4. FACTORS INFLUENCING TRANSPORT CHOICE

Individual travel decisions are influenced by a range of economic, physical, social and psychological factors. These factors may be real or perceived, within individuals' direct control (for example, car ownership) or outside it (for example, shop location, distance to school, provision of public transport or cycling facilities, zoning policies, media messages, tax policies etc.) External factors are the result of actions and decisions by people and institutions outside the household and provide the context for individual travel behaviour.

Understanding how these influences operate and accounting for them is essential if measures aimed at modifying travel patterns are to be successful. Transport policy to date has mostly sought to change individual travel behaviour by modifying infrastructure capacity and/or by pricing (road, fuel) strategies. However, Government action aimed at reducing car travel will have little effect if the weight of external or structural factors is so strong that individuals feel that their current behaviour is the only one possible.

This could occur, for example, where a person's place of residence is not serviced by public transport, he/she is provided with a company car with subsidised fuel and parking, and the only shopping available is at a large retail complex some distance away. In these circumstances, an individual may feel that they have no choice but to use a car to meet their travel and lifestyle needs (OECD, 1997a). Furthermore, if individuals have never experienced any other mode of travel, their perceptions of those forms of travel can be very distorted which can act as a barrier to change.

The OECD has recognised the importance of understanding individual travel behaviour in order to reduce the environmental impacts of transport. The issues and recommendations for government policy emerging from that work are outlined in section 4.11.

The key factors influencing travel patterns are common to most countries. However, the weight and direction of influence that specific factors have on travel decisions varies. Australia's high level of car ownership, the sprawling nature of its capital cities, and the policy emphasis on road infrastructure capacity, are not only strong influences in themselves but also have a bearing on the degree to which households have experienced other means of transport besides the private car. Media advertising and taxation policies also exert pressure on decision–making in favour of car use.

> **"At the heart of many of the problems stemming from current transport activity are the daily actions of millions of individual actors... Reducing transport's environmental impacts..will.. ultimately require a more thorough understanding of how (individuals') travel decisions are motivated and/or constrained by other factors."**
>
> *OECD, 1998*

Governments and policy-makers who seek to modify Australian travel behaviour need to be cognisant of the overt and covert messages delivered via different policies – not just transport policy – and of the contradictions inherent in those policy messages. Australian governments and policy-makers who decry the adverse environmental impacts of excessive car use while at the same time implementing taxation policies which subsidise or encourage private car travel cannot expect either public credibility or success.

4.1 Car ownership

Car ownership is, not surprisingly, the principal determinant of car use. The need to get the most value out of what can be a large investment, leads to the near exclusive use of the car, even for trips where other modes are more cost or energy efficient. The relatively low cost of fuel in Australia and favourable taxation policies on company cars reinforces this trend.

Car use can become so routine that "choice" is not an issue as people act automatically without considering any alternatives. Habitual travel is

particularly noticeable in the case of short trips (OECD, 1997a).

The automotive and associated industries (i.e. vehicle manufacture, component suppliers, sales and repairs, oil, rubber, road building, advertising) are a large contributor to the economic wealth of Australia, and of Victoria in particular. The industries benefit directly from society's use of motor vehicles and have a strong vested interest in ensuring continued car use. The economic might of the car industry and the jobs it creates directly and indirectly, constitutes a formidable force encouraging car ownership at the public policy and individual level.

As well as determining vehicle technology, industry can influence car purchase decisions and behaviour – when and what type of car to buy and how it is used – through marketing and research (ibid).

4.2 Perception of modes

Travel choices can be made on the basis of perceptions rather than reality, particularly where there is no or only limited experience of certain modes of transport.

Car drivers systematically perceive the car's characteristics (for example, cost, travel time, ease of use) as being better than they actually are and consistently judge public transport, and to a lesser extent, walking and cycling, as being worse than they are. This has been identified as one of the principal barriers to changing travel behaviour (OECD, 1997b).

A study in Melbourne found that those people who were either not using public transport or had not had much experience with it, tended to have fairly negative attitudes towards it. Those with more experience of the system viewed it more favourably (Ampt et al., 1992).

