



Figure 2.00: Renault *Ublo*
- never produced

CHAPTER TWO

SUSTAINABLE TRANSPORT ISSUES

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Introduction

This chapter describes the literature I reviewed early in the candidature in



Figure 2.01: Corbin 'sparrow' –
out of production

relation to sustainable transport. At the outset of this project I believed sustainable transport to be the key field of inquiry, however when the projects orientation later shifted towards social meaning in the form of personal 'experience',

the subject of sustainable transport became more the

backdrop against which my research about experience took place. It is offered here with the intention of helping to set the context of the study and explain why the experience of these vehicles is relevant in this project at all; that is, why a study of this form of transport is relevant to understanding human experience.

2.1 Background to the transport question

During a previous study of scooter riders in Sydney, I had come to a rather curious realisation. There exist currently around the world, a large number of vehicle designs, concepts, technologies and production facilities, which are capable of significantly improving most major road transport issues such as congestion, pollution and safety. In fact each year leading automobile manufacturers commit millions of dollars to concept vehicle development, some even to the point of low volume production runs of vehicles, which are often abruptly 'shelved', ostensibly due to 'lack of consumer response' {Duffy, 2002 #254}.



Figure 2.02: New Mobility Vehicles (*NMV*s)

This anomaly continues even while transportation design facilities around the globe strive to cope with increasingly complex transport issues as well as new demands for unprecedented levels of personal mobility. New types of vehicles similar to those in Figure 2.02 above, are being developed in design laboratories in an effort to satisfy demands symptomatic of an environment driven by volatile world politics, uncertain economic conditions, rapidly changing social values and threatening environmental concerns. Transport design appears to be labouring in its attempts to cope with this ‘new mobility’ environment and is looking increasingly desperate for answers. Regardless of the ‘silver bullet’ solutions offered by many new technologies, there is increasing need for a deeper philosophical understanding of ‘the transport consumer’ (us, people, ...me).

Transportation research in Australia and the United is dominated by supply and demand-side perspectives. However, research centres in Europe, particularly in the Netherlands, Germany and England, have reported increasing concern for the environmental effects of excessive automobile use {Vuchic, 1999 #52; OECD, 1996 #42; Ebert, 1997 #139}. This may be partially due to the more obvious and visible manifestations of the threat in European countries¹. In these countries, research into ways to build higher levels of sustainability into transportation vehicles and systems has dominated much of recent transport research work. Many studies have now been completed which provide a clearer understanding of psycho-social aspects of automobile use, particularly its influence on and by social attitudes, activities and structures {Buttner, 1995 #240; Hensher, 1993 #144; Ebert, 1997 #139; Cameron, 2003 #165; Low, 2003 #61}. Many transport strategists believe that there is an overly optimistic expectation that technology will offer a solution, saying that more socially oriented programs are required {OECD, 1996 #42; Hoogma, 2002 #29; Riley, 1994 #45}. In many cases they call for a reduction in the increasing social-mobility dominance of cars, and see 'car dependency' as an imperative for policy reform {Vuchic, 1999 #52}. Others suggest that greater diversity in the transport mix is needed than is currently provided by the automobile / public transport dichotomy {Sperling, 1995 #137; Newman, 1999 #40}. To this end, many researchers have suggested the use of smaller vehicles variously described as Sub-cars, Mini-cars, Bubble cars, 'L' category vehicles, Hybrid vehicles, Single track vehicles, Two / Three wheelers, Low speed vehicles (LEV's), Low speed, low mass vehicles (LLM's), Neighbourhood Electric Vehicles (NEV's), Personal rapid transports, Single occupancy vehicle (SOV) and so the list goes on. Every new idea seems to generate a new vehicle name suggesting that the field is exploring a new

¹ Refers to the effect of acid rain on buildings, soil bacteria poisoning, air, noise and visual pollution in congested cities.

genre or species of transport which has yet to settle on a generic name {Riley, 1994 #45; Delucchi, 2002 #159; Hoogma, 2002 #29; Sperling, 1995 #137}. In this paper I refer to this vehicular group in a generic sense using the term, New Mobility Vehicles (*NMV's*) (see Terms section for a more detailed description of *NMV's*).

2.2 Situating the transport question

My current research into the New Mobility Vehicle (*NMV*) experience grew out of my initial interest in the paradox posed by the apparent need for these vehicles on one hand and the number of these innovative alternatives to cars, designed and built every year, that rarely survive in the market place.



