

B. THE CHILD THE PARENTS, THE TEACHER AND EDUCATION**5.0 UNDERSTANDING THE WORLD OF THE CHILD**

- 5.1 Introduction
- 5.2 Children's Minds
- 5.3 Road Behaviour
- 5.4 Play and Road Behaviour
- 5.5 Pedal Cycle Behaviour
- 5.6 Development
- 5.7 Perceptual Cognitive Development
 - 5.71 Vision
 - 5.72 Hearing
 - 5.73 Perception of Distance
 - 5.74 Estimation of Speed
 - 5.75 Attention and Concentration
 - 5.76 Memory
 - 5.77 Logical Reasoning
 - 5.78 Language
- 5.8 Social Attitudinal Development
 - 5.81 The Child
 - 5.82 The Environment
- 5.9 Key Developmental Considerations in Educating Children in Road Safety.

This chapter provides an insight into some of the constraints that need to be taken into account when dealing with children. It begins with a somewhat critical analysis of the Piaget theory of child development because of its prominence in road safety literature rather than for its conceptual efficacy in behaviour change programs. The analysis moves on to an examination of what is known with respect to play and road behaviour including, pedal cycle activities.

The developmental aspects of the child are reviewed in terms of perceptual, cognitive and social development. The chapter concludes with a brief review of key developmental considerations as far as education for road safety is concerned.

5.1 Introduction

Irrespective of the problems diagnosed thus far, the task of overcoming any, or part of any, of the problems must recognise the real world environment. In this chapter the constraints which operate, because the child is a child and not an adult, are reviewed. In chapter 6, another important environment is covered; viz., the perceptual environment of the mother and the school-teacher since it is upon these two social change agents that road safety education has to rely.

5.2 Children's Minds

Necessary to any complete understanding of road safety problems confronting children and the education of children in road safety, is an understanding of the child him/herself - how he/she sees the world, his/her development, his/her capabilities and limitations.

Even supposing that the best known training methods available are effectively implemented, there are still limits to what can be taught to children at various ages. These limits arise, not only from the way the child operates functionally, but also from his personality and social development.

One of the most widely accepted theories of child development is that of Piaget (1958). Although the literature would suggest that thus far it has provided the most used link with the traffic education of young children, there is no evidence that it forms the basis of any proven effective traffic safety programs.

Piaget's (1953) theory postulates 4 stages of development. In the first sensorimotor, stage (from birth to two years of age) the child is not able to distinguish between itself and the world around it. Clearly, in this stage, the child is not equipped to cope with traffic in any way.

In the second or pre-operational stage (from two to seven years of age) the child's thinking is at first very concrete, bound to the immediate present and rather rigid and egocentric. Consequently, there is little capacity for generalisation to other situations, or for anticipation. This creates difficulties when an attempt is made to train the child in road safety, as it is virtually impossible to train the child in every traffic situation he/she could possibly meet. This type of thinking also has an effect on the child's capacity to predict possible danger.

In the course of this second developmental stage, however, the child slowly becomes better able to control and decentralize his attention, implying that it can take into account more than one feature of the environment at a time, leading to a better search of the environment, the understanding of more complex situations and finally the beginnings of integration of information over time. In order to make a correct decision about crossing or not crossing it is perhaps unnecessary to remember and combine the judgments made, as long as the child crosses only when there is no oncoming traffic present. For this kind of decision, it might suffice to remember whether oncoming traffic has been detected and which phase of the crossing procedure is reached. In that case, integration of information from both directions is not needed. However, as soon as the child starts to cross in the presence of oncoming traffic, it becomes necessary to relate aspects like distance and speed of traffic to each other. Since this demands a certain measure of integration of information over time, such crossing can be carried out in a safe way only after the child has reached a higher level of development somewhere in the next stage.

The third, operational stage (seven to eleven years) is characterised by development and use of concepts in thinking. This development of abstract thought enables the child to reason about events not actually present and relate them to other events that have already taken place, or to anticipate what will happen in the future. Causal thinking is also developing in this stage. The implications of such development for traffic behaviour appear rather straightforward.

Around the age of eleven, the child reaches the fourth, formal operations stage. The child in this stage achieves an adult level of functioning, grasping the principles of logical thought and causal thinking. As such, the child is capable of participating in traffic, as a pedestrian, at an adult level, at least as far as intellectual development is concerned.

Although development was described by Piaget (1958) in terms of discrete stages, this does not imply that development occurs in discontinuous stages rather than evolving continuously. The ages mentioned should be treated with some caution, because there are large differences between individuals, and also because they depend upon the task the child is coping with. Even with these provisos it seems reasonable to conclude that the largest intellectual deficits in relation to the pedestrian task do exist in the age-group between two and seven years and of course under this age.

The impact of Piaget's theory has been most noticeable amongst child development workers and teachers involved with pre-schoolers and kindergarten aged children; i.e., with children in Piaget's 'pre-operational' stage. Recently, some of Piaget's claims have been called into question by a number of researchers (Hughes 1975; Chestnut 1979; Donaldson, 1978). These researchers working with children in 'pre-operation' stage, have questioned Piaget's claim that children in this stage of development are 'egocentric' and incapable of 'decentering'; i.e., they cannot view something from the viewpoint of another. They found, using modified Piagetian tasks, that so long as the task was no longer abstract and made "human sense", the motives and intentions of the characters became entirely comprehensible to even a child of three years. Donaldson (1978) expressed her results as follows:

"1. Children are not at any stage as egocentric as Piaget has claimed. For all human beings, the taking of another point of view requires a certain effort, and the difficulty is bound to vary from one situation to another in many complex ways. But the gap between children and adults is not so great in this respect as has recently been widely believed.

"2. Children are not so limited in ability to reason deductively as Piaget and others have claimed. This ability shows itself most markedly in some aspects of their spontaneous behaviour - and we have seen that it reveals itself with great clarity in the comments they make while listening to stories. But it can be demonstrated also in the contrived situation of an experiment from about the age of four, if not sooner, even though many experiments have failed to elicit it. At least from age four, then, we must again acknowledge that the supposed gap between children and adults is less than many people have claimed.

"3. A child's ability to learn language is indeed something at which we may wonder. But his language-learning skills are not isolated from the rest of his mental growth. There is no reason to suppose that he is born with an 'acquisition device' which enables him to structure and make sense of the language he hears while failing to structure and make sense of the other features of his environment. On the contrary it now looks as though he first makes sense of situations (and perhaps especially those involving human intention) and then uses this kind of understanding to help him to make sense of what is said to him.

"It appears, then, that the theories about the growth of language and thinking which have been most influential over recent years are, in important respects, ill-founded. This does not mean that these theories are wrong in their entirety.

"Nor should we conclude that, because children turn out to be in some respects closer to adults than has been supposed, they are really just like them after all. It may simply be that we have to look for the differences elsewhere."
(Donaldson, 1978 p.57-59.)

For Donaldson, the 'elsewhere' is in language development. She argues that the child acquires linguistic skills before he/she becomes aware of them. The child's awareness of what he talks about - the things 'out there' which language refer to - normally takes precedence over his/her awareness of what he/she talks with - the words he/she uses.

When a child interprets what adults say to him/her their interpretation is influenced by:

- a) knowledge of the language
- b) an assessment of the speaker's intention
(based on observation of non linguistic behaviour)
- c) the manner in which he/she would represent the physical situation to himself/herself if we were not there at all.

5.3 Road Behaviour

As the biggest problem group among children on the roads has in the main been perceived to be the pedestrian, much of the research relevant to this general field of inquiry has been concentrated on investigating the road behaviour, capacity and education of the child pedestrian.

The pioneering research investigating the child's ability to cope with the modern traffic situation, was conducted by Dr. Stina Sandels at the Institute for Child Development Research in Stockholm, Sweden. Her work stimulated an interest and has been elaborated and extended by the work of subsequent researchers especially by the Dutch researchers at the University of Groningen in The Netherlands.

Sandels noted that children do not apprehend the traffic environment in the same way as do adults, and emphasised the need for adults to recognise the discrepancies. She, and other workers, have documented various developmental competencies that differentiate adult and child pedestrian activity. They can be basically grouped under 3 headings: 1 physical, 2 perceptual-cognitive, and 3 social-attitudinal. Following, is a discussion of specific competencies of children as they relate to pedestrian safety. It should be noted, that although they are discussed separately, they are by no means discrete processes. Prior to such a discussion, some general observations on actual road behaviour need to be documented.

Furthermore, a considerable mass of data exists in relation to pedestrian behaviour. It is not the intention of this report to go into great detail since it has been most ably constructed recently by Van der Molen (1981). Whilst a mass of data does exist the value of the data available, to date, in setting educational objectives has been seriously questioned (Vinje 1981).

5.4 Play and Road Behaviour

Much of the road behaviour research over the years was stimulated by the pioneering work of Dr. Stina Sandels. Some of her findings (Sandels, 1975) concerning road and play behaviour, shows the incompatibility of traffic and children. She found that children like to keep close to home for reasons of security, food, toilet facilities and a physical and emotional dependence upon their mother (or substitute). Mothers also like to keep the children close so they can be checked and observed. This interaction is especially so for younger children.

Sandels observed that the older the child becomes the more he is left to play alone and outside. Males tend to be on the road more than females, with males using more outdoor type toys and engaging in noisy and active games. Females were seen to be accompanied to the playground by an adult more frequently. This observation could be interpreted to mean that parents might have a greater degree of concern for the possibility of assault for a female child rather than a concern over traffic safety.

Various experiments and studies by Sandels (1975) showed the immature behaviour and poor traffic abilities of pre-school children.

"Children appear sometimes to be entirely unconscious that they were not in secure surroundings, and they paid no attention whatsoever to the traffic or to the fact that some form of adaptation was required on their part.

"If they looked around, this often appeared to take place mechanically without insight.....

"The children played, both alone and in groups, when crossing roads and walking along pavements, strong emotions resulted in impulsive action, which rapidly moved the child from the protection of the pavement out on to sometimes busy roads. Children convinced themselves and others that streets which they had previously regarded as being free from traffic were always safe, and it appeared as if small children had difficulty in understanding the function of the traffic island". (Sandels 1975, p.47-8).

Some specific results of Sandel's research showed that children believed they must run across the road so they would not be run over. Some eight year olds did not understand the concept of right and left of their own and other persons bodies. Even nine year olds had trouble determining what side of their body the car was coming, and only about 25% knew why they had to look right and left. Although most children in these age groups knew how to use a pedestrian crossing, some eight year olds thought they did not have to look for traffic. These beliefs are critical in the development of any programs which are to incorporate kerb drills.

If the crossing situation involved parked cars and two way flow of traffic, it became more complicated. Hardly any 6 year olds and only half of the seven years olds knew how to handle this situation, even some eight and nine year olds had difficulty and only 25% of nine year olds could explain why they had to cross at a specific spot. The situation remains the same when the number of traffic variables were decreased or changed with the most difficult situation being a road junction requiring two crossings.

