

# Roadcraft

DRIVER EDUCATION SPECIALISTS



*TOWARDS DEVELOPING  
SAFER, MORE AWARE & ATTENTIVE  
DRIVERS*

**Note to Roadcraft Educators:**

The underlying philosophy of all Roadcraft courses is to foster and promote attitudinal change.

This is done by embracing best practice and sharing the proven driver training techniques, systems and principles in order to enhance the participants' understanding of the simple need to maintain more space, look further ahead, concentrate on the task, drive smoothly and be "in the car" in order to stay safer on the roads.

Participants need to leave with the appreciation that human beings have no natural responses for driving a motor vehicle. In fact if we rely on our natural reactions they will most likely make any emergency driving situation worse and contribute to a crash.

It is an expectation that all participants attending Roadcraft courses leave with the understanding that they will be much safer on the road by relying on Low Risk Driving principles and techniques and avoiding any need to react at all times, and that if they do react, there has been a breakdown in their technique.

Roadcraft's aim is to have participants complete the course with the understanding that they have a choice in their driving destiny and that their safety is first and foremost their responsibility.

We do not want them to leave believing that they are a better driver or good driver. We want them to appreciate that by using the systems and techniques advocated they will be safer, more aware drivers, thus improving the safety of all road users.

All course information, demonstrations and exercises are to be presented and carried out with the above philosophical tone in mind.

## *Roadcraft's commitment is to prevent road trauma by providing effective road safety education to road users of all ages.*

Roadcraft is a "Not for Profit" Community owned organisation that has been providing quality driver education to road users of all ages for over 33 years. Over time, we have developed courses that are truly effective covering all areas from secondary students, learner and licenced drivers, 4WD and corporate clients. The concept and development of Roadcraft came into being in the early 1980's and was initiated by the Rotary Club of Gympie with the assistance of many dedicated people from other service clubs and the community.

Roadcraft is governed by a Management Committee consisting of local residents and business people who have a dedication to the reduction of trauma on our roads.

### **Student Driver Education**

Roadcraft Driver Education works with children from Prep to High School age coming from as far afield as Rockhampton to the North, Chinchilla to the West, and the Metropolitan to the South.

Year 11 - 12 students with limited or no driving experience, learners and provisional licence holders are taught to identify, understand and avoid hazards on the road as well as develop the ability to anticipate effectively. Participants are encouraged to make mistakes in the simulated and safe environment where they can experience the results and gain the appropriate knowledge and understanding without the serious consequences associated in the real driving world.

In our two day courses students are coached and nurtured by Educators whose primary aim is to assist them to:

- develop the appropriate safe attitude to the road environment
- build their understanding and ability to deal effectively with peer pressure
- build respect for road law
- become safer more aware drivers
- greatly enhance their appreciation and understanding of the risks
- reduce or even eliminate risk while driving

and, all at the beginning of their driving career.

Roadcraft also caters for 'Special Needs' students over a two-day course. These students are encouraged to develop their appreciation of the driving task, ability to drive safely and manage traffic situations in simulated purposefully designed exercises on the Roadcraft circuits.

### **Professional Services**

Corporate clients who have fully embraced Roadcraft's education programs consistently report greatly reduced crash rates.

Our courses all contain a careful balance of theory and practical hands on driving, each reinforcing the other. Without the theory, complete understanding is not possible. Without the practical, effective translation of the theory to the real-life road environment is not possible.

Our involvement in both academic and practical research ensures thorough understanding of what it takes to reduce risk and maximise safety in the driving environment. The Roadcraft training complex at Gympie is a purpose-built facility which provides the safest possible environment for participants to learn the Low Risk Driving Techniques required to stay safer on the roads.

Roadcraft prefers to work with relatively small numbers on a course so that we can address any particular individual learning needs or issues that may be of concern, and we can give individual attention to every participant assisting them to develop the techniques and systems advocated.

### **Membership**

Membership of Roadcraft is open to any interested person in the community. At present, there are some forty members, but many more in the local community, including local Service Clubs, support Roadcraft and the work we do in reducing road trauma. Members do not necessarily benefit directly themselves from this membership.

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## Forward:

The purpose of this manual is an attempt to provide an in-depth understanding of the systems, techniques, principles, concepts and philosophical approaches developed in house or adapted from world best practice by Roadcraft Driver Education in order to provide courses that work and adjust the attitudes and risk acceptance of drivers.

In fact we do not teach driver training, we teach a philosophical approach to driving.

The systems, techniques and principles of driving expressed in the following pages are the culmination of the combined efforts of many highly experienced, knowledgeable and proficient driver educators whose primary aim has been to impart best practice low risk driver education to participants.

It should become evident that drivers can easily increase their safety on the road by simply applying the arts of space management and avoiding the human tendency to fixate by concentrating on the job (Driving) more often.

By adapting these simple strategies drivers can become as **crash proof** as is possible.

**Ultimately your safety is your responsibility; it is the driver that makes the difference on the road.**

You have a choice!

The current driver licencing system is adequate for new drivers to learn how to develop the "monkey" skills of starting, turning and stopping a motor vehicle under a basic assumption that if you obey road law you will be safe. It does however, not address the need to expose new drivers to their natural HUMAN SURVIVAL RESPONSES and how these responses can cause them to react inappropriately in an emergency situation, especially when they feel threatened or get a fright, causing them to have a crash. However, if they had been aware of and exposed to these natural responses, they would be more inclined to respond appropriately and likely avoid a crash.

What we have found over many years of educating drivers is that once drivers become aware of these Survival Response tendencies they become motivated to use proven Low Risk Defensive Driving techniques and principles to avoid getting into threatening situations in the first place.

Over the 3 decades of its existence Roadcraft has seen many changes and had many Mission Statements; much thought has gone into this statement to ensure that it represents what we stand for and what we do.

Roadcraft Driver Education's mission is -

**'To prevent road trauma by providing effective road safety education to road users of all ages'.**

Our courses are purposely designed and developed to maximise the participants' learning experience and motivate them to use proven systems and techniques to minimise their level of risk on the road.

Roadcraft courses focus on developing the appropriate attitudes and understandings that address the risk acceptance of all drivers and particularly young drivers, arming them with the ability to use advanced visual skills, space management techniques, observation skills and anticipate more effectively, minimising the risks faced while driving.

Roadcraft Educators are highly trained and motivated to provide the best possible learning experience and outcomes, while making the Roadcraft courses fun to participate in.

The types of things participants can expect to be exposed to at our courses are –

- How to develop the appropriate posture, bracing and steering techniques for safe, crash proof driving.
- Learn about individual Survival Responses tendencies and how to avoid these inappropriate responses taking effect in any driving situation.
- Develop advanced visual and peripheral vision techniques.
- Learn how to apply the management of Time and Space principles effectively maximising safety.
- As well as this participants are exposed to simulated potential life threatening road situations where they can experience how to avoid crashing in a safe environment.

By participating in a Roadcraft course participants will develop a heightened awareness of what it takes to remain crash proof and the techniques appropriate to maximise safety and minimise the risks associated with the driving task.

The following pages have been developed from a mix of the learnings of many individual instructors over time as well as incorporating some of the session plan contents to enhance the reader's understanding of what it takes to become a safer, more aware and conscientiously attentive driver, maximising safety and minimising risks on the road for all drivers. Reader may note there is no mention of Road Law and its applications; this is deliberate as Road Law is more than adequately covered in current licencing manuals and Learn to Drive publications.

### SOME DRIVER STATISTICS FROM 2013

- Injury is the single biggest killer of Australian youth; more than all other causes combined.
- 45% of all young Australian injury deaths are due to road traffic crashes.
- Of all hospitalisations of young Australians, almost half are drivers involved in a road traffic crash and another quarter are passengers.
- Young drivers (17 – 25 years) represent one-quarter of all Australian road deaths, but are only 10-15% of the licenced driver population.
- A 17 year old driver with a P1 licence is four times more likely to be involved in a fatal crash than a driver over 26 years.
- The biggest killer of young drivers is speeding and around 80 percent of those killed are males.
- One-third of all speeding drivers and riders in fatal crashes are males aged 17-25; 6 per cent are females aged 17-25.
- Two thirds of the Australian population live in capital cities and metropolitan areas but more than half of the road fatalities occur on rural and remote roads.
- Current estimations are that at least 700 people are killed annually in rural areas, with many thousands seriously injured.
- Road safety is the greatest threat to human life in workplaces, resulting in the deaths of around 450 Australians in the course of their work every year.
- Current figures supplied by the Royal Australian College of Surgeons indicate that each week there are on average 25 deaths and 600 serious injuries on our roads (that's 1300 deaths and 32,500 serious injuries per year).
- The social impacts of the above mentioned are devastating and the annual cost to the Australian economy is estimated to be \$27 billion.

**Not Accidents** – They are almost always avoidable so therefore they are Crashes.

Note: The following article was written with the intention of sharing some of the knowledge and learning strategies for driver development being practiced at Roadcraft Driver Education in 1996. I feel it is just as relevant in today's training environments and hopefully will assist to enlighten readers.

## DRIVER TRAINING

### Why should we train drivers?

#### WHAT IS REALLY HAPPENING ON OUR ROADS?

There are so many thoughts that come to my mind when thinking about driver training.

Having spent the best part of nine years working as a Senior Instructor with a prominent Queensland Driver Education Complex, training Queensland Ambulance Service personnel, Corporate and private clients, as well as Hyundai one day advanced driving training courses and tens of dozens of tertiary students in the very simple arts of Defensive Driving and not so simple vehicle control skills, I feel that I am in the enviable position where I have been able to observe literally hundreds of drivers of all ages, from many different backgrounds and varying degrees of experience and would like to share some of my observations with you.

One of the conclusions many professional driver educators have come to is that most drivers seem to learn very little after they get their licence, and in fact spend very little time and effort endeavouring to develop or improve their driving skills.

In many cases the requirement for licencing is viewed as an inconvenience and the motivation for going through the licencing process is in order to receive the piece of paper that deems one legal to drive on the roads.

In fact the licencing system exacerbates the situation by allowing untrained, questionably experienced drivers (parents, friends, relatives) to train the new drivers (many of these so called experienced drivers have poor driving standards and have themselves developed bad habits that are not necessarily conducive to safe driving).

In order to substantiate these statements I would like to share the following observations -

**Human beings have no natural responses for driving a motor-car, in fact if we rely on our natural reactions they will most likely make any emergency driving situation worse and contribute to a crash.**

In my role of Driver Educator I have often been involved in courses educating 15 to 18 year old students in the basic fundamentals of driving a motor car; these courses can be of two and three days duration. I am often amazed at how quickly these students (some that have never even steered a car before) can be educated to drive, and in most cases control a car in simulated emergency situations with an acceptable degree of proficiency.

I have learnt, as have my colleagues, that in order to take charge of the vehicle it is often simply a case of **controlling or directing the driver's eyes in the direction you want the vehicle to go.**

It is not often after the learner learns to stop, go and steer that we find we have the need to use passenger side pedals that are fitted to vehicles for the educators.

It is important to understand however that this training is all done in a controlled environment at the training complex.

Now the point I would like to make here is that we can take control of the vehicle the same way with almost every driver regardless of age or experience providing we don't introduce the fear factor which I shall cover later.

There is a saying we share with our clients: **"Your eyes don't tell you what you see. You tell your eyes what to look for"**. From my observations it is apparent that many or even most of our drivers on the roads, whether they've driven two years or twenty years have not learnt **"where to look or what to look for"** in normal driving situations, let alone life threatening ones.

This is not surprising however if you stop to consider that “Man was never designed to travel at speeds over 10, 15, 20 km an hour,” and that our eyes (**the primary guidance system**) were only intended to guide us at walking or running speeds.

Another observation that I feel is of considerable significance is that it seldom happens that a pupil is unable to **react quick enough** regardless of age or gender. In fact we find we need to spend a lot of time developing **systems of control** in order to **suppress their natural tendency to over react**, inducing more transfer of weight in the vehicle than the tyres (grip or traction) can deal with by winding on too much steering too quickly, standing on the brakes and locking the wheels or punching the accelerator and spinning the wheels or any combination of these inappropriate reactions.

By observing hundreds of drivers in simulated emergency situations it has been possible to observe that human beings have major deficiencies that are primary causal factors of motor vehicle crashes, especially coming into effect when a driver is confronted with an **unexpected situation** or **gets a fright**.

These responses are automatic and, in the untrained or uneducated driver, can be fatal. They are in our basic genetic make-up and as **they are automatic are predictable**; they are our **Natural Survival Responses**. These responses are the same ones that have helped man to survive throughout eternity until the invention of the motorcar.

**What, you might ask, are these survival responses?**

- **FIXATION:**
- **AGGRESSIVE OVER REACTION: Overuse of steering. Overuse of brakes.**

**Fixation:** The first thing we tend to do when confronted with a potential life-threatening situation is look at it.

This is necessary, as we need to do this to understand the danger in order to respond appropriately. How long this process takes is the critical difference. This then leads to **fixation** which works very well for us in most potentially life threatening situations, except in motor vehicles at speeds above 20 kph.

**Fixation has the potential to kill at much less than normal posted speed limits.**

It is interesting to note that some people tend to have a much stronger tendency to fixate than others.

It is also very important to understand that at 100 kph a motorcar is travelling at 27.8 metres per second.

So it is perhaps obvious to conclude that the longer a driver fixates on a problem the less **time**, or more importantly **space**, that driver has to respond in. The later the driver sees the hazard the less **time** he has to **understand** it and therefore respond appropriately and the more chance there is of that driver **reacting aggressively** and inappropriately, causing a crash scenario.

We have observed this effect with literally hundreds of drivers as they **over-react** during training sessions.

When confronted with an emergency we need **time** or **space**, to identify a satisfactory alternative (**OPTION**)

**TIME + SPACE = OPTIONS**

**Over-reaction:** When we run out of **time** or **space** we tend to fixate on the problem, then we over react on the brakes and/or crank on too much steering, generally causing the wheels to lock up in vehicles without ABS and the car skids straight into the problem.

This is obviously not the desired result, and you see the evidence of this at almost any set of traffic lights or intersection, controlled or uncontrolled.

**Roadcraft has developed specific hands on exercises to demonstrate this effect and heighten the trainee driver's awareness and understanding of these human deficiencies that are seldom appreciated by uneducated drivers.**

There is an argument against hands on simulated emergency vehicle control training that is often mentioned in the media or by anti-driver training lobbyists that does have some merit, especially when you consider the complications that can be introduced by teaching advanced vehicle control skills to immature adolescent or even adult drivers, who may have a much higher degree of **risk acceptance** than is generally accepted by more experienced mature drivers.



My response to this is:

Surely, these **higher risk takers** would be **better off** and even **safer** to have **some knowledge and understanding** of the forces they are playing with and the consequences of their actions by exposing them to the potential **causes and effects** in the controlled environment, where they can find out what happens without placing others at risk.

In short, if they are that way inclined, they are going to do it anyway. Not that I condone this attitude or behaviour, but aren't these drivers better off with some knowledge rather than none?

To go one step further, it is possible to change the attitude and **level of risk acceptance** by exposing these high risk takers to their **natural survival responses** and their own limitations as drivers and letting them experience how quickly the **energy** takes over in these simulated situations, when they are expecting something to go wrong.

### **So what would happen when they aren't expecting it?**

Once we have developed this level of awareness it becomes much, much easier to **motivate** the driver to develop and employ systems and techniques that will help them to avoid getting caught up in the Survival Response mode.

Of course there are many different motivational factors that contribute to our degree of risk acceptance and in the majority of cases the person who chooses to go to a driver training course has already become aware that there may be something more to driving (and driving well) than they realise for one reason or another.

What about all the people who are already good drivers?

At Roadcraft we have probably had a higher percentage of people who perceived that they didn't need driver training than anywhere else in Australia over the period from 1991 to 2013 due to the intensity of the QAS associate diploma training programme and the more recent University Undergraduate programs, Corporate and Professional Driving Courses.

The comments made on the first day of these courses have been consistent for several decades, often along the lines of, "**I've been driving for ten, twenty years. What can these guys teach me?**"

Usually by the end of the first day the same drivers are demanding to know why they haven't been exposed to this before, and why isn't the government making this training compulsory for all the drivers?

