Risk and enjoyment in powered two wheeler use

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Declaration

I declare that the work contained within this Thesis has been composed by myself and that it embodies the results of my own research and studies. Listed below are conference presentation and publications that have been, or are about to be, published from this Thesis.

Paul S Broughton

Publications

Broughton, P. S. (2006). The Implication of the Flow State for PTW Training. In *Behavioural Research in Road Safety 2006, sixteenth Seminar*. London: DfT.

Broughton, P. S. (2005). Designing PTW training to match rider goals. In L. Dorn (Ed.), *Driver Behaviour and Training*: Ashgate Publishing.

Broughton, P. S. & Stradling, S. (2005). Why ride powered two wheelers? In *Behavioural Research in Road Safety 2005, fifteenth Seminar*. London: DfT.

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Broughton, P.S. (2006), "*What Type of Rider are You?*", BMF Scottish AGM
Broughton, P.S. (2006). "*Influencing Powered Two Wheeler Behaviour*" Highland Motorcycle Safety Conference 24th April – Inverness.

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Abstract

The road accident statistics show that the number of killed and serious injury (KSI) accidents involving powered two wheelers (PTW) is increasing. The UK Government, in ‘Tomorrow’s roads: safer for everyone’ (DfT, 2000) set a target of reducing overall KSI by 40% of the 1994 to 1998 average by 2010, yet for PTW the KSI has shown an increase of nearly 9% a year between 1996 and 2002. Some form of intervention is needed to reduce the KSI rate. To give any intervention a high chance of success, it has to take into account the riders themselves and be based on an understanding of behaviours; that is an understanding of the goals of riders. This thesis explores those rider goals, and utilises Fuller’s task homeostasis theory and Csikszentmihalyi’s theory of flow to develop an understanding of the interaction between risk and rider goals.

The research finds that riders ride because they enjoy it; but they do not necessarily enjoy the risk involved. The research also finds that there are two types of enjoyment: one based on rush and the other on challenge. Riders’ attitudes to risk also vary, with three risk profiles being proposed - risk adverse, risk acceptors and risk seekers. Comparisons of rider and driver enjoyment types are made, indicating that riders and drivers differ.

The research is used to develop principles of interventions, with the aim of guiding future research and reducing KSI figures.

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Abbreviations, Acronyms and Symbols

#	Number
Δ	Delta (change in)
≈	Approximately equal to
ACEM	Association des Constructeurs Européens de Motocycle
BMF	British Motorcycle Federation
DAS	Direct Access Scheme
DfT	Department for Transport
f	Function
IHIE	Institute of Highway Incorporated Engineers
KSI	Killed or Serious Injury
MAG	Motorcycle Action Group
MCIA	Motorcycle Industry Association
MPH	Miles per Hour
n	Number of samples
ONS	Office of National Statistics
Pi	Power Index
PTW	Powered Two Wheeler
RoSPA	Royal Society for the Prevention of Accidents
RTA	Road Traffic Accident
RTC	Road Traffic Crash
TRL	Transport Research Laboratory
α	Proportional to

Chapter 1 – Introduction

"Biking – Anything else is just transport"
www.ukbikeforum.com1.1 Introduction

The objective of this chapter is to give an insight into the world of Powered Two Wheeler (PTW) use, and thus allow those who do not ride to gain a better understanding of the material within this thesis. Beginning with the basics, what is a motorcycle, or PTW? The online encyclopaedia, Wikepedia defines a motorcycle thus:

> *"A motorcycle is a two-wheeled vehicle powered by an engine. Motorcycles are one of the cheapest and widespread forms of motorised transport for many parts of the world. On a typical motorcycle the operator sits astride the vehicle on a seat, with their hands on a set of handlebars and their feet supported by footpegs. When the bike is at rest, the rider puts one or both feet on the ground, because the gyroscopic force that keeps a moving bike up is absent. Engine speed is controlled by twisting the throttle on the right side handlebar grip with braking being controlled with a hand-lever and foot pedal. Shifting of gear ratios is controlled by operating a foot lever with the clutch being operated by a hand lever. Steering is accomplished by trained application of slight turning of the handlebars and lateral shifting of the riders weight."* (Wikipedia, 2006)

After giving an overview of the thesis, the chapter considers the history of PTWs, from their early invention up to the machines of today and then, after this historical review; a brief description of the various types of bikes available is given. A section is devoted to the skills needed to ride a bike. This is intended to give insight of how to ride and therefore a better understanding of the material that follows. There is a section on what is required to get a British licence to ride a PTW to give an appreciation of the process that potential riders must go through in order to ride PTWs on public roads. Finally the chapter explores the 'biker image' by looking at how others view PTW users and their portrayal in the media.

1.2 Overview of Thesis

This thesis examines the reasons why people make the choice to ride Powered Two Wheelers (PTWs) on public roads, despite the commonly held view that this is a very dangerous mode of transport. To that aim this thesis will ask the questions:

- Who are PTW riders and why do they ride?
- What are the goals of PTW riding and how do riders strive to attain them?
- How do these goals relate to risk?

- How can an understanding of rider goals be used to develop interventions to improve PTW rider safety?

1.3 A Brief History of Powered Two Wheelers

1.3.1 Early Days

When was the motorcycle invented and by whom? This is not an easy question to answer as, unlike most inventions, the motorcycle cannot be traced back to a specific person who had the idea. Towards the end of the 19th Century, many people investigated the idea of replacing humans on pushbikes with an alternative power source. American Sylvester Howard Roper has a claim of inventing the first motorbike with his steam-powered machine in 1867, however it is more generally accepted that Germans Gottlieb Daimler and Wilhelm Maybach designed the first real motorbike in 1883 when they attached their four-stroke engine to a pushbike (Noss, 2006).

With motor-powered transport came legislation; vehicles and drivers having to comply with the 1865 Locomotive Act (amended 1878). This restricted ‘horseless vehicles’ to a maximum 4 mph, and only 2 mph within towns. This act also required each vehicle to have three drivers, two in the vehicle and one in front waving a red flag, hence this piece of legislation is often referred to as the ‘Red Flag Act’ (Devon and Cornwall Safety Camera Partnership, 2003). The Motor Car Act of 1903 raised the speed limit to 20 miles per hour and banned powered two-wheeler passengers from riding side saddle (The Wolverhampton History & Heritage Society, 2002).