The OECD Report on "Pedestrian Safety" (1978) again highlighted the lack of basic skills in children, especially under the age of seven. Children only looked in one direction or not at all, they crossed close to hazards, such as parked cars, often attending to a game or something else while crossing and ran across. Children in the under seven age group did not realise the degree of unsafe behaviour they were exhibiting. Head movement from side to side may not indicate that a child has seen or even looked for traffic coming. Movement may be related to conversation or something interesting on the road and this is when in a group. (Sandels, 1975; Van der Molen 1976).

Michalik (unpublished report, cited in OECD Report, 1978) argued that the behaviour of 5-6 year old children in real traffic situations could be summarised as follows:

"The most deviant careless and risky behaviour was observed when children are in pairs of the same age. In the company of grown-ups (or considerably older children), hardly any active behaviour on the part of the child itself was observed". (Michalik, 1978, p.20).

In predicting road behaviour he found no apparent sex differences but the behaviour displayed on the footpath often influenced the road behaviour.

Chapman, Foot & Wade (1980) observed that, in the United Kingdom, the 5-14 year olds use the street more than the 0-4 year olds or 15-17 year olds. The major group being 8-10 year olds. They did find that males more than females used the street, especially in the 8-10 category, where, during holidays twice as many males as females were seen in the street. The major use of the road was for walking and talking and the incidences of playing and running decreased with increasing age while walking and cycling increased with age. They found no evidence that males ran more than females. Of course, generalisation from children in Wales to Australian cities cannot be assumed.

In the presence of adults there was a decrease in running, cycling and playing and an increase in passive activities. More females than males were seen on the roads with adults which led the authors to indicate that males, especially in the 5-10 age bracket, were more at risk on the road as they were more inclined to use it for active recreation when alone or in peer groups but they found no real evidence for the "adventurous male" stereotype.

Russam's (1976) review of the "Psychology of Children In Traffic" again shows the inappropriate behaviours of running, not looking, lack of attention, judgement abilities and that these behaviours are more prevalent when accompanied by peers than when alone.

A comprehensive study was undertaken by Reiss (1977), in the U.S.A., of 5-14 year old children on their journeys to and from school which substantiated previous data and has subsequently not been shown to be incorrect.

Predominantly Male Behaviour

Travel alone

Take more risks

Choose shortest route

Run across street

Cross against traffic signal

Indicate nothing has happened to them when struck

Consider it safer to run than walk.

Predominantly Female Behaviour

Choose safest route as parents told them

Go another route if told by parents or consider it safer

Consider unprotected corner as safest location

Younger Children

Less walking exposure

Take school bus, driven or walked by parents

Little or no understanding of control devices and safety techniques other than crossing guards

Fearful if not safety patrol or crossing guard

Cross against traffic signal

Cross at unprotected corners

Consider crossing guards the safest location

Take another route if told by parents or school officials.

Older Children

Walk to school alone

Take the shortest route

Cross without crossing guards

Are fearful of the dark

Take greater risks

Cross in the middle of the block

Run across the street between traffic gaps

Use crossings

Pick traffic signals as the safest place

Use a different route if told by parents or school officials

Rural children

Cross against traffic signals

Cross at unprotected middle block locations

Urban Children

Wait for the lights before crossing

Cross at unprotected corners

Run if no cars coming or traffic is slow

Suburban Children

Run out if drop something on road

Choose crossing guard as safest

Cross more than three roads with crossing guard.

5.5 Pedal Cycle Behaviour

Chlapeck, Schupack, Planek, Klecka & Driessen (1975), in a major study of bicycle accidents to elementary school children (5-14 years) in the United States, found that most children learnt to ride when they were about 6 years of age and those that were injured had 2.8 years of riding experience (if the accident was on a 'high rise' bike the average riding experience was 3.4 years, unless they owned the 'high rise' bike, then it was less than a year's experience). (Chlapeck, et. al., 1975).

The Ranleigh U.S. Bike Study (Campbell, Foley and Pascarella, 1981) found that amongst 6-14 year old cyclists males rode an average of 313 miles per year and females an average of 159 miles per year. The average male had a minor accident every two years and a serious one every twenty five years, with 88% of accidents occurring in residential streets.

In the Chlapeck, et. al. (1975) study, teachers indicated that 89% of males and 87% of female students rode cycles and this peaked to about 96% by age 10. About 21% of children reported accidents in the last five years with accidents being more frequent to the younger students. There was no sex difference in accidents per mile, but as the Ranleigh Study shows males travel about twice that of females, so their level of exposure is significantly higher.

The U.S. Bureau of Product Safety (1972) (cited in Chlapeck, et. al. 1975) reported that doubling on a bike designed for one was the most frequent cause of cycle accidents and losing control was the most common factor, whilst riding for recreation.

Chlapeck, et. al. (1975), found that most accidents occurred between 2-6 p.m. in residential areas within five blocks of home. The accident group described themselves as more active, riding more miles from home, carrying parcels and passengers with their cycles 'customized'. In half of the accidents, the cyclist was riding in the direction of the traffic, one quarter against and the other quarter in the middle of the street. Thirty percent struck an object, 22% skidded and fell, 26% lost balance and fell, 11% collided with another bike while 9% collided with a motor vehicle. Speeding accounted for 38% of accidents while 30% were turning and 25% cyclists were not sitting in the conventional position. Half had no time to take evasive action and 25% attributed the accident to cycle failure. Younger children had less bike failure and more group riding but received more serious injuries. The older more experienced riders rode more for transportation and more often on streets. While those with less experience rode on non-paved surfaces and engaged in more recreational cycling. Care must be exercised in extrapolation of U.S.A. 1975 to Australia in 1984.

Gonski, Southcombe & Cohen (1979), in an Australian study of Sydney hospital accident cases, found that of 312 cycle accidents, 25% involved doubling and playing games; 3 were hit by a motor vehicle, 16 were on a borrowed bicycle, 23 were doubling, 14 hit a pothole, 11 were riding up or down a hill, 10 were playing games. Of the 28 riding borrowed bikes, 50% had less than two years riding experience, 3 were doing "wheelstands" and 4 riding "no hands". Half of the accidents occurred in the 5-9 age group and three times more frequently to males than females.

A very recent report prepared by the Child Safety Centre (1984) at the Royal Alexandra Hospital for Children in Sydney covered bicycle accidents between January - December 1983. 259 children were treated of which only 20% involved admission to hospital (for an average of 8 days). Seventy eight percent of accidents involved boys, whereas for all accidents seen at the hospital boys account for only 62%. The 10 and 11 year old had the most bicycle accidents. In terms of age groupings the 5-9 age group were the most involved followed by the 10-14 age group. Most accidents occurred on the road but only a minority involved a motor vehicle.

A summary of the main findings follows:

<u>TABLE 82</u>		<u>BICYCLE ACCIDENTS SEEN AT THE ROYAL ALEXANDRA HOSPITAL FOR CHILDREN, SYDNEY 1983</u>	
<u>Type of Accidents</u>		<u>Number of accidents</u>	<u>Number of admissions</u>
Fell from bike		162	24
Collided with	- car	26	17
	- Motor bike	1	1
	- Bicycle	9	2
	- Object	13	1
	- Person	9	-
Fell across bar/foot flipped off pedal		8	2
Bike fell on child (not being ridden)		6	2
Limb entrapment		21	3
Other		4	-
		<u>259</u>	<u>52</u>

Source: Child Safety Centre, R.A.H.C. Sydney (1984).

"Causative or Contributing Factors"

Information on possible causes of accidents was only given in 69 cases (27%). Because of the small number of cases with information about cause, these figures may not be very reliable. 112 accidents in the "fell from" category alone, gave no indication of cause of accident.

"Careless riding emerged as a prime cause of accidents. It played a part in 45% of accidents. This included "excessive speed", "racing other cyclists", "riding too fast downhill", "steering with one hand", "riding down steps", "doing wheelies", and "jumping gutters".

"The road surface played a part in 16% of accidents. Hazards included wet road, loose gravel or stones on the road, and potholes in the road.

"Doubling" was a factor in 18% of accidents. Most of the doubling accidents involved a foot getting caught in the back wheel. One accident involved collision with a motor vehicle.

"Problems with brakes were reported in 14% of accidents. These included "brake failure" and "brakes not applied". Reasons for non-use of brakes were either that they were too difficult to apply or that the rider was unskilled in their use. Unfamiliarity with a bike (borrowed) was a factor in a number of accidents where the front brake was applied suddenly and the child went over the handlebars.

"A number of accidents were related to the lack of skill of the rider. In fact this may turn out to be a major factor in many accidents.

"As may be expected, accidents involving collision with a motor vehicle were more serious than most other accidents. There were 26 accidents in this category, 17 (65%) were admitted to hospital, with an average stay of 16 days. Two children with fractured femurs spent 9 weeks each in hospital.

"No indication was given as to whether the cyclist was unsighted by the motorist in these accidents, but this is likely in a number of cases as reported by Lee (1981) where in 8 out of 11 accidents, the cyclist was not seen by the motorist." (Child Safety Centre, 1984, p.3).

Lugg (1982), analysed hospital morbidity statistics for Western Australia for ten years. Whilst the 5-9 and 10-14 year old children had the highest accident rates throughout the 10 years, the most dramatic finding was an alarming increase in the 0-4 age group which increased four-fold over the period. As with other studies, males account for the bulk of hospital treatments (over 70%). In 77% of cases the accident did not involve another vehicle. However the figures were not available for under 17 year olds.

Arnberg, Ohlson, Westerberg & Ostrom (1978) conducted a study investigating the skill and ability of children aged five to thirteen in riding bikes. Their results were rather surprising:

"Children under eight performed very poorly in most tests and it is therefore doubtful if these children should be allowed to cycle in traffic at all. The children between eight and twelve were significantly better, especially those who cycled most. Almost all of the thirteen year olds could manoeuvre a bicycle acceptably." (Arnberg, et.al. 1978, p.1)

Most of the children in this study had been riding two-wheeled bikes since they were four or five and rode regularly. None of them had had bike education, which might have improved their skills dramatically.

Reasons given for the children's poor performance were as follows:

1. Children are not physically and mentally mature enough to learn how to cycle.
2. Although children cycle a lot, they do not practice skills necessary to be able to cope with riding in traffic, (such as looking backward while riding).
3. Bikes are frequently too big or too small for the rider, or have handle bars, seats, etc., poorly designed for use by a child.

A 1983 OECD report elaborated the primary skills needed for cycling. The main task is course-holding, and this involves steering and stabilizing the bike. Children, under eight, were found to have limited skills in these tasks.

The problems that inability to hold course raises, and the oscillating and unpredictability of children on bikes, creates obvious concern for the driver who cannot anticipate a child's next move.

The problems are further exacerbated when a passenger is being 'dinked' or doubled. This alters the centre of gravity of the bike and combined with unpredictable movements on the part of the passenger, makes holding course an even more difficult task.

The OECD Report (1983) suggests that bike design for children be reconsidered, that children be provided with large areas in which to learn to ride, and that traffic be segregated.

5.6 Development

In general, there is a developmental lag between perception and performance. Young children of certain ages are able to see and recognise some objects or situations but they are not able to respond correctly. Children react more slowly than adults, due to a lack of experience. Children require more time in order to emit a motor response on the basis of a visual or auditory stimulus. Generally speaking, reaction time is negatively correlated with age.