Figure 2.03: Twike

The answers to this paradox being much too big to be addressed in one project, forced me to redirect the research topic towards a more manageable direction. Understanding the 'new mobility experience' is an important aspect of what is still essentially a transportation industry question integral



Figure 2.04: Daimler -Benz F300

to understanding why certain *NMV's* such as the Carver 300 and Twike have succeeded where others such as the Ford T!ink and Daimler-Benz F300 have failed?

I have already discussed this research direction in the introduction; however the transport 'life world' context in which these vehicles will be explored needs to be established.

The following review of transport related literature, while not exhaustive², provides a snapshot the more relevant and current issues affecting the personal transportation world within which this research into NMV experience is situated.

2.2.1 Current road transport thinking and sustainability

Interpretations of history often suffer from perspectival inaccuracies but they are generally decided after some consensus enabling at least an acceptable understanding of the prior events to be described. This principle does not apply to sustainable transport. The lack of clear understanding of the level of sustainability of current road transportation is largely due to a lack of consensus on the interpretation of predominantly historical data. The levels of divisiveness range from an optimistic belief that there is no 'real problem' {Dunn, 1998 #23} to the pessimistic view, that we are all but 'doomed' as a species (Hoogma et al 2002).

The upper end of this spectrum of division, the 'no real problem' or 'business-as-usual' faction, suggests that there is no scientific basis for the need for any improvement in sustainability and the concept of environmental degradation is a 'beat up' by radical environmentalists.

"The automobile system has been nothing if not sustainable for about a century now... Sustainability is not science it is not even a very useful policy goal. Sustainability is rhetoric designed to portray the Vanguard [environmentally concerned individuals] anti-auto preferences...[and] its elitist agenda amongst policymakers and opinion moulders. The issue of global warning is fashionable in the "issue-attention cycle" and is used to push an anti-auto agenda" {Dunn, 1998 #23, p. 173}

² More background information surrounding this context can be seen in Appendix 2.01: Transport industry background.

Another argument suggests that the concept of Sustainable Transport is effectively a 'contradiction in terms', by virtue of the fact that the substantive nature of transport is to consume finite resources and that this aspect alone makes it intrinsically unsustainable {Mees, 2000 #184}.

The 'doom and gloom' proposition further suggests that the human race may not have what it takes to 'evolve' in time to ensure survival of the species.

"... environmental catastrophe may be the only sufficiently strong motivator for change in transport practices" {OECD, 1996 #42, p. 53}.

"The central question seems to be whether the human family has the moral and political will to develop new and stringent constraints on mobility patterns. If the answer is no, then we better prepare for auto-geddon" {Hoogma, 2002 #29, p. 3}.

But of course these are at the more radical ends of the spectrum and the majority of discussion is more temperate, if no less vocal in its urgings to action. The majority view is by its nature the 'muddy' middle ground where almost all the theoretical solutions lie. Here, clarity of thought could be a means to enable action but the sheer volume of conflicting research ensures that the majority's rhetoric, results mostly in inaction. The end product is an increasing urgency to enact change in an environment where the focus for that change gets more and more unclear.

"...not only is it impossible to foresee how and at what pace this transition will take place, but it is very difficult 'to simply see the present', i.e. to recognise how it works today and in which way and where 'the new' is appearing" {Manzini, 2003 #151, p. 1}.

2.2.2 Automobile dominance

Approximately eighty per cent of world land transport is performed by automobiles (Hoogma et al 2002) and any discussion of sustainable road transportation will undoubtedly be dominated by references to the automobile. This is an important part of the problem. Automobiles are often seen to be the only solution where in actuality, they are the dominant player, but there are ample alternatives that could be considered {Sperling, 1995 #48}. The automobile's dominance of land transport is a major issue. It has created an environment where a person may endure social stigma if they do not have a car. The car is no longer a luxury item but has become a necessity, without which many people believe they cannot live a 'normal' life {Coombs, 2000 #19}. The car has become a status symbol, a personality statement, and a larger than life extension of the driver's persona {Redshaw, 2001 #237}. This illusion has been aggressively promoted by commercial interests in their desire to improve market acceptance and consumption {Hamilton, 2003 #164}. The car has also become a social symbol of freedom and mobility. It provides a fantasy of wide-open spaces and unfettered progress towards personally rewarding destinations. It provides the owner with the power to 'win' in a highly competitive 'race' arena that is often frustrated by the reality of traffic congestion {Sofoulis, 2003 #252; Reid, 2000 #197; Redshaw, 2001 #237}. The car has become a powerful metaphor for an increasingly, illusionary mobility.