1.3.2 The Twentieth Century

By the 1900s so many companies were manufacturing powered two wheelers that the future of motorcycling was looked assured, yet the British magazine, Engineering, described motorcycling as:

> ‘*a form of entertainment that can appeal only to the most enthusiastic of mechanical eccentrics... We think it doubtful whether the motorcycle will, when the novelty has worn off, take a firm hold of public favour.*’(Chadwick, 2005)

In 1904 over 25,000 PTW were registered in England, growing to over 60,000 by1907. This growth continued so that in 1913, just prior to the start of World War One, the number of registered machines in England topped the 100,000 mark. It was not only in Europe that the motorcycle industry was advancing during the years just

prior to the war. In the United States of America over 200 companies were producing more than 70,000 bikes a year (Chadwick, 2005). After the war ended, Germany was restricted in what it could manufacture. Companies switched from manufacturing items that could have military use. Bayerische Motoren Werke AG, or BMW, was one of these companies who moved from making aircraft engines to motorcycles (Total Motorcycle, 2006).

Motorcycle production continued to increase in the United Kingdom to a peak of 147,000 in 1929, but the great depression of the 1930s put many manufacturers out of business. The companies that survived did so mainly by marketing more expensive and innovative machines. PTWs shifted from being a cheap form of transport to an enthusiast's hobby.

The Second World War, like the First, had a marked affect on companies who manufactured powered two wheelers. Many moved production away from bikes to aid the war effort, and never switched back (Total Motorcycle, 2006). One of the major changes after the Second World War was the rise of Japanese manufacturers. Honda, who are today's largest PTW manufacturer, was started in 1948 by Soichiro Honda (HondaBikes.Net, 2006). The Japanese motorcycle industry, through good marketing and innovative design, made powered two wheelers available to all and not just a small group of enthusiasts.

Today's modern powered two wheeler may look similar to earlier machines, but in terms of performance and sophistication they have changed significantly. Most powered two wheelers are now designed for a specific purpose. The next section discusses some of the main types and their characteristics.

1.4 Types of Powered Two Wheelers

1.4.1 The Sports bike

The sportbike is essentially a consumer version of a race track bike and tends to be a lightweight, high-powered, very fast machine with the rider position leant forward to minimise wind resistance. There has recently been a voluntary agreement amongst manufacturers to limit the top speed of these bikes to 300km/h (186 mph) (Ridley, 2006). Examples would be the MV Augusta F4 1000 (Figure 1.1) and the Kawasaki ZX-9R

Figure 1.1 MV Augusta F4 1000

Reproduced with kind permission of John (www.bikemotel.co.uk)

1.4.2 The Tourer

This PTW's purpose is for high mileage riding and is therefore designed with rider comfort in mind. The rider has an upright seating position.

Figure 1.2 BMW K100

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These bikes are often designed so that they can carry considerable luggage. The requirements of the engine are also different to that of a sports bike with the Tourer being designed to do a lot of mileage easily, hence the engine will generally be lower revving and designed for higher mileage. These bikes also tend to be heavier than the Sports bike. Examples are the Honda Pan-European and the BMW K100 (Figure 1.2)

1.4.3 Sports-tourer/All rounder

This type of bike is a blend of Tourer and Sportbike allowing long distance riding at higher speeds with the emphasis more on performance. Examples would be the Kawasaki GPZ500S (Figure 1.3) and the Yamaha FZS600 Fazer.

Figure 1.3 Kawasaki GPZ500S

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1.4.4 Classic/Custom/Cruiser

Generally these machines are in the style of American bikes from the 1930s through to the 60s. These are normally big engine bikes, with the rider sat in an upright relaxed position and the feet in a more forward placement than on other powered two wheelers. These machines often have no fairing but lots of chrome. Examples would be the Harley Davidson V-Rod, Yamaha V-Start (Figure 1.4) and the Kawasaki VN1500 Classic.

<u>Figure 1.4 Yamaha V-Star</u>

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1.4.5 Off road/Trail

Off road machines are designed for riding through rough, muddy and uneven countryside. They have bulky tyres designed to get grip on muddy surfaces and front shock absorbers with a lot of travel to compensate for rough terrain. These machines are not geared for top end speed but for torque. Examples of this type of bike are the Suzuki DR-Z400S and the Triumph Tiger (Figure 1.5).

<u>Figure 1.5 Triumph Tiger</u>

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1.4.6 Moped/Scooter

Mopeds and scooters are normally at the lower end of the engine capacity, but there are now scooters that have significantly higher power than a few years ago. Mopeds have an engine size of less than 50cc, and must have a maximum speed of no more than 50km per hour. An example of a moped would be the Yamaha FS1-E, and of a scooter the Honda SCV100 Lead Scooter (Figure 1.6)

Figure 1.6 Honda SCV100 Lead Scooter

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Although there are a variety of bike types, the fundamentals of riding PTWs are similar for all. The next section gives a brief description of the riding process, highlighting some main differences between riding PTWs and driving cars.

1.5 Basics of Riding a Powered Two Wheeler

Although powered two wheelers and cars are governed on British roads with the same generic set of legislation, albeit with some specific clauses, the riding of a PTW is very different from driving a car, varying in such aspects as the position of the controls, safety equipment and the control skills needed.

1.5.1 Safety Equipment

When a person drives a car the major protection is given by the vehicle itself. Modern cars have crumple zones, various air bags and side impact protection amongst their armoury to protect their occupants (Cars Direct, 2005). The PTW rider does not have anywhere near the level of protection offered to car occupants as very little can be built into the PTW to protect the rider. Leg protectors, which prevent a rider's leg being caught between the bike and an object, is the only commonly available safety feature for the bike (RoSPA, 2001). There has been some development carried out into a form of air-bags for PTWs, Honda's version is shown in Figure 1.7 (Honda, 2006).