This fact is only partially explained by an increase of motor co-ordination. Another problem for motor performance in young children is the relative instability in suppressing impulsive behaviour. There should be some correlation between impulsivity and traffic accidents. It appears, however, that an impulsivity-inhibiting mechanism develops between the ages of 5 and 7 years. Until such a time as this, it is argued that younger children may run into the roadway whenever they feel like it. While some laboratory experiments have shown that it is possible to teach children a less impulsive way of reacting, it does not suffice simply to train them to react later. Instead they need to be taught explicitly what to do with the extra time (Vinje, 1981).

Young children between 2 and 4 years have problems in a traffic environment caused by the mental effort and attention required for motor behaviour. Such children require all their effort in order to remain walking, and it is very difficult for them to stop quickly once they are already in motion (for example at the kerb). These difficulties are aggravated by temporary and emotionally laden situations (e.g. one of their little friends is in trouble, or they see one of their parents etc.)

Cyclists require different skills, the main one being ability to hold a course. Children under the age of 8 years experience difficulties in dealing with this basic task.

Children also undergo rapid physical development, which changes the body's proportions. Thus the child continually needs to adjust and revise his learned movements. Consequently, he needs a lot of moving space. If this need is not satisfied in playgrounds, gardens and so forth, children will attempt to satisfy it in the traffic environment.

The diminutive stature of the child also limits his speed of movement. This requires that a child operates at a fast rate to be able to maintain a comparable margin of safety on the road to that of an adult. This aspect of the child, needs to be stressed in any programs aimed at adults and involving children.

Children often have trouble telling the right side of their body from their left side, and do not understand the total meaning of right and left as it relates to their own body until the age of about 12. In a stressed traffic situation it is, therefore, conceivable that the situation for them is even less manageable. This is interesting when the dominant role that 'look to the right, look to the left, then look to the right again' has had in road safety education in the past is considered.

5.7 Perceptual - Cognitive Development

5.71 Vision

The young child's visual perception is characterised by a number of important limitations. In a physical sense, they have a lower eye level (due to lower body height) which means a more limited field of view. For example, it means children cannot watch out for traffic when standing behind a parked vehicle and they also have fewer possibilities to survey a traffic situation.

In a more psychological sense, children have a restricted capacity to use information in the periphery of the visual field. In adults, the peripheral visual field is especially sensitive for detecting movement, thus may be used for detecting traffic without turning the head in its direction. This behaviour, by adults, actually provides an undesirable model for the child. Avery (1974) suggested that some of the deficiency in peripheral vision could be compensated for by the child turning the head to look directly at an object. And indeed, Van der Molen (1981) found that young children do make more side to side head movements in surveying a road before attempting to cross.

In scanning a visual field young children are much more bound by incidental aspects of the situation. There is no planned search in connection with what they are looking for, rather the search process is almost totally directed by conspicuous parts of the visual field that may be totally irrelevant to the traffic task something new or surprising, or something the child is emotionally involved with. Thus, even if trained to look for traffic appropriately, under six years of age especially, children cannot be trusted to look for traffic in an adequate way, and especially not when there are other more attractive objects (for example dogs, other children, an icecream van, etc.) around.

Children also appear to fixate on elements within the total traffic environment, and hence tend to perceive discrete, independent events. Integration of information over time develops with age (as memory develops), until the age of about seven when the length of time between pieces of information loses its influence on the child's ability to put discrete pieces of information together in his mind. Of course, the possibility of integration depends on the complexity of the information, more complex information being more difficult to integrate. Relating this to the traffic environment directly, it is evident that integration of pieces of information is not required where the child pedestrian crosses a road in the absence of oncoming traffic, but is necessary when crossing in a gap before oncoming traffic.

Other visual deficits in young children are also well-known. For example, children under eight years of age are less able to detect discrete objects in a complex context; eight year olds take twice as long to move their eyes toward a light stimulus as college students. With respect to the comprehension of what they are looking at, children are unable to understand the importance of obstacles restricting their sight. Children cannot change from looking at a distance to looking close and identify correctly as fast as can an adult.

5.72 Hearing

Whilst some workers in the road safety field concerned with children believe that hearing plays a critical role in detecting vehicles, the literature on hearing or auditory perception in child road behaviour is very sparse, Avery's (1974) classic review had little to say on the matter.

"....In the most recent review of research on the development of auditory perception in children available, the literature was divided as to whether auditory perception improves with age (Kidd & Kidd 1966). Many of the studies confound age with the ability to attend and to co-operate with the experimenter. The reviewers conclude that further research is needed into the developmental stages of auditory perception." (Avery 1974, p.11-12).

An analysis of the recent educational approaches, using behavioural modification techniques, also tends to overlook hearing and concentrate on vision. This is especially true of Limbourg and Gerber (1981) and is in stark contrast with the emphasis placed on head movements (Van der Molen 1981, 1983).

What little information is available suggests that, below about seven years of age children are not as efficient in localising sounds coming from the left or right, and are more likely to be distracted by irrelevant sounds. Thus, hearing clearly also plays a role in providing cues for accurate traffic perception.

5.73 Perception of Distance

Ability to estimate distances is a function of age. Although in children estimation of distances is rather accurate, there is greater variation in it. Thus the reality of distance estimation is weak, and becomes increasingly so as the distance to be estimated becomes greater. Salvatore (1973) found an unusual example of the way children perceive distance: they tend to think a small, compact car is further away than it actually is, and a big truck is closer than it actually is. Accurate estimates of distances are of obvious importance to safe traffic behaviour, as is the ability to accurately estimate speeds. Size of object may also influence adults' distance perception and account for problems in seeing motor cycles.

5.74 Estimation of Speed

Speed estimation in children under 8 years old may also be a weakness. Children (especially those less than five) have a concept of speed based on an ordinal notion (i.e. fast, not so fast, slow, etc.) and not on the perception of real time. A faster speed for them means passing more objects independent of the time needed. The importance of the ability to estimate speed in a traffic environment lies in its being the basis of an estimation of how long a vehicle will need before reaching the child attempting to cross a road. Children also judge the speed of a vehicle on its size and the amount of noise it makes. Smaller vehicles and noisy vehicles are perceived to be travelling faster (Salvatore, 1973). Perception of the direction of movement also poses problems for the young child.

5.75 Attention and Concentration

There is a large attentional deficit in young children which makes them unreliable in traffic. They tend to focus all their attention on situations of interest to themselves and have a restricted concentration span. This is one of the difficulties when it comes to practicing what they have learned in traffic education. Play engages children entirely and they forget all else, as when they are seized by sudden emotion (e.g. if they catch sight of mum or the milk bar).

The improvement of attention with age is attributed not so much to a limited capacity for information processing, or a limited memory storage capacity, but more to the interference of irrelevant aspects of the task which get mixed up with the relevant aspects. Below 5-7 years of age children are not able to divide their attention between a number of relevant tasks. Avery (1974) believes, however, that they can be trained to attend to more than one factor at once. This suggests that experience, particularly in what to attend to, is an important factor in the development of attention. Van der Molen (1981) pointed out that children may completely lack attention (as is the case when they do not look for traffic at all before attempting to cross a road), or may have a partial lack of attention, where they will e.g. look for traffic, but not see the oncoming vehicle.

The critical issue may not be attending to more than one factor at once. With young children, especially 5-7 years old, the key is to get them to do one thing at a time before going onto the next (e.g. stop before looking, looking before crossing etc). The importance of this with respect to stopping behaviour has been emphasised by Mohr, Parsonson & Field (1983).

5.76 Memory

One of the main supporting functions of decision-making such as the decision as to when to cross the road, is the memory process. Long term memory is directly involved in remembrance of road crossing instructions and of previous road traffic experience. Vehicles travelling in both directions need to be judged before a road crossing is attempted, thus short term memory is necessary for the pedestrian to remember information from one side of the road before proceeding with judgements about the other side.

Relevant aspects which seem particularly difficult for young children to remember are the position and orientation of objects, especially when there are only a few environmental characteristics available on which to base the coding of a position. Thus, it may be difficult for young children to remember the position and direction of traffic especially when they are in an unfamiliar street. Memory storage is slower in children than in adults. Generally speaking, children have not acquired the heuristics, rules of thumb, strategies, algorithms etc., which give the adult the ability to process certain information from the complex traffic environment automatically and efficiently.

Also, increasing the amount of information to be processed may overload a child's system, lowering performance. Thus in busier traffic their performance is likely to drop.

5.77 Logical Reasoning

Until they reach a certain level of development, around the age of eleven years, children cannot cope with problems that require logical reasoning to solve them. They experience particular difficulty grasping an understanding of instructions framed in negative terms. For example, a difficult form of such negation would be "cross where there are no cars near". This could, and should if it was to be used in instructing children in road safety, be simplified to the positive statement "cross when the cars are a long way off". "Either ... or" statements should also be avoided, as they are not well understood by children. Even better there is a need to develop a verbal guide suitable for use by children rather than adults.

True, rational understanding of causal relationships also doesn't occur until a child is 7 or 8 (Piaget, 1958). On the road, they don't understand that if they walk out into the path of a vehicle that vehicle can't stop immediately, and that they will be hurt if they are hit.

Tying in with this is children's lack of understanding of risk. Six to ten year olds are able to perceive and anticipate risks to some (unknown) extent, although their accuracy in doing so is questionable.

Similarly, Deutsch (1964) argued that children don't always perceive dangers in relating themselves to the environment. This seems to be because of the difficulty they experience relating events to consequences, and because of their limited ability to cope with new experiences and situations.

Children really only fully understand the purpose of rules by the age of ten. Before this age they can follow rules but, because of an incomplete understanding, may apply them to situations inappropriately. Sandels (1966) reports that many children because they have been taught that 'you cross at the pedestrian crossing because cars have to stop there', take it for granted that motorists will indeed stop immediately for them at these crossings, and they perform kerb drill as a 'magic rite' and not in a way that would lead to the safe detection of traffic. (Schreiber, 1978).

5.78 Language

A number of researchers (e.g. Sheehy, 1982; Sandels, 1966) have found that a considerable proportion of the child population do not understand much of the terminology used to explain and teach to them safe road behaviour. Children as old as eleven have been found to misunderstand such terms as 'kerb', 'danger', 'pavement' (Cattell & Lewis, 1975), and six to twelve year olds have been found to give incomplete and impoverished descriptions of road safety procedures (Firth, 1975). Preschool children are still busy trying to learn their language, and the meaning of words is seldom as clear to them as it is to us (Sandels, 1966).

Terms most easily understood by children aged between six and ten are those that are simple and concrete. Even so, the most concrete terms need to be explained at length and even very concrete terms, such as footpath or kerb, need to be actually demonstrated to young children in a real-life and familiar traffic situations (i.e. places where they will go unaccompanied).

Older children also have problems understanding the meaning of some traffic terms, for example, 'traffic' (often understood as only meaning cars), 'caution', 'keep to the left', 'priority'. Also, vague instructions such as 'be careful' are of virtually no use (Steinaeur, 1980).

As mentioned previously, in formulation of instructions, negations and "either or...." statements should be avoided. Children also frequently find passive sentences difficult to understand; they need to be told what to do, rather than what not to do.

