclists, though as noted, the latter may add references to cycle commuting’s relative dangers, mundane routines, and potential dullness. Even with leisure cyclists, it is important to communicate cycle commuting’s broader culture, not just its activity, if this issue is to be resolved. That is, tensions between the interests of cycle commuting and leisure cycling need to be resolved.

Demand for provision for cycle commuting from the broader cycling community is then a powerful way of attracting attention to cycle commuting’s culture and benefits. Transport and local authority decision-makers are sensitive to the level of demand, and providing for 20%-odd of the adult community over the longer term is easier to justify in political and practical terms than the few percent comprised by cycle commuters.

This has important implications for advocacy groups, who could gain significantly from a broad cyclist membership but typically lack the resources to achieve this. Avenues for funding of advocacy groups might be one solution, either via direct funding, or via funding of advocacy infrastructure such as websites and communications production technologies.

10.5 Summarising design of change in cycle commuting

The diagram below summarises the design of change in cycle commuting as discussed above. It uses Luhmann’s concepts to illustrate how these have been applied above.
The diagram suggests cycle commuting and leisure cycling are coupled – in as much as their relative separation as programmes encourages mutual irritation. It also suggests transport and cycling are coupled, though the nature of the coupling is more complex than suggested above, as leisure and commuter cycling have quite different relationships with transport.

The diagram identifies two broad types of interventions – protest and communication. Protest is cycling’s way of irritating and pushing transport into being fully accountable for its stated commitments, and to adjusting its operations and communications to include cycling more fully. The targeting of transport decision-making by advocacy groups is central to this.

Communication is cycling’s way of amplifying its culture and appeals. On the one hand, communication resources enhance cycling commuting’s own communications to bolster its culture and social conditions, and to champion its successes to itself. That is, the aim is to resource cycle commuting’s autopoietic communications. On the other hand, communications translate, amplify and champion cycle commuting’s culture for the consumption of leisure cyclists, so recruiting them
to cycle commuting. These both draw the cycling industry into seeking opportunities to promote innovations and consumables, so further enriching communications.

Finally, these protest and communication strategies will enter the public domain via information, debates and events that attract media attention. Communicating and championing cycling within media environments is also important, first in educating media themselves about cycling, and second in educating the non-cycling public.

10.6 What might an Auckland social change programme look like?

Designs for programmes communicating cycle commuting might take many forms, and the three below are provided as examples only. These all depend on the commitment of Auckland’s local and transport authorities, and on the capabilities of Auckland’s cycling-related advocacy groups. The examples are:

- An integrated long-term programme spanning traffic reduction, infrastructure development, promotion of innovations, education of motorists and cyclists, enforcement of appropriate behaviours, and endorsement of cycle commuting’s culture.

- A single-intervention programme leveraging as much change as possible from 1 – 2 interventions, such as infrastructure development with media coverage of progress, with ongoing media stories supporting the culture of cycle commuting.

- A local authority Councillor and transport staff education campaign to educate key decision-makers about the culture, values and benefits of cycle commuting, and to address dominant negative perceptions. A parallel campaign for media staff might address similar issues. A parallel pro-cycle commuting public event might also focus public awareness on the values and benefits of cycle commuting.

10.7 What does this thesis recommend for Auckland?

This thesis recommends that:

1. Traffic reduction measures should be integrated with local authority cycle strategies

2. Local authorities should scale provision to all cyclists and all cycling, not just utility cycling
3. Programmes should address all cycling first, and then prioritise utility cycling only when issues are specific to cycle commuting

4. Programmes should aim to build the culture and appeal of cycle commuting, and should avoid promoting the activity on its own

5. Programmes should support and/or promote technological and social innovations

6. Programmes integrating a number of interventions should be prioritised

7. Avenues for funding of advocacy, consultation and involvement of cycle commuters should be developed
11. Appendix 1: Declaration

Declaration

Name of candidate: Stephen McKernon

This Thesis/Dissertation/Research Project is submitted in partial fulfillment for the requirements for the Unitec degree of Masters in Design Management.