Figure 1.7 Honda Airbag System

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The majority of the protection afforded to a PTW user comes from the protective clothing that the rider wears, but the only compulsory piece of safety equipment is the helmet (DfT, 2004b) which must comply to an appropriate British (BS) or European (CE) standard (TC, 2005). Study after study has shown that wearing helmets does save lives (for example see American College of Surgeons, 2004; Branas & Knudson, 2001; Kraus, Peek, McArthur & Williams, 1994). The other parts of safety equipment

that can be worn include gloves, jackets, trousers, boots and back protectors (Unwished Legacy, 2005). This equipment is designed to absorb the forces of any direct impact as well as to be resistant to wear should a rider slide along a road after an accident. The amount of force that equipment can absorb is limited, and in the case of most accidents, it is the rider that takes the brunt of the force.

1.5.2 Bike Controls

The controls on a bike need to be positioned in a way that allows easy use; therefore the majority of the controls are situated on or near the end of the handlebars with the exception of the gear change and rear brake, which are foot controls. The majority of powered two wheelers have separate front and rear brakes, with the front brake being a hand-operated lever on the right hand side of the handlebars and the rear brake being a foot operated lever that is activated with the right foot. Figure 1.8 shows where the standard positions are for the main controls.

The clutch, in the form of a pull lever, is situated on the left hand side of the handlebar. The other controls on this side are positioned so that the left thumb can operate them and include the horn, hi-beam light control, passing lights and indicator control. The indicator control on a powered two wheeler differs from those found on a car in two significant ways: firstly indicators do not auto-cancel so a rider must always be sure that they are cancelled so as not to send false intentions to other road users (Begin Motorcycling, 2006b); in their operation, the indicator is turned on by moving the button to the left or right and it is cancelled by pushing the button in.

The controls found on the right hand side of the handlebars include the front brake and the throttle control. The front brake is a pull lever while the throttle operates on a twist-grip principle - that is the handgrip is twisted to alter the amount of throttle being applied to the engine, clockwise (towards the rider) for more throttle and anti-clockwise (away from the rider) for less throttle. The button, used to start the engine is also situated on the right hand side of the handlebars along with the emergency engine stop switch, which can be used to kill the engine quickly if needed. The on/off controls for the lights are also placed on this side of the handlebars.

The left foot is used to change gears by pushing the foot operated lever either up or down. PTWs have a sequential gear box, that is each gear is selected in turn and gears cannot be missed; for example to get from second to fourth, third gear must be

selected. Generally pushing the level down will select a lower gear and pushing it upwards will select a higher ratio. Neutral is situated between first and second so to place the bike into first from neutral the gear lever is pushed down, then to move into second the level is moved upwards, and then up again to change into third, hence a six speed gearbox will often be referred to as one down five up. The right foot is used to work the rear brake by depressing it; the harder it is depressed the harder the brake is applied.

Figure 1.8 Standard Positioning of Bike Controls

1.5.3 Basic bike control

As with driving a car, the knowledge of where the controls are situated and what each control does is not enough to allow the safe operation of the vehicle. For the riding of a PTW the basic riding skills are taught to a rider when they undertake compulsory basic training (CBT), which is described in section 1.6.1. Some of the basic skills needed to ride a bike are now described.

When a PTW does not have a rider sat upon it, it has to be supported. Most machines have two methods of doing this, a side-stand and a centre-stand. The side-stand is a flip-down device that allows the PTW to be supported by leaning the weight of the bike against it, side-stand can be activated with the rider still on the bike by flipping the stand down and then leaning the bike onto the stand before getting off the bike. The centre-stand is a more substantial method of supporting the bike and this cannot be operated while the rider is on the bike. The centre-stand, as the name suggests, is in the middle of the bike and, when in use, supports the bike in an upright position, often with the rear wheel off the ground. To place the PTW on to the centre-stand the rider must stand beside the bike, balancing it, and then lift the PTW while applying pressure to the stand, forcing the bike back and up onto the stand.

Anytime that a powered two wheeler is not on one of its stands, but in a resting position with the rider upon it, it must be held on either the front or rear brake. Unlike a car, most machines do not have a brake that can be activated and left on, such as a car's handbrake. For the majority of time when sitting stationary on a bike the PTW should be held on the back brake by using the right foot, with the weight of the machine supported on the rider's left leg.

Most modern PTWs use an electric starter operated by a push button situated on the right hand side of the handlebars. Before starting the bike the ignition key is turned to the on position, illuminating the warning lights on the display which the rider should check to ensure the bike is in neutral before starting.

With the bike started, the rider can prepare to pull away with the order of events to do this being the same as for driving a car; clutch in, select gear and increase the engine speed whilst balancing against the clutch to allow the vehicle to pull off. On a PTW however, there are some other complications; firstly to select the gear the left foot must be used, but this is the foot that is supporting the machine. So the weight of the

machine must be switched so that the right foot is supporting the PTW, but as the right foot is being used to hold the machine still by using the rear brake, the front brake must first be employed. Therefore the basic procedure, in addition to normal observations, for pulling away on a bike is:

1. Apply the front brake.
2. Release the rear brake and put the right foot down.
3. Shift the weight of the machine onto the right leg and ensure it is balanced.
4. Bring the left foot onto the footrest.
5. Pull the clutch in using the left hand.
6. Select first gear by pressing the gear change downwards with the left foot. The neutral light on the display should go out.
7. Put the left foot back onto the ground.
8. Shift the weight of the PTW from the right to the left leg and balance the bike.
9. Put the right foot back onto its footrest.
10. Apply the rear brake using the right foot.
11. Release the front brake (right hand).
12. Increase the speed of the engine by operating the twist grip with the right hand.
13. Move the clutch to biting point by slowly releasing it with the left hand.
14. Balance the engine speed and clutch and release the back brake as the bike starts to want to pull away.
15. As the machine starts to move off, place the left foot onto the footrest.