Road signs are also frequently misunderstood by children (Van der Molen, 1976), as are road traffic education posters (Cattell & Lewis 1975; Sheppard, 1975). Michalik (1978) concluded, in her study, that 5 to 6 year old children experienced great difficulty deciding which side of the traffic lights in the middle of an intersection was relevant for them.

Rothman & Freedmann (1982) claim that while children could identify certain behaviour as either safe or dangerous, they were often unaware of why this was the case. Schreiber (1978) found similar results, and formed the conclusion that often children's reasons for situation classification indicated that they had not yet formed a concept of the components of a 'safe' or 'dangerous' situation.

Finally, to date, there seems to be little or no reported studies carried out amongst school children with respect to how they perceive road safety education or how they perceive the road situation they have to deal with.

5.8 Social Attitudinal Development

5.81 The Child

Sandels (1975) referred to the relative playfulness and spontaneity of children's behaviour compared to that of adults. Because of these characteristics children are inconsistent and unpredictable as pedestrians, and as pedal cyclists. Sheehy (1982) points out that there is a danger in endorsing a romanticised image of the child's world as removed from the reality of adulthood. The danger in such a view is that it under-emphasises the important role that child-rearing practices, educational policies and social norms play in determining children's behaviour.

But Sandels' point is an important one. Children do forget what they have learned if something interesting happens and they do become heedless of the presence of traffic. Also "dashing out" accidents can often be caused by sudden emotions.

This brings up another interesting point - the child's egocentricity. Because of this trait he is, for example, unable to understand that his view of the road may be obstructed, that a vehicle can't stop immediately and so forth. Within the Piagetian perspective a gradual development is assumed to occur, away from this egocentric view of the world, toward a more social viewpoint where, by the age of seven to eight, and child can begin to conceive the perspective of another.

Personality has also been suggested as a factor contributing to likelihood of involvement in accidents. Determined, daring, fearless and hyperactive children have been dubbed as groups with increased vulnerability on the roads. This, it has been suggested (Avery, 1974), contributes to the greater number of boys killed and injured on the roads, Australian boys being encouraged to display many of the aggressive characteristics of accident repeating children.

Despite the findings of Chapman, Foot & Wade (1980) (see 6.4) to the contrary, there is a wide spread belief that boys have been found to exhibit more hazardous behaviour than girls on the roads. Boys play on the roads more, they are more active, run more, look around less frequently when crossing a road. They are less likely to stop at the kerb before crossing over, and make less use of pedestrian crossing sites. Boys are also less likely to take parents' advice on safe routes to travel etc.

5.82 The Environment

There is another important factor operating on a child's ability to cope with the traffic situation referred to as the 'natural living range' of a child.

This range is an area in which a child is free to circulate independently, and in which he/she acquires many experiences necessary to his/her development. Such experiences and any knowledge acquired by a small child are obtained through the immediate environment at home and within the limits of the immediate surroundings. As a child gets older he/she develops a natural urge to enlarge this living sphere and to learn by gathering experiences.

However, the urban environment severely restricts the enlarging of the living sphere characteristic to the child's natural growth, largely due to the presence of traffic and traffic systems. A study in Finland found that in rural conditions where traffic doesn't make it difficult for children to move around, a child of 6 or 7 very often circulates independently in an area with a radius of 3 to 4 kilometres. Children of corresponding age in an urban area, where children are confined within the limits of their home surroundings for safety reasons, the radius of independent activity was found to be only 200 metres. Consequently, the world experienced by children living in different environments and the informative content provided by the incentives they receive are very different.

Systems developed by adults to provide incentives, such as play parks and traffic cities, with ready-built activating devices, cannot compensate for the importance of independently developed games. When playing on his own initiative, a child observes, studies and understands dependencies between phenomena. Later on, of course, theoretical knowledge obtained from books, school and elsewhere, is necessary. Together with one's own experiences, the knowledge of the world, of one's own country and of society, provide the best possible basis for natural development and for understanding the surrounding life.

It is of great importance that a child's environment enables him to enlarge his living sphere, according to his own abilities and without being restrained by traffic, from his home surroundings to the neighbourhood and beyond. However, this ideal is prohibited by the urbanisation of our environment, both in industrialised and developing countries. The structure of cities and traffic impose fairly tight limits on the young child's range of movement.

Perhaps these factors should be taken into account in the development of new estates where planning is still possible to afford children greater area in which to move around in safety.

5.9 Key Developmental Considerations in Educating Children in Road Safety

Children do not readily transfer theoretical education and knowledge to the practical situation. Therefore, they should be taught theory in the classroom (or home) for a short time. More attention should be paid to modeling safe behaviours and reinforcing them in real life situations.

Simple and concrete terms should be used. All terms, posters, and traffic signs should be thoroughly explained.

As children have little control over their attention, and their mechanisms for inhibiting sudden impulses are under-developed, cognitive training methods are virtually useless. Concrete behavioural training is a much more effective method.

Because of the child's limited concentration span, very little should be taught at a time, and everything should be constantly repeated and revised.

When information becomes too complex children become confused or forget. Consequently they should be taught only what they should do, and not what they shouldn't do. Otherwise they will forget what they are supposed to do, and not do.

As children evaluate familiar situations more realistically than unfamiliar, it has been suggested that they be thoroughly taught a few specific routes to a limited number of destinations (e.g. to school, to the shop etc.). (Vinje, 1981).

Parents should be encouraged to let their children attempt to cope with difficult traffic situations independently, in their presence - and bear with their children's 'risk-avoiding' behaviour (stopping longer time at the kerb, waiting for larger gaps in the traffic, crossing straight across the road rather than diagonally as adults do, and so forth). (Bongard and Winterfeld, 1976).

While parents may be a most useful channel of information for younger children, the peer group may have more influence on older children.

Although the picture given in this report is that child development is a fairly stable process, important differences can exist between children of the same age, and important differences exist between males and females in road behaviour and accident patterns.

In evaluating any road safety education course, it must be kept in mind that children will always perform better in any theoretical knowledge test than they will on the actual road. Thus theory test scores are unlikely to reflect actual ability or behaviour.

In sum, studies of child accidents, abilities, behaviour and exposure to traffic show that children display poor:

- powers of perception, concentration, attention, memory and physical and emotional control.
- knowledge and understanding of traffic.
- behaviour patterns in the traffic environment.

All of these various aspects of the child need to be acknowledged in development of road safety training programs for children and adults, although some to a greater extent than others. Any program for children must provide concrete and simple direction to children and emphasise the importance of actual training in behaviour in the real road environment.

Increased protection of children on the roads should not only involve child education calculated to adjust the child to his environment, but also education of adults to increase their awareness of the physical and psychological limitations of children. It should also involve measures aimed at making the environment a safer place for children.

6.0 MOTHERS' AND TEACHERS' POINTS OF VIEW

- 6.1 The Importance of Mothers and Teachers
- 6.2 An Exploratory Study of Mothers and Teachers
- 6.3 Mothers and the Road Safety of their Children
 - 6.31 Children and Play
 - 6.32 Dangers and Concerns
 - 6.33 Responsibility for Road Safety Education
 - 6.34 The Safety of Children in Cars
 - 6.35 Reactions to Suggested Countermeasures
- 6.4 School Teachers and Road Safety
 - 6.41 Dangers and Concerns
 - 6.42 Responsibility for Road Safety Education
 - 6.43 Reactions to Suggested Countermeasures

This short chapter is included because of the potential important role of mothers and teachers in assisting children to adopt safe road behaviours. The results of a small scale exploratory study of mothers and teachers are reported. In essence, mothers and teachers may not always agree on their respective roles or responsibilities, but there is considerable consensus on the need for far more to be done, especially within the school curriculum.

6.1 The Importance of Mothers and Teachers

Any measures aimed at reducing the incidence and/or severity of road accidents in which children 0-16 are involved cannot ignore the role currently or potentially played by two of the most significant change agents in children's lives, especially in the earlier years of life. At the pre-school level the role of the parents (especially the mother) is critical since the very young child relies on adults and older siblings to learn how to cope with the world of the adult.

It is generally recognised that in the pre-school years the mother provides much of the behavioural modelling for the child (Bandura, 1977), including road safety (Polak, 1980). Further, researchers and road safety educators have consistently argued that parents are often poor models because of lack of knowledge, modeling incorrect or unsafe road safety behaviour (Ryhammar & Berglund 1980; Rothman & Freedman 1982). At the same time, parents are unlikely to recognise their importance as models in the social learning process.

In addition to the parents lack of knowledge and awareness of the nature of their role in road safety education, especially with respect to pre-schoolers, parents frequently have unrealistic beliefs with respect to the ability of young children as road users (Limbourg & Gerber 1981, Schrieber & Lukin 1978; Rothman & Freedman 1982).

Christie (1983) argues:

"To avoid children becoming victims of their parents ignorance or naivety, road safety educators, behavioural scientists and others have a duty to make road safety information/education available to parents (and others who may contact young children) in a useful and easily digestible manner or form." (Christie 1983, p.5).

Sadler (1969) carried out a comprehensive questionnaire survey of mothers in England in relation to road safety and their children. She found that mothers appear to accept that parents have the main responsibility for teaching children road safety (rather than the schools or the police) and most of them had taught something about crossing roads even to the youngest of their children (aged 2). Similar surveys of mothers have been carried out more recently by others involved in developing educational programs. (Ryhammar & Berglund 1980, Rothengatter, 1981b).

Given the importance of mothers, and others who come into contact with young children (e.g. teachers), it is desirable to know what their concepts of road safety are since they are involved in the training of children. Further, the implementation of educational countermeasures aimed at the 0-16 age group. Mothers and teachers can aid or inhibit the learning process or the behaviour change process. Where countermeasures involve education, and especially mass communication, the existing viewpoint of mothers and teachers is likely to be critical to the effects of any such campaigns; e.g. bicycle helmet usage, restraint usage, bicycle education, etc., etc.

6.2 An Exploratory Study of Mothers and Teachers

A series of exploratory (qualitative) group discussion sessions were conducted by Elliott & Shanahan Research with mothers and teachers. The technique has been described in detail elsewhere in relation to road safety (Elliott, 1980(b)) and to road safety communication (Elliott, 1983). The technique is now widely used in the development of road safety mass communication campaigns (e.g. Freedman & Lukin 1981).

A series of eight group discussion sessions were conducted in Sydney, in April 1984. Every effort was made to gain a broad cross-section of eight specific target segments:

- Mothers of pre-schoolers
- Mothers of infant school aged children
- Mothers of lower primary aged children
- Mothers of upper primary aged children
- Teachers of pre-schoolers
- Teachers of infant school children
- Teachers of lower primary school children
- Teachers of upper primary aged children.

The nature of the research process was entirely exploratory, using largely unstructured group discussions, where the role of the supervising psychologist was that of providing a supportive environment to enable all group members to participate. The results ought to be regarded as 'hypotheses' in need of further verification, not as definitive findings.