In many outer suburbs of Australian cities where housing is scattered and cars are assumed, travel options are severely limited and children and young adults are losing the opportunity to experience anything but car-based mobility. As this occurs from generation to generation, people lose knowledge of non-car travel and develop new car-based cognitive maps of their surroundings, further reinforcing the inevitability of car use (OECD, 1997a).

People's perceptions of different forms of travel are strongly influenced by advertising and the media. Cars, for example, are promoted as a means of obtaining high status, personal freedom and comfort, and are associated with images of power and sexuality. The advertising industry portrays cars as a means of escape, generating distorted images of the world (for example, by emphasising contented drivers on free, open roads when most cars are used in crowded urban settings) (OECD, 1997a; Evans, Smyth & Harron, 1997). The motor vehicle has become a cultural and individual icon, a "symbol of the unhindered self" (OECD, 1997), an extension of a person's personality and a reflection of lifestyle and place in society.

4.3 Cost of different transport activities

Relative costs of transport modes are an important consideration in travel choice but the cost figures used do not always reflect the true costs of the modes of transport being compared.

Motorists when asked about the cost of driving to work often refer to car parking and fuel expenses but fail to include the running costs of the car concerned (Ampt et al., 1992). As a result, car travel appears to be financially attractive relative to public transport.

However, road transport also generates external costs: that is, costs not borne by transport users but by society as a whole. The most obvious are health impairment because of air pollution, accidents and noise, and time losses due to road congestion.

The external costs of urban driving are high and increasing. Road trauma and motor vehicle emissions are estimated to cost Australia $6.1 billion and $5.3 billion per annum respectively (see sections 2.1 and 2.2) while the direct annual costs of traffic congestion in mainland cities have been calculated to be $2.6 billion (Australian Academy of Technological Sciences and Engineering, 1997).

In Europe, external costs linked to transport have been estimated to be 4.1% of the gross domestic product of the European Union (WHO,

1999b). The Confederation of British Industry has calculated the annual cost of road congestion alone to be in the order of 20 billion pounds (Roberts, 1998).

In Australia, the costs of road congestion are estimated to rise from $12.75 billion in 1995 to $30 billion in 2015. Melbourne and Brisbane are predicted to have the largest increases with congestion costs over the same period rising from $2.7 billion to $8 billion in Melbourne and from $2.6 billion to $9.3 billion in Brisbane (Bureau of Transport Economics, 1999)

"Overseas studies of external costs of urban driving in USA and Europe using different estimation methods for costs of pollution, accidents, noise, congestion, indirect subsidies of parking and roads, show car owners being encouraged to overuse their cars by a subsidy of about $5,000 each per year.

Victorian (EPA 1994) and Western Australian (Laube and Lynch 1994) transport externalities studies show that the external costs are around $4,000 per car per year in major Australian cities...What all these studies have in common is that the external costs over the 12 year life of the average car exceed its initial purchase price. The Australian urban car fleet...is subsidised by between $17 and $25 billion."

Parker, 1995a

Car users are not aware of, and do not bear, the full costs of car travel in terms of damage to health and the environment. Reports from the British Lung Foundation reveal that motor vehicle users only pay about one-third of the costs they impose on society (Bicycle Federation of Australia, 1998).

In an evaluation of the Dutch city of Groningen's urban policies in 1988, it was estimated that people who used a bicycle to replace short car trips saved the city $405 each per year in external costs (Krommendijk, 1988).

In Victoria, the annual external costs of car use have been calculated at around $4,000 per car in 1994. This amounts to 25.9 cents per kilometre in Melbourne with similar results likely in other Australian capital cities. The total social cost of driving (i.e. personal running costs plus the external costs of driving) has been estimated to be 73.4 cents per kilometre for an average Melbourne car in 1994 (Parker, 1995a).