Once the bike is moving, further progress can be made by changing gear by moving through the gears on the sequential gearbox. To change up a gear the clutch is operated using the left hand on the pull lever, at the same time engine speed is reduced by closing the throttle off by twisting the twist grip anti-clockwise with the right hand, the gear change is actuated by moving the gear lever upwards with the front part of the left foot, the clutch is then slowly released, being balanced with an increase in engine speed. Changing down a gear is very similar except that the gear changer is pressed downwards by the sole of the left foot instead of upwards. When the PTW comes to a stop it can be put into neutral by a half movement of the gear changer, in an upwardly motion, to select a gear between first and second, the machine must be in first gear prior to doing this. While putting the machine into

neutral it must always be held on a brake, so the shuffle between the left and right supporting leg, as well as changing from using the front/rear brakes, would need to be carried out in a similar fashion to that used when pulling off.

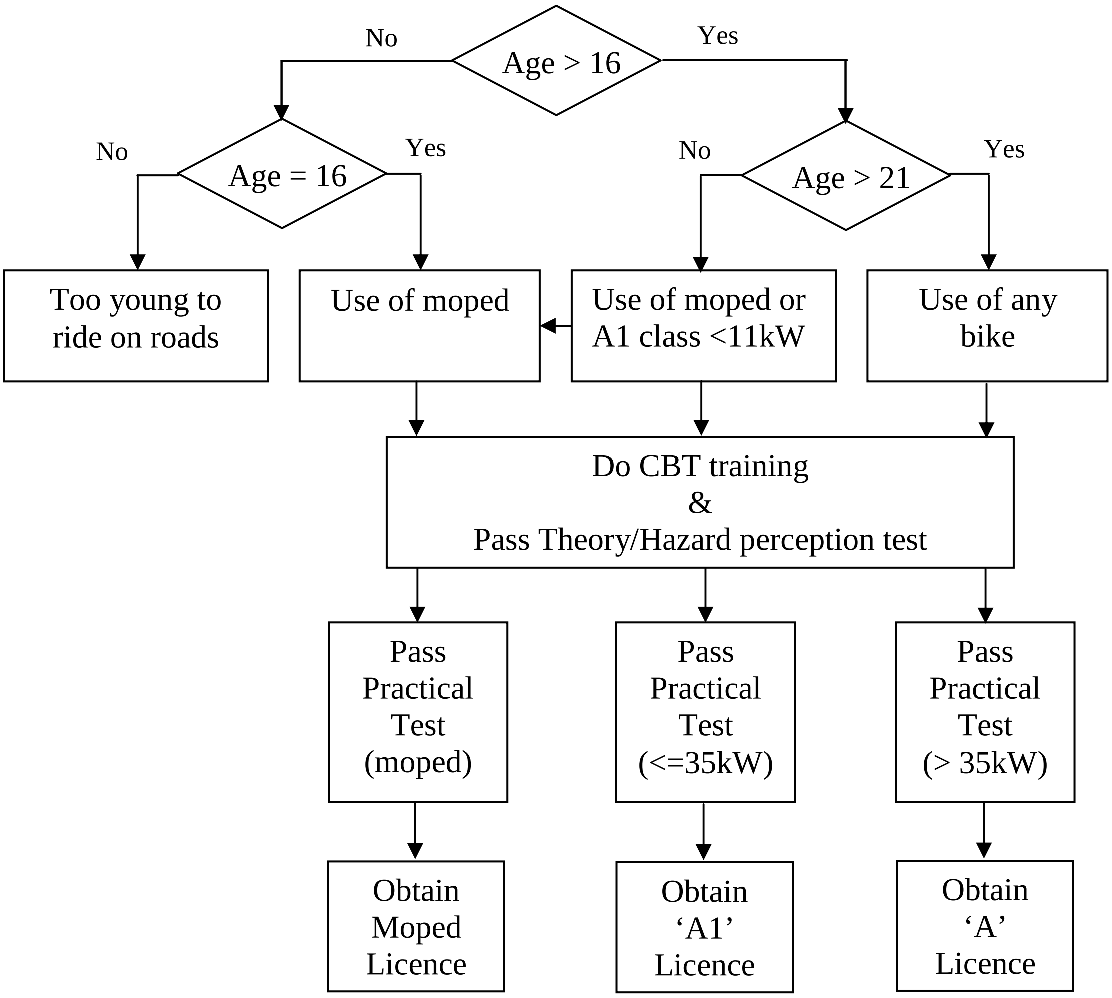
When attempting to slow a PTW, engine braking should where possible be used, as use of the brakes can make the machine unstable (Begin Motorcycling, 2006a). Engine braking is simply shutting off the throttle and allowing the engine to slow the vehicle up, with more effective engine braking being achieved by selecting a lower gear. If the use of the brakes is needed, then these should be applied with a balance between the front and rear brake, with the majority of the braking being carried out with the front brake. In dry conditions about 80% of the braking should be the front brake, but the ratio moves more towards 50/50 in wet conditions. With the nature of bikes being unstable, braking needs to be carried out with caution and in a controlled way and should only occur while the bike is travelling in a straight line and not leaning from the perpendicular otherwise the front wheel is liable to slide out from under the bike.

This has been a discussion of some of the mechanics of riding a powered two wheeler, but to ride safely a lot of additional skills are also needed, such as road craft and a high observation competence. While some of this is learnt and honed by experience, the basics are taught to riders during their passage to obtain a licence.

1.6 How to Get a Motorcycle Licence

The route to a licence that will allow a person to be qualified to ride any bike is not the same, or as simple, as a car (DfT, 2003b). Figure 1.9 shows the current route that has to be taken to get the full licence; the starting point for all new riders is the Compulsory Basic Training or CBT. Once the CBT has been successfully completed the rider is issued a DL196 form, which validates the learner's provisional motorcycle licence so that the learner can ride, with "L-plates", unsupervised on the road using a machine of less than 11kW. The DL196 certificate is valid for 2 years after which, if both the theory and practical motorcycle tests have not been passed, the CBT has to be re-taken for the rider to continue to use their powered two wheeler on the road.