"Consumers, manufacturers and car sales people have a firm idea of what a car is and is supposed to do" (Hoogma et al. 2002, p. 13).

If other mobility alternatives are to be considered in the transportation mix then they will require a very different 'image' and must represent different values, even a different concept of mobility {Riley, 1994 #45}. However, scepticism is strong. When car drivers evaluate new transport technologies

they 'judge' the new option in comparison to their entrenched perception of what a 'car' is. The car is the 'dominant technology'. The question in their minds then becomes, is this new alternative, better than a car option?

(Hoogma et al. 2002)

2.2.3 Social values

Increased mobility has come at a high price for society. Auto-mobility has contributed significantly to the promotion of urban sprawl, which has brought with it other problems. The automobile on the one hand, provides a sense of independence, as people feel they are free to come and go as they please. But paradoxically, this creates a growing dependence on the very means by which this is accomplished. Society³ is largely dispersed, people work farther from home, travel longer distances to shopping and entertainment. This change in social structures increases car dependence for those who have the means and social isolation for those who do not have the means to satisfy their car dependence {Dowling, 2000 #22}.

Over the last few decades there has been a steady increase in the incidence of depression in many communities. This phenomenon can be at least partially linked with changes in mobility patterns and their detrimental effect on community based activities, localised social networks and community closeness. (Hamilton, 2003).

[The excessive dependence on cars has] "... atomised urban life and stunted peoples capacities to nurture and value shared forms of life: family, community and civic life" (Sperling et al. 1995a, p. 3).

Access to auto-mobility has also impacted on the family unit with work choices and availability often determined by distance from home and

³ In this kind of general description I am referring to 'Western' Society, particularly Australia, the United States and Europe.

transport access. Parenting quality is effected by the ability to participate in activities and entertainments accessible only by car. The car is used as a 'management tool' in the performance of complex daily, domestic routines and has even become a measure of 'good parenting' {Dowling, 2000 #22}. The issues of automobile dependence, social equity, and community fragmentation are very much issues of social sustainability. To achieve more sustainable transportation, in the changing social environment, there is a need to not only make significant changes to the technology we use {Mees, 2000 #167} but perhaps with more difficulty, to change the way society views their mobility. The emerging battle line is not so much in the automobile factories or car yards as in the minds of people. A new mobility ethos needs to be developed and imprinted onto a sustainable social structure. This will require much greater understanding of the ways people think about their mobility needs and indeed how they view themselves in transport terms. This will require more research and understanding.

[The lack of awareness] "... underlines the need for further, culturally aware, research on motor vehicle use and of the difficulties facing the development of successful sustainable transport policies" (Dowling 2000, p. 1).

The link between personal and cultural awareness and transportation choices has now been well established. Further research is now needed to bring those elements together in design solutions that show how better transport options can be developed to help repair the damage to our culture, social networks and environment.

2.3 Current road transport research

Transportation research does not suffer from any shortage of interest. Around the world and particularly the western industrialised nations, thousands of organisations devote enormous resources to the study of modern and historical transportation. Just a few of the larger Government bodies involved in this work include the World Bank, Organisation for Economic Cooperation and Development (OECD), European Union (EU), United States Transport Research Board. These are joined by hundreds of academic transport organisations, institutes and schools active in sustainable transportation research.

2.3.1 The research knowledge pool

Research conducted by these eminent organisations covers a wide range of sustainable transportation research topics and the depth of knowledge continues to grow every year, in line with the worlds deepening environmental concern. In some quarters, the concept of sustainable transport is itself considered simply a passing fad {Dunn, 1998 #23}. Fortunately, there are many academic and practice based disciplines embracing the problem and working actively towards solutions with some urgency. Most agree however, that much more work needs to be done. A brief look at the key areas of research in the last ten years featured in this review, suggests a pattern of largely quantitative, scientific, empirical approaches to the myriad of topics being researched under the banner of Sustainable Transport.

Even with this wide coverage of topics there is dissent as to how best to move transport knowledge forward in the search for solutions to a problem of such a global scale. The societal, technical, economic and environmental

demands of a rapidly changing transportation system have prompted a move away from traditional scientific theoretical approaches to more pragmatic, qualitative methodologies (Reid, 2000).

2.3.2 Scientific models

It has been argued that a feature of transport research lies in its ability to repeatedly analyse that which has been analysed before, leading to little or no progress. One conference presenter referred to it as 'paralysis by analysis' (Dobinson 2003). Far too many research resources are occupied with quantitative analysis of safety statistics, driving distances, traffic interventions and travel behaviour patterns {Feitelson, 2001 #26; de Rome, 2002 #195; Nilsson, 2000 #125}.