In addition to the more commonly cited external costs, there are other hidden costs associated with the complete life cycle of the motor vehicle that are seldom accounted for when assessing the cost of car travel. These include:

- emissions and factory waste from the processing of materials used and the assembly of each car;
- emissions from repair, servicing and disposal of cars;
- emissions and pollutants from leakage, evaporation, energy use and spillage associated with oil extraction, refining and distribution;
- disposal of waste oil and fluids from cars and of contaminated water from car washes;
- emissions and pollutants from the building and maintenance of roads;
- cost of traffic policing, emergency services and street lighting;
- the opportunity cost of land used for car-related activities (Parker, 1995a; Australian Broadcasting Corporation, 1999a).

To obtain an accurate picture of the cost of car use, the social account should include not only the direct and more obvious external costs but also the hidden costs associated with the construction of motor vehicles and of the infrastructure and upon which they rely.

The picture is more muddied by the current taxation system which tends to encourage car use by reducing the cost of car travel for the motorist. According to the Australian Tax Office, $1.77 billion was claimed for motor vehicles in 1994-95 (Bicycle Federation of Australia, 1997).

The use of company cars as fringe benefits in salary packaging is popular in Australia.

Employers and employees can minimise taxation payments when a car is provided in place of the cash equivalent. As a result, there is a financial incentive to provide company cars to employees and to change the cars every few years (Lee, 1992).

Provision of a company or subsidised car, together with free or subsidised parking and fuel, not surprisingly encourages car travel by executives and other recipients. Official estimates are that company and government cars comprise 40% of peak hour traffic (Davidson, 1999). Travel data for 1994 suggest that company car trips represent about 18% of total car trips at any time of the day of which about one-half (9%) are work-related and the other are management or optional company car trips. This adds significantly to road demand. Company car trip duration and distance were found to be slightly longer than private car trips (Luk et al., 1997).

The unequal treatment under the current fringe benefits tax (FBT) regime of cars and public transport tickets included in employee salary packages places public transport at a serious competitive disadvantage. Currently employers pay FBT of only 10% of the cost of a vehicle but 95% of the cost of a yearly public transport ticket. As a result, the FBT payable on three yearly public transport tickets worth $3,600 equals that paid for a $30,000 car. By contrast, employers in the US can provide public transport tickets worth $100 a month without incurring any tax liability. The rail industry is arguing, as a minimum, for the same FBT treatment for public transport tickets as applies to salary packaged cars (Davis, 1999).

The implementation of taxation policies to encourage cashing out of company cars is possible (for example, creating an FBT tax neutral environment). However, the powerful motor industry lobby would strongly resist such a move because of its potentially adverse effect on the sale and production of cars (ibid). Instead, and in contradiction with its greenhouse gas strategies, Australia appears to be moving in the reverse direction judging by the high level of Cabinet support reportedly given to the proposed exemption of corporate car parking from FBT recommended in the Ralph report (Dodson, 1999).

Changes foreshadowed under the tax reform package will provide an additional incentive to car travel. The replacement of the wholesale sales tax with the GST will reduce the cost of buying a car by around 6%, increasing sales by an estimated 50%. The cost of running company cars will also be cheaper as business can claim a seven cents a litre tax credit on petrol used for "business purposes", and FBT applies to only 10% of the vehicle's purchase price. By contrast, the 10% GST surcharge will be applied to the full cost of all public transport fares (Davidson, 1999).

The taxation of fuel has so far only poorly reflected environmental and health concerns of motor vehicle usage. Although the reduction in diesel fuel prices in Australia under the tax reform package will now be less than originally proposed, Australia is moving in the opposite direction to countries, such as Britain, which are increasing fuel taxes. In its March 1999 Budget, the British government increased its road fuel tax by almost 12% and is proposing to increase fuel duty by 6% above inflation each year in an attempt to stem traffic growth (Fisher, 1999; UK Department of Environment, Transport and the Regions, 1998). The Netherlands has introduced proposals to increase the price of petrol in urban areas and reduce the use of car-based remuneration packages (People for Ecologically Sustainable Development, 1997).

In some European countries, an attempt is being made to integrate ecological aspects into taxes. In Finland, Norway and Sweden, for example, sales taxes are differentiated according to the emission standards of the cars while in Sweden, Austria, Germany, Finland and Greece, recurrent annual charges are differentiated according to engine size and other factors affecting fuel use (Walter et al., 1997).