Figure 1.9 The route to a licence



1.6.1 Compulsory Basic Training

The first stage for anyone wishing to get a motorcycle driving licence is to complete the Compulsory Basic Training (CBT). The Driving Standards Agency (DSA), in an attempt to reduce the accident rate amongst learner riders, introduced the CBT in December 1990 and it is now mandatory for all new riders wishing to ride a motorcycle, scooter or moped on public roads. The CBT consists of 5 Elements (Begin Motorcycling, 2006a):

1. Introduction.
   An eyesight of reading a new style number plate at 20 metres or an old style at 20.5 metres (DirectGov, 2006).

   An explanation of what the CBT is and what will be taught.

   A discussion of the correct use of safety equipment, including what is available, what protection it will give and how it should be maintained.

2. Practical on site training.
   This section of the course is carried out in a private off road area where basic information is given such as how to put the bike on its stand and how to start and stop the engine.

3. Practical on site riding.
   This is also carried out in a private off road area. Basic bike control skills are taught including:
   - Riding the bike in a straight line and stopping
   - Changing gear
   - Emergency stop
   - Slow speed bike control
   - Performing u-turns

4. Practical off road training.
   Skills that are needed for riding on the public road are taught in a private off road area, such as:
   - Hazard perception
   - Observation skills
   - How to negotiate junctions

5. Practical on road riding.
   A minimum of two hours riding on public roads is required. During this period the instructor supervises the learner using a one-way radio.

If the course is completed to the satisfaction of the instructor then a DL196 certificate is issued, which validates the student's provisional motorcycle licence so that they can ride, unsupervised, on the road using a machine with power of less than 11kW, but they can not carry passengers and they are not allowed to use motorways.

1.6.2 Theory and hazard perception test

In order to take the practical riding test and obtain a full licence (A1 or A) a theory test, which also includes hazard perception, must be passed (Begin Motorcycling, 2006c).

The first part of the theory test consists of 35 questions about various subjects to do with riding, including road signs, maintaining a bike in a safe condition and safe riding techniques. Of the 35 questions, 30 must be answered correctly within the 40-minute time limit for the test to be passed. Since November 14th 2002 there has been a second part to the theory test, the hazard perception test. This consists of 14 video clips of about 60 seconds each showing real road scenes in which hazards develop.

The rider is asked to identify the hazards; the faster the hazard is identified the higher the score obtained.

Both parts of the theory test must be passed to obtain a theory pass certificate; this is valid for two years. The theory pass certificate and the CBT certificate (DL196) must both be presented at the practical test.

1.6.3 The practical riding test

Once a DL196 and a theory pass certificate have been obtained then a rider can take a practical test on a 'learner motorcycle' or moped class to obtain a category 'A1', or P, licence respectively. A 'learner motorcycle' can have an engine size of up to 125cc with a power output not exceeding 14.6 BHP (11kW), and a moped is defined as a two-wheel vehicle that has a maximum design speed not exceeding 50km per hour and an engine capacity of not greater than 50cc (DSA, 2004).

The practical test is conducted by a Driving Standards Agency (DSA) examiner who is in one-way radio contact with the rider throughout the test as he follows behind on his own machine. During the test some compulsory manoeuvres have to be carried out, including a hill start, an emergency stop and pushing and riding the bike in a 'U turn' (DSA, 2004).

If successful in the test then a motorcycle of up to 33 BHP can be ridden. This restriction is removed after two years and a motorcycle of any size can be ridden: this is a class A1 licence (DVLA 2003). Learners who are over 21 years of age can undertake a Direct Access Scheme (DAS) course, which allows them to learn, and take their tests, on machines of at least 35kW. The theory test and CBT still have to be completed to undertake this type of training. Upon passing this test the rider can then ride a bike of any capacity or power: this is a class A licence.

Getting a driving licence allows a person to ride, and become a 'biker'. The term biker means different things for those who ride to those who do not, so what is the image of bikers?

1.7 The Image of Bikers

When motorcycles were in their infancy, those who rode were enthusiasts, engineers, people who enjoyed tinkering with the bikes, and eccentrics. This image is demonstrated with the quote:

> *"Most motorcyclists love to spend their Sunday mornings taking off the cylinder head and re-seating the valves." Donald Heather, director of Norton.* (Hopwood, 1998)

The Second World War changed the nature of biking and the image of bikers. Many soldiers were affected by their wartime experiences and felt the need for a sense of identity and freedom; some found this in biking. Also around this time came the trend of racing from café to café with the riders dressed in their leather jacket uniform. Motorcycle gangs were forming and, with the bad press received, many were put off from buying a bike and instead opted for the family friendly car (Quiñones, 2006).

In 1954, less than 10 years after the war ended, the image of the biker as a criminal was established when Columbia/Tristar Studios released 'The Wild One' starring Marlon Brando. This film did more than anything else to establish an image of bikers in modern culture (Dirks, 2006b). The film was based on a real life story, albeit very loosely. On the weekend of July 4th 1947 about 4,000 people descended, many on bikes, on the town of Hollister, California. However, unlike in the film, the town was not ravaged or destroyed and only a few arrests were made, mainly for drunkenness. This event was reported in the January 1951 issue of Harpers Magazine in an article entitled "The Cyclists' Raid" (Rooney, 1951). In 1954 another article reported, "Nobody - except another cyclist - likes a man on a motorcycle" (Burton 1954). In 1969 the outlaw side of biking was further immortalised into modern culture when Columbia Pictures released the film Easy Rider starring Peter Fonda, Dennis Hopper and Jack Nicholson (Dirks, 2006a). This film modified the image of bikers for many to be an outlaw type of criminal, living on the edge of society. How justified is this image? Are bikers people who want to be outlaws, to live outside of society?

The next Chapter considers the research evidence relating to riders and motorcycle use.

Chapter 2 - PTW Safety – A Literature Review

Bloody, Battered, Tattered Thing
Which is body? Which is wing?
What kind of bird it's hard to say
On a motor way
But the marks in your blood
Are sharp and clear
A Dunlop 'safety' tyre
Has just been here
Spike Milligan 1918-2002

2.1 Introduction

This chapter reviews the current literature concerning powered two wheeler (PTW) safety to enable an understanding of the problems concerning PTW safety. The chapter starts by reviewing the literature specific to the problem with motorcycle safety, followed by a review of literature concerning the types of accidents that PTWs tend to be involved in, before considering interventions and ideas concerned with improving PTW safety.