**Observation: We can change risk acceptance by educating drivers using well thought out and implemented exercises that demonstrate our natural tendencies and how inadequate they usually are in emergency situations.**

These experiences produce a **higher degree of motivation** for drivers to employ better driving techniques that embrace risk management procedures conducive to Low Risk driving, than anything else we have tried.

Suddenly the concepts of **Time and Space management** start to have more meaning; they can start to see what's in it for them!

There are of course other ways of motivating people that are already being used, but how effective are they?

Do they have the desirable effect?

If not, why not?

It would be foolish of me to suggest that I have the answers to these questions.

However I don't prescribe to the ideas of creating tougher laws with stronger penalties. While this type of solution can produce a short term improvement in driver behaviour it doesn't, as history shows, do anything to improve the driver's ability to identify and respond appropriately to hazardous situations or understand the consequences of taking **undue risk** and losing control of a motor-vehicle, other than the motivational factor of possibly losing a licence or receiving a fine.

**In other words legislating new laws has no real bearing on improving the quality of drivers on the roads, and in fact quite possibly could contribute to the proliferation of poorer drivers, who take more risks and have less understanding of the forces they are dealing with when they do.**

**You see we tend to teach our children how to obey road law, which is important. We teach them how to drive, i.e. start, stop, steer, change gear, give way, etc, but how much knowledge or how many techniques do we teach them in order to save themselves in an emergency situation?**

We all know that at some time in their driving life they will probably get into a situation where their natural survival instincts will take over affecting their ability to respond appropriately. In fact you only have to visit a couple of panel shops to see the evidence of this.

It's all too easy to blame the roads, or the vehicles.

Ultimately it's **THE DRIVER who is responsible.**

**The better we build the roads the faster we go!**

**The safer we make the cars the more the risk acceptance!**

Imagine the outrage if as many people were being killed or injured in the aeronautical industry.

Every aeroplane would be grounded until the safety of all could be assured.

The phenomenon of survival responses is well known in the aeronautical industry, these were covered in the training of fighter pilots as far back as the Second World War. The difference is that a driver of a motor car is required to make potentially life threatening decisions that could affect the rest of their and others' lives, in fractions of a second in situations where the potential for conflict with other vehicles is ever present.

The driver of a motor vehicle is subject to these situations often dozens of times a day on the way to or from work, whereas the pilot has more time to spare to make decisions and time to make adjustments, or correct mistakes before facing the consequences.

**“So how do we justify the huge difference in input in terms of training and expenditure between the driver and the pilot?” Isn't the driver of a motor vehicle also in charge of a lethal weapon that has the potential to kill and or maim and cause destruction, especially when you consider that almost every Australian will probably own or drive one in their lifetime?**

I believe that if we are serious about reducing the tragic road toll in this country, the system needs to address the issues of safety and inexperience head on. The public should insist that all drivers be exposed to as many possible normal, and in particular emergency driving situations as practicable in order to develop their **“systems of response”** enhancing their **ability to anticipate and respond appropriately** in normal driving situations and emergency situations that occur in day to day driving.

Better still by being exposed to their own inadequacies it is possible to **motivate** more drivers to use **proven driving practices** and develop appropriate attitudes, as well as **reduce** the inappropriate **high degree of risk acceptance** we find in many of our young, and often not so young, drivers.

With the annual cost of road trauma climbing towards the **27,000,000,000** (2013) dollar mark, it is not a valid argument to suggest it would be too costly to implement the facilities and practices required to make our roads safer.

In fact there is no excuse for not doing so!

**“We have the knowledge. We have the infrastructure. We have the ability.** If we could reduce the carnage on our roads by a mere 10% we could save in dollar terms (not to understate the human side) \$2,700,000,000! Surely that would go a long way towards the costs involved.

**In conclusion:**

My aim in writing this presentation has been to introduce some arguments into the driver training debate that I have, as yet, not seen discussed.

It has not been my intention to project myself as an expert.

It has been my intention to share my observations, conclusions and solutions with the reader, as I feel I have something in the form of knowledge and experience of possible significance to add to the overall driver-training debate.

It is also important to note that there are quite a number of other driving educator colleagues who share the views and conclusions I have expressed here.

Since first putting pen to paper in 1996 there has been an enormous amount of energy, money and time invested in upgrading the licence system. The one area that is still not appreciated is the role preventative training can play in ensuring safer road usage.

I believe that as a community we can no longer afford the luxury of letting our children learn to drive by passing a licence test that is highly inappropriate and ineffective in terms of ensuring that the new driver has the **real driving experiences to anticipate and respond appropriately** in every day driving situations.

**What exposure or training do they have for emergency situations, where these same drivers are exposed to trial and error experiences, in life threatening time frames, when they need to learn what works and what doesn't work while their life depends on the result, with only too often fatal consequences?**

Maybe the problem with the current system is that it is based on an incorrect premise:

**Drivers should or will obey road law and nothing will go wrong.**

If we change this premise to read:

**Drivers will make mistakes, and terrible and frightening things can and do happen.**

It is now perhaps more obvious where the input should be directed

Food for thought

Robin George Bailey  
Operations Coordinator

## VEHICLE FAMILIARISATION

Before using any vehicle it is important that the driver becomes familiar with the location and function of all ergonomic and safety features and controls of the particular motor vehicle he/she is to drive.

It is wise to make sure the vehicle is currently registered as it is the driver's responsibility to be driving a Roadworthy Registered vehicle.

It is important to remind participants that they have no insurance cover if unlicensed, unregistered or third party insured.

The implications can be life changing.

**ALL** drivers should refer to the owner's manual (supplied with the vehicle) to be aware of the suggested maintenance requirements.

In general drivers should check at least the following at regular intervals.

### ENGINE BAY

- Engine Oil Level
- Auto Transmission level
- Washer Fluid
- Radiator fluid
- Visual – Brake Fluid
  - Power Steering
  - Clutch fluid
  - Fluid Leaks



### EXTERNAL

- Tyres –Pressure and condition
- Light lenses
- Glass - cracks chips
- Clean Windscreens and windows
- Registration label

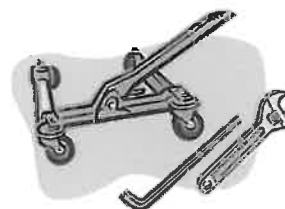


### INTERNAL

- Mirrors – condition & adjustment
- Fuel
- All gauges

### BOOT

- Spare tyre/wheel – Location varies from car to car
- Vehicle Jack
- Wheel Spanner



### **REMEMBER:**

*It is the driver's responsibility to ensure that the vehicle they are driving is Registered and Roadworthy.*

*Remind participants that they have no insurance cover if unlicensed, unregistered or third party insured.*

*The implications can be life changing.*

Drivers would do well to make sure that they familiarise themselves with all the following and adhere to the suggested daily and weekly vehicle checks.



### ELECTRICAL

- Ignition – lock, off, accessories, on, start
- Lights switch – park
- Headlight – Hi/Low beam dimmer switch – Driving – Fog lights
- Indicator control
- Hazard lights
- Interior light/s
- Windscreen wiper and washer control/s
- Rear window demister
- Dash (instrument lights) dimmer control
- Fuse Box
- Clock
- Radio

### CONTROLS LIGHTS & GAUGES

- Oil warning light
- Temperature Gauge
- Fuel Gauge
- Alternator light
- Speedometer
- Odometer (distance travelled)
- Trip meter (resetable)
- Park brake light
- Brake Fail Warning light

<b>Suggested Vehicle Check Schedule</b>	
<b>Daily</b>	<b>Weekly</b>
Rego – Label Engine Oil Level Washer Fluid  <b>Visual –</b> Brake Fluid Power Steering Fluid Leaks Tyres Lights: Mirrors Wipers Horn V Belts Panel Damage	Battery Tyre Wear Tyre Pressure Spare Transmission Fluid

## THE AUSTRALIAN ROAD TOLL

In 1988 - Every day in Australia 7 people were killed, 8 people were seriously injured, and 80 were hospitalised with injuries they would eventually get over.

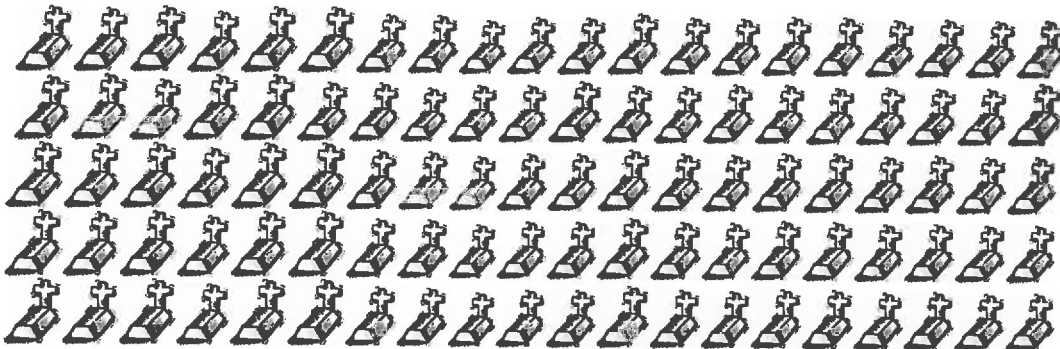
In 2013 - Every day



4 PEOPLE were KILLED:



12 PEOPLE were PERMANENTLEY INJURED:



100 PEOPLE were HOSPITALISED:

So it is clear that better cars and safer roads have not significantly reduced the road trauma in Australia.

Why?

- More drivers on the roads
- Less focus on the driver being responsible for their reactions and destiny
- An unrealistic belief that the car will save me

What most people do not understand or appreciate is that all this wonderful technology does not extend the laws of physics. It only enhances the ability to maximise the available grip, it does not allow or create more grip. So ultimately it is the Driver that makes the most difference on the roads.

**Better roads and safer cars do not produce safer, more aware and capable drivers.**

While we cannot measure the human costs associated with the disproportionate amount of carnage on our roads, we can measure the financial costs. As the annual cost of road trauma climbs towards the **\$27,000,000,000** dollar mark do you think it is a valid argument to suggest it would be too costly to implement the facilities and practices required to make our roads safer?

In fact is there any excuse for not doing so!

We are obliged to know ROAD LAW

But will it keep us ALIVE?

Apparently not, from the above statistics

The application of appropriate **SOCIAL INTERACTION** might give us a chance!

- **COURTESY**
- **PATIENCE**
- **TOLERANCE**

Are all virtues to aspire to and a blessing on the road.

## OBSERVATION

Good Observation Technique is the building block on which Low Risk Defensive Driving is built.

In order to use good Observation the driver needs to include the use of hearing and at times smell in order to collect all the appropriate relevant information available.

The most common statement at crash sites is -

***I DIDN'T SEE IT OFFICER.***

***I DIDN'T SEE IT TILL IT WAS TOO LATE!***

WHY do you think this is so?

The answer is that in order to be a **Safer More Aware Driver** we need to learn to tell our eyes **where to look and what to look for**, all the time when driving or even in the passenger seat.

In order to do this we need to be paying attention to the driving task and consciously present in the car, not day dreaming or distracted.

We need to be **concentrating** so we can-

### **TELL OUR EYES WHERE TO LOOK AND WHAT TO LOOK FOR**

By concentrating and using your eyes more effectively you will then be able to develop the ability and have the time, and therefore the space, to **anticipate** the actions of other road users.

- **CONCENTRATE**
- **BE OBSERVANT**
- **ANTICIPATION**
- **USE GOOD DRIVING TECHNIQUE**

***LOOKING FURTHER AHEAD MORE OFTEN CAN CREATE EXTRA LIFE SAVING SPACE. IT CAN CREATE A SECOND, TWO OR EVEN THREE SECONDS. (EYES UP)***

***IF EVERY DRIVER APPLIED THIS SIMPLE PRINCIPLE THE RESULT COULD BE AN 80 - 90% DROP IN THE CRASH RATES***

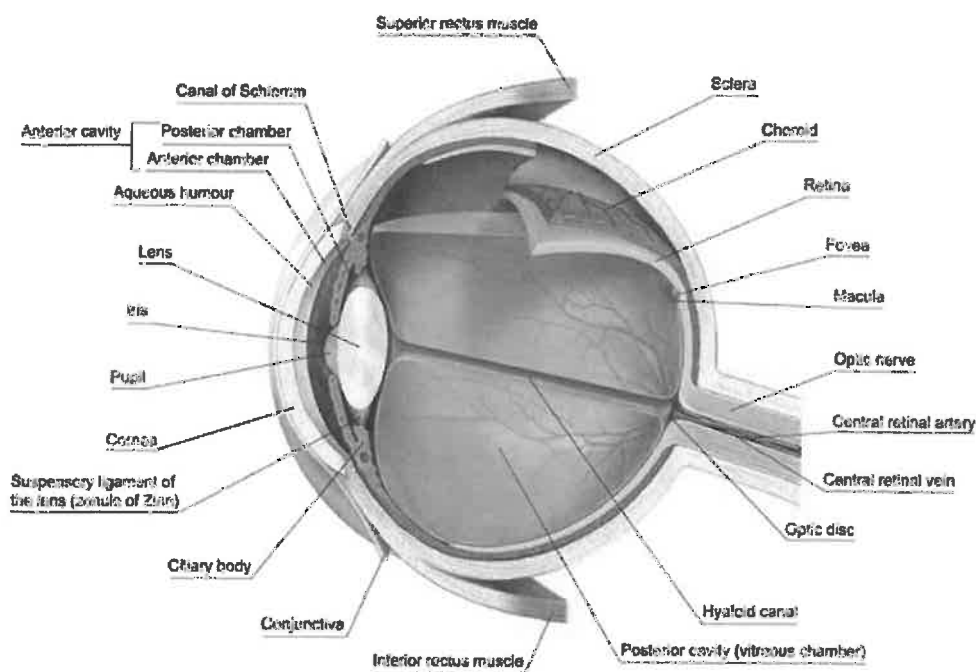
**SEEMS TOO EASY  
&  
IT IS EASY**

**Applying the principles of Low Risk Defensive Driving is very much like taking a health pill.**

**But first you need to commit to using it consistently.**

***The systems and techniques advocated can only work for you if you use them all the time; not selectively.***

## INSIDE THE AMAZING EYE



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## HOW THE EYE SEES

### ***Light's amazing journey into the brain.***

Light first enters the eye through the outer, transparent layer of the eye called the **Cornea**.

Through the cornea, the light next passes through a hole called the **Pupil**. The pupil gets bigger to allow more light in (when there is very little light) and smaller to allow less light in (when there is a lot of light). How does the pupil know to get bigger or smaller? That is the job of the **iris**.

The iris is the coloured part of the eye, and it controls the pupil's size.

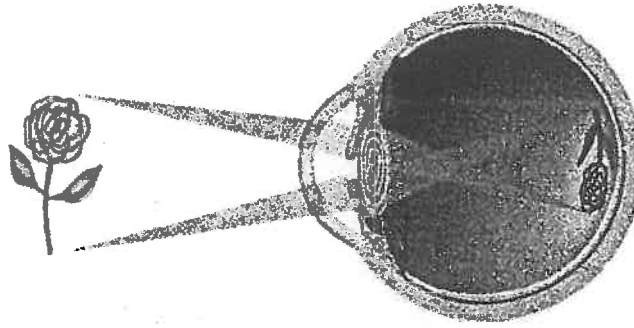
Once the light passes through the pupil, it next hits the **Lens**. The lens focuses the light rays sending them to the **retina**. Before the light hits the retina it has to travel through...

**Vitreous Humour!!!** This is a colourless mass of jelly like material that fills the eye behind the lens. The light travels through the jelly when it finally reaches this...

The **retina**, this is the innermost layer of the eye. If the eye was a camera think of this as the film in the camera, which captures the images. The funny thing is the image captured on the retina is upside down, backwards and in only two dimensions. But when we think about how we see, things are always right-side-up and in three dimensions. Something else has to happen before the journey is over... This light-information has to be sent to the brain.

The retina contains light sensitive cells called **rods and cones**. We use the rods for seeing in black and white and the cones for seeing in colour. These cells send information to the brain through a very important nerve at the back of the eye called...