6.3 Mothers and the Road Safety of their Children

6.31 Children and Play

Mothers of pre-schoolers prefer for their children to be outside, except when it is raining. Some play in the front yard, most are told not to venture out of the backyard. It worries mothers when children are out the front, they may get out and go on the road or meet strangers. Some play with older brothers and sisters and go out of the house boundary. Generally, they are not allowed out of the house yard, and many mothers seem to have locks on gates. However, they occasionally do get out and this worries mothers. Where they are allowed to play also depends to a small extent on how busy their road is and how many other children play in the street (because it's difficult to keep them inside when all the other children their age are outside). Whilst the mothers claim not to allow their children play on the street, they all appear to know mothers who do.

Once the child has reached school mothers accept that their children will play with other children at the home, in the streets associated with the homes, or in the parks. Bicycles play an increasingly important role in the play process and as means of transportation to a 'mates'/friends place. In the infants age, mothers are more likely to be more concerned, but as the age increases mothers tend to have little influence over where the children play. Mothers approve of playing in cul-de-sacs and riding bicycles on footpaths.

Most children have a tricycle or bicycle. Mothers of pre-schoolers tell their children not to ride on the roads and assume that they don't. Some mothers go riding with their pre-schoolers. At the infants school age, mothers begin to allow their children to ride on the road but prefer them to ride on the footpath. Most of the infants mothers believe children shouldn't be allowed to ride a bicycle to school until primary school age (about 8) or for some until the last year of primary school because they feel boys especially are too daring. Currently, schools establish the minimum age, if any, for cycling to school. Mothers would support increasing and enforcing a higher minimum age.

By the lower primary age, mothers grudgingly accept that their children want to ride to school and on the roads. They encourage use of the footpaths and may wish bicycles were banned from school. Mothers recognise that children of this age are a concern on bicycles and most get irritated when children ride bicycles around supermarkets and shopping centres.

At the upper primary age, many of the children ride a bicycle to school and their bicycle is important to them as their mates also ride. Mothers are less concerned about their knowledge of road rules than about their 'silly', 'daring' play behaviour on their bicycles. This finding supports the data from the Child Safety Centre (1984) (see 6.5). Mothers quite regularly send children on errands after school, but not before school, and only with other children for infants school children. The sending of children on errands is usually very local and more likely to be boys than girls for fear of molesting, not road safety fears. The upper primary age errands frequently involve the use of a bicycle.

6.32 Dangers and Concerns

In general, the awareness of the dangers are very high but not very salient. At the time of the study, kidnapping and child molesting was much more salient than the dangers of being a pedestrian, passenger or a pedal cyclist.

For many mothers the lack of salience is a defense mechanism. They can't be constantly vigilant and they feel guilty for not so being. Accordingly, they deny or dismiss the road safety problem. They are aware and concerned at a cognitive level but they can't cope with the thought of the child being constantly at risk. They will periodically carry out checks to see where the children are playing.

Mothers see the main dangers as:

- speeding cars
- running out from parked cars
- running to cross the road
- riding a bicycle on the road
- playing in groups on the road
- boys on bikes in groups
- double parking near schools and school crossing
- adults crossing against a walk signal and children following.

Mothers recognise that the primary danger is the 'unexpected' due to the impetuosity of the child. Mothers feel children do not apprehend the danger and that the attraction or goal at the time overrides the effects of any road safety education that they might have been taught.

Mothers cope with the dangers in a variety of ways. At a young age (pre-school) some mothers take their children out walking and try to teach them - the signs - the right behaviour. In general, when mothers try they do not just hold the pre-schoolers hand, they teach them as they take them across the road. At this age mothers are more likely to be continually on the watch.

As the age of the child increases the mother is more likely to "lecture" or use punishment. In the infant years, mothers try to organise some parent involvement after school.

It was most noticeable, in discussing road safety and their children, that the frame of references is almost exclusively pedestrian and pedal cycle, not as passengers.

In general, mothers were more likely to attribute blame for child pedestrian and pedal cycle accidents in most instances to the child's behaviour, rather than to the motorist. Where blame was attributed elsewhere, it was attached to parents of the child, young motorists, and male motorists. In the event of an accident, mothers are somewhat disinclined to believe the child, especially the male child. Mothers' attitudes may, in part, exacerbate the already low levels of reporting of accidents.

6.33 Responsibility for Road Safety Education

Mothers accept that it is their responsibility to educate their children in road safety. Indeed, it is more than an acceptance it is a strong belief that, at least in the early years, it is an essential element in being a good parent. However, mothers recognise that other authority figures can be very influential so that "what the teacher or policeman says" carries more credence or weight than what mother says.

At the pre-school level, mothers believe that teaching road safety is primarily their responsibility. However, because learning occurs in a fun environment in pre-school more could be done by the teachers whom the children 'adore'. There was the suggestion that television for pre-schoolers has not been sufficiently exploited either on program segments ('Playschool', 'Humphrey') or advertising.

At school, in Sydney there appears to be little done by way of teaching road safety in any formal way as far as mothers are concerned. They regret this situation. Perhaps they only hear about Police visits and not everyday classroom learning situations. Mothers would prefer to see road safety taught throughout a child's school life and especially in the teenage years. Mothers are very supportive of road safety education and complain about how little is being done or taught.

The recent HORSCORS (1984) Report on Road Safety presented the findings of a survey carried out by the Federal Parliamentary Committee.

"Road Safety Education

17. It was in the replies to the question on road safety education that the Committee saw the most marked agreement on the two or three key measures to the virtual exclusion of all other suggested measures. The use of television (selected as the most important preventive measure by 45.6 percent of total sample) and road safety education in schools (39.7 percent) stood out as the key measures from the public's point of view. Third was the need to make parents more responsible for the safety of their children (9.5 percent), but it must be stressed that the results were massively in favour of both television and school education as the key methods of road safety education." (HORSCORS. 1984, p.5).

Mothers believe that much more can be done to improve the safety of their children on the road. They realise that education is not the only solution. They prefer to see more physical countermeasures such as flashing lights on pedestrian crossing, traffic lights, footpaths, "lolly-pop" wardens, more crossings on busy roads, etc. They also volunteer the need for more mass communication (advertising) aimed at children on children's programs and aimed at adult drivers.

A significant proportion would support various legislative countermeasures such as a minimum age for pedal cyclists on the road, mandatory use of helmets (for those who believe they are effective), banning of bicycles as a means of school transport until high-school age.

Mothers of pre-schoolers are somewhat ambivalent towards education for pre-schoolers. They try to do their best on the one hand. They feel not enough is done to help them and that "authorities are not interested in pre-schoolers". At the same time they are not at all optimistic about formal efforts aimed at teaching pre-schoolers road safety. This age group is seen to be too impulsive, forgetful, and untrainable.

The only educational material referred to by mothers in the groups was the "Spikes Bike Books" in the lower and upper primary age groups. Mothers voiced strong approval because of the need for the books and the comical presentation. It was felt that the first book was especially good because it allowed interaction between parent and child.

6.34 The Safety of Children in Cars

As mentioned earlier, this aspect mostly arose only on the prompting of the supervising psychologist moderating the group sessions. Mothers, in general, approve of restraints but recognise that children resist their use. For mothers of pre-schoolers the problem is one of getting the children in and keeping them wholly in the restraint. Mothers are more concerned about a child opening a car door whilst the car is in motion than they are about having an accident. The expense of child restraints where 2 or 3 are needed was a common complaint suggesting that a hire system could be considered by authorities. Harnesses for bassinets tend not to be used, even when owned, because of the difficulties in use. Booster cushions, on the other hand, were regarded as an excellent innovation.

Mothers of infant and older ages have to constantly tell (insist) on seatbelt usage. Children will not automatically comply in the primary school years.

Mothers who do insist on compliance are irritated by other drivers who allow children to go unrestrained, especially in the front seat. Furthermore, they are very critical of the apparent lack of enforcement, in Sydney, in relation to restraint non-usage by children, teenagers, and even adults (at least in the back seat).

Quite frequently, mothers knowingly drive with some children in the car unrestrained. This tends to happen when more than three children are crowded into the back seat.

There appears to be considerable confusion amongst mothers in Sydney over liability for non-usage of restraints at least as far as children are concerned.

6.35 Reactions to Suggested Counter-Measures

Towards the completion of each group session a number of "ideas" were proposed by the supervising psychologist in an effort to gain reactions. None of the ideas were explored in any depth owing to time constraints. In this sub-section gross or global reactions only are reported. Should any of these countermeasures be contemplated further research would be necessary.

6.351 Engineering Devices to Slow Traffic Down in Residential Streets

Mothers agreed that road signs alone do not stop traffic (i.e. there are a sizeable minority of drivers who ignore them). They also concur that putting up a speed zone sign is also ineffective in slowing traffic down. They prefer not to have speed humps but recognise that such measures really are effective in speed control.

6.352 Bicycle Education and Helmet Usage

They were unaware of the existence of 'Bike-Ed' and applauded the concept. They responded positively to any idea associated with generating a demand for 'Bike-Ed' in schools. For some, it ought to be mandatory for any child riding to school.

Reactions to Bicycle Helmets were not always so positive. They recognise that their children (at least in upper primary age) are unlikely to wear them and that they cost "too much". Some mothers really do not believe that they are an important road safety device except for motor-bike riders or perhaps for children riding on very busy roads. For after school play, they see little need and are pessimistic about their adoption.

6.353 Graduated Licensing

This concept evokes a complex set of reactions. On the one hand mothers believe:

- if the driving age is to be changed it should go up not down;
- driver training needs to be improved - taught in schools;
- it's too easy to get a licence now.

They agree that young drivers are a problem and that something needs to be done about the problem.

When explained more fully, and the rationale behind graduated licensing discussed, reactions mellowed somewhat so long as the driver age is not lowered. The concept of no other teenage or child passengers was acceptable once the nature of the problem was outlined. The difficulty of enforcement was a concern and so too was the lack of convenience if an adult had to be present in the car.

6.354 Adult T.V. Pedestrian Campaign

Reactions to this idea were spontaneously a little negative. Not because it isn't needed, but because they believe it would be more effective if aimed directly at children. For mothers, television's power or influence is awesome.

6.355 The Use of Reins

In general, reactions are quite negative. Two issues arose. The first is a social constraint whereby mothers feel that the use of reins is like 'taking a dog for a walk'. It appears that what matters is the perception of others. If many mothers used them they would be legitimised. Because they are used only by a minority they are seen to be a deviant form of behaviour. The other constraint is the child's reaction. Many mothers used reins of some description to keep the infant in a high-chair at meal times. They vividly recall the temper-tantrums associated with this activity. At a rational level they see their merit. Emotionally their acceptance would require some positive modelling.

6.356 Driver Responsibility for Restraint Use

Mothers are aware that currently children unrestrained in the front or back seat can result in a driver being 'booked' in N.S.W. However, they feel the problem is that rarely do they ever see a driver being booked for such an offense. They are much more likely to see deviant behaviour go unpunished.

Their awareness of the age at which the driver is no longer liable appears to be low. They agree that teenagers ought to either be responsible or be booked. The idea of the driver being responsible for teenagers (14-16) was most acceptable since they felt a policeman was unlikely to serve an infringement notice on a teenager who is in their eyes (and his), still a child. They were unsure about drivers being responsible for seat belt usage by other adults (18 years of age and over).

6.4 School Teachers and Road Safety

6.41 Dangers and Concerns

Teachers are directly involved in road safety when taking children on excursions, of a morning on the way to school and, more particularly, when school is out in the afternoon. They also drive home at a time when children are likely to be out playing or on the way home.