2.2 Understanding The Motorcycle Problem

There has been a steady rise in motorcycle ownership over recent years (RoSPA, 2001). In 2006 there was 133,077 new bikes registered in the UK (MCIA, 2007) and according to Mintel (2004), even though the market is slowing down from the rapid growth it experienced at the end of the 20th Century, it still remains buoyant. Currently not much is known about the levels of motorcycling within the UK (RoSPA, 2001), however 2.3% of households own at least one Powered Two Wheeler (PTW) accounting for about 1% of total annual road mileage (DfT, 2006a).

Mintel, in their April 2004 report, forecasts that congestion will be one of the key market drivers for PTWs, with the recent congestion zone expansion in London as well as other schemes likely to come into force countrywide having a positive effect on new bike sales (Mintel, 2004). Mintel predict that leisure biking will also be a market driver with people turning to biking as a way to relieve the stress of work. The report does comment that the motorcycle industry will have to compete with other leisure sectors, especially those who offer a safer alternative to stress relief. Chorlton and Jamson (2003) showed that there is a shift in the nature of motorcycling, with more machines now being purchased that are suitable for leisure riding. This suggests that those who ride mainly for leisure have larger capacity bikes and are

long-term or returning riders (Chorlton & Jamson, 2003). Thus riders will continue to use PTWs and leisure riding is key reason for PTW use.

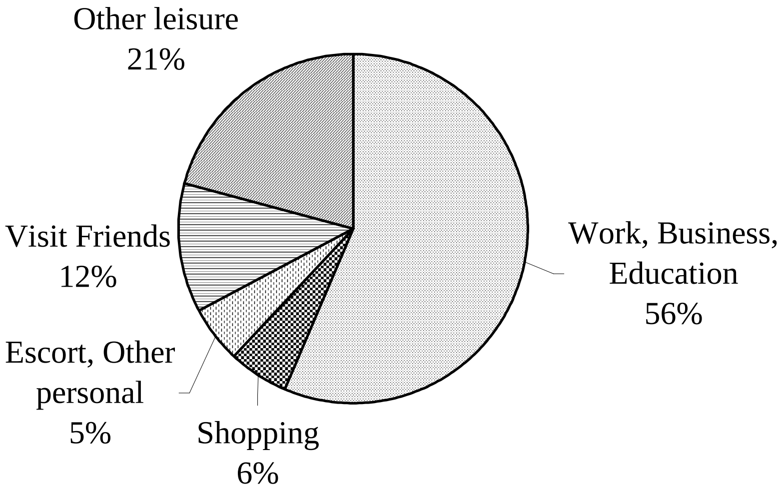
Possibly because PTW usage is seen as being primarily leisure, the PTW as a viable means of transport has sometimes been minimised, yet Diekmann showed that within Europe they accounted for 3% of surface transport; Europe's railways only account for 6% (Diekmann, 1996). PTWs can offer a cheap and energy efficient means of transport, giving options for some who do not have access to a car, as well as offering a valuable alternative transport method to car owners. Given the specific transport needs that they satisfy, it would be difficult to replace them whether for commuting or for leisure. Since the Diekmann report, more Europeans have begun to use PTWs as an urban mode of transport; a method that preserves their freedom of mobility and helps them to get through traffic congestion (ACEM, 2000).

If motorcycling was made easier, safer and more convenient then it would be logical that this would in turn reduce congestion as well as improve the environment (ACEM, 2000). A 2004 Federation of European Motorcyclists' Associations (FEMA) report also supports this view as well as expressing that the riding of a PTW is a meaningful leisure activity that improves the quality of life for millions of European citizens (FEMA, 2004). The stereotype of a biker as being a young male rebel is not borne out in the facts; the average age of the European biker is rising and more women are now riding (FEMA, 2004).

In the UK there is some evidence that a considerable amount of 'biking' is carried out for commuting purposes (RoSPA, 2001). A survey of participants of the Scottish Bikesafe scheme, an initiative run by Police Forces in the United Kingdom to help to lower the number of motorcycle rider casualties, showed that 93% of respondents used their bikes for pleasure and 51% used their bikes for 'getting to work' (Ormston, Dudleston, Pearson & Stradling, 2003). The Department for Transport (DfT) reported that in terms of distance, 56.3% of all trips are for work, business or education, with 20.7% for leisure (Figure 2.1). The average miles ridden per week is 88.8 miles taking an average of 3.4 hours (DfT, 2004a), giving an average speed of 26.1 miles per hour. This relatively slow speed is contrary to the image of high-speed risk taking riders.

Within the activity of PTW riding, there are a number of bike specific and general safety considerations

Figure 2.1 Bike use, by distance travelled (Source DFT, 2004a)



2.2.1 Road Safety

Safety is an issue that is intrinsically linked with the riding of a PTW, and with the increase in bike use has come a rise in casualties from motorcycle related incidents. In Great Britain, Killed or Seriously Injured (KSI) accidents rose from 5,717 in 1996 to 6,255 in 2004 (DfT, 2006a), a rise of nearly 10% at a time when there is a reduction for other road users in line with Government set targets (DfT, 2004c). Although this percentage rise is less than the percentage increase in bike ownership for the same period (739,000 to 1,191,000 – 61%), it is still a major concern.

The types of accidents that involve PTWs differ from those experienced by other motorised road vehicles for various reasons. For example the types of manoeuvres that motorcyclists can perform (e.g. overtaking without crossing the centre line and filtering through traffic) are different as is visibility to other road users, and the performance of machines (e.g. acceleration and cornering characteristics). A study by Preusser et al. estimated that these factors contributed to 85% of fatal PTW accidents (Preusser, Williams & Ulmer, 1995), Mannering and Grodsky (1995) further discussed the differences of PTW accidents compared to other vehicles and give a variety of reasons why the accident profiles differ. These were identified as:

- car drivers are often only looking for other cars as potential collision risks and therefore do not see bikes (Looked but did not see)
- riding a PTW is a more complex task than driving a car
- riding a bike may attract 'thrill seeking' individuals as it is considered more dangerous than other forms of transport.