The **optic nerve**: This nerve is the brain's messenger passing the light information into the brain. At this important part of the brain called the occipital lobe, the backwards upside down 2-dimensional image is switched into its correct form.

How does the brain switch a 2-dimensional image into a 3-dimensional image? You need to remember that you have two eyes, each carrying this light information to the brain from slightly different angles (your eyes are several centimetres apart, and this gives each eye a slightly different view on the world.) When the brain receives both of these 2-dimensional images, it combines them together into one 3-dimensional image, allowing you to see in 3D!

Phew! What a journey! Just imagine how many times a day light takes this amazing journey through your eyes. The number would be too many times to count. It happens all the time and you don't even think about it. Your eyes just do it! The eye is truly amazing...

### **The Day Blind Spot**

The day blind spot is caused by the position of the optic nerve in the retina, as this area of the back of the eye has no rods or cones (the light receptors) that enable you to see.

#### **The main concerns about blind spots are:**

- > That you have them, and
- > What to do about them.

When an object is in your blind spot, you simply do not see it with one eye, as demonstrated.

#### **Blind spot effects – The cone of blindness**

- At 30 cm from the eye - 25 mm in diameter the size of a 20 cent coin.
- At 250 m from the eye - 22.5 m in diameter the size of a semi-trailer.
- At 1.6 Km from the eye - 158.4 metres in diameter.

To give these figures a perspective, a Jumbo Jet is 46 meters long!

Under average conditions, blind spots don't bother you because you use both eyes; an object in the cone of blindness of one eye is normally seen by the other. However, when an obstruction such as the windshield pillar cuts off the image of one eye, an object in the blind spot of the other eye is simply not seen. The solution to this problem is using both eyes, systematically scanning all portions of a field of vision, and moving your head frequently while searching.

The two eyes work in conjunction and each is capable of movement. When an object is observed the lines of sight of the eyes converge on the same point, though each will receive a slightly different view. It is this disparity of images which is largely responsible for the fact that objects are seen to have depth as well as height and width. The angle of convergence of the lines of sight is signalled to the brain as information of distance, serving as a range finder. This is backed up by the brain's computer converting differences between the images into depth.

Whilst the effects of stereoscopic vision may be enhanced or diminished by optical viewing instruments, all normal viewing instruments largely nullify the brain's ability to compute distance.

**It is wise to remember:**

**We can only respond to what we see, but we will only respond appropriately to what we understand. So the sooner we see a problem and understand it, the more time or space we will have to deal with it and the less the need or potential to react inappropriately.**

## **THE HUMAN FACTOR**

So by now it should become evident that human beings are not designed to drive and therefore have very few, if any natural responses, or appropriate reactions when they get a fright or are suddenly confronted with a potentially life threatening situation while driving. In fact we are more likely to overreact and make any potential situation worse by fixating on the problem and applying aggressive reactions on the controls that destabilise the vehicle and reduce the grip.

### **OVER REACTION**

The Over Reaction when faced with a potential hazardous situation is caused by the brain receiving the wrong message. Because we are looking at the problem our brain assumes that is where we want to go. As we get closer and closer to the problem the brain is not receiving or processing an avoidance message but is receiving a very strong I HAVE TO STOP message. The only way that this will not happen is to move the eyes from the problem to where you really want to go.

The Human ability to use hard eye focus is a critical contribution to our ability to survive as a species, and works really well for our design parameters and natural speed, assisting humans to become the dominant species on the planet.

This ability is also what is contributing to the large number of us being killed or injured on the roads as the longer we focus or fixate on a potential hazard, the less **Time and Space** we have to respond and the more the tendency to react which then places us in a **Survival Response** situation where everything we do naturally is wrong.

In life threatening or even less threatening events we tend to overreact on the steering or the brake and cause the loss of grip that ends up in a crash result. The evidence of this is often very obvious as there might be one tree, or post, or parked car with lots of space either side, but the result is more often than not impact with one of these hazards.

- **Your eyes are your Primary Guidance System.**
- **Your PERIPHERAL Vision is your Early Warning System.**

So it makes good sense to learn to use these systems effectively.

### **PERIPHERAL AWARENESS**

While on the point of peripheral vision there is such a thing as **Peripheral Awareness**.

**Peripheral Awareness** is the ability of a person to first be aware of what they are seeing in their peripheral vision, and secondly understanding what they are seeing. The time this takes has a significant impact on the reactions and responses in drivers, so it is very important that educators are aware that these differences exist in order to identify an individual driver's visual capacity early.

I have had participants who had very little peripheral awareness and it turned out that they had hardly any peripheral vision; they thought that this was normal as this is how it had always been for them,

**They were totally unaware of their visual deficiency and as a result had crash prone histories.**

Consider the impact this deficiency would make to their hazard identification and response?

Of course a driver with a peripheral vision deficiency can make up for this by making sure they use plenty of head and eye movements at all times while driving, in order to see and identify potential hazards earlier more often.

**It is also very important to note that we cannot rely on peripheral vision alone to maintain safety when driving.**

## **VISUAL ACUITY**

Visual Acuity is the ability to see things at distance clearly.

Visual Acuity is a very personal thing; people differ considerably in this quality. One person may be able to clearly distinguish a potential hazard at 400 metres while another may find this indistinct and blurred, even though at these distances they may not be considered to require glasses to drive.

This is scary as the driver with the poorer visual acuity does not realise that this limited vision is not normal and assumes that they are fine.

However when you consider the Time and Space management deficiencies that result the effect is often a reactive, rough and time poor driver who is crash prone.

## **CENTRAL VISUAL ACUITY**

There are many factors and potential hazards to be accounted for while at the wheel.

In order to process and understand a situation we need to first identify it, then take the time to see it fully to understand it, and in order to do this effectively we do need to look at it with our Central Vision. **We only get fine detail from the use of Central Vision.**

Examples of the need to use this Central Vision is when we want to read a sign, identify where a pedestrian is going or understand the speed and direction of another vehicle approaching a cross road. All these situations require the use of our Central Vision. However this accounts for only 3% of our 180 degree visual field, hence out in the world everything appears to be in focus but in reality at any one time, we can only focus on an area at arm's length the size of a ten cent coin. Rapid eye movement tends to overcome this deficiency. So it goes without saying that the better our Central Visual Acuity the greater the clarity of vision.

For drivers the optimum safe visual experience requires perceiving the entire scene under dynamic circumstances with ease and understanding. It is definitely not merely identifying and isolating individual detail. This is where **Telling Your Eyes Where to Look and What to Look For** (Scanning) comes into the equation. See page 47

**Here's the thing!** If we rely on our Central Visual Acuity alone we tend to fixate and lose the ability to be aware of the peripheral field.

I have had participants who had not learnt to use their visual field adequately; fortunately vision is a learned ability so it can be improved.

## **PROCESSING**

The ability to gather appropriate information from the brain and the relative environment and understand what is there.

**This takes time.**

For new or inexperienced drivers it takes much more time than it does for more experienced, aware drivers.

Some drivers will fixate and take an inappropriate amount of time to read road signs or understand the most basic of emerging situations, such as a child on the side of the road.

- What are they there for?
- Are they accompanied?
- What are they likely to do next?

All these things need to be identified in a timely manner.

So the earlier the driver sees the child, processes the information and understands the potential consequences, the less need there is to react, and the driver has more ability to respond appropriately by checking the mirrors first, slowing and taking evasive action if this is warranted.

***With this knowledge why would anyone drive with a dirty windscreen? It always disappoints me to see so called educated and experienced drivers with vehicles that have dirty glass.***

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How can a new driver anticipate something they haven't experienced?

As a community we spend a lot of time and money training our children at school in things they may never need or use in preparation for a future where we can't be sure of what they may choose to do.

We can almost be certain that they will drive a car in this country.

So why don't we provide the new driver with more education, is the community's risk acceptance also too high?

Youth, by their very nature, are risk takers. We learn to perceive and understand risk through experience and in a car we do the same.

The difference is that in a car we are totally out of our design perimeters.

As already mentioned, humans were not designed to drive motor cars or travel at the speeds we consider to be normal in this day and age. We have no natural responses for emergency situations at speeds above running pace.

However once a person is aware of these human inadequacies when driving they tend to become more motivated to use proven strategies that can be employed to minimise the risk.

By educating drivers in the **flaws of relying on reaction time** and following too close we can adjust the driver's perception of the risk and motivate them to stay further behind or check their mirrors earlier just in case that Mac B Double isn't going to stop.

A driver who has been in a serious nose tail will soon appreciate the relationship between time and space and the fact that when things go wrong, they go wrong very quickly. If they haven't they will most probably get caught out again. You see we keep on making the mistakes till we learn the lesson! **Unfortunately some of us don't get a second chance!**

So you see it's our perception of risk that is the problem not the risk itself. If we push the laws of physics in the wrong place without the appropriate understanding of the consequences the results are often disastrous.

When you add **the human factor** to the lack of understanding and overconfidence in reaction response skills to the inexperience of youth and their natural tendency to experiment, we have a lethal cocktail waiting for a single moment in time to detonate.

What about your risk acceptance?

Can we continue to send our most precious youth onto the roads where in this region they are straight into 100 kph, without the education and knowledge they deserve and need, to address the identification, perception and reduction of the risks that are ever present?

A proactive approach to the driving task and the reduction of risk requires the application of Best Practice driving Techniques and Systems of response.

So we must-

- **CONCENTRATE** - on Driving (The Job) and applying good technique always
- Apply **TIME AND SPACE** - management
- Develop **OBSERVATION** – More consistent and effective use of the eyes
- **ANTICIPATION** – can be achieved with appropriate knowledge and experience
- Avoid **HUMAN SURVIVAL RESPONSES** of **FIXATION** and **OVER-REACTION**

## CONCENTRATION

In order to maintain the safety of yourself and other road users the driver first needs to be concentrating. When you are driving the car that is "your job" and if you get that wrong you are no good to anyone. It is only with the appropriate concentration that the driver is able to direct their attention to the driving systems, strategies and techniques applicable.

Like any other endeavour we will not be as successful as we can be if we do not apply ourselves and concentrate.

The difference to most other human endeavours is that the consequences in a motor vehicle of failing to concentrate can be fatal.

### **Here's the thing -**

The ability to successfully apply and maintain the above strategies is not possible if the driver is not sitting in the car correctly!

## APPLICATION OF GOOD DRIVING TECHNIQUES

### **Foundation Techniques**

- **Posture**
- **Left Leg Body Bracing**
- **Pull Push Steering using the Leading Hand with light grip**
- **Advanced Observation Skills**

*The application of appropriate Posture, effective Left Leg Body Bracing, Pull Push Steering using the Leading Hand with light grip and Advanced Observation Skills are what we call Foundation Techniques, because if we fail to get this right the results of anything we do as a driver will be less effective.*

### **Driving Posture**

The correct sitting position (posture) of the driver in relation to the foot controls and steering wheel is a critical factor in maintaining effective control of the vehicle in all driving conditions. High standards of

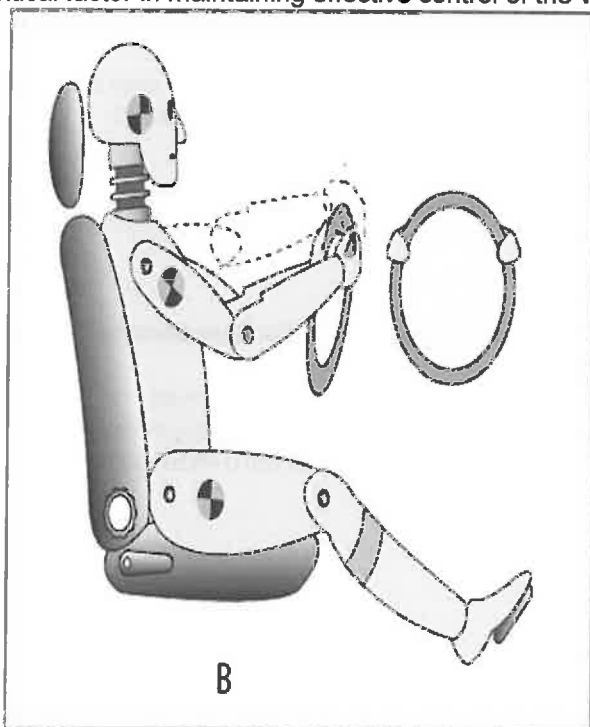
ride quality can only be achieved by using the correct driving posture.

**The proven benefits of appropriate posture are -**

- Enhances correct vision technique and ability to avoid Fixation
- It enhances the driver's ability to feel the car. (Dynamic Feel)
- It assists in the management of the Dynamic Forces on the vehicle
- It improves the driver's ability to concentrate and stay **Switched on**
- Assists in fatigue management
- Assists in using 'Pull / Push' steering
- Reduces the danger of serious injury

To achieve the best posture while driving you will probably need to adjust your seat.

If there are several drivers using the same car, you may need to re-adjust the seat to suit you each time you get in.



## Left Leg Body Bracing

The driver's body is exposed to forces produced by cornering, accelerating and braking.

In racing cars they have full body harnesses and custom built seats to accommodate the need to stay secure and firm in the seat at all times, for maximum vehicle control and stability. This seat arrangement is not practical for every day driving.

Many drivers try to resist the body movement by holding too tightly onto the steering wheel (white knuckling) to resist their body weight transfer. Instead, they should be bracing their body by using the left foot firmly placed on the footrest with positive pressure, to keep them securely and comfortably in their seat. Lateral bracing for cornering forces can also be achieved by using the sides of the legs against the door and centre console. Bracing allows the driver to have the dexterity to use their arms and hands for steering effectively and appropriately, rather than for balance and stability.

We have observed that in order for the course participant to be able to successfully complete the activities presented, they must apply positive pressure to the left leg while bracing, push their back and shoulders into the seat firmly and use very little grip on the steering wheel. By applying this technique the driver is able to feel the vehicle and the feedback from the front tyres through the steering and the rear tyres through the back of the seat and base. In fact the driver will feel the dynamic changes in the vehicle much earlier through the top of the back of the seat, allowing them to make small adjustments as required earlier to maintain control.

Correct application of this technique contributes to smoother driving with minimum inputs and maximum grip management.

To add to this it is apparent that the eyes are then freer to look for the required escape or space as the body is not thrown into Survival Response by poor stability in the vehicle contributing to the fixation tendency. This is quite profound but appropriate use of Left Leg Bracing has been proven to be the most effective way to maintain vehicle control in all driving environments.

**Often when participants are finding it difficult to achieve results it is due to lack of Left Leg Bracing.**

If you fail to do the vital steps of posturing yourself appropriately, each and every time you get in the car, you will not be in the best position to apply the best responses should you be faced with a life threatening driving event, and therefore will not get the best desired outcome.

**You never know when someone is coming down the road with your name on their bonnet!  
So follow these quick easy steps -**

**Comfort** - Firstly, wiggle your hips as far back into the seat as you can.

**Back Rest** - Adjust the back rest to be at about 100° - 110° angle (so it is leaning back slightly).

**Head Rest** - Adjust the headrest to be level with your ears, not the back of your neck. Your head should not be touching the headrest while driving.

**Seat Base** - If you can adjust the height and angle of the seat base, try to get your hips and knees about level.

**Seat Slide** - Adjust the seat forward or backward so your left foot can relax on the footrest with your left knee bent. Your right foot should be able to easily reach the accelerator with your heel staying comfortably on the floor with your knee still bent.

**Arms** - Check that your wrists can rest comfortably on the top of the steering wheel with the arms maintaining a slight bend. Adjust the backrest again if necessary.

**Hands** - Bring your hands down to either the 10 o'clock & 2 o'clock position, or the 9 o'clock & 3 o'clock position, whichever is the most comfortable for you. With your hands on the steering wheel in either of these positions, your elbows should have good bend in them.

**Seat Belt** - After you have put your seat belt on and reduced the slack in it, you're ready to go! You can then use your left foot to push against the footrest to keep your hips, back and shoulders firmly in the seat, which will help to keep your upper body stable... with a bit of practice!