As it currently operates, the tax system in Australia encourages car travel by subsidising car use, rather than taxing it to compensate for the external costs which car use imposes on society. At the same time, public transport which generates significantly fewer external costs and provides a service that is vital to poor and disadvantaged groups, is being made financially less attractive as a travel option through the imposition of a tax surcharge on fares. To the transport user, the cost of

motoring is effectively being reduced while the cost of public transport is being increased.

Faced with these misleading price signals, individuals with a travel choice could be expected to substitute car travel for public transport. In a situation where most motorists do not take account of vehicle operating costs in cost comparisons of travel modes, much less external (and hidden) costs and benefits, the end result is excessive use of car transport and of much of the road network.

In the case of freight, an attempt is made to recover road spending related to heavy vehicles (over 4.5t gross mass) by way of a fuel charge (part of the diesel excise) and a fixed annual (registration) charge. The charges are set to ensure that heavy vehicles pay their way for the costs they cause roads and bridges (National Road Transport Commission, 1998). The situation with respect to light commercials and smaller rigid trucks is uncertain but it seems unlikely that the environmental and health costs imposed by the high use of these predominantly diesel powered vehicles in urban areas are recovered through registration or fuel charges.

4.4 Availability of public transport

As much of the fixed public transport infrastructure was constructed at a time when Australia's capital cities were more compact, inner city areas have on the whole relatively good access to train and tram networks. The picture is significantly different in many residential areas on the middle and outer fringes which have been developed around the private car. Public transport in these areas is generally limited making car ownership virtually a necessity.
Developed when most employment was located in the city centre, public transport infrastructure is more geared to trips from suburbs into the CBD. Although once existing, circle train routes have long since been dismantled. As a result, public transport options are not so readily available for 'cross-town' journeys which have increased in demand with the development of regional retail/commercial complexes and the decentralisation of work places.

Even when public transport services are available, off peak services can be infrequent and distances to stations or bus stops can be significant. In outer suburbs reliant on buses, both peak and off-peak services can be lengthy, indirect and with frequent stops. Whereas tram and train services on Sundays in Melbourne have been improved considerably, most weekend bus services are either non-existent or very poor (Williams, 1999).

The number of travel options available to people with disabilities was reduced with the replacement of certain train services in Melbourne with light rail and the removal of conductors on trams. Standard buses are not accessible for people in wheelchairs while older people have difficulty using trams because of the steep gradient of the steps. People with young children and baggage have also expressed difficulties in using public transport (Ampt et al., 1992).

Public transport in many rural areas has been substantially reduced with the closure of rail lines and limiting of services. This has particularly affected regions with ageing populations and single parent families. According to a Victorian Auditor-General's report, replacement of the Horsham/Dimboola, Mildura, Bairnsdale and Leongatha rail lines with privately operated bus services has resulted in a drop in patronage with no reduction in the cost of operation (McPherson, 1999).

The opportunity to combine cycling with other modes of transport is limited due to the inability of buses and certain trains to accommodate bicycles. Restrictions on the carriage of bicycles on trams and the difficulty of fitting bicycles on heavily used peak hour trains provide further disincentives to mixed mode travel.

4.5 Safety

Despite the well-publicised number and frequency of fatalities occurring in road accidents, there is no evidence that the risk of death or injury deters car usage.

On the other hand, risk of a road accident is a prime deterrent to cycling. The major reason cited by non-riders, who have toyed with the idea of cycling, is fear of injury on busy roads where cyclists are forced to compete for road space with vehicles.

"..evidence suggests that, even in the current hostile traffic environment, the benefits gained from regular cycling in terms of life years gained are likely to outweigh the loss of life years through cycling accidents."

British Medical Association, 1992

"One calculation has shown the ratio to be around 20 to 1 with considerable scope for improvement by making the environment for cyclists more user-friendly."