These differences, along with the lack of protection afforded on a PTW (RoSPA, 2001), help to explain why PTWs are over represented in KSI accidents on British roads.

The Association des Constructeurs Européens de Motorcycles (ACEM) commissioned in-depth research into the cause of accidents that involved PTWs, the Motorcycle Accident In Depth Study or MAIDS report (ACEM, 2004). This comments that PTWs are different when compared to the majority of other forms of road transportation because bikes, along with their riders, are more sensitive to conditions. The riding of a bike is also a complex task that requires well-honed motor co-ordination and balance skills (Mannering & Grodsky, 1995). Riding skills differ significantly from car driving skills, such as the use of independent front and rear brakes, weight distribution/shifting while riding and accelerating during cornering (see section 1.5.3). Impairment by factors like fatigue or alcohol may therefore have a more significant effect on PTW riders than other vehicle drivers (Haworth & Rowden, 2006).

With the control of a bike being more complex than that of a car and with PTWs being more sensitive to environmental conditions, it can be concluded that when things do go slightly wrong that this can quickly be amplified into a major incident. This is one reason why bikes are often considered more dangerous than cars. It is often stated that motorcycles have more accidents than cars, yet when FEMA reviewed the insurance statistics it showed that riders do not have a higher accident involvement risk than motorists (FEMA, 2004), but as PTW users are more vulnerable, they have a higher risk of being injured or killed, as demonstrated in Table 2.1. For car drivers the 1994-1998 average was lower than for PTW riders (11% compared to 27%). The car driver KSI Figure has been reduced to 8%, while for PTW users there has been little change.

It is true that some 'high risk takers' have been attracted to motorcycling and these, with their extreme behaviour tend to give motorcyclists a bad reputation. This is

recognised by some police authorities, for instance, regarding the roads around North Yorkshire where the police are targeting “an ‘idiot minority’ who ride dangerously and cause problems” (BBC, 2004).

Table 2.1 KSI / Slight accidents

		1994-1998 average		**Oct 05 to Sep-06**	
		#	**%**	**#**	**%**
Car	KSI	23,254	11%	14,480	8%
	Slightly injured	180,034	89%	159,870	92%
	All casualties	203,288	100%	174,350	100%
PTW	KSI	6,475	27%	6,370	27%
	Slightly injured	17,547	73%	17,080	73%
	All casualties	24,023	100%	23,450	100%

(Source Transport Tends 2006 DfT, 2007)

The Government has set targets for reductions in all vehicle accidents. Using a 1994 to 1998 baseline average, the aim is to reduce KSI accidents by 40% by 2010 (DfT, 2000). This target also applies to PTWs. In the three year review of the targets (DfT, 2004c) it was reported that good progress was being made towards this target, except in the case of PTWs where there was an increase of 16% in KSI accidents. This increase was put down to exposure, as when PTW accidents were related to distance driven, then there was actually a reduction in the accident rate.

It is clear from the literature reviewed that while there are advantages to using PTWs, there are also serious disadvantages. Riding a motorised bike is a more complex operation than that of driving a car (Mannering & Grodsky, 1995) and this, coupled with the additional vulnerability of PTW users (RoSPA, 2001) gives rise to the perception that the risk of riders is higher than that of other motorised vehicles. The statistics show that the risk of having an accident is not higher for PTW users (ACEM, 2004), but that the risk of serious or fatal injury is (DfT, 2006a). The next section looks at the safety of PTWs in more detail by reviewing accident causes and statistics.

2.3 PTW Accident Causes

With the exception of pedestrians, when motorcyclists are involved in accidents they are more likely to suffer serious injuries than other road users. These injuries were more likely to be causing problems a year after the accident than injuries suffered by

other road users; again with the exception of pedestrians (Mayou & Bryant, 2003). Therefore the issue of motorcycle safety is one that is taken seriously within the motorcycle community.

Sexton, Fletcher and Hamilton (2004) surveyed motorcyclists to look at the relationship between accident risk and other variables. This showed that those who rode smaller bikes, of less than 125cc, were 15% more likely to have accidents than those riding the larger machines, although the larger machines were more likely to be involved in fatal accidents. This research confirmed that the risk per mile of a fatal accident increases with engine size (Sexton, Baughan, Elliot & Maycock, 2004). Not surprisingly, the report also showed that the accident risk increased with the number of miles ridden, that is with exposure. Rutter and Quine (1996) also found that, after taking into account exposure rates, younger motorcyclists are more likely to be killed or injured on the roads. A similar finding was reported by Yannis, Golias and Papadimitriou (2005), who also state that although rider age was a factor in PTW accidents, the engine size of the machine being ridden was not significant, a finding concurred by Langley, Mullin, Jackson and Norton's (2000) research. It may be that engine size might not be related to the accident rate, but may be related to KSI accidents as these bikes have the capability to travel further, and faster, than smaller bikes (Sexton, Fletcher and Hamilton 2004).

Speed will always be an issue as the resultant energy (E_k) of an impact is related to the mass of the object (M) and velocity (V) squared - $E_k = ½(MV^2)$ (Aarts & Van Shagen, 2006). Therefore, for PTWs involved in accidents, the risk and severity of injury increases with speed. Most PTW accidents happen at slow speeds (RoSPA, 2001); in over 70% of cases the PTW impact speed was less than 30mph (ACEM, 2004). The statistics show that a majority of KSI accidents occur in non-urban areas. Again this is most likely to be related to the fact that these are areas where higher speeds can be obtained. It is often suggested that this 'high speed, non-urban accident' is a bike problem. 'The Key 2005 Road Accident Statistics' (Scottish Executive, 2006) shows that within Scotland a greater percentage of car drivers have accidents in non-urban areas compared to PTW riders (Table 2.2). As speed is perceived as the reason why there are more KSI accidents on non-built-up roads it is interesting to note the higher percentage KSI for cars over bikes on this type of road.