2.3.3 'New Mobility' models

Thankfully, not all researchers follow the scientific model. A number of European researchers have been busy in the last few years developing alternative transportation models. Their work has involved large-scale action research in community projects such as the 'Mendisio experiment' (Hoogma et al. 2002). This project was productive but failed when participants instead of evaluating one mobility behaviour pattern with another, tended to compare vehicle types. This meant that the focus of the project was 'high-jacked' in that it was changed from a social change project to a technology comparison. Changes in mobility behaviour did not result but changes in vehicle type did. The research presented in this paper is designed to address a socially focussed agenda by studying the lived experiences of the participants. The vehicles involved in the project while they are still relevant are only so because they provide the social context for engagement with a

unique technology. It is in no way a technological comparison as eventuated in the 'Mendisio experiment'.

"What we need is experiments and experimental designs that help us to discover ways in which the two dimensions - technical design and social organisational arrangements - work in harmony towards the goal of sustainable mobility" (Hoogma et al. 2002, p. 194).

This focus on the vehicles themselves highlights one of the most important biases affecting the clarity of the 'middle ground' of transport research; the lack of attention paid to the anthropological side of the socio-technical transport relationship. The unbalanced focus on technological components of the mix will continue to yield data on an already well-defined set of problems. However, if research is to begin to seriously address sustainability solutions then more human oriented understanding is needed.

"Technology experiments...have contributed little to social learning and to processes of co-evolution. We are arguing therefore, for experiments that are linked to visions and oriented towards social learning...There is a need for further articulating this vision and acting upon this, which requires investment" (Ibid, p.202).

2.3.4 Socio-technical models

A proposal from the University of California considers the role society plays in transport modelling. The title of their work asks the question, "How we can have safe, convenient, clean, affordable, pleasant transportation without making people drive less or give up suburban living" {Delucchi, 2002 #159}. The revolutionary idea proposed in this work is that a parallel system of roads be designed into new cities in order to separate 'Low speed, low mass vehicles' (LLM's) from 'Fast, heavy vehicles' (FHV's). The importance of this type of work is that it breaks new ground and pushes transport research thinking in new directions. By envisioning new transport vehicle types, new

infrastructure concepts and new social behaviors, it proposes answers in areas little explored, instead of revisiting the same ground as has been the case in most engineering based research in the last twenty years.

2.3.5 Policy Models

Researchers have also developed models to assist transport policy change. A team from the Free University, Amsterdam uses a scenario-building program called Scenario Explorer 1.0 to develop their CEST (Co-Evolutionary Socio-Technical) scenario method (Feitelson 2001). However their technology agenda is very strong and proposes formula for the possible success of various market scenarios that are discussed in terms of auto-mobility use not social-mobility needs. The shortcomings of this type of approach are that again the car is assumed to continue in its present technological form with variations in propulsion and fuels systems. There is little change to social mobility behaviour and choices. The methods developed in this thesis could play a role in this process by providing an information base of 'lived experiences' to fit into models of this nature. This facet of social modeling is missing in most research methods of this type.

2.3.6 Marketing models

Another research group from the Netherlands have developed a more action research oriented, design/marketing approach to policy reform, which they call Strategic Niche Management (SNM). SNM deals with setting up 'experiments' or case studies in order to facilitate theoretical insights. It focuses on currently available technologies that might be considered 'under-utilised' in terms of their contribution to sustainability (Hoogma et al. 2002).

This supports the transport concepts researched in this thesis proposing that there are existing transport technologies (i.e. *NMV's*), which are 'underdeveloped' and could offer significant opportunities for social and environmental enhancement. Their central claim is that, "SNM is a policy tool that can contribute to successful niche creation for new technological options" (Ibid, p.29).

They also argue there are two key sustainability ideologies available at the moment. The 'Technical-fix' ideology, which presupposes that technology will provide greater positive benefits than its negative environmental effects. Secondly, the 'Cultural-fix' ideology theorises that real solutions will come from social and cultural change (restricting mobility by using control mechanisms such as pricing as well as managing technical change through standard setting).

The SNM system recommends the use of both ideologies in a simultaneous and coordinated manner with the goal of 'socially embedding' the changes rather than simply creating superficial short lived change.

"The co-production of technical and social change has not been recognised well enough in the transport debate ... Hardly any policy instruments try to exploit and work upon the socio-technical features of transportation systems" (Hoogma et al. 2002, p. 3).