Hillman, 1993b

The view that cycling is dangerous is widely held, with people harbouring genuine fears for their personal safety (or that of their children) on the roads. However, the scale of risk for cyclists is somewhat exaggerated. In Britain, the fatality rate is only 1 in every 25 million kilometres cycled. The injury rate for cycling is significantly lower than that for soccer, netball and basketball, squash and football (Drummond & Jee, 1988; Routley & Ozanne-Smith, 1991).

Research has shown that people who ride consider the risk of cycling as less than people who do not cycle. Non-riders traditionally have experienced road travel from a motor vehicle and fear being without the 'protection' of a metal shell. Cyclists view the road environment differently and have the experience to balance perceived risk against actual risk (McInnes, 1996).

Safety concerns also dominate decisions made concerning whether or not to walk. The principal reasons established in surveys for people not walking are difficulties in crossing busy roads with speeding traffic; the prospect of tripping and falling on cracked, uneven surfaces; difficulties of walking along cluttered pavements; and fears of assault, particularly on poorly lit and deserted streets.

The speed of motorised traffic is a principal factor influencing the safety concerns of cyclists and pedestrians. The general urban speed limit in Victoria of 60 km/h applies on all urban roads irrespective of whether they are classified as arterial or local roads. This is high by international standards; in the Netherlands, Scandinavia, Japan and West Germany a 30 km/h limit applies on residential and shopping streets.

The risk and severity of an accident rises with increased vehicle speed: a pedestrian has a 90% chance of survival if hit at 30 km/h but only a 20% chance of survival if the impact speed is 50 km/h (Victorian Road Safety Committee, 1999). European research indicates that a 1 km/h reduction in average vehicle speed brings a 3% reduction in accident frequency (ibid).

As most adult cyclist and pedestrian accidents occur on main roads while child road accidents occur mostly on residential streets, lowering the speed limit on both main and local roads could reduce the accident rate significantly. This is supported by evidence from overseas (Victorian Road Safety Committee, 1999; Parker, 1995b). Given this, it is perhaps not surprising that those countries with low vehicle speed limits in urban areas also have a high incidence of cycling and walking.

4.6 Travel time and convenience

Spatial constraints have gradually been replaced by temporal constraints in the framing of travel decisions (OECD, 1997a). As individuals have become involved in an increasing number and diversity of activities, the amount of time needed to travel to and from these activities has become of growing concern. The perception of speed is particularly important for people with busy work and personal schedules.

A key driving force behind car travel is the convenience it offers in giving control over time and space. It provides independence and enables freedom of movement at any time to any place. In addition, car travel is perceived to be fast, reliable, flexible and comfortable.

Factors influencing public transport travel decisions are journey speed (frequency and speed of service), connectivity (ease and speed of transfer between modes and lines), reliability, and accessibility (physically and in terms of information). Public transport is less competitive off peak when service frequency is cut.

People with young children and those carrying heavy or bulky items are less likely to use public transport because of the difficulty of manoeuvring prams and baggage (Ampt et al., 1992). Concerns about safety (particularly at night and on train stations which are unstaffed and poorly lit), the discomfort associated with over crowding at peak hour, and the inconvenience and time involved in changing modes also deter public transport use.

Convenience and quick travel time are amongst the main reasons given by cyclists for choosing to ride. Other major reasons are fitness, environmental friendliness and enjoyment (McInnes, 1996). Cycling offers time savings in congested traffic conditions and convenience in the form of door-to-door travel and ease of parking. Rain, limited freight capacity and lack of end-of-trip facilities (showers, lockers, parking) act as deterrents to cycling. Other barriers perceived by current non-riders are low comfort, limited function, slow speed and necessity of physical exercise.

4.7 Availability of parking

The availability of cheap or free parking at individuals' destinations can be an important factor influencing car use. Conversely, high parking charges or extreme difficulty in securing parking can act as a deterrent to driving. In these circumstances, people may decide to car pool, take public transport, or drive to an inner suburb, park, and then walk or catch public transport into the city centre (Ampt et al., 1992).

4.8 Conditions for walking and cycling

"People make (travel) choices based on economical decisions. Is it easier, more pleasant, more enjoyable, quicker, safer, more beautiful, more inviting to walk those three miles or less? Or are there too many barriers to making a human-powered trip?"