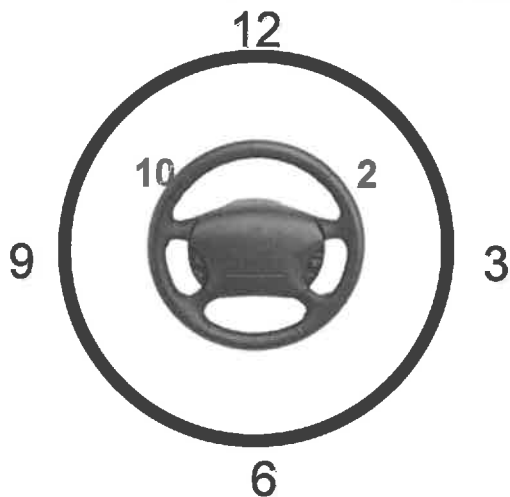
## The Pull Push Steering Technique

The importance of Correct Steering Techniques cannot be underestimated. The best technique to employ is **Pull Push Steering** using the **Leading Hand**.

**The benefits** of using the **Pull Push Steering** technique are that it assists the driver to:-

1. Retain the correct driving posture enabling the hands to remain soft during steering maximising dexterity and feel feedback from the front wheels.
2. Maintain the shoulders in the seat maximising dynamic vehicle feel and response applications
3. Reduce the inappropriate Human Survival Response tendencies of excessively quick steering, that then cause loss of grip.
4. Prevent arm crossing (and loss of finesse for smooth applications of the steering and feel or feedback from the front wheels).
5. Prevent injury to themselves when an Air Bag deploys.
6. Enhance their ability to apply smooth, progressive steering inputs, maximising grip.
7. Maintain superior vehicle control in adverse driving conditions or in emergencies where evasive action or skid avoidance or control is required.
8. Be more able to know where the wheels are pointing and the appropriate input required.

Imagine the steering wheel as a clock face....



Hands start at the 10 – 2 or the lower 9 – 3 position

**Technique:** To commence Pull Push Steering, the lead hand or the corner side hand is moved to the top of the steering wheel.

The input is then initiated by using the **fingers and thumbs mostly** and pulling the wheel down smoothly to the required, or 6 o'clock position, depending on the turn required.

At the same time the other hand slides down to meet the leading hand if need be at the 6 o'clock mark, which then may be pushed up if more steering input is needed.

The procedure is then reversed to straighten or return steering to the neutral position. When more steering is required the technique is to allow the thumb and forefinger to “kiss” at the top of the wheel and the heel of the hands to “kiss” at the bottom each time the wheel is moved.



## Leading Hand Steering

Leading Hand Steering is a single steering movement technique advocated for driving purposes where minimal steering input is required, such as open road and highway speeds.

In the Leading Hand Technique the steering is initiated in exactly the same way as in Pull Push Steering. The only difference is that there is no need to proceed with the push action once the steering input has been applied, as determined by the cornering need of the vehicle.

- The hands start at the 10 – 2 or 9 – 3 Position
- Steering input is initiated by the hand on the corner side and using the fingers and thumbs pulling down from the 12 o'clock position to the position sufficient to negotiate the corner.
- The other hand stays at the 9 o'clock position for the right hand turn or 3 o'clock for the left hand curve, with the steering wheel sliding through this hand until the desired line of travel is established.
- Once the required steering input is met and steering completed, the driver unwinds the steering back using the same hand to the 12 o'clock position and replaces the hand to the 10 – 2 or 9 – 3 position.

**Note:** It is not acceptable to coast with both hands at the top or bottom of the wheel when the steering input has stopped during cornering.

**Correct Pull Push of Leading Hand Steering Technique can only be achieved with appropriate application of Posture and Left Leg Bracing.**

### THE 'SWITCH ON' TECHNIQUE

The **Switch On** technique is simply achieved by applying

- **Left Leg Bracing** - with positive pressure
- **Light grip on the wheel** - fingers and thumbs
- **Eyes scanning** – looking for potential hazards and space

In order to do this the driver must first be concentrating, emotionally present in the vehicle, not distracted or day dreaming and aware of their situation.

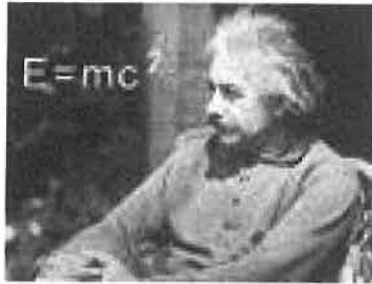
We suggest that the driver applies the **Switch On Technique** whenever approaching intersections, there is a need to brake or corner and congested traffic situations, or at any time they suspect there may be a hazard or need to respond while driving.

**Switching On** will allow the driver to more readily identify solutions and respond appropriately with fewer tendencies to react inappropriately and enhance the ability to use more finesse, therefore maximising the grip by applying minimal inputs as they will be readily able to feel what is needed and appropriate to maintain control.

# VEHICLE DYNAMICS

The Unseen forces that affect vehicle control.

**Albert Einstein**



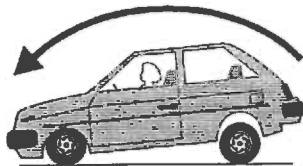
**$E = mc^2$**  this formula explains that everything contains energy. A house brick contains enough energy to destroy an entire city block

## TRANSFER OF WEIGHT

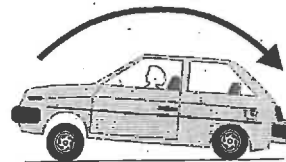
### THE EFFECT OF BRAKING ON VEHICLE STABILITY

The application of braking force, whether by reduction of accelerator or use of brakes causes the weight of the vehicle to move on its suspension longitudinally, which produces a weight transfer effect from back to front compressing the front suspension and extending the rear suspension.

When this weight transfer occurs, it increases the amount of load on the front tyres and decreases the amount to the rear making the rear "Light". When the brakes are released the opposite affect occurs.



Brakes on

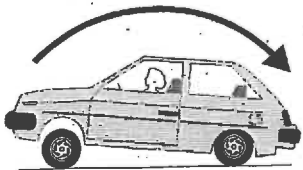


Brakes off

### THE EFFECT OF ACCELERATION ON VEHICLE STABILITY

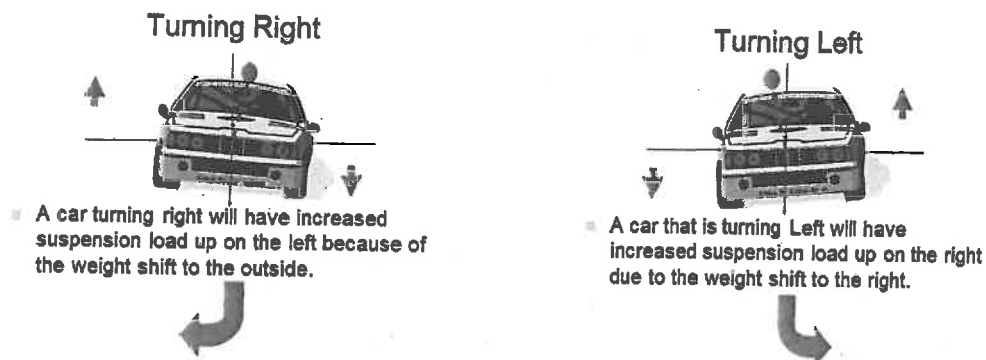
Acceleration forces cause the vehicle weight to move on its suspension the opposite way, producing a weight transfer effect from front to back.

When this weight transfer occurs, it increases the amount of tyre grip to the rear and decreases the amount to the front, with the exception of excessive transfer of weight too quickly, which will then break the grip at the rear as well.



A reduction in acceleration will cause the weight bias to move in the opposite direction.

## THE EFFECT OF STEERING ON VEHICLE STABILITY



### TRANSFER OF WEIGHT OR BODY ROLL (LATERAL SWAY)

When the driver steers right or left the vehicle weight is transferred on its suspension laterally.

When this weight transfer occurs it can increase or decrease the amount of grip on the weighted side of the vehicle depending on the smoothness of application and amount of transfer induced.

Once again if this is done too aggressively the weight can transfer too quickly overloading the tyres and breaking the grip.

If the driver is too **aggressive** in these applications of the **Accelerator, Brake and/or Steering** the **security** of the vehicle will be compromised and **loss of grip** the result.

So it should be evident that the application of **Smooth Driving Techniques** will **reduce the potential dangers and risks** associated with the application of Accelerator, Brake and Steering forces.

*Smooth Driving is - No Accident 😊*

### PRINCIPLES OF SMOOTH DRIVING

**The ability to drive smoothly with finesse does not come easily or naturally to most drivers.**

It takes a **concentrated, concerted, technical approach** and the **application of good technique** by the driver to drive as smooth as is possible in all driving situations.

It is essential that the driver applies the appropriate **Foundation Techniques** and **Switch On Technique** in order to maximise the ability to be successful in smooth driving applications.

The application of the Accelerator, Brake and Steering needs to be gentle and progressive. It is a good idea to imagine that there is an orange under the Accelerator or Brake pedal and that if the pedal is pushed rather than squeezed it will split.

This smooth pedal action should be evident when applying and reducing the Brake or Accelerator pedal at all times. The nose of the vehicle should not rise appreciatively when applying Accelerator or dip when reducing it and this also applies when applying the Brakes or releasing the Brakes.

Steering should be applied with soft grip or the fingers and thumbs and the wheel should be drawn down progressively as if pulling the cord of your curtains at home, not suddenly or with a jerking movement.

***By applying Smooth Driving techniques the transfer of vehicle weight will be better managed resulting in smoother ride and more Grip. This should be the goal of all professional and not so professional Drivers.***

## ENERGY & BRAKING

Kinetic Energy

$$KE = \frac{1}{2} (mv^2)$$

The formula for Kinetic Energy tells us that if we double the speed of an object it will take 4 times the distance to stop.

The reason is that the increase in speed causes an exponential effect on the energy of an object, so if we triple the speed the energy goes up by 9 times (3 squared).

### Braking Distance

**Braking Distance** is the distance it takes to stop the vehicle from the moment the braking force is applied.

### Reaction Distance

**Reaction Distance** is the distance travelled in the time taken to see the hazard and get the foot to the brake and take up the slack in the pedal to the point that the brake actuates a stopping force on the vehicle.

Reaction times can vary considerably depending on how much the driver is concentrating on the driving task at that point in time and their ability to recognise and process the information relevant to the hazard.

Reaction times are generally considered to be around 1.5 Seconds for the average driver who is concentrating on the driving task.

**It is a critical and potentially fatal error to believe that you can reduce one's risk on the road by relying on reaction time responses.**

Reaction times of 3 – 5 seconds and even more have been recorded for inattentive drivers. At 100 kph this represents a reaction distance of 90 to 150 metres, before anything is done to change the vehicle's speed or direction!

### Total Stopping Distance

The Total Stopping Distance is the sum of the Reaction Distance and the Braking Distance.

**Total Stopping Distance = Reaction Distance + Braking Distance**

**Example for a 2000Kg Vehicle, Reaction Time = 1.5 seconds**

Speed	As m/second	Mass	Joules of Energy	Braking Distance	Reaction Distance	Total Stopping Distance
@40Kph	11.1 m/sec <sup>2</sup>	2000kg	123,210 joules	7m	16.5m	23.5m
@80Kph	22.2 m/sec <sup>2</sup>	2000kg	492,840 joules	28m	33.3m	61.3m
@100Kph	27.7 m/sec <sup>2</sup>	2000kg	767,290 joules	50m	41.5m	91.5m
@120Kph	33.3 m/sec <sup>2</sup>	2000kg	1,108,890 joules	63m	49.9m	112.9m
@160kph	44.4 m/sec <sup>2</sup>	2000kg	1,971,360 joules	112m	66.6m	178.6m

## **INFLUENCES ON BRAKING**

The following are the most relevant influences that diminish the driver's abilities to stop and affect vehicle's braking system.

- Poor Posture
- Not Left Leg Bracing – causing an inability to control the driver's body weight transfer to the brake pedal
- Poor Technique (e.g. white knuckles, heel of foot off the floor)
- Incorrect Tyre Pressure
- Excessively worn tyres, brake pads, disc brake rotors, master cylinders
- Tyre design applications
- Excessive brake use can overheat the brake fluid contributing to brake failure
- The road surface (available traction or grip provided)

## **EMERGENCY BRAKING TECHNIQUES**

It is most important for all drivers to understand that there are major benefits to be gained by making sure that they keep the heel of their foot on the floor when braking. Where ever possible the driver should simply pivot the foot on the heel from the accelerator to the brake.

This allows the dexterity to control the leg weight from weighting the brake pedal and allows for better muscle control in the legs enhancing the ability to get maximum feedback and feel from the brake pedal.

Applying this principle is paramount to the finer control when braking.

**Of course to do the effectively Drivers need to be applying the Foundation Techniques.**

## **CADENCE BRAKING**

To use Cadence Braking effectively the driver applies a quick, measured and progressive increase of pressure to the brake pedal until the critical limit of the available Grip (lock up) occurs.

The pressure is then varied by the driver by modulating or pulsing the brake pedal to minimise lock up of the wheel while keeping the heel of the braking foot on the floor. The goal is to minimise lock up while maintaining wheel rotation to allow directional control of the vehicle while still maintaining maximum retardation of the vehicle. This can only be done effectively by the application of appropriate **Foundation Techniques**.

## **THRESHOLD BRAKING**

**Threshold braking is the most effective emergency braking technique and allows steering while braking.** Threshold Braking is more of a racing technique and should only be used in an emergency.

If used continually the result will be excessive brake wear and a very uncomfortable ride for any passengers. In a real emergency the most likely outcome for most trained or untrained drivers will be full LOCK UP or activation of ABS necessitating a reduction in brake pressure to regain maximum grip, wheel rotation and vehicle retardation.

Threshold Braking is performed with a quick, measured and progressive increase in brake pedal pressure applied to the point just before the critical grip limit where wheel lock up occurs, but at the point where maximum retardation of the vehicle is happening. The driver then endeavours to maintain this braking position until the required result is achieved.

Both the Cadence and Threshold braking techniques require considerable practice in a controlled, safe environment to master and can only be done effectively with the application of appropriate **Foundation Techniques**.

## **A.B.S.**

ABS Stands for - Anti Lock Braking System. The ABS is electronically controlled and was originally developed by the Mercedes Manufacturer for Trucks and Buses in the icy conditions of Europe. Early systems were rough and scary for drivers but the modern system are much more user friendly. The driver may feel a pulsating through the Brake Pedal and feel a slight shudder through the steering. ABS prevents Lock up and allows steering at the same time providing some ability to control the vehicle.

**Note: Contrary to common belief ABS does not extend the laws of Physics or create more grip, it only allows the driver to better use the grip available.**

## **COVERING THE BRAKE**

A recommended technique to apply whenever approaching a hazard or a perceived hazard is to cover the Brake (while or after first checking the mirrors. MIB).

The Covering the Brake technique provides the benefit of reducing the time it takes to get the foot from the accelerator to the brake if the perceived hazard eventuates.

By moving the foot off the accelerator to the brake, the braking process is initiated causing the retardation of the vehicle which then places the weight over the front wheels where it will need to be should you need to use brake.

This process has the potential to save you Time and therefore Space in normal braking and an emergency situation, maximising the ability to manage the energy and maintain the grip.

In order to do this effectively the driver first needs to be "in the car" and concentrating so that they can identify potential hazards early enough to have the time to process this information and respond appropriately.

So the **Switch On** technique is once again a useful tool to apply prior to any potential hazard situation encountered when driving.

To Cover the Brake simply pivot the foot from the accelerator to the Brake pedal and take up the slack in the pedal to the point where you may just detect the brake starting to work.

An added benefit to this process is that the brake lights alert drivers behind that there may be a need to slow or stop ahead. This has a multitude of potential benefits to drivers and other road users by creating a chain of responses rather than reactions.

## **TRAIL BRAKING**

Trail Braking is the technique where instead of releasing the brake suddenly, resulting in the unwanted unweighting of the tyres as the suspension releases, the driver eases off the brake gradually, allowing the transfer of the weight in the vehicle to be managed, therefore there is a less unweighting of the tyres resulting in the maximising of grip.

This technique contributes to smoother driving and increased safety by increasing grip, especially when entering corners or in adverse conditions.

## GRIP

Everything you do while driving has to be transferred to the road via the tyres.