Hoogma's work recognises the value of social behavioural change and the role that new, less environmentally intrusive technologies can play in this. More importantly they highlight the need to 'socially embed' new technologies as a key ingredient in long term social change. The design research methods presented in this thesis are well positioned to enhance the kind of design thinking required in this type of change.

2.3.7 Methodologies and Disciplines

The scientific model

The nature of much of the information guiding current transport research and the infrastructural decisions it informs, is determined by the type of quantitative epistemic thinking employed in Statistics, Architecture, Planning and quite a few Engineering disciplines. 'Soft science' approaches from Sociology, Psychology, Social Geography and Philosophy are less often employed to inform these types of decisions. It is impractical to represent here the diversity of views arising from these somewhat opposing epistemic stances, but it is evident from the agendas of recent transportation research conferences {BTRE, 2007 #267} that the focus of information gathering in the last ten years, has been largely dominated by scientific, empirical, statistical research with a heavy reliance on historical data analysis. The broader research community is beginning to realise the narrowness of this predominantly quantitative approach {Dobinson, 2003 #245} and leading researchers have vigorously debated the value of these methods {Newman, 1991 #74; Pund, 2001 #105; Litman, 2000 #161}.

2.3.8 Creative 'Visioning' or Futures modeling

An example of the type of creative research methodology that might break the current strangle hold of quantitative methodologies, comes from Ezio Manzini⁴ from the Milan Polytechnic; presenting his scenario-building tool, DOS (Design Oriented Scenarios) {Manzini, 2003 #151}.

The creative approach proposed by this method can be seen in the nature of the questions asked:

⁴ Director of CIRIS (an interdepartmental Centre for Research on Innovation for Sustainability)

- Vision: How the world would be like if...?
- Proposal: What has to be done to implement that vision?
- Motivation: Why this scenario is relevant?

This blend of future scenarios and reverse engineering methods combines the benefits of far-sighted envisioning with down-to-earth pragmatism.

Dutch researchers have developed many creative ‘mixed-methods’ transportation research methodologies. The ‘Mendisio experiment’⁵ (mentioned earlier) combined the disciplines of Social History and Technological Sciences (Hoogma, 2002). The Free University, Amsterdam combined Economics, Planning and Transport to develop their futures based ‘Spider Model’ {Nijkamp, 1997 #41}.

As with Manzini’s DOS method, the Dutch Spider model also utilises Scenarios as a key tool. Scenario building has been increasingly used in the last few years as transport researchers and strategists endeavour to see more clearly into a future that appears to be arriving more rapidly.

Many of these types of research are based on a fundamentally economic premise, one which acknowledges that the share of car traffic (in Europe) is so large that even a *small change* in transport modal splits (the percentage each transport mode contributes to the whole system) will have a large impact on the collective transport system {Nijkamp, 1997 #41}.

This idea further supports the argument that virtually any and all efforts to reduce car dependence can have profound effects on the total transport system and subsequently the general environment. The current *NMV* research project was conducted within the context of this argument and it is

⁵ An action research project by Remco Hoogma, Johan Schot and Rene Kemps from the University of Twente (Hoogma 2002).

hoped it will contribute the type of new knowledge, which might be useful in the process of bringing about such important 'small changes'.

2.4 Summary

Considering the history and technological progress of road transportation it can be seen that in comparison to other fields of engineering advancement, automobiles and individual mobility choices have not come a long way. A century of transport design and development has provided a legacy of global environmental degradation, pandemic health effects and social inequity which researchers, government and industry have yet to find ways to overcome. Now is a good time to deeply reflect on the concept of personal mobility design, not by continuing a natural science approach with repeated analysis of historical data but from a socially oriented, ecological, 'human science' perspective. What do individuals and society want for their mobility choices in the future? What do they really want now? What could the experience of new mobility be like and how would we understand it? These are the types of questions this project probes by studying the lived experiences of people who are using *NMV*'s now.

So what is the question?

The information and questions related to transport described above, while they may have provided the direction for the early phases of this thesis, did not provide any specific insights for improving the social impacts of transport decisions. The noticeable lack of qualitative perspective in transport research literature could be seen as motivation enough for more human oriented approaches. Existing research into the social impacts of transport appeared to be missing the fundamental human perspective contained in everyday experience. This suggested that the direction this

research needed to take was to consider ways to answer this type of question:

what is the *NMV* experience?

How can we understand this or any other experience? How can this understanding be made useful in the design of more socially sustainable vehicles?

Chapter Three begins this process by considering the philosophical and methodological perspectives necessary to even begin to understand these questions