Candidate’s declaration
I confirm that:
- This Thesis/Dissertation/Research Project represents my own work;
- The contribution of supervisors and others to this work was consistent with the Unitec Regulations and Policies.
- Research for this work has been conducted in accordance with the Unitec Research Ethics Committee Policy and Procedures, and has fulfilled any requirements set for this project by the Unitec Research Ethics Committee.

Research Ethics Committee Approval Number: 2006.501

Candidate Signature: [Signature]
Date: 15th March 2007

Student number: 1193046
The table below provides the base data profiling cycling in New Zealand, and is followed by a table covering Auckland. The data in black is primary data, while the data in blue is derived by cross-referencing with ad hoc surveys, SPARC NZ studies, Ministry of Transport and Auckland Regional Council Household Travel Surveys, and anecdotal evidence from the cycle industry.

![Table showing cycling data in New Zealand](image-url)

**New Zealand**

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<th>Cycles Manufactured</th>
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### Auckland

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13. Appendix 3: system dynamics model

The list below details the equations and values for each of the variables in the small system dynamics model used to explore different interventions.

- Culture(t) = Culture(t - dt) + (Change_in__culture) * dt
  INIT Culture = 1
- INFLOWS:
- Cycle_Commuters(t) = Cycle_Commuters(t - dt) + (change_in_number_of_cycle_commuters) * dt
  INIT Cycle_Commuters = 65805
- INFLOWS:
  - change_in_number_of_cycle_commuters = if TIME < 2007 then (change_in_number_base_rate*Cycle_Commuters) ELSE (impact_of_appeal_of_cycle_commuting*Cycle_Commuters)
  base_rate_of_appeal = 1
  base_rate_of_infrastructure = 1
  base_rate_of_media = 1
  base_rate_of_perceived_safety = 1
  Base_rate_of_traffic_calming = 1
  base_rate_of_innovations = 1
  base_strength_of_culture = 1
  change_in_number_base_rate = -.025
  (0.00, 0.00), (0.2, 0.02), (0.4, 0.04), (0.6, 0.06), (0.8, 0.08), (1.00, 0.10), (1.20, 0.12), (1.40, 0.14), (1.60, 0.16), (1.80, 0.18)
- impact_of_appeal_on_culture = GRAPH(appeal_of_culture_on_appeal)
  (0.00, 0.00), (0.2, 0.02), (0.4, 0.04), (0.6, 0.06), (0.8, 0.08), (1.00, 0.10), (1.20, 0.12), (1.40, 0.14), (1.60, 0.16), (1.80, 0.18)
- impact_of_culture_on_appeal = GRAPH(Impact_of_culture_on_appeal)
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- impact_of_culture_on_innovations = GRAPH(Impact_of_culture_on_innovations)
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- impact_of_culture_on_media = GRAPH(Impact_of_culture_on_media)
  (0.00, 0.00), (0.2, 0.02), (0.4, 0.04), (0.6, 0.06), (0.8, 0.08), (1.00, 0.10), (1.20, 0.12), (1.40, 0.14), (1.60, 0.16), (1.80, 0.18)
- Impact_of_infrastructure = GRAPH(base_rate_of_infrastructure)
  (0.00, 0.00), (0.2, 0.02), (0.4, 0.04), (0.6, 0.06), (0.8, 0.08), (1.00, 0.10), (1.20, 0.12), (1.40, 0.14), (1.60, 0.16), (1.80, 0.18)
  (0.00, 0.00), (0.2, 0.02), (0.4, 0.04), (0.6, 0.06), (0.8, 0.08), (1.00, 0.10), (1.20, 0.12), (1.40, 0.14), (1.60, 0.16), (1.80, 0.18)
  (0.00, 0.00), (0.2, 0.02), (0.4, 0.04), (0.6, 0.06), (0.8, 0.08), (1.00, 0.10), (1.20, 0.12), (1.40, 0.14), (1.60, 0.16), (1.80, 0.18)
- impact_of_numbers_on_culture = GRAPH(Cycle_Commuters)
  (0.00, 0.00), (0.2, 0.02), (0.4, 0.04), (0.6, 0.06), (0.8, 0.08), (1.00, 0.10), (1.20, 0.12), (1.40, 0.14), (1.60, 0.16), (1.80, 0.18)
- impact_of_numbers_on_innovations = GRAPH(Cycle_Commuters)
  (0.00, 0.00), (0.2, 0.02), (0.4, 0.04), (0.6, 0.06), (0.8, 0.08), (1.00, 0.10), (1.20, 0.12), (1.40, 0.14), (1.60, 0.16), (1.80, 0.18)
- impact_of_numbers_on_media = GRAPH(Cycle_Commuters)
  (0.00, 0.00), (0.2, 0.02), (0.4, 0.04), (0.6, 0.06), (0.8, 0.08), (1.00, 0.10), (1.20, 0.12), (1.40, 0.14), (1.60, 0.16), (1.80, 0.18)
- impact_of_numbers_on_perceived_safety = GRAPH(Cycle_Commuters)
• \((0.00, 1.00), (10000, 1.00), (20000, 1.01), (30000, 1.03), (40000, 1.09), (50000, 1.20), (60000, 1.43), (70000, 1.62), (80000, 1.84), (90000, 1.97), (100000, 2.00)\)