Mark Fenton, Editor of Walking Magazine. Address to the 1997 US National Pedestrian Conference.

Regular use of cycling and walking as a means of travel depends in part on the availability and proximity of facilities and conducive environments for these activities. Street design, lighting, aesthetics and accessibility contribute to how safe people perceive walking and cycling to be.

Communities designed solely around the motor vehicle provide strong barriers to involvement in non-motorised forms of transport. Those people who opt to ride or walk are required to accept the risk to personal safety generated by car-based planning; most regard the risk as too great and choose not to engage in these activities. Road safety is a major hurdle to be overcome for that sector of the population who is interested but has yet to be converted to walking and cycling (McInnes, 1996).

Where facilities have been provided to encourage non-motorised transport (for example, bicycle lanes, safe main road cycle crossings, off-road paths, extended pavements, traffic calmed streets etc), walkers and cyclists have followed. Cities in the Netherlands, Germany, Austria and Denmark are testimony to this with their high rates of bicycle and walking trips relative to more car dominated cities. The Netherlands which has a similar urban population to Australia, has invested $1.5 billion in bicycle infrastructure compared to a figure of less than $80m in Australia.

Research over the past 20 years has shown that provision of designated road space for cyclists makes both cyclists and drivers more predictable and more comfortable with each other's presence. A 1993 report commissioned by the US Federal Highway Administration concluded that cities with higher levels of bicycle commuting have on average 70% more bikeways per roadway mile and six times more bike lanes per roadway mile. A 1996 study on the impact of bicycle lanes in Santa Barbara, California, found that there was a 47% increase in cyclists on streets where bike lanes were added compared to just 1% on streets without bicycle lanes (Clarke, 1998).

In Melbourne, provision of dedicated space for cyclists on main roads (for example, Royal Parade, St Kilda Road), construction of off-road paths such as the Main Yarra Trail, closure of

streets to traffic and reduction in speed limits (for example, Swanston Walk) has generated a sizable increase in cyclist and pedestrian numbers (McInnes, 1996). It suggests that there is a strong latent demand for walking and cycling that can be readily tapped given the right environments.

4.9 Distance to school

The rationalisation and amalgamation of schools, and parents opting to send children to schools other than neighbourhood schools, has increased the distances which many children are required to travel to and from home. Time pressures on parents, more complex routes to school, children carrying more books and equipment, and the perceived threat to children's safety from having to cross busy roads and from 'stranger danger', have caused many parents to restrict their children's independent travel (walking, cycling and public transport), opting for car travel instead.

The share of school trips made by car in Perth has increased from 29% in 1986 to 62% in 1998. In 1993, approximately 50% of all children at 4 primary and secondary schools in Sydney's southern suburbs were driven to school while, in Melbourne, 52% of children travelled to and from primary and secondary schools by car in the same year.

The increase in car travel to schools has resulted in growing traffic congestion around schools. By attempting to avoid danger, parents have inadvertently created additional danger for their children from the increased traffic. Air pollution levels around schools from the increased number of vehicles create further health hazards for students.

Travelling to school on a school bus is more common in rural areas. Research presented to the Victorian Road Safety Committee indicates that a child travelling to school by car is seven times more likely to be killed or injured than when travelling on a bus (Victorian Road Safety Committee, 1999). UK statistics also indicate that the risk of a car accident for a child travelling to school is considerably greater than the risk of abduction or assault.

Traditionally a popular form of travel to school, cycling has now declined to the point where bicycles in the school grounds in any quantity are an uncommon sight. Security difficulties have resulted in some schools actively discouraging children from taking bicycles to school.

The extent to which travelling to school by car has become the accepted form of transport is evident from the current Transport Accident Commission (TAC) advertising campaign in Victoria. In one of its "Don't Drink and Drive" advertisements, TAC poses the question "How will you get the kids to school for the next 6 months?" at the prospect of a woman losing her driver's licence for driving with a blood alcohol level over the legal limit.