Pre-school teachers tend not to experience directly the dangers since a sizeable proportion of pre-schoolers are collected by

adults or older siblings. They recognise that older siblings present a problem because they ignore the pre-schooler who ambles behind in his/her own world and then is likely to run to catch up. Pre-school teachers believe that it is the parent's role to teach road safety to pre-schoolers. Teachers of pre-schoolers recognise that children of this age are especially vulnerable because of:-

- the child's perceptual abilities;
- motorists' lack of awareness;
- dart-out behaviour;
- impulsive behaviour;
- lack of awareness of danger by child;
- the child's preoccupation with distractions.

Once children go to school the teachers are likely to see a common set of dangers irrespective of the age of the primary school child. The main dangers as perceived teachers are:

- parents who park on crossings, corners, and especially double parking;
- parents who park across the road;
- parents who set bad examples as pedestrians;
- the false security of a zebra crossing so that a child believes he is safe;
- children from non-english speaking households;
- impatient car drivers at pedestrian crossings;
- bad example of older children in charge of younger siblings;
- unrestrained children in cars;
- boys on bicycles, especially BMX;
- mothers concern only about the safety of their child, and no other child;
- children crossing nearby a zebra crossing or near lights;
- children walking in gutters;
- lack of supervision of children on bikes;
- children stepping out from behind cars/buses;
- a lack of sense of fear or danger.

6.42 Responsibility for Road Safety Education

Teachers, like parents, believe that most road accidents involving children are directly a result of the child's behaviour. Accordingly, they sympathise with the "poor" driver who is involved. Teachers are aware of the behaviour of children, especially the tendency for boys to be impulsive and even daring.

At an early age, teachers believe parents ought to be responsible for road safety education. However, whilst parents are believed

to have a major role, the infants and primary school teachers believe that far more road safety ought to be taught in the school curriculum. They do feel strongly, however, that wearing seat belts is entirely a parental responsibility. They note, that children are given two entirely different models. In the car they use the seat-belt. In a bus its do what you like. If it is a school excursion seating is compulsory (but no belts). If its a bus to school standing is acceptable.

Teachers believe that they themselves are likely to be more conscious of modelling positive road user behaviour than are parents. They tend to be critical of the bad examples set by parents.

Teachers and parents disagree as to the respective influence each has. Both denigrate their own potential to influence child behaviour and attribute more importance to the other than probably occurs in reality.

Teachers (like mothers) approve of visits by the Police but recognise, more than mothers do, the limitation of such occasional talks. At the pre-school level, the work of the Fire Commissioners with a puppet show was highly commended.

Pre-school teachers were quite open to being involved to a greater degree in road safety education. They recognised the need and the high degree of flexibility that their program offers which would facilitate its introduction. They were happy to take small groups onto quiet streets for training.

In general, school teachers are conscious of the need for road safety education but rarely think of it in formal educational terms. Road safety as a topic is an exception - a response to a problem which has occurred. Teachers complain about a lack of teaching aids. They admit that they do exist but are not readily available to them. 'Road Safety and Me' was mentioned, but usually in terms such as 'its better than nothing' or 'its not that terrific'.

Teachers complain about the emphasis on audio rather than visuals; the language used; and the quality (relevance) of the visuals provided. Teachers use modern day communications. They want video not slides or tapes.

In the primary school, television is a regular part of the learning process. They use the ABC educational TV programs and asked why road safety couldn't feature more prominently in this medium. Some teachers suggested that, with guidance, they could use video to teach road safety by involving the children in video-taping their own behaviour.

Teachers were less enthusiastic about 'Spikes Bike Books' than were the mothers. For the teachers, the children were distracted by the crosswords and jokes.

Road safety clearly is not very salient as something important to be taught to children. Teachers are ill-prepared to teach road safety. They learn nothing in their own training to prepare them for this activity. This is especially true of pre-school teachers.

Teachers are open to a greater involvement of road safety in the curriculum so long as they are given more assistance than they are currently getting. Furthermore, they feel that the community doesn't expect them to place much emphasis on road safety and that television advertising should play a greater role. Such advertising should be aimed at children, parents and drivers.

6.43 Reactions to Suggested Countermeasures

6.431 Engineering Devices to Slow Traffic Down in Residential Streets

Teachers recognised the need to slow traffic down near schools and in residential streets. They were of the opinion that speed signs or zones are unlikely to have much effect. They endorse traffic lights as the best measure and/or the 'lollipop' ladies. Speed humps and/or other devices could assist in slowing down traffic.

6.432 Bicycle Education and Helmet Usage

Like mothers, teachers were unaware of 'Bike-Ed' and thought that there was a real need for it. Those who taught in schools where bicycles had been banned thought that banning was even better. The teachers warmed to the idea of community involvement and 'Bike-Ed' in holiday or weekend time.

Mandatory use of Bicycle safety helmets would be approved of by teachers, although they recognise that the children would hate it. They admit that wearing rates are so low as to be almost non-existent in Sydney (amongst primary school-aged children). Teachers claim that, if the right person could be found, the 'kids' could become interested in wearing them.

6.433 Graduated Licensing

Like mothers, teachers were unaware of the novice drivers over-involvement in child road accidents. They saw the answer in driver education in the schools, including the need to heighten driver awareness of children as a road hazard.

6.434 Adult TV Pedestrian Campaign

Pre-school teachers generally thought it wouldn't solve the problem but it might help. Like mothers, they felt there was a need to aim a campaign at the children. However, all the other groups of teachers applauded the idea because it would make parents more aware of the problem and their responsibility, and hopefully, it might even rub-off onto the children. A side benefit, as perceived by teachers, was that parents might increase their level of supervision.

The N.S.W. video presentation aimed at parents "Crossing Roads Isn't Child's Play" was screened in the teachers group and was reacted to positively and questions asked as to 'why' it hasn't had more exposure.

7.0 ROAD SAFETY EDUCATION

- 7.1 Background
- 7.2 Does Road Safety Education Work?
- 7.3 Setting Measurable Objectives for Educational Programs
- 7.4 Instructional Methods
 - 7.41 Theoretical Instruction
 - 7.42 Practical Instruction
 - 7.43 Instructional Aids
 - 7.44 The Use of Fantasy Characters
- 7.5 Children's Traffic Safety Clubs - Parent/Child Education
- 7.6 Safe Playing Program (Parents and Pre-Schoolers)
- 7.7 Other Programs

Road safety education plays a dominant role in the literature on child road safety. A thorough analysis of the role and nature of specific educational programs is beyond the scope of this volume. This brief chapter attempts to raise a small number of important issues whilst ignoring many other equally important matters, including "Is or can road safety education be effective?". The issue of what are appropriate goals is addressed in some detail. This analysis is followed by a review of what is known about instructional methods, including theoretical versus practical training. The use of fantasy characters is examined. The belief that fantasy characters should not be used is questioned. The growth of Children's Traffic Safety Clubs necessitated their inclusion. The importance of Safe Playing Programs also warrants their inclusion. The chapter concludes with a brief mention of some other programs.

7.1 Background

Perusal of the road safety published literature in relation to children 0-16 reveals a sizeable body of literature on road safety 'education'. Whilst education is only one counter-measure it has evoked by far the greatest amount of published material.

For the young (pre-schoolers), there are many who argue that education is virtually a waste of time (or at least has a very low cost-benefit ratio). This has led some (e.g. Herbert, 1982) to suggest alternative approaches, such as educating adults, including young male drivers and parents. Still others, suggest that the solution is to minimise the involvement of pre-school children in traffic by segregation. For yet others (e.g. Christie, 1983), the solution to improving the safety of pre-school pedestrians is to develop specific education programs for this age group.

The importance of the debate cannot be overlooked. The terms of reference of this project did not include the development of educational materials or recommendations regarding what ought to be carried out by way of educational programs (see section 1.1). Accordingly, this section of the report attempts to outline some of the more significant contributions in the area of education and raise some of the more important issues. Ideally, questions like the following also need to be addressed at some time in the future.

- Does education work?
- * If not, why not? Can it be made to work? Under what conditions?
- * If it does work what is known about what seems to work best?
- * What should be avoided?
- * Are fantasy characters useful or a hindrance for young children?
- * At what age should education start?
- * Can parents be involved in the education process. When and how should the involvement take place?
- * Are traffic clubs an effective educational device?
- * Should education involve real traffic situations or can it work in a protected environment?
- What types of road safety education have been shown to work:
 - pedestrian
 - bicycle
 - pre-driver
 - etc.

- * How effective are existing programs such as:
- 'Bike-Ed'
 - 'Road Safety & Me'
 - 'Roadwork'
 - 'Roadshow'
 - 'Safe Playing Program'
 - 'New England Traffic Education Centre & Programs'?

A thorough analysis of the educational task is the proper subject of a separate report. This section of the current report attempts review only a small selection of material. Extensive analysis of the major educational programs are to be found in Rothengatter (1977, 1981a, 1981b).

7.2 Does Road Safety Education Work?

This question clearly requires an answer. To answer such a question is beyond this paper. For the purpose of providing a summary of what is known it will be assumed that, as a broad principle, education does have an important role to play in improving the road safety behaviour of children. (HORSCORS 1982, p.33).

The OECD (1983) report attempted to assess the effectiveness of education programs:

"The value of road safety education was accepted almost as a self-evident truth in the past, but far more attention has been given to the question of evaluation in recent times. This has resulted not so much from a questioning of the basic need for education, as from efforts to introduce and assess the merits of new techniques of instruction." (OECD, 1983, p.47).

Johnston (1983) pointed out that accident reduction is not the primary goal of most educational efforts and, as such, should not be the sole or major criteria for evaluation. With respect to accident reduction, the OECD (1983) report points that only a small number of studies have attempted to demonstrate the effectiveness of training and education in terms of accident reduction and almost invariably these have produced inconclusive results.

Singh (1982) claims that there is almost no empirical evidence as to the effectiveness of education and/or informational programs, including face-to-face and mass media campaigns if the criteria employed is changes in road behaviour. To use the early Lasswell paradigm of communication effects, there is still a very real need to establish what kinds of educational programs for road safety have what kinds of effects on what kinds of people? (Schramm & Roberts 1971).

Thus, the general question as to the effectiveness of education needs to be restated. It is not simply a matter of whether or not it works, rather, what works to what effect on what kinds of children.

The OECD (1983) report concluded that the instruction of children in road safety is a "desirable practice which should start from an early age". Furthermore, it concluded that, in recent times, considerable interest is now being shown in programs aimed at pre-school children and their parents.

In the following sub-section an attempt will be made to examine what is known about the various programs which have been documented in the literature, as well as the instructional methods.

7.3 Setting Measurable Objectives for Educational Programs

Goals and objectives serve two purposes. Most importantly, they guide the nature of the educational process through content and execution. Of almost equal importance, objectives make realistic assessment of the program possible, at least in theory. Accident reduction, in the view of the author, ought to be a goal of any educational program. It is not, however, an objective. Goals are broad aims or general descriptions of desirable outcomes. An objective is a goal made specific as to time and degree. The same distinction needs to be made between strategies and tactics.