In order for this to happen we need to have Grip, sometimes called traction or stiction. Drivers need to appreciate the need to manage grip appropriately and understand that there are only 4 small contact patches where the tyres meet the road and all driver inputs are passed through these contact patches.

So it is obvious that the more grip we have the safer we will be.

The management of available grip is where competition drivers and tyre technicians apply most of their energy and expertise.

It is every bit as important for the standard driver to have an appreciation and understanding of how to manage the available grip as it is for the formula one driver, when it comes to maximising safety and reducing risk.

The techniques and systems advocated by Roadcraft Driver Education courses are purposely chosen and designed to allow the driver to always be in the best position to maximise the management of grip and minimise the risks in all driving circumstance and are appropriate for all styles and disciplines of vehicle handling, management and control.

### **CRITICAL LIMIT (Threshold)**

The critical limit is the point just before lock up where there is maximum retardation of the vehicle while maintaining the ability to retain steering input and vehicle control. This point is also called the Threshold Point.

### **LOCK UP**

Lock up occurs when the wheel stops rotating. Full lock up is when all four wheels stop rotating. The front wheels **MUST** be rotating to enable the vehicle to be steered.

There are very few circumstances where locking up the wheels is appropriate. When all else fails and there is nothing else to be done it may be the only option, but there are serious limitations to the ability to maintain control of the vehicle to be considered.

Excessive Lock Up can cause the tyres to overheat and melt.

**Lock up is extremely dangerous** because you have no steering control what so ever and it generally extends the braking distance at speeds above 20 kph.

## **ENVIRONMENTAL**

- Water, Mud, Gravel, Oil or any other contaminant can cause you to lose grip.



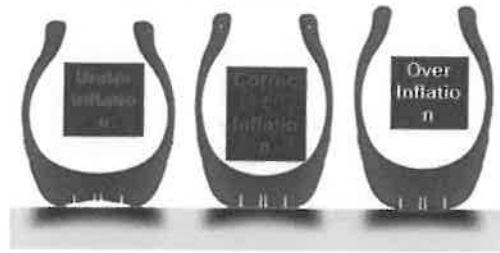
# TYRES

## WHAT KEEPS YOU ON THE ROAD ?

- Your tread is simply a water pump.
- Keep tyres with good tread on your vehicle
- Those pieces of rubber are the most important part of our car.
- They are the link between you and the road.
- Keep all 4 the same!



### TYRE PRESSURES



## SO WHAT IS THE CORRECT PRESSURE ?

- A lot more than you think.
- Most people think 30 – 32psi.
- More pressure will give you better stopping.
- Plus better fuel economy.
- Plus increased tyre life.
- 40 psi = 280 kpa
- 36 psi = 250 kpa



TYRE GAUGE PRESSURE		NS	
*ONLY FOR OLD TYRES ONLY			
*MAX LOAD 11,000K			
*SPEED CATEGORY 11,000K			
LOAD	PRESSURE		
UP TO 7.5 TONNES	PSI	KPA	PSI
	30	200	30
FULL LOAD	PSI	KPA	PSI
	36	250	36

THE PRESSURE FITTED TO THE VEHICLE SHALL HAVE A MAXIMUM LOAD INDEX OF NOT LESS THAN 80 AND A SPEED CATEGORY NOT LESS THAN H

The Manufacturers Tyre Placard should tell me.

## CAN I OVER-INFLATE A TYRE ?

- Don't go over the maximum pressure stamped into the Sidewall of the tyre.
- Max Load @ Max PSI/KPA



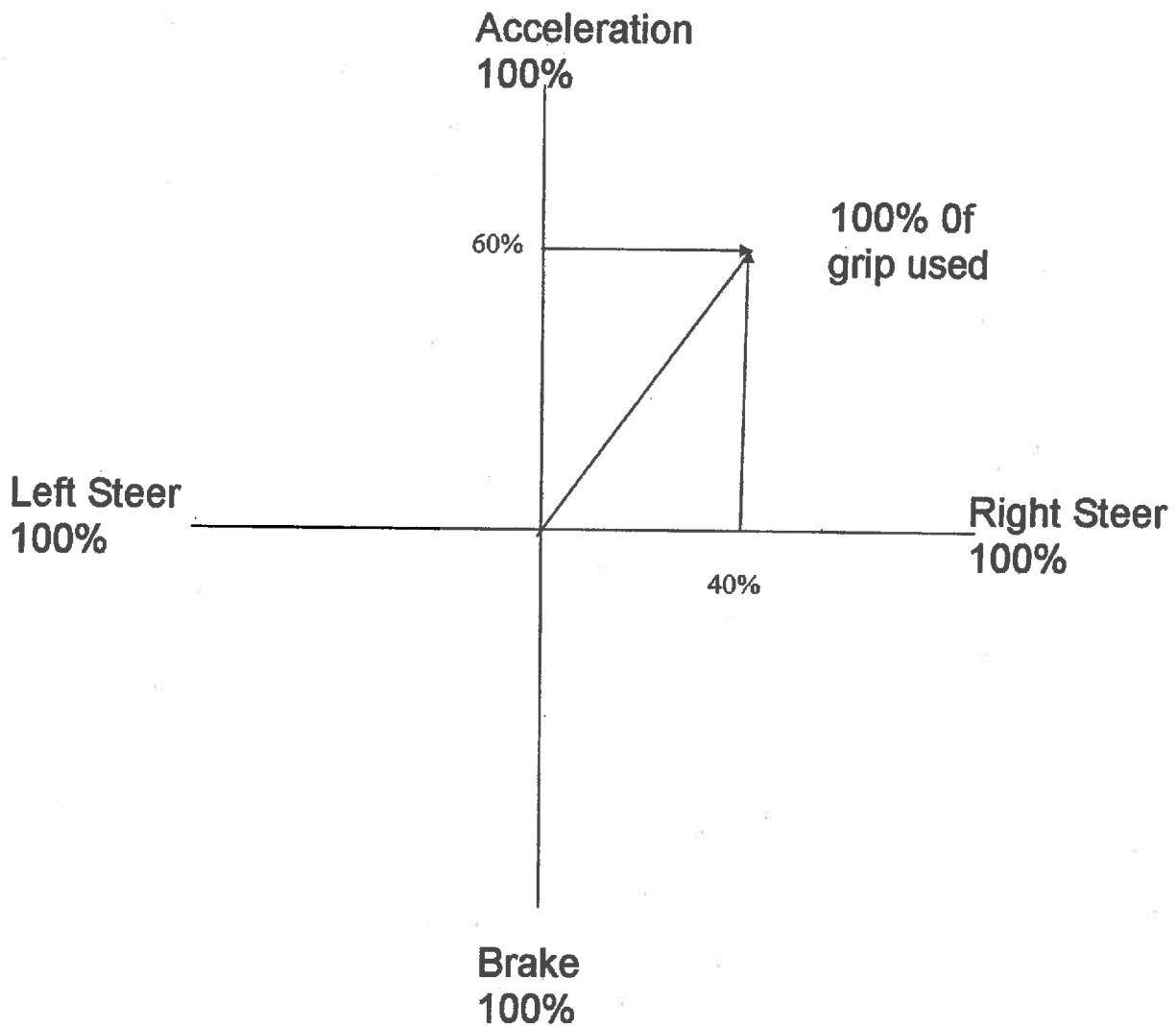
Max. Load and Pressure Markings



## THE TRACTION GRID

The Traction Grid is an ideal method of assisting drivers to develop a comprehensive understanding of the relationship between Grip and the application of steering, accelerator and brake pedals of a vehicle.

It highlights the effect of the % increase in the use of the control to the % decrease in available Grip to share at that point in time.



In the graph above the driver is using 40% of the grip for steering to the right and there is therefore up to 60% grip left to brake if required. If the driver applies more in either area, loss of grip is the result.

So it is apparent that if the vehicle needs to be steered more the driver needs to reduce the amount of braking in order to have the required grip to get the steering movement required.

If the driver fails to identify this dangerous LOCK UP in non-ABS vehicles or ABS activation in ABS fitted vehicle will occur.

**Note:** The appropriate application of Foundation Techniques and correct use of the Switch on Technique assists drivers to maximise the ability to manage Grip in all driving applications.

## CORNERING

It is an unfortunate fact that most drivers do not know how to corner correctly. This is not surprising; correct cornering technique is not generally taught to new drivers.

Like so many things we do, once one achieves licence standard, very little effort is applied to becoming a safer driver until something goes wrong, or a minor incident provokes a change of attitude. Far too many never get the chance again.

Cornering technique is the discipline that drivers find hardest to accomplish; it is the least understood and potentially the area of poorest results from a driver training perspective. The evidence from Road Toll Statistics does not support the widely held belief that more crashes occur on corners, however, safely negotiating corners takes a concentrated and concerted application of good driving systems, observation techniques and smooth driving principles.

Once the driver has identified the need to negotiate a corner the next step is to check the mirrors to make sure they are aware of what is behind them, and look as far around the corner as possible to identify the risk of hazards including oncoming traffic as well as initiate the appropriate amount of braking smoothly.

The vehicle should be placed as far to the left on a right hand corner as practicable without running off the edge at the Entry point. The eyes should follow the outside edge of the road as far ahead as can be seen, with "Eyes Up" and the required amount of steering applied. Once the vehicle is following the required path the momentum and stability of the vehicle should be maintained until the Exit (point at which the road starts to straighten out) is identified. At this point the steering can be unwound progressively and the accelerator applied smoothly. This is where it is possible to identify the Apex which is also called the clipping point.

During this process there is a need to **disassociate the eyes** from the hands so that the hands do not move the steering with the eyes, as they look further around and or ahead. This is called Hand Eye Separation. The common mistake made by almost all drivers is to look short at the Apex and not use a progressive forward motion of eye movement towards the Exit. This causes the driver to steer to where they are looking and they usually either cut a right hand corner and end up on the wrong side of the road or run wide on the exit of a left hand corner, or find it necessary to make constant adjustments to the steering destabilising the vehicle.

**Hand Eye Separation** does not come easily to most drivers. The application of Hand Eye Separation allows the driver to maintain their speed and direction and avoid stationary hazards like pot holes without the need to fixate on them by using the peripheral vision to maintain position, awareness and vehicle flow. If the driver looks at the hazard, drops their eyes or moves them out of position the effect is often a movement in the steering that is not required necessitating a correction in the steering and the resultant dynamic forces which induce vehicle instability.

This is a very common occurrence with almost all drivers that have not been made aware of this human tendency.

Because our hands are guided by our eyes we need to develop the ability to look for space when driving as opposed to looking at the hazard as "**you go where you look**".

Conversely if you want to be able to accurately hit a point or a pot hole, or cane toad, you need to look at it. That is the only way you can assure the accuracy required to hit it.

**Like catching a ball we need to catch the space when driving, especially in an emergency.**

This is a critical understanding that all drivers need to be aware of as it is the cause of most crash scenarios and contributes to **Target Fixation**.

*One of the common mistakes drivers make is leaving the major component of their speed adjustment into corners or intersections too late. The result being that they are carrying the major proportion of the energy closer to the required stopping or turning point where the risk of loss of grip is the highest.*

This is dangerous and becomes a critical issue in adverse conditions.

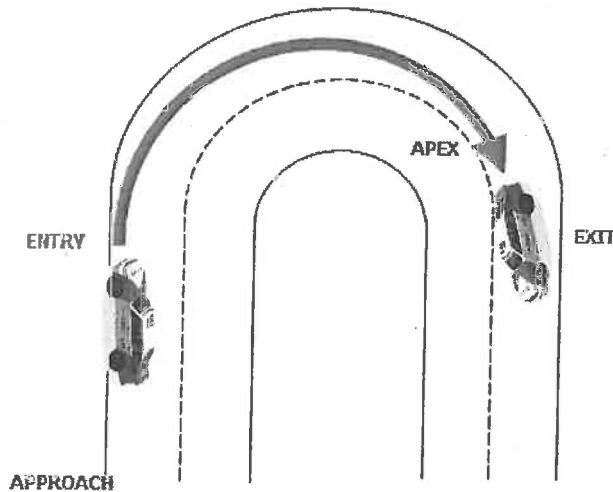
So, **More Brake Earlier – is Far Better** - than a lot of Brake Late.

It is important to understand the exponential effects of energy on braking distances which dictate that if you can **halve the speed you have reduced the energy by 4 times**. So you will have more Grip and reduce the distance required to stop.

The 3 Time World Champion Formula One Driver Sir Jackie Stewart is on record as stating -

**“You should drive with Finesse and never feel the beginning or the end of a corner or the application of Brake and Accelerator.”**

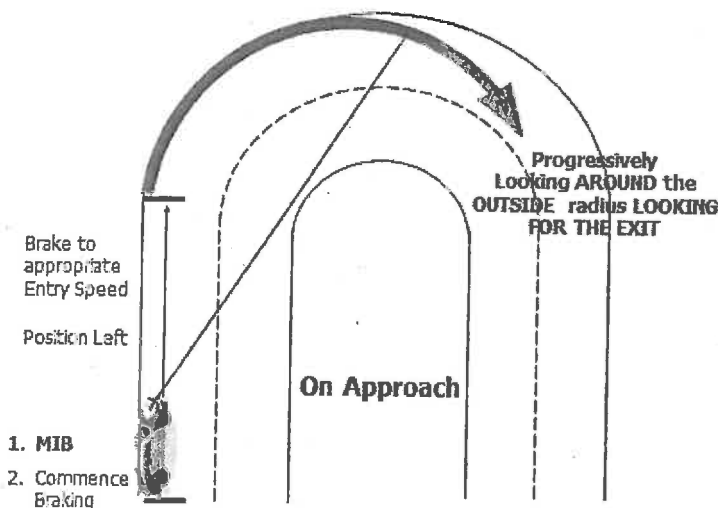
Driving with “Finesse” takes a concerted, concentrated, technically correct approach and effort to achieve.”



The 4 parts to a corner are:

- **Approach**
- **Entry**
- **Apex**
- **Exit**

**The Approach- Switch On** - where all the forward planning and identification should be done:



Be aware of what is behind so that you can respond appropriately to what is in front of you.

On the Approach the speed should be adjusted to the required Entry speed while visually sweeping the eyes through the corner around the outside edge seeking the Exit point paying particular attention to the traffic situation beyond and noting any potential hazards.

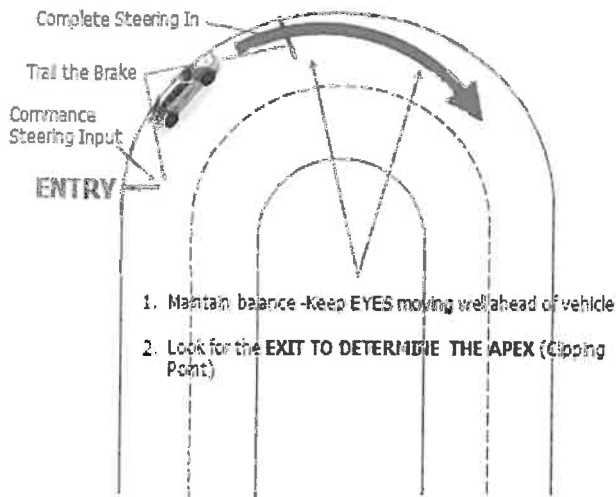
Often it is often possible to see for quite some distance ahead if you look far enough.

This called **getting the Big Picture**.

The Approach is where you identify

- The direction and severity of the corner
- The traffic situation like on coming vehicles
- Whether it is safe to continue or there is a need to take evasive action

**The Entry** – is where the steering input is applied and the eyes are searching for the exit.

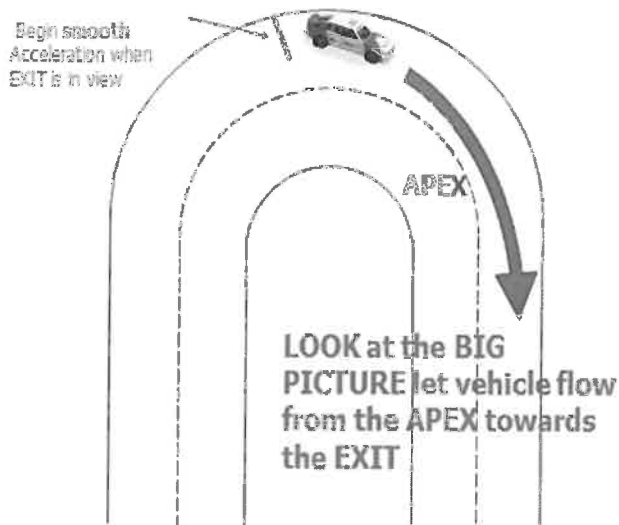


**Note: Minimal steering should be the goal of all drivers when entering corners to maximise the grip and minimise the transfer of weight.**

On long sweeping corners the vehicle momentum is maintained at a constant speed while the steering is held static with as little or no adjustment needed.