• \(\text{impact_of_perceived_safety_on_appeal} = \text{GRAPH}(\text{impact_of_safety_campaign})\)

• \((0.00, 1.00), (0.2, 1.00), (0.4, 1.00), (0.6, 1.00), (0.8, 1.00), (1.00, 1.00), (1.20, 1.00), (1.40, 1.01), (1.60, 1.02), (1.80, 1.02), (2.00, 1.02)\)

• \(\text{Impact_of_safety_campaign} = \text{GRAPH}(\text{base_rate_of_perceived_safety} \times \text{impact_of_numbers_on_perceived_safety})\)

• \((0.00, 0.98), (0.2, 0.98), (0.4, 0.985), (0.6, 0.99), (0.8, 0.995), (1.00, 1.00), (1.20, 1.00), (1.40, 1.01), (1.60, 1.02), (1.80, 1.02), (2.00, 1.02)\)

• \(\text{Impact_of_traffic_calming} = \text{GRAPH}(\text{base_rate_of_traffic_calming})\)

• \((0.00, 1.00), (0.2, 1.00), (0.4, 1.00), (0.6, 1.00), (0.8, 1.00), (1.00, 1.00), (1.20, 1.00), (1.40, 1.00), (1.60, 1.01), (1.80, 1.01), (2.00, 1.01)\)

• \(\text{Impact_of_traffic_calming_on_appeal} = \text{GRAPH}(\text{Impact_of_traffic_calming})\)

• \((0.00, 0.965), (0.2, 0.966), (0.4, 0.971), (0.6, 0.978), (0.8, 0.989), (1.00, 1.00), (1.20, 1.02), (1.40, 1.04), (1.60, 1.06), (1.80, 1.07), (2.00, 1.07)\)

• \(\text{Impact_of__innovations_on_culture} = \text{GRAPH}(\text{Impact_of_innovations})\)

• \((0.00, 1.00), (0.2, 1.00), (0.4, 1.00), (0.6, 1.01), (0.8, 1.02), (1.00, 1.03), (1.20, 1.07), (1.40, 1.10), (1.60, 1.16), (1.80, 1.19), (2.00, 1.20)\)

• \(\text{impact_of__media_reports_on_culture} = \text{GRAPH}(\text{Impact_of_media})\)

• \((0.00, 0.00), (0.2, 0.00), (0.4, 0.024), (0.6, 0.125), (0.8, 0.29), (1.00, 0.575), (1.20, 0.762), (1.40, 0.876), (1.60, 0.948), (1.80, 0.978), (2.00, 1.01)\)
14. References


Design of Change in Cycle Commuting