In setting objectives for road safety education it is important to recognise that young children are forced to negotiate the hazards of the road and adults have an obligation to protect them as much as possible from these hazards. Michon (1981) provides a useful analogy with teaching the "Three R's". The fact that someone, later in life, might choose not to read or write at all, does not relieve the system from teaching the "Three R's". Similarly, whether or not a person will choose to behave safely in traffic is in fact immaterial for the pertinence of traffic education.

Thus, whilst accident reduction is a worthwhile goal for road safety education, specific objectives should be set relating to the educational process. Ideally, such objectives ought to include behaviour in the road traffic environment. Michon (1981) argues that road traffic education ought to adopt the objectives formulated by van der Molen, Rothengatter, & Vinje (1981) viz:

- to recognise and select safe situations;
- to behave as safely as possible in those situations.

The team of researchers (van der Molen, Rothengatter, Vinje, & Michon) at the Traffic Research Centre, University of Groningen in the Netherlands have carried out extensive 'task-analyses' in relation to the child pedestrian tasks (van der Molen, et.al. (1981); van der Molen (1981); Rothengatter (1981b)). At this point in time it appears that their research is state-of-the art as far as 'task-analysis' goes. One of the primary purposes of task-analysis is to determine which behaviour is desired and which is not. Task analysis also analyses what should take place versus what behaviours actually do occur.

Having determined which behaviours are desirable and which are not, it is critical to next determine which abilities or functions are needed for these desired behaviours. Such ability information, of necessity, must be related to road behaviour. Such studies are very rare (Avery, 1974; Older & Grayson, 1974) and much of the work in this area is theoretical (Vinje, 1981). These theoretically based abilities and functions must then be related to the developmental process. As expressed by Vinje (1981):

"If certain functional processes are deficient at a certain age, it should be considered whether they can be trained or whether there is some way to perform the relevant task without relying on these processes." (Vinje, 1981, p.225).

Vinje (1981), after reviewing the current state of knowledge of abilities and limitations of children as pedestrians, concluded that:

"The most striking conclusion to be drawn from this survey is that there exists a depressing lack of hard facts. Because of the lack of detailed information it is not possible at present to give a detailed set of educational objectives feasible at a particular age, or rather at a certain developmental level." (Vinje, 1981, p.235-236).

As a result of her analyses, Vinje argues that cognitive training methods seem virtually useless because young children (under 5 years of age) have very little control over their attention and, as well, have a deficient regulatory mechanism to inhibit impulses. She recommends concrete behavioural training throughout childhood (up to 11-12 years of age).

Van der Molen (1981), in one of the most extensive surveys carried out to date, argues that a "wealth of data exists" concerning the actual task performance of child pedestrians.

Grayson (1981) points out that four approaches can be used to identify training objectives:

- the study of accidents,
- the study of child behaviour on roads,
- exposure (preferably in relation to accidents to obtain measures of risk),
- theoretical (e.g. task analysis).

Grayson challenges traditional wisdom by examining three road safety principles. First, "Don't run across the road". This principle is based on accident records which show that running out into the road was a common contributory factor in fatal accidents involving child pedestrians. Often, the data comes from driver's accounts. However, other studies have found that many children involved in accidents were running at the time. Grayson argues that this does not mean that running as such is dangerous. Traditional wisdom was that running was dangerous because of the possibility of falling over. Perhaps running can reduce the level of danger as the child is on the road for less time. Observation studies show that running is commonplace behaviour and, to date, there is no evidence from exposure studies to indicate that running is associated with a higher risk of accident. Grayson concludes that it is not running that leads to accidents, but forgetting to look before and during the crossing task. Grayson challenges the conventional wisdom in relation to "don't cross near junctions" and "cross away from parked cars". The former is very much a U.K. only principle.

The essence of Grayson's argument is that all four procedures are important if sound educational objectives are to be achieved. To date, the emphasis has been largely on theory and accident analysis. He argues the need for behavioural observation studies to find out what children do. The current author would agree. Behaviour cannot be explained if it cannot be defined and attempts at defining what behaviour should occur depend first on what is occurring. According to Grayson:

"..... it must be accepted that the identification of "safe" or "dangerous" aspects of behaviour is still some way off, as is any real understanding of the relationship between behaviour and accidents" (Grayson 1981, p.172).

The act of studying "normal" behaviour may not be very productive unless the seemingly deviant behaviour is also studied. It is the latter we need to know much more about.

In addition to observational studies, Grayson argues that the most promising area is exposure studies so long as they compute the risks associated with alternative courses of action. Then, educational efforts can aim at replacing high risk patterns with low risk patterns rather than relying solely as accident data.

Thus, it appears that there clearly are very significant gaps in the current state of knowledge so that consensus on goals or objectives is not yet achievable. Given this constraint the task in the remainder of this section is to examine what knowledge exists in relation to programs and techniques, etc.

7.4 Instructional Methods

7.41 Theoretical Instruction

The one-off safety lecture has been shown to be relatively ineffective. Maisey (1982) studied the effectiveness of a Police lecture to children in Western Australia. He found a slight improvement in cycling and pedestrian behaviour, but not enough to show the effectiveness of the lecture.

School Instructional programs are to a large degree dependent upon both the materials and the teachers. To be effective instruction to children must be simple, using terminology they understand (see lists compiled by Cattell and Lewis, 1975). They must be taught only a little at a time and this must be constantly reinforced. Teaching should relate to what the child should do, not what he should not do. The most effective method is to teach the theory indoors for a short time and then pay more attention to practical training outdoors, preferably on the road.

Teachers need to be informed as to how best to train their pupils. Ideally, they should be taught whilst still in the training colleges or alternately in-service training courses. Otherwise, printed material with detailed instruction and explanations informing and encouraging the teachers seem to be the most appropriate method.

A current example of such a program is "Safety and Me" being run in the N.S.W. schools. An evaluation of the teacher effectiveness (Schreiber & Berry, 1978) found that the lack of pupil interest was related to the teachers' poor use of the material. They concluded that the teachers needed to be trained in the effective use of the material. Their finding is a salutary reminder, to initiators of educational materials and programs, that the implementation of programs is as important as the development of materials.

Rothengatter (1981) argues that theoretical instruction whilst it may be effective in communicating traffic knowledge, has little or no effect on traffic behaviour.

7.42 Practical Instruction

Rothengatter (1976, 1981(a), 1981(b)), Yeaton & Bailey (1978, 1983) lead to the inescapable conclusion that the real street, preferably with traffic, seems to be the most promising instructional situation in which to train traffic behaviour.

Little can be expected from training in semi-real situations. Simulated street situations may in, some cases, be effective. The effectiveness of classroom training is dependent on the use of audio-visual media.

Demonstration of the desired behaviour is likely to be effective but depends on the characteristic of the person modeling the behaviour. Rothengatter (1981), concludes that the modeling principles of social learning theory enhance demonstration effects. Practical training per se, however, seems of little value unless followed by a behaviour modification approach. Models ought to be prestigious characters.

7.43 Instructional Aids

The only firm conclusions to date are that audio-visuals can be useful especially if used to display demonstrations following modeling principles. Film seems to be superior to slides and video-tape replay of observed behaviour seems to have a demonstrable effect on traffic behaviour.

The value of printed media is not so clear (Embry, 1984). According to Rothengatter (1981), over-exposure to such material can even have negative results.

7.44 The Use of Fantasy Characters

Outside of road safety, the use of fantasy characters in the education of the very young (under 5) is commonplace. The Tufty Club founded in England, in 1961, used Tufty the squirrel who, with his animal friends, became involved in many dangerous situations in which he nearly always sets a good example of safe behaviour, in contrast to his playmates. Colborne (1971) investigated the use of Tufty with pre-schoolers. She concluded that the use of an animal character to convey one basic item of pedestrian safety had been successful even though a complete understanding of the intended message was rare. Later, Firth (1974) demonstrated that road safety officers, head teachers and playgroup leaders believed that animal characters should be used to illustrate road safety literature for children aged 2-9 years.

Fantasy characters have also been used in N.S.W. (Hector) the cat; in South Africa (Danny Cat); and U.S.A. (Low the Roo) (see Rothman 1980).

Schreiber & Lukin (1978) carried out an exploratory study of 'Hector the Cat' road safety materials developed by the Commonwealth Department of Motor Transport between 1971 and 1975. Since that study, fantasy characters have not been used in road safety in Australia, it being concluded by others that fantasy characters don't work!

Schreiber & Lukin (1978), in their study, presented the children (aged 3 1/2 to 8 years) with a conflict situation in which Hector (or their favourite TV fantasy character) and a Policeman were giving conflicting advice as to whether or not a child should cross the road. The results indicated that the child obeyed the Policeman 67% of the time. Schreiber & Lukin concluded that:

"The subjects preferred to obey a realistic authority figure in preference to a fantasy character." (Schreiber & Lukin, 1978, p.13).

The current author would argue that, before fantasy characters are banished forever from pre-school road safety education, further investigation is desirable. For example, Dueker's (1975) research on imitation and children's traffic-related behaviour revealed the importance of using child-esteemed models.

The most extensive use of fantasy characters outside of "Tufty" and "Hector" has been in the materials developed by Dennis Embry and his colleagues in their Safe Playing Program (Embry & Malfetti 1980, 1981, 1982). They make extensive use of Sesame Street characters to develop symbolic modeling by imitation. Embry (1983) argues that children will not imitate just any symbolic model. The model needs to receive positive social attention, be perceived as powerful, and must be something/someone that children can identify with strongly.

The impact of Embry's use of fantasy characters in a positive modeling context is the fact that the Safe Playing Program is empirically based using extensive field testing over a number of years in the U.S.A. and, more recently, in New Zealand. If fantasy characters posed a problem, Embry and his colleagues would have detected the problem and removed them. These characters are a vehicle to enhance imitative behaviour. The imitation process could very easily employ real-world characters but Embry and his colleagues have found no reason to depart from their Sesame Street characters. Furthermore, the use of story books to promote imitation or concept learning is well documented (Fischer & Torney 1976; Kelley, Embry & Bauer 1979; Zebrowitz,

Zebrowitz, McArthur & Eisen 1976). The interested reader is urged to read Lutzker's (1980) "Children's Storeybooks as Mediators of Behaviour Change" which is the report of a symposium on the subject.

7.5 Children's Traffic Safety Clubs - Parent/Child Education

Since children are allowed to participate in traffic at a very early age there has been a move towards commencing education at the earliest possible age. As a result, Children's Traffic Safety Clubs have been developed in a number of countries. Generally, children are enrolled by their parents and material is sent to the parents explaining developmental trends in children, their capabilities and recommending exercises and practical tests for the children.

Limbourg & Gerber (1981) claim that most of the pre-school educational programs have only a limited empirical and theoretical basis and most have never been evaluated. The question of evaluation is very important, as mentioned above. Grayson (1981) argues that it is desirable to regard road safety education from the standpoint of realism rather than of utopianism. Safety education may well be an 'act of faith' for many, whilst others regard it as a necessity in a society which cares for its young.