This is quite difficult for the unskilled driver and takes a concerted and conscientious application of **Foundation Techniques** and smooth driving principles to achieve desired cornering results. Steering commences Trail Braking (See Page 30) completes

**The Apex** - the point where the vehicle is closest to the edge of the road on left corners or centreline right corners.



The Apex is also referred to as the clipping point as it is where you clip the closest part of the corner.

Once the exit point has been identified the driver can smoothly progressively apply acceleration and start to unwind the steering to allow the vehicle to straighten out, clipping the Apex and flowing out towards the outside of the corner progressively and smoothly.






**Note: Always allow room for oncoming traffic when cornering avoiding the potential of conflict.**

**Exit point** – The Exit is the position where the vehicle leaves the corner and the steering is in the neutral position ready for the input required for the next corner.

The driver now speeds up to the required cruising speed or makes the appropriate adjustments and observations for the next corner.

It is best practice to look for the **Big Picture** at all times when driving and in particular when approaching corners.

### Some General Rules for Cornering

-  MORE BRAKE EARLY – IS FAR SAFER THAN – A LOT OF BRAKE LATE
-  LESS STEERING EARLIER - IS FAR BETTER THAN - A LOT OF STEERING LATE
-  THE SLOWER THE CORNER – THE LATER THE APEX
-  THE FASTER THE CORNER – THE EARLIER THE APEX
-  SLOWER IN - FASTER OUT - FASTER IN - YOU WON'T GET OUT

## LOW RISK VEHICLE POSITIONING & CORNERING

While the use of appropriate cornering lines provide many advantages and benefits it is not always appropriate to follow these principles to the letter.

Applying the Cornering Line Technique can create dangerous situations when there is an oncoming vehicle, wide loads or heavy vehicles coming from the other direction, so it is critical to the safety of all drivers to be concentrating and looking well ahead in order to plan the approach and appropriateness of the use of the desired cornering line. A more moderate entry into the corner may be the desired result.

**However these decisions can only be made with good forward planning and observation being applied.**

It must be stated that the appropriate use of Cornering Line Technique will almost always provide the driver with better vision around the corner allowing more time to respond to any hazardous situation that may be identified. The earlier hazards are identified and understood the more Time & Space to respond in.

So it is important to note the positioning of the vehicle when negotiating blind corners and traversing hilly or mountainous terrain is a critical contribution to maximising the safety of all road users.



By placing the vehicle further to the left approaching right hand corners, the driver will see further and deeper into the corner and identify any vehicle approaching, from the opposite direction, that may be hugging the centreline or about to run wide onto their side of the road much earlier. They will also be better placed to take any evasive action appropriate.



The same thing applies to the driver entering a left hand blind corner. By placing the vehicle further to the right hand side of their lane (not across the centre line or double lines) the driver will see further around the corner and once again be able to identify any vehicle approaching that may be hugging the centreline, or about to cut the corner onto their side of the road.

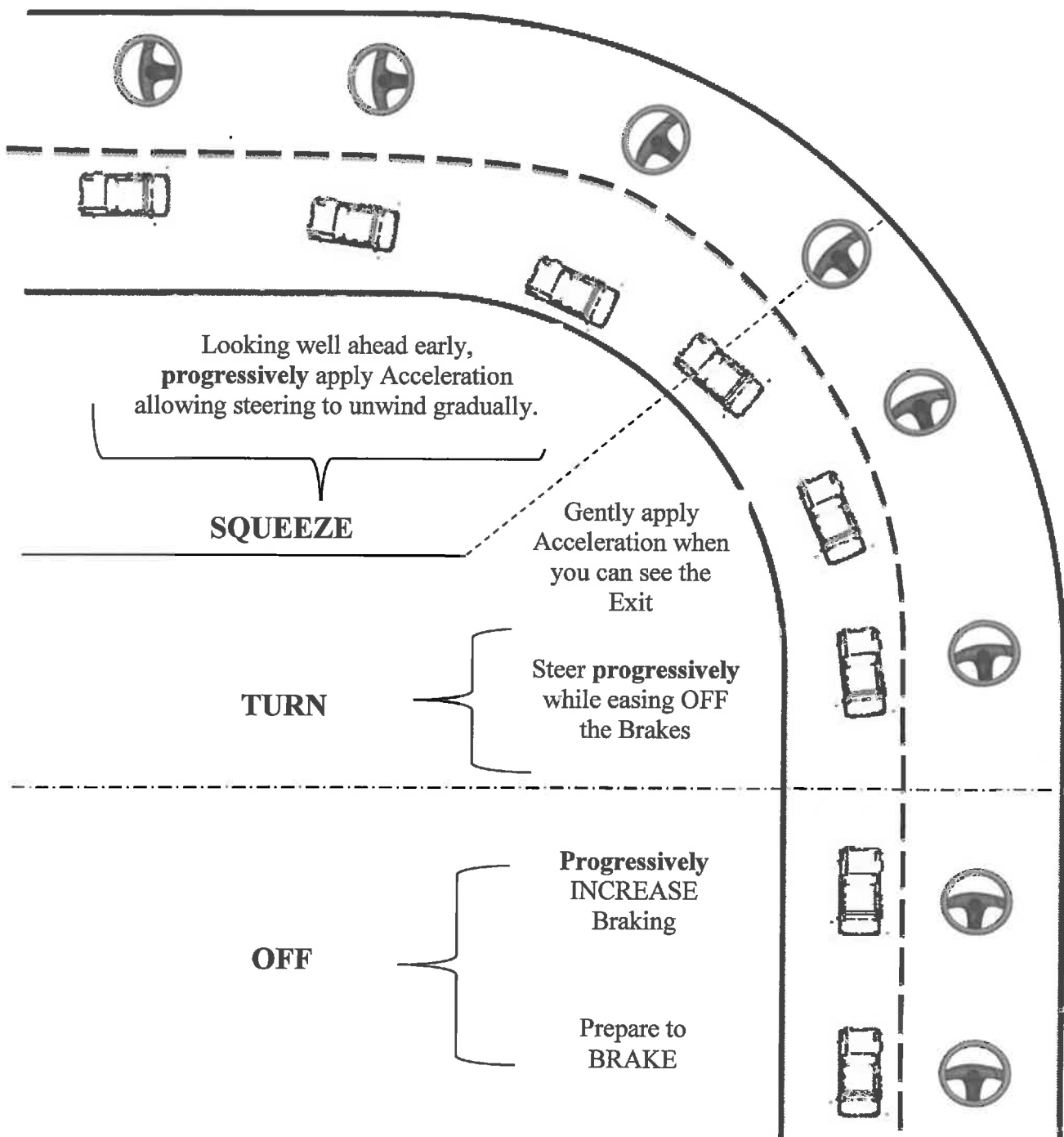
**In situations where no more visual gains are to be achieved by being closer to the centre of the road prudence dictates that this is the time the driver should tuck in and stay left.**

## Cornering, Control and Balance

A good trick is to endeavour to always use as little steering as possible when cornering.

In order to do this the correct application of Foundation Techniques is essential.

Drivers are always quite surprised at how little steering is really needed in most corners when this principle is applied.



## SKID AVOIDANCE & CONTROL

Skidding (Drifting) by its very nature is an aggressive action which should be avoided and has no place in normal driving practice. Whenever a vehicle is in a skid, tremendous forces are exerted on vehicle components and in particular drive trains and tyres.

The ability to recover from and/or control a skid is determined primarily by the amount of space available and the ability of the driver to keep their **eyes up** and look for the appropriate space to use to correct the skid.

It is imperative that the driver fully understands the consequences of driving at inappropriate speeds or failing to drive to the conditions. The relationships of "Time and Space" should be readily appreciated.

One way of developing this appreciation and understanding is to introduce drivers to skid situations in the driver training environment where they can develop a better understanding of the finesse and techniques required to avoid the Human Survival Responses triggered by the "**Fear Factor**". Once this understanding is achieved they are better able to learn how to respond appropriately and hopefully not over-react, if they are ever in a dangerous skid situation.

The importance of avoiding Fixation by moving the eyes progressively ahead (Keeping The Eyes up) and the use of Smooth Driving principles to maintain control are the most important techniques appropriate for the avoidance or control of a skid.

Most skids are brought on by aggressive inputs by the driver. **(DRIVER ERROR)**  
Skids can be caused by the **driver failing to identify** and respond early enough to:

- **Weather conditions**
- **Poor cornering technique**
- **Changes in road surface**
- **Poor observation**
- **Speed appropriate ( Excessive speed)**
- **Aggressive steering**

Generally a skid will occur when the driver applies

- **Too Much Steering too quickly**
- **Too much Brake**
- **Too much Acceleration**
- **A combination of any of the above**

Poor tyres or tyre pressures can contribute to the cause of skidding, but primarily it is the driver's input that determined whether a skid is induced or not.

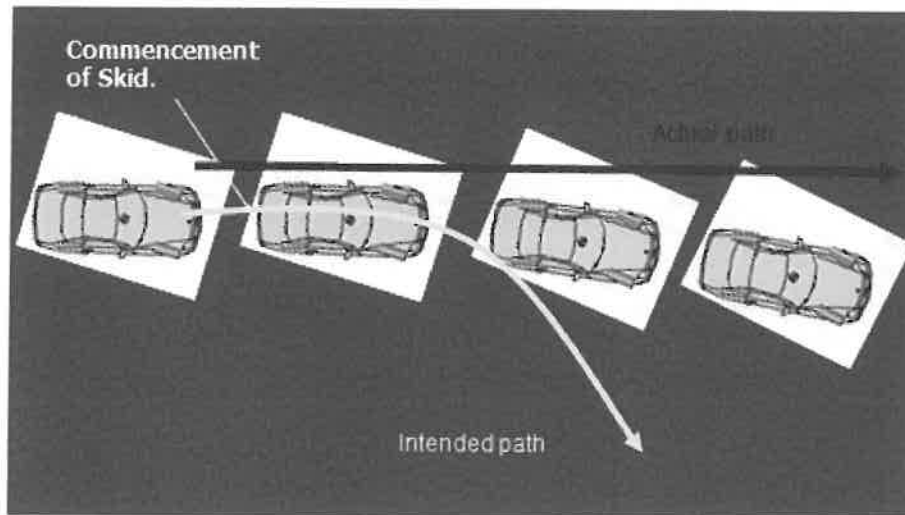
Generally the principle of **Less is More** applies in all driving situations.

### **Less Steering, Less Brakes, Less Accelerator = More Grip**

We tend to use the word control to describe the state of motion the vehicle is in, however we only have control while the vehicle is stable and once the vehicle becomes unstable we are out of control.

So perhaps the word control lulls us into the belief that we are in control, when in fact we are under the illusion that we are in control until something goes wrong.

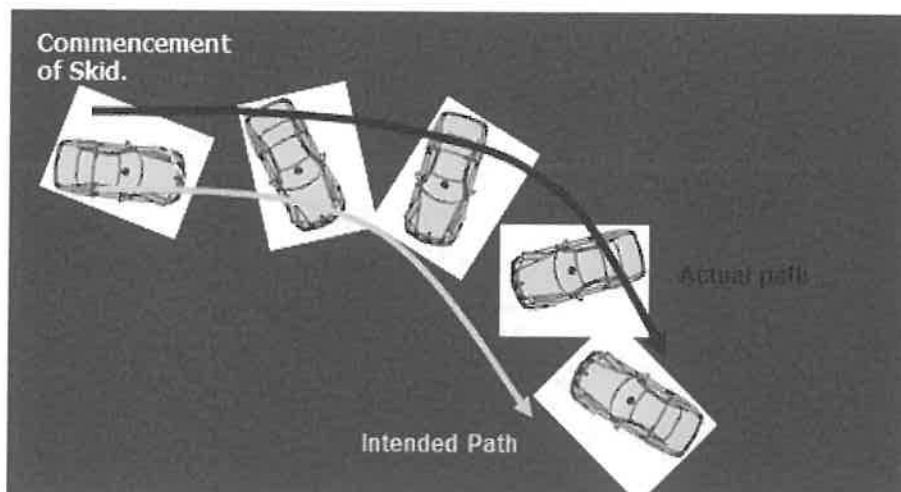
## UNDER STEER - Front wheel skid



### Under Steer - Front Wheel Skid:

Under Steer is where the front tyres lose grip and the vehicle is running wide of the intended line of travel or even straight ahead with steering applied.

## OVER STEER - Rear wheel skid



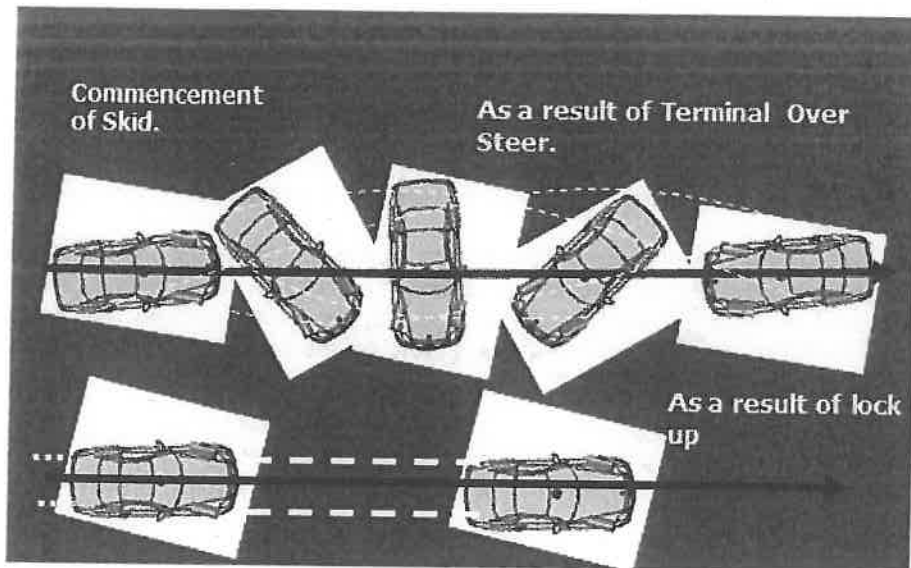
### Over Steer - Rear Wheel Skid:

Over Steer is when the rear tyres lose grip, which causes the rear end of the vehicle to initially run wider and where the front of the vehicle, which is still gripping is pushed deeper into the turn.

Classically the driver's eyes follow the direction of the bonnet so there is often very poor corrective response to this type of skid.



## Four wheel skid



### Four Wheel Skid

The **Four Wheel Skid** is the most dangerous of skid types and often terminal, resulting in vehicle damage and or injury. Once again this skid is indicative of the inappropriate Human Survival Response of Fixation and over reaction on the controls.

## SKID RECOVERY

Drivers are wiser to drive to the conditions and maintain smooth driving practices to maximise the grip and minimise the potential for skidding.

However if a driver does find themselves in a skid -

The most effective way to correct skidding is to maintain your focus and **Switch On**. Tell your eyes to **keep looking in the direction you want to end up not the direction in which the bonnet of the car is pointing**, and reduce the input (be it speed, steering, acceleration or braking that induced the skid in the first place) by applying smooth use of the controls to maximise the grip at that point in time and **never give up**.

In order to do this effectively and successfully the driver must be using the **Foundation Techniques** of:

- **Correct Posture**
- **Left Leg Bracing**
- **Pull Push Steering**
- **Observation moving ahead – not fixating (Eyes Up)**

**Note:** To be proficient at these techniques and systems of response it is advisable for drivers to always **invest the time** at the beginning of the drive to **posture** themselves appropriately.