The main reasons provided by parents in the UK for using a car to take their children to school are convenience (going to work, going shopping, saving time etc - 46%); too far to walk (29% - but 80% lived within 1 mile of school); bad weather (20%); safety (5% - with assault or abduction by far the main fears) (Walk to School Working Group, 1999).

Children's preferences, however, do not necessarily mirror those of their parents. Surveys in the UK show that there is unmet demand among young people for more independent travel and greater freedom. In a recent survey of nearly 500 ten and eleven year olds in Dorset, 76% said they would prefer to walk or cycle to school with only 15% opting for car travel (ibid; UK Department of the Environment, Transport and the Regions, 1999a).

4.10 Residential and commercial/retail development

Low density residential development in Australian cities has been planned around the private car; where available, public transport services are limited and provided as an 'add-on'.

This is particularly the case in outer areas of the major capitals which have attracted large numbers of younger families because of the relatively lower cost of housing, the larger land sizes available for purchase and the perceived cleaner environment. These housing location decisions, however, have generally been

accompanied by an increased need to travel for personal and business purposes.

Errands and shopping are prominent considerations in individual travel decisions (OECD, 1997a). The construction of large regional retail/commercial complexes surrounded by car parking has contributed to the decline of more locally accessible strip and corner shops and encouraged a modal shift from public and non-motorised transport to car travel.

Car use is closely related to density. Cities and parts of cities with densities less than 20 people per hectare (characteristic of Australian cities) are heavily car dependent and are experiencing a rise in car use (Newman, 1999b). Provision for cars is land intensive, taking up one-third of the space of the average city. Roads, highways, garages and parking lots were estimated to occupy about 10% of all arable land in the US in the late 1980s (Renner, 1988).

The density of most Australian capital cities is increasing with the rise in multiple occupancy in suburban areas and the growth in supply of, and demand for, residential accommodation in central city business districts. These trends, particularly the interest in central city living, could reduce the dependence on car travel for a small percentage of city residents but, in the absence of other measures, is unlikely to have a significant effect on car usage for the population as a whole.

4.11 Changing individual travel behaviour: OECD findings

Transport policy makers have drawn predominantly on economic theory to explain individual travel choices. This has led to a focusing of attention on those factors influencing travel choices that can be quantified; non-quantifiable factors that cannot easily be incorporated in economic models have not been taken into account. This analysis has provided only partial answers for individual travel behaviour and an imperfect basis for policy making (OECD, 1996).

Growing recognition that changes in travel choices of users and providers of vehicles, infrastructure and services are essential if substantial reductions in the adverse impacts of transport are to be achieved. This prompted the OECD to initiate a project investigating issues surrounding individual travel behaviour.

The project drew upon such social science disciplines as sociology, psychology, anthropology and geography, to gain a better understanding of all the factors influencing travel choices, their relative importance and the relationships between them. This information was used to provide new insights for policy makers aiming to promote more sustainable travel behaviour (ibid).

A number of 'effective messages for change' emerged from this multidisciplinary work (OECD, 1997b):

(a) "doomsday" stories or scenarios can be counterproductive leading to feelings of helplessness and guilt unless they provide people with concrete opportunities for change;

(b) individuals engaged in habitual patterns of travel are much less sensitive to messages calling for changes in travel behaviour;

(c) not all kilometres travelled are equal (for example, people may value certain trips over others and be less willing to modify these);

(d) messages about behaviour change must be relevant to the audience (for example, safety, health and "quality of life" seem more relevant than CO2 to many individuals);

(e) messages should be delivered at moments when people are receptive to modifying their behaviour (for example, childhood, adolescence, and other points of change in people's lives);

(f) policy-makers should aim to provide children and young adults with the chance to engage in a variety of forms of mobility and to develop cognitive maps of their surroundings based on different transport modes;

(g) messages from governments should focus on the practical and positive alternatives to current patterns of travel behaviour with an emphasis on a few simple things that people can readily understand and change;

(h) these messages should seek to dispel certain subjective misperceptions relating to travel modes that may bias both individuals' and policy-makers' behaviour (OECD, 1997b).