Children's Traffic Safety Clubs, as they currently exist, vary from country to country. In the U.K., the Tufty Clubs were developed in 1961. In Japan, Children's Traffic Safety Clubs exist using the Tufty Club model (Hoshi, 1976). More recently, Downing (1980) investigated the possibility of setting up a British Traffic Club for pre-school children aged three to four and half years. This was followed up by further research (Downing, Murray & Durow, 1981).

In Scandinavian countries children aged 3-7 years are involved and the child enrolled by his/her parents before his or her 3rd birthday. A small fee is involved. To date, only around one third of eligible children have joined. Every six months child and parent receive materials including advice to parent and guidance in child development and exercises to work out with the child. The program runs over 4 years after which the child enters primary school. There is no kindergarten/infants system as in Australia.

The Norwegian Traffic Club was evaluated by Schioldborg in 1974 and 1976. These evaluation studies were not published in English. He did present highlights in a paper in 1978 (Schioldborg, 1978). The best documentation of the evaluation study, in English, is provided by Rothengatter (1977). Since the Schioldborg study have been used to support (e.g. Christie, 1983) and deny the value of Traffic Safety Clubs, the results, as reported by Rothengatter (1977), are quoted verbatim:

"On the basis of the combined results Schioldborg (1975, 1976) concludes that members have a higher degree of road safety. Whether this is an effect of the Children's Traffic Club is unclear. The learning objectives of the club have only partly been reached: it is effective in 'giving the child elementary knowledge about traffic' (as evaluated by the knowledge test, but it is not effective in 'creating the correct attitudes and habits towards traffic' (as evaluated by behaviour observation). To summarize, it has to be concluded that the traffic club is not effective in changing children's traffic behaviour (one of the explicit objectives of the club) and is not effective in changing parent's attitudes or restrictions on exposure. The differences in accident rate between members and non-members cannot be explained on the basis of an identified effect of the Children's Traffic Club." (Rothengatter, 1977 p.26).

Downing (1981) points out that some of the impetus for traffic clubs comes from the seeming success of the Swedish Traffic Club where child road casualties fell significantly after its introduction in 1969. The trial by Downing of a booklet for the proposed British Traffic Club came out in favour of Traffic Clubs.

Most recently, empirical evidence of the effectiveness of parent education/child education for pre-schoolers has emerged in studies by the researchers at the University of Tübingen in West Germany by Limbourg and Gerber (1981) and in The Netherlands by Rothengatter (1981).

The Tübingen road safety program was developed independently of the Traffic Schools but has since been integrated. It consists of a media package with a film showing the training stages (model film for parents) and a brochure which gives concrete instructions as to what to do in the different developmental stages. The training program can be used within a variety of frameworks such as Kindergartens, parent teacher meetings, school, or could be brought to the attention of parents by TV advertising. The film is an integral part of the program. The details of the program are outlined in Limbourg and Gerber (1981) including parents activities at each stage.

TABLE 83 NUMBER OF CHILDREN REGULARLY ATTENDING CHILD CARE SERVICES BY AGE OF CHILD AND STATE

AGE IN YEARS	NSW	VIC	QLD (A)	SA	WA	TAS	NT	ACT	AUSTRALIA
Less than 1 year	641	891	412	465	160	125	87	308	3,089
1 year	2,003	2,769	1,208	1,221	567	394	207	666	9,035
2 years	3,795	4,497	1,871	2,078	1,177	565	321	869	15,173
3 years	21,552	12,939	2,254	6,499	3,353	1,183	534	2,126	50,440
4 years	39,786	43,791	1,811	15,361	11,835	4,301	2,121	4,118	123,124
5 years	5,698	8,988	711	1,712	12,229	2,351	362	635	32,686
6 years and over	74	111	18	48	157	21	53	20	502
TOTAL	73,549	73,986	8,285	27,384	29,478	8,940	3,685	8,742	234,049

(A) Queensland did not participate in the 1982 NDB Collection. **The statistics for Queensland** were collected by the Office of Child Care from Family Day Care Schemes and child care centres funded under the Children's Services Program.

Source: National Data Base Collection from Pre-school and Child Care Services - 1982.

The evaluation of the program revealed that results depended upon the age of the children, the training quality and the training frequency. A follow-up study revealed some decay, but the exposed groups still outperformed the control groups. One of the major weaknesses of the program was the practice of giving the parent all the information in one block covering a number of years of activities. Parents were likely to try and give too much information to the child on too few occasions and assumed the child "knew" what to do and would retain and implement the knowledge. As a consequence, the parent did little by way of continuous teaching. It is possible that this anticipation, on the part of the parent, that the child "knows" lead to greater exposure. The results of the Tübingen program lend weight to the belief that a staged presentation is needed for both parent and child, as occurs in Children's Traffic Safety Clubs.

Another important finding from the Tübingen program is that it is possible to teach children resistance to distraction, at least in semi-controlled conditions (see also Mohr, et. al. 1983).

In the Dutch study (Rothengatter, 1981a) using similar approaches based on behavioural modeling in a real world environment also found positive results. The study known as the Hoogherk Experiments which involved a number of stages, assessments and revisions produced similar positive results as the German program. Rothengatter concludes that, whilst the program was effective, these effects were dependent upon the motivation of both parent and the child. The Hoogherk experiments used preschool involvement, parent evenings including filmed demonstration and printed and audio-visual material. One key feature of the Dutch program was the integration of pre-school staff and parents. The pre-school staff carried out classroom activities, including media presentations, whilst the parents carried out the behaviour training in the traffic environment.

It must be noted that this integration is theoretically achievable in Australia where over 120,000 4 year olds regularly attend some form of child care activity (table 83 opposite).

In sum, it appears that recent attempts at pre-school training based on behavioural modeling involving parents has resulted in positive changes in child pedestrian behaviour.

7.6 Safe Playing Program (Parents and Pre-Schoolers)

According to Michon (1981) and Van der Molen (1981) children's risk is of the order of 40 times higher than an adult's risk where encounters as pedestrians are concerned with motor vehicles. This has lead many researchers to argue for the minimisation of young children in traffic. This approach known as the protection - segregation approach (Christie, 1983) has an educational counterpart to the normal engineering measures.

Laugeson & Antoniadis (1984) in a review of New Zealand pedestrian casualty and child fatality rates including an analysis of coroner records, recommended that:

"Traffic education for younger children be refocussed to place more emphasis on parents taking responsibility for walking beside their young child in crossing the road and less emphasis in training young children in how to cross the road by themselves." (Laugeson & Antoniadis, 1984, p.2-3).

Embry & Malfetti (1982) developed a program entitled 'Safe Playing program' for the American Automobile Association. Like the Traffic Clubs, and the instructive programs of Limbourg & Gerber and Rothengatter, the program involves parents and can easily incorporate pre-school and/or kindergarten teachers. The Embry program also uses behaviour modification principles, or applied behavioural psychology. Whilst Embry is currently developing a street-crossing training program in New Zealand for 5-7 year old children, the Safe Playing program is aimed at pre-schoolers, and attempts to teach pre-schoolers not to enter the road without an adult. Embry (1983) argues that parents want to keep their pre-schoolers out of the road entirely (and this is supported by the current study (section 6.3). Therefore, a program aimed at teaching independent road crossing does not have parental support. Embry's program focuses on changing the behaviour of children in the natural environment in which accidents occur using proven techniques such as symbolic modeling. Furthermore, Embry's current study attempts to identify the processes and techniques necessary for the program to be widely accepted and used.

The success of the Safe Playing Program is difficult to determine at this point in time. According to Embry:

".. A recent review of literature on children's accidents undertaken at Vanderbilt University in the United States reveals that the Safe-Playing Project is one of the very few educational programs to have documented impact on children's accident-related behaviour, and Dr. Leon Robertson, a major advocate of the injury-control model, has proposed to cite the Safe Playing Program as an example of how "educational" approaches should be developed and tested in a forthcoming book." (Embry 1983, p.9).

The major ingredients in the Embry approach appear to the current author to be:

- pre-school safe play behaviour not road crossing behaviour,
- proven principles of behaviour modification not a cognitive approach,
- involvement of parents and/or teachers,
- audio-visual material, including booklet and videotape,
- an empirical developmental program with feedback and modification.

Assessment of the program to date must remain tentative. As with Limbourg and Gerber, and Rothengatter, Embry has carried out his own evaluations. The two available for this review were unpublished. Embry and Malfetti (1984) undertook a study to evaluate the effects of modeling alone, presented via story book, on the rate of children's entries into the street while playing outdoor near their homes. The results revealed that the story books alone had only a transient effect. The author suggest that modeling may be incapable of producing long-lasting imitation in the absence of direct reinforcement for the imitated behaviour.

Embry, Rawls, Hunt & Hemingway (1984) conducted a study to evaluate the effects of an individually-based stand alone, parent-training package on the rate of children's entries into the road while playing outdoors near their own homes. The results have not been finalised but appear to be encouraging.

7.7 Other Programs

As mentioned previously, this section of the report is selective rather than comprehensive. In this subsection, a number of other programs are included to demonstrate the range of activities being undertaken.

Mohr, Parsonson & Field (1983) carried out a road crossing

Mohr, Parsonson & Field (1983) carried out a road crossing training program with 5 year olds in New Zealand using parent volunteers. The results revealed that the trained children performed a series of safe street crossing behaviours consistently on the training street and another street and these behaviours persisted in a follow-up beyond the pre-training level. In a personal communication with a member of the New Zealand Ministry of Transport (Mr. Wayne Perkins) a number of interesting observations were made. First, it takes a lot of effort to achieve a result if there is no contingency for performance. Second, stopping is critical to looking. Third, adult distractors are very powerful - so are older siblings, but as with the Tübingen program it is possible to teach resistance to distractions.

Ryhammar & Berglund (1980) present one of the very few recent documented educational programs aimed at the primary school aged child (Forms 3-6). A search of the literature reveals that very few other programs have been documented in the last 10 years in relation to school-based programs. The current material used in primary schools in Australia has not been evaluated. This situation appears to be the 'norm' judging by the lack of documented evaluations.

Some findings of the Ryhammar & Berglund (1980) study are worth noting, especially since bicycle activity was part of the Swedish program and evaluation. Furthermore, the Swedish program involved instruction over a normal class year but in two periods each including five practical lessons in a real traffic environment. Assessment took place on four occasions during the year using the real traffic environment as well as the creative tests. They concluded:

"....in spite of training and improved knowledge of road traffic, it is not always possible to count on children being reliable road users.

....some parents tend to overestimate their children's knowledge of road traffic.

....the parents take a positive attitude to instruction in schools, but today this instruction falls short of their expectations and requirements." (Ryhammar & Berglund, 1980, p.1).

A new approach to road safety for high school students is the development of ROADSHOW which was first performed in April 1982 in Christchurch in New Zealand. ROADSHOW is a multi-media road safety stage show aimed at high schools students. ROADSHOW is directly aimed at highlighting poor driver attitudes. It correctly assumes that providing people with facts (statistics) is unlikely to influence driver behaviour. Accordingly, it attempts to communicate via a strong emotional content.

ROADSHOW is an interesting initiative but no assessment was available to the author at the time of writing. Given the nature of the problem it sets out to deal with, every effort ought to be made to (1) trial the program and assess it; and (2) to find a more practical way of making it available. As a medium, it appears unlikely to be practical on a large scale.