## LOW RISK DEFENSIVE DRIVING TECHNIQUES

*The development and application of LOW RISK DEFENSIVE DRIVING TECHNIQUES are the primary objectives all intelligent drivers (or not so intelligent drivers) should strive to master by maximising their individual efficiency, effectiveness and safety on the roads as well as minimising any risk and enhance their ability to become as crash proof as possible.*

*Primarily it is the driver that makes the difference on our roads. Drivers have a choice. They can choose to take responsibility and apply best practice defensive techniques and the principles of smooth driving, as well as develop the appropriate attitude and apply a proactive approach, contributing to the safety of everyone on the roads and achieving the ability to control their own destiny.*

Defensive Tactics are the various strategies and systems drivers can employ in every-day driving in order to stay safer.

It is a fact that if drivers see a hazard one second earlier, up to 90% of all crashes could be avoided.

*IF YOU CRASH YOU HAVE MOST LIKELY DONE SOMETHING WRONG!*

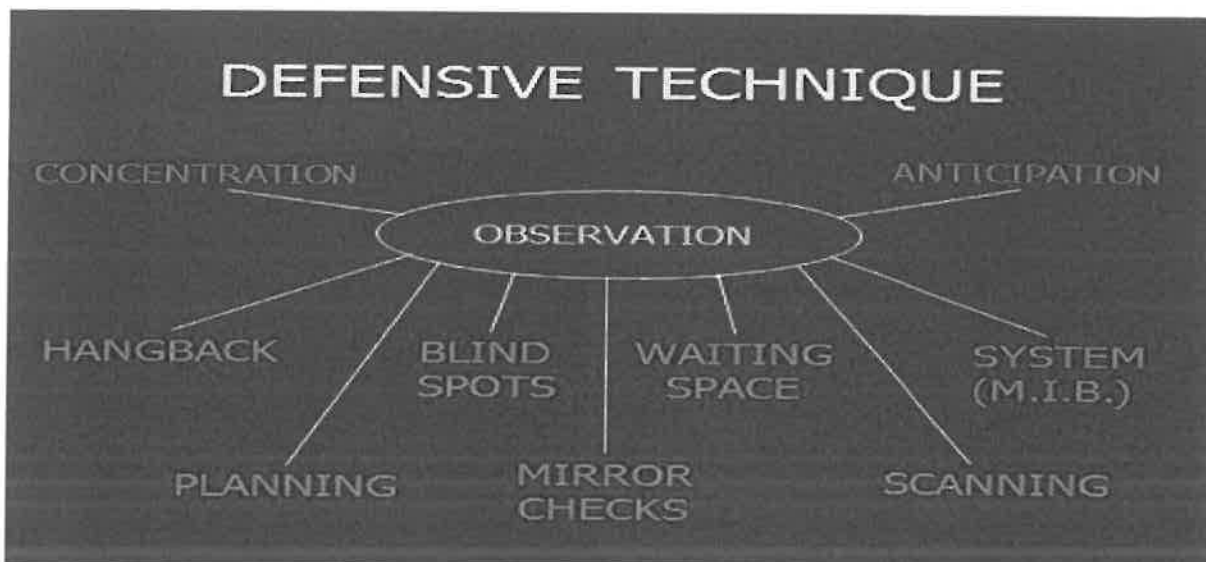
Everything you do on the road is related to where you look, and the ability to process what you are seeing in order to understand.

### More Space – Keeps You Safe

Managing your time and space effectively provides you with time to think and direct **your eyes (the primary guidance system)** process the information and find the appropriate options you need in order to respond appropriately, maintaining the illusion of control and maximising safety, minimising risk and allowing the driver to take control of their destiny.

### *Time + Space = Options*

So the driver's primary focus should be to concentrate on the application of the following Defensive Techniques.



## THE SYSTEM OF VEHICLE CONTROL

The **System of Vehicle Control** has been around since the 1930's and originated in the UK.

This System has been included in the Driving Licence Regulations of many Australian states for decades but very few people can ever relate to it when we ask them about it in courses.

This is an unacceptable and tragic situation. If this System was regularly taught to learners and practiced by drivers the tragic road toll we have experienced for many decades could well have been greatly reduced.

System driving is a corner stone of the Defensive Driving System.

It incorporates many of the techniques and requirements we advocate for the safe and efficient low risk driving practices to this day.

The sequence of this System should be used when approaching anything that represents a potential hazard where a change in direction or speed may be appropriate. It goes

- **Course** - Plan your Course, eyes up, look ahead, **get the Big Picture**
- **Mirrors** - Check your mirrors so you are aware of what is behind before responding to what is in front
- **Signals** - Signal your intentions. Communicate to other drivers with time for them to plan to allow you to proceed
- **Brakes** - Adjust the speed as appropriate, **more time and space keeps me safe**
- **Gears** - Select the appropriate gear for the speed if driving a manual; possible in modern automatics where appropriate
- **Mirrors** - Re check your mirrors to confirm understanding
- **Evasive Action** - Plan any required evasive action ( stop or proceed)
- **Acceleration** - When safe to do so accelerate through.

In order to effectively plan the course you first must be **concentrating on the Job** (The Driving Task).

Planning your course can mean many things, it could mean checking your referdex before taking a trip so you already know the land marks or street names you need. It also requires that you be Observing well ahead in order to plan.

The overriding value and importance of our Observation Techniques has been discussed but there is much more we can do in terms of Observation to maximise our safety, primarily looking further ahead more often (Eyes Up) and Scanning. I will cover scanning shortly.












So if we are observing appropriately and planning our course we can abbreviate this system to Mirrors, Indicators and Brakes.

### **M. I. B.** (Men In Black)

As a major proportion of crashes are nose tail we can therefore reduce our risk of being involved in a nose tail by looking further ahead more and checking our mirrors before responding to anything in front of us, endeavouring to be in a position to make the appropriate stopping or evasive actions, not reactions.

**If a driver is reacting they are getting it all wrong!**

# The System of Vehicle Control

				
				
8. Accelerate Clear:	When safe accelerate clear			Pedestrian
7. Evasive Action:	Take appropriate evasive action. Slow or stop or sound horn			
6. Mirrors:	Check traffic behind again			
5. Change Gear:	It's necessary to be in the appropriate gear for the speed			
4. Brake:	Check speed – adjust	<b>Black</b>		
3. Indicators:	Indicate intentions. Increase scanning	<b>In</b>		
2. Mirrors:	What traffic is behind you	<b>Men</b>		
1. Course:	Is my position correct? Yes / No			
HAZARD (pedestrian/Intersection) Identified				

## HANG BACK

**Hang Back** is also called by some Following Distance.

Road Crash statistics consistently show that nose tail crashes represent up to 60% of all road crashes. Yet the nose tail crash is potentially the easiest to avoid. All a driver needs is more space and to check the mirrors earlier before stopping, or more often once stationary.

**Hang Back** is the distance you stay behind the vehicle in front to avoid the dangers of tailgating and the consequences apparent.

The recommended method of measuring your space is by applying the time lapse formula measuring your **Hang Back** using the 3 second Rule.

### **3 Second Rule –**

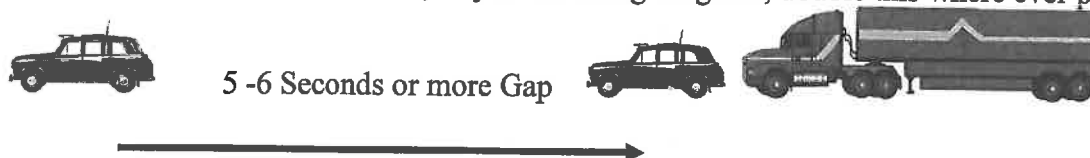
As the vehicle in front passes a stationary object start counting the seconds one one thousand, two one thousand, and three one thousand. When you get to the 3<sup>rd</sup> 1000 you should now be passing that same object.

If you have already passed the stationary object you are too close for safety.

3 seconds is recommended. 2 seconds is the bare minimum.



If in adverse conditions like rain, or you are being tailgated, double this where ever possible



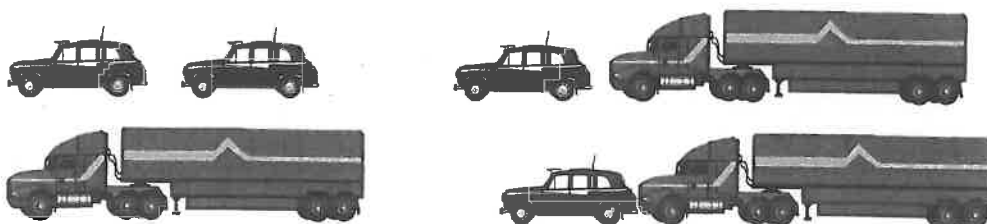
## SAFETY SPACE

When stopped in traffic, or at roadworks or intersections keep at least a car length of space in front.

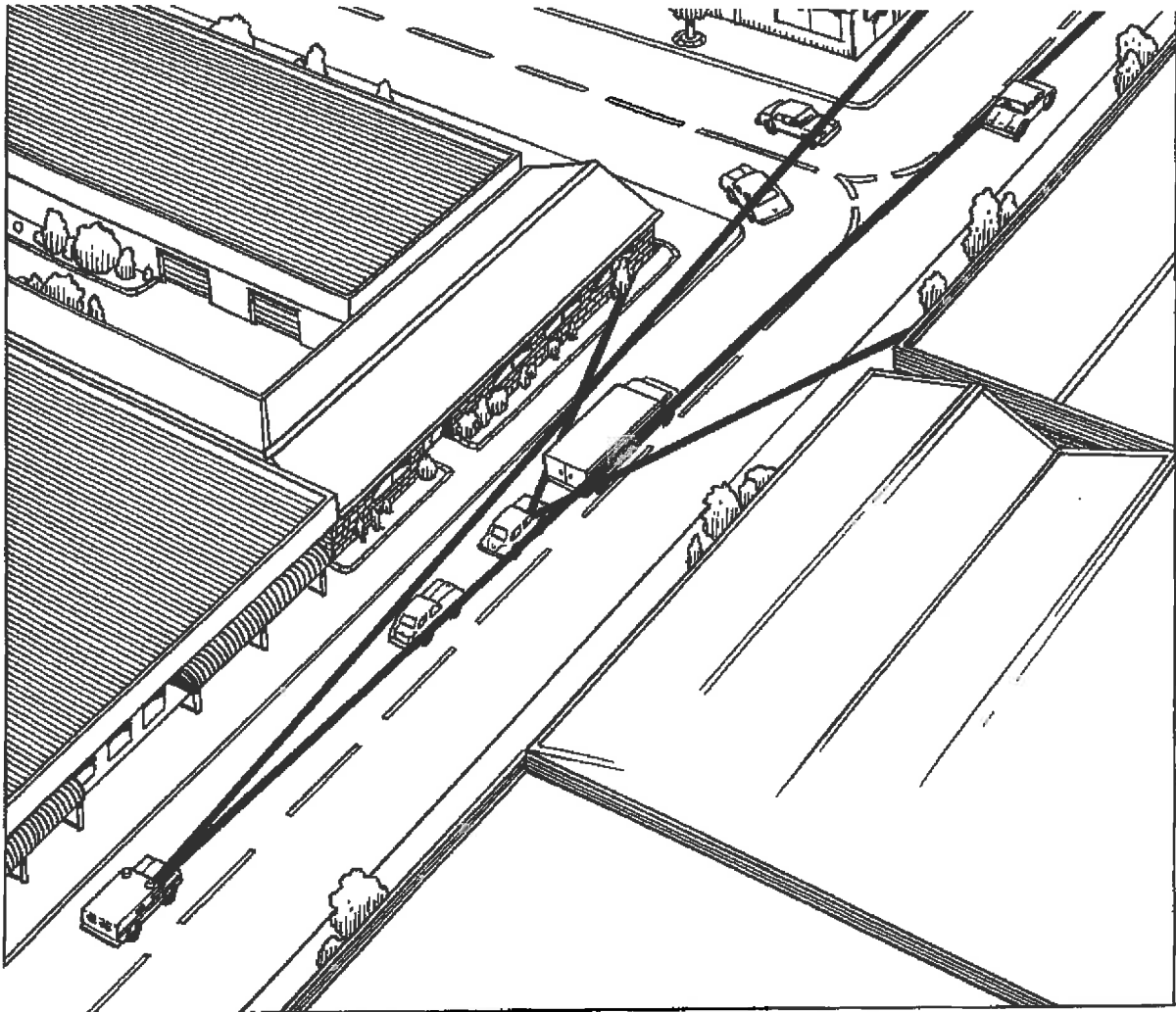
ALWAYS BE AWARE of what is happening behind you. CHECK your MIRRORS often.

Do not sit with the vehicle in neutral because if you need to move to avoid being shunted from behind, by the time you select the gear it will be too late.

Be prepared to move forward if it appears that the vehicle behind will not stop in time.



Manage your space so that you have options in difficult traffic situations.



The benefits of maintaining the appropriate space between vehicles cannot be over stated.

The visual improvements and ability to gather all the appropriate information available are obvious in the above diagram.

One of the factors that contribute to making tailgating so dangerous is that the visibility past the vehicle in front is totally obscured, especially if that vehicle is a truck.

In tailgating situations the following driver may as well be a passenger in the front vehicle, as the ability to control their destiny has been negated.

**Would you drive with a complete stranger in control of your destiny in any other circumstance?**

# **BLIND SPOTS**

## **EYE BLIND SPOTS**

What we need to be aware of is that we have two natural Blind Spots, one in each eye! We have already covered this in the Observation section. (Page 15)

## **VEHICLE BLIND SPOTS**

There are many Blind Spots associated with driving a motor vehicle, the primary ones being –

- A pillar (R front)
- B pillar (L Front)
- Side pillars
- C and D pillars (rear)
- Boot obstruction
- Bonnet obstruction
- Thick framed glasses

The next time you are sitting at an intersection, traffic lights or the likes take a second to check out how much the A and B pillar obscures on the other side of the road . You will most likely discover that you can easily obscure a car. This is quite surprising to most drivers.



**As a rule always check behind and around your vehicle before reversing, or get a passenger or passer by to assist.**

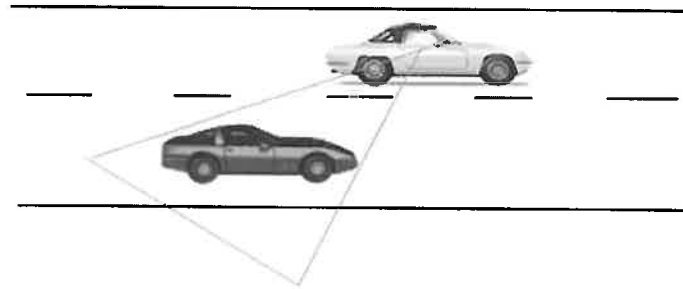
Every year too many children are run over by parents or family and friends in their driveways.



Checking behind you before entering the vehicle takes less than 10 seconds and can save a lifetime of remorse.

It may only be the toys in the way but it is far better to be sure than sorry.

## Cone of Blindness



Never travel in the Blind Spot of the vehicle in the left hand lane when on dual carriageways. Endeavour to be either behind or in front of the Blind Spot area where ever possible.

In the diagram above the overtaking vehicle is in the Blind Spot of the vehicle beside it. This is a particularly dangerous place to be in when overtaking.

You can check if you are in the Blind Spot by looking in that driver's mirror, if you cannot see them in their mirror they likely can't see you. So you need to be either in front of this position or further behind.

**The trick for the vehicle on the left is to have the mirrors turned out further to cover this blind area of travel.**

However it is always wise to do a shoulder check before pulling out to overtake or pass another vehicle or parked car, just in case there is an obscured vehicle like a motorcycle passing you.

Failing to cover this Blind Spot is one common cause for Road Rage and a major contributor to motorcycle crashes.

Evidence of this can be seen every day on our nation's highways and freeways. You can see sets of tyre marks running off to the centre where drivers have pulled out on overtaking vehicles, without first checking the blind spot for overtaking vehicles.

**It is important to remember:**

**We can only respond to what we see, but we will only respond appropriately to what we understand.**

**So the sooner we see a problem and understand it, the more time or space we will have to deal with it and the less likely the need or potential to react inappropriately.**



## SCANNING

Scanning is the only way to adequately account for the natural Blind Spots in our eyes and those created by the pillars on either side of the wind screen and in some cases like large mirrors the driver needs to look around these.

The pillar Blind Spots can totally obscure the visibility of a truck at 50 metres. This is one and one half seconds away at 100 kph. This little appreciated fact is a major contributing factor to cross road crashes.

**"I didn't see it officer, I didn't see it till it was too late"**

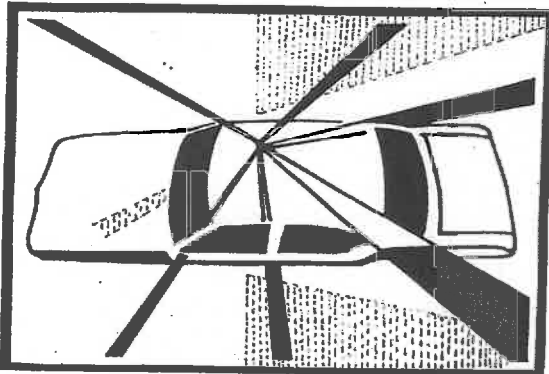


Using eye movements alone will not adequately cover the Blind Spots, the driver must use lateral head movement from left to right and right to left to adequately gain all the appropriate relevant information needed to maintain safety and reduce the risks associated with cross roads, intersections, roundabouts and the obscurity of motorcycles and pedestrians.

**Scanning is one of the most important aspects of "risk free crash proof driving".**

**A driver needs to look to understand and therefore look earlier in order to have the Time and Space to respond to what he sees, therefore avoiding the need to react.**

**Always, Always, Always**, look left before committing to entering any intersection. Most drivers fail to confirm it is safe to enter by looking before entering to the left. This is a common cause of nose tails and pedestrian strikes when entering intersections.



**It is wise to remember that ultimately your safety and the safety of others is in your hands.**

To Scan effectively and cover the potential for hazards to be obscured in Blind Spots it is necessary to always have at **least 2 looks each way before committing** to an action.

**So look Right, Left, look Right again then Left again and move on when it is safe to do so.**

**Never commence a left turn while still scanning to the right  
Never commence a right turn while still scanning to the left**

## COMMENTARY DRIVING

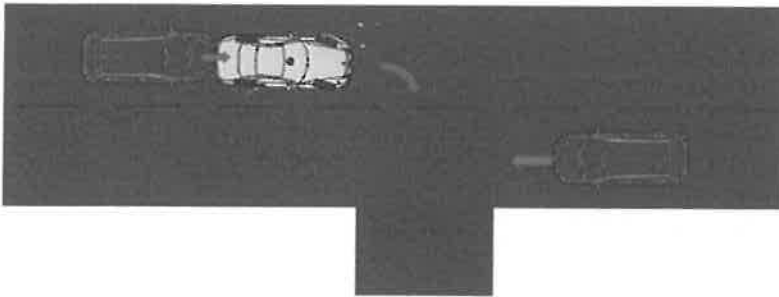
**Commentary Driving is the technique where the driver verbalises all that is being seen and the actions that may need to be taken while driving.**

The use of Commentary Driving improves concentration, assists in the reduction of fatigue and development of advanced observation and scanning techniques as well as increases the driver's ability to stay on task while driving. We have found it particularly useful for anxious or timid drivers to develop their ability to drive with the appropriate confidence and awareness appropriate to reduce risk and enhance safety. This technique works particularly well where intense traffic condition or difficult driving situations occur by assisting the driver to maintain focus as it opens up an extra channel into the brain. You actually see more when commentating.

## VEHICLE POSITIONING

Some more strategies you might like to incorporate into your driving technique to maximise your safety and minimise the risk on the road:

- Never stop with wheels turned.



- Never sit in the middle of the road waiting to turn right with your wheels turned because if you happen to get shunted from behind you will be pushed into the oncoming traffic.
- Better still; avoid placing yourself in this position at all costs.
- Avoid hugging the centreline as a head on crash is the worst in terms of the energy released and resultant potential for fatalities.
- Always stop before the stop lines to reduce risk of impact with other vehicles.
- Position yourself with plenty of Safety Space at roadworks and be vigilant on the mirrors until several vehicles have stopped behind you. Be ready to move forward if there is a vehicle unable to stop in time behind you.
- Always anticipate that vehicles approaching from the opposite direction will cut corners or be on your side of the road on blind crests or run wide on the exit of corners, so take the appropriate countermeasures to allow for their mistakes.
- Never assume a driver is going to take a course of action or give way without confirmation.
- Always try and get confirmation of their intentions by seeking eye contact.
- **Communicate** with other drivers effectively.
- To confirm intentions of the other driver look for nose down or nose up movement of the vehicle to identify if they are proceeding or stopping. Look where their wheels are pointing.
- If you are not sure what the other driver's intentions are, check where they are looking.
- Understand that if you cause a driver to get a fright that they are likely to fixate on you and that is where they will go.
- **Expect the Expected** and you won't get a fright and be thrown into the Human Survival Response mode.

## COUNTRY ROAD DRIVING

Some strategies for country road driving are -

- Always go in front of a horse and behind a cow or steer, as the horse will generally shy back or sideways and the cow or steer will shy forward or sideways.
- Roos are unpredictable 😊 but will go where they look so if they look at you?
- Roos will rugby tackle you if they get beside you.
- Always err on the side of caution and leave plenty of space.
- In head on situations - Understand that if the other driver looks at you they are likely to follow you off the side of the road and crash into you.
- **The trick is** to try and break the fixation tendency. Using an indicator to show your intended path may help. The window of opportunity may allow for this especially if you are on top of the game and see the potential earlier.
- You may be far better off to select to go off the edge of the road when approaching other vehicles on narrow bitumen or even gravel roads rather than be forced to go off a little further on where you have no options and may not get to avoid large sharp edges, pot holes or grooves etc.
- Always look to the horizon or as far as is possible to get the "Big Picture".
- Do not swerve violently or aggressively to avoid animals. A roll over at speed is far more dangerous than a collision with a light-boned animal.
- Use smooth progressive responses rather than reactions.
- Look for dust up ahead as an indication of traffic for blind crest, corners etc.
- Dark or light patches indicate holes or bumps
- Use the road wear lines to determine the likely position of oncoming vehicles on country roads.
- For example- 4 wheel tracks = using their own side, 3 wheel tracks = sharing the middle, 2 wheel tracks = all using the same space and 1 wheel track = motorbikes or lots of animal use?
- Always drive blind crests and curves as if something will be coming from the other direction using more than their share of the road – this way you are ready for this eventuality and won't get a fright and fixate.
- After heavy rain, assess creeks and floodways before driving in, if in doubt always walk it. If you are unable to walk it, don't drive it.
- Remember - still waters flow deep.
- Assess the situation.
- Decide on the best course and the options available.
- Ask yourself – Do I need to drive it?
- Have I got the ability to drive it? Is the vehicle capable of driving it?
- **Expect the Expected.**



# NIGHT DRIVING

## Night driving – use light effectively

Night driving introduces another dimension to the driving task.

It is a little known fact that human eyes adjust from dark to bright light reasonably quickly but they are very slow in readjusting from bright light to darkness. So this is where it is critical to manage your night vision.

Some useful strategies for night driving are -



- Dip the high beam before blind crest and corners to determine if another vehicle is approaching on low beam – only for a moment and then put back on high immediately if nothing is approaching. This strategy must be done well before the entry of the corner as all the available light is needed to corner.
- Look and scan well ahead of the noticeable line of light for the flash of animal eyes and potential hazards that may be picked up in the grey light.

- Be sure to look ahead of the vehicles in front for stop lights or hazards picked up in their lights that might cause a need to respond.
- Adjust your centre rear view mirror to reduce glare.
- When on low beam at highway speeds we are overdriving our lights in many cases.
- Red reflectors are on the left, white on the right, so you can identify the correct side of the road in adverse conditions, fog and dust.



- It is a good idea to fit driving lights to enhance vision and space management when driving country roads by extending the visual range.
- Remember animals can be dazzled by lights especially on high beam becoming confused so it may be appropriate to drop to low beam in some circumstances to reduce potential of a collision.

- If confronted with bright oncoming lights – look left and low to avoid dazzling your eyes.
- If you are dazzled by oncoming lights it can take up to 30 minutes before your night vision returns.
- Remember to **Switch On**. Concentrate and be attentive to the task.
- Apply the principle of - **More time and space keeps me safe!**

# FATIGUE

THE BEST MANAGEMENT STRATEGY FOR FATIGUE IS - TO AVOID IT ALTOGETHER.

However this is not always a practical option.

The contributing factors to fatigue are;

- Your health
- Sleep quality
- Conditions including environmental
- Driving style
- Time behind the wheel
- Time of day
- Stress
- Worry
- Visual conditions
- The mental and physical demands of work including work scheduling and planning

A driver who has been awake for 17 hours has a driving ability similar to that of a driver with a blood alcohol concentration of 0.05.

Fatigue crashes are usually severe, resulting in serious injury and death, as the driver makes no attempt to avoid or prevent the crash.

Driver fatigue affects everyone, however those at higher risk of a fatigue-related crash are rural drivers. (Centre for Accident Research and Road Safety – Queensland)

Some signs of Fatigue are – Continual yawning, tiredness, sore eyes, dehydration.

NEVER DRIVE FATIGUED

## FATIGUE MANAGEMENT

So we need to apply some basic fatigue management strategies;

- Applying **Foundation Techniques** will allow you to maintain concentration and apply yourself to the driving task
- Make sure you get plenty of sleep before the trip
- **Commentary** driving assists to increase concentration
- Make sure you stay hydrated
- Carry some light low sugar snacks
- Make sure you stop and have a walk around the vehicle in a safe place every 2 hours or less if fatigue is apparent
- Get someone else to drive for a while
- Sing?☺ Be aware that by now it is time to stop, rest and take a break
- **Deep breath – time to stop!**
- Always plan your trip and schedule stops to manage fatigue appropriately

**Remember:** Ultimately - Your safety is your responsibility.

## IN SUMMARY

*You can control your driving destiny on the roads by using the following principles of Low Risk Defensive Driving.*

### CONCENTRATION:

Learn a relaxed method of concentration. Have a break every 2 hours. Learn to recognise the first signs of fatigue and manage this appropriately. Relax and breathe.

### ANTICIPATION:

Be aware of all road situations. Plan your travel well ahead, continually looking for escape routes and the soft options. Never make assumptions based on what the other driver appears to be going to do, visually confirm this at every chance. **Expect the Expected.**

### OBSERVATION:

**"Teach your eyes what to look for"**. Expand your vision to the end of the horizon. If you see a problem early it will become less of a problem. Get the **"Big Picture"**.

Wherever possible use direct eye contact to confirm that you understand the intentions of other drivers, pedestrians and motorcyclists or any other road users. (**Eyes Up More often**)

### FOUNDATION TECHNIQUES:

**Posture yourself – Switch On, use appropriate steering techniques.**

### SYSTEM DRIVING:

Always check your mirrors before braking and/or indicating, **M.I.B. Men In Black**

### SCANNING:

Use left and right head and eye movements to cover the blind spots early to get all the available information to be well aware of what you are approaching.

#### **It is important to note:**

**Your eyes are your primary guidance system. Everything you do when driving is related to what you are seeing or looking at.** If you are still not convinced of this fact try driving with your eyes shut!

### TIME SPACE MANAGEMENT:

When confronted with an emergency we need time to process the information or space to identify a satisfactory alternative (OPTION).

**TIME + SPACE = OPTIONS**

**More Time, More Space keeps me safe**

### HANG BACK:

Count in seconds, the spaces between you and the vehicles in front of you.

Extend from 3 to 6 seconds if being tailgated.

The laws of physics dictate that it is impossible to stop with less than a 2 second gap at normal highway speeds.

### BLIND SPOTS:

Blind Spots are all around the vehicle. Be aware, Blind Spot check at all times before manoeuvring, pulling out to overtake or leaving the curb.

Adjust the mirrors out appropriately to assist with covering blind spots.

### HAZARD RECOGNITION & RESPONSE:

Anything that creates a need to adjust speed or direction is a hazard. Animals, potholes, water on the road, corners or even a road train are hazards. Learn to prioritise hazards and take the appropriate action accordingly.

**TEACH YOUR EYES WHERE TO LOOK & WHAT TO LOOK FOR - CREATE TIME AND SPACE**

*So by now it should be obvious that the ability to apply accepted driving principles and techniques, manage our "Time and Space" and concentrate on the effective use of our eyes, plays a primary role in our ability to be a "Safer more Aware Driver"!*

*At the end of the day if you only maintain more space more often you may never need to apply any evasive actions, as you will not get mixed up in the mistakes of other drivers. Other drivers won't get a fright and fixate on you when you make a mistake. It is that easy.*

## **THINGS YOU MIGHT LIKE TO REMEMBER**

Here are some reminders of what has been covered in your defensive driving course. Every one of them will help make you become a SAFER and MORE AWARE DRIVER

### **Human Factors:**

**Attitude**

**3Cs Concentration, Cooperation, Courtesy**

**Understand Human Survival Responses and how they impact you**

### **Vehicle:**

Vehicle and Tyre Inspection

### **Foundation Techniques:**

Posture

Observation Techniques

Bracing – "Always be Bracing"

Pull/Push or leading hand Steering

Smooth Input – Accelerator,

Steering and Brakes

### **Vision and Observation:**

Avoid Fixating (Eyes Up)

Vision- Get the "Big Picture"

Look further around corners

Scanning at intersections

Blind Spots/shoulder check

Eye Contact

Use mirrors

Hazard recognition

Forward Planning

Plan Escape Routes

### **Emergency Control:**

Skid Prevention

Cadence Braking

Threshold Braking

It is all in the eyes "Eyes Up"

Avoid "Fixation"

### **Low Risk Defensive Techniques:**

Observation

Concentration

Anticipation

Defensive Positioning

Time and Space management.

Waiting Space

Follow Distances > 3 seconds

### **System Driving:**

Mirrors Indicators Brakes.

Adherence to the Road Law

Hazard Response

## YOUR PERSONAL SURVIVAL KIT:

1. *In order to have time to respond in any situation, keep your eyes up looking further ahead more often. By developing observation skills you will find yourself identifying potential hazards earlier, creating less need to react and allowing more time for you to plan your responses.*
2. *Remember that; your eyes don't tell you what you see; you tell your eyes what to look for.*
3. *Use the 3 Second Rule and 5-6 seconds in adverse conditions in order to maintain an adequately safe following distance.*

### **More Space - Keeps Me Safe**

4. *Always check your mirrors before braking and/or indicating, M.I.B. Men In Black*
5. *Communicate your intentions to other drivers early enough for them to have adequate time to respond.*
6. *Employ Smooth Driving Techniques. It takes skill to drive with "Finesse". Smooth driving is no accident!*
7. *The Three Cs - Concentrate, be Courteous and Considerate of other road users and their needs.*
8. *Ultimately your safety is your responsibility; you can control your driving destiny.*

**By applying the above strategies in your everyday driving you will be a long way towards becoming a much safer, more aware, crash proof driver.**

If every driver gave themselves one extra second of space up to 90% of all crashes could be avoided.

Is your life worth that extra second?

SAVE A SECOND, SAVE A LIFE



I would like to acknowledge the following current and past Senior Roadcraft Driver Educators for the amount of input provided to me personally in developing the understanding and insights I used to draw on to put this driving manual together, without which it would not have been possible.

In alphabetical order.

Barry Brunjes, Brian Everett, John Kilpatrick, Wayne King, Mark Phillips, Graham Smith, Eric Woodhead.

*Thank you guys. Your contribution to road safety in Queensland is unquestionable.*

I would also like to take the liberty of acknowledging the patience, influence and contribution my father George Arthur Bailey (Race no 44) who was a multiple Australian Scrambles Champion in the 1950s played in my personal development by assisting, mentoring and sharing the principles of riding motorcycles and the fundamentals of using one's vision correctly at an early stage of my development. This allowed me to become an accomplished Moto Cross rider where I gained valuable knowledge and experience that I have been able to pass onto my own family and course participants in my Driver Education career.

The Save a Second Save a Life series has had a lot of influence on the development of Roadcraft courses as has the Jackie Stewart Driver Training video series.

Robin George Bailey  
22.01.2014

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