Table 2.2 Comparison of Accidents Rates for Car and PTW on Urban and Non-Urban Roads

		Built up			Non built-up			Percentage Non built up		
Model	**Year**	**Killed**	**KSI**	**All**	**Killed**	**KSI**	**All**	**Killed**	**KSI**	**All**
PTW	2003	12	159	591	38	258	523	76%	62%	47%
	2004	5	146	527	36	244	461	88%	63%	47%
	2005	3	151	572	31	244	506	91%	62%	47%
Car	2003	22	497	5381	162	1194	6359	88%	71%	54%
	.2004	28	376	5153	139	1199	6418	83%	76%	55%
	2005	20	342	4828	133	1082	6102	87%	76%	56%

(Source Scottish Executive, 2006)

When comparing non-urban areas to urban areas the number of PTWs having collisions with cars decrease from 64.1% to 46.7%, there is a small increase in collisions between bikes (6.3% to 9.6%) and also a substantial increase from 4.2% to 19.7% for accidents between bikes and fixed objects (ACEM, 2004). With a higher KSI rate in non-urban areas as well as a different accident profile, there is an argument for treating urban and non-urban accidents separately for research purposes.

The MAIDS report (2004), which examined 921 accidents involving PTWs, found that in 50% of accidents the primary contributing factor was human error on the part of the other driver, with 70% of these errors being failure to perceive the bike – a 'looked but did not see' error (ACEM, 2004). In similar research, Mannering and Grodsky (1995) found that 'drivers not being attentive' was a main cause of the accident rate for motorcycles. The MAIDS (ACEM, 2004) report found that in the majority of PTW accidents the bike collided with another vehicle (80.2%) and that a passenger car was the most frequently collided with object (60%). Over half of all PTW accidents occur at junctions. These figures suggest that the causation of accidents is complex but identifies that bikes not being seen by other road users is a major problem.

Age and experience also have an effect on accident rates. The MAIDS report states that there is a lower risk of being involved in an accident for riders in the 41-55 age group (ACEM, 2004), with the 18-25 age group being over represented (Chesham, Rutter & Quine, 1993). It is often stated that the 'born again' bikers, who mainly fall into the 41-55 age group, are the main PTW accident problem. While it is true that in absolute numbers this age group do account for a large proportion of those having accidents, it is also true that they form the majority of those who ride. When this is

taken into account this group actually has a lower risk. The 40 to 49 year olds have 18% of the total KSI accidents, however this group makes up 25% of the riding population. This is illustrated in Table 2.3, the rider percentage is a 2002 to 2004 average, with KSI figures for 2004 (DfT, 2007).

Table 2.3 Age of Riders and KSI

	KSI				
	% of Riders	**Bike Engine Size**			
Age		**Moped**	**<125cc**	**>125cc**	**Total**
16-19	10%	37%	37%	19%	19%
20-29	10%	28%	28%	23%	23%
30-39	27%	15%	15%	27%	27%
40-49	25%	7%	7%	18%	18%
50-59	17%	4%	4%	8%	8%
60+	10%	4%	4%	2%	4%

(Source Compendium of Motorcycling Statistics 2006)

Riders with less than 6 months experience are more likely to be involved in an accident when compared to the rest of the riding population. These riders are more likely to make decisions or manoeuvres that result in an accident, suggesting that rider experience is useful for developing skills in risk identification and anticipation of dangerous situations (ACEM, 2004).

Although there is no substitute for experience, training can help to bridge the gap between a novice and experienced rider. As noted earlier, the riding of a PTW is more complex than that of a car (Mannering & Grodsky, 1995), particularly for skills specific to PTW use such as using independent front and rear brakes. RoSPA (2001) reported that the correct use of brakes could prevent 30% of accidents, hence showing an area where more training would be beneficial, hence training, or other interventions, could be useful in reducing PTW KSIs.

2.4 Interventions

A review of fatal motorcycle injuries in South East Scotland (Wyatt, O'Donnell, Beard & Busuttil, 1999) found that injuries to the head, neck and chest were the most severe and concluded that accident prevention and injury reduction measures are the best methods for reducing rider deaths, rather that improved treatment of injuries. This section discusses some of the interventions that aim to reduce the number of accidents.

2.4.1 Training

When examining the reasons for accidents, an argument can be made for a high level of training for PTW users. In 32.2% of accidents examined in the MAIDS report (ACEM, 2004), the PTW rider had adopted some faulty traffic strategy that contributed towards the accident. This suggests that additional training could be provided in the selection of correct traffic strategy.

Currently anyone who is taking up biking must take a CBT, or 'Compulsory Basic Training' (see Section 1.6.1), a short training course at an approved school. This course consists of a mix of theory, off road practice and some time to practice the newly learnt skills on the public road. Once the CBT has been passed then a bike of up to 125cc can be ridden on the road with learner restrictions (DfT, 2004b). Further training is normally taken to enable the rider to pass the required tests and then use a bike without the learner restrictions, although some engine size restrictions may still be imposed depending on age and type of bike used to take the test (DfT, 2005a).

This training is undertaken for the purpose of obtaining a licence and the majority of it is carried out in an urban environment. While this is where most accidents happen, it is not the place where most KSI accidents happen. The trend is towards more fatalities with higher travelling speeds. The MAIDS (ACEM, 2004) report found that in 21% of PTW accidents only involving one bike, the bikes were travelling at speeds over 60mph (100km/h). In general the impact speeds for single vehicle accidents are higher than for accidents that involve other vehicles (ACEM, 2004). Lack of control can also be a problem, with running wide on a turn being the most common type of loss of control (23.04%); braking slide-outs on the low side (14.5%) and low side[1] cornering slide-outs (11.0%) are also main factors (ACEM, 2004). Additional training, and training on non-urban roads could help to reduce these kind of accidents and reduce the KSI figures.

While extra training for PTW users would be beneficial, especially in the skills needed for non-urban riding, this would only be addressing part of the problem as

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1 The "low side" of the bike is the side that is leaned towards the ground while cornering, for example, in a right turn, the right side is the "low" side and the left side the "high" side, because it's higher off the surface. A "low-side" crash is when the tyres slide from under the bike and the bike lands on its low side

other road users also create a risk to riders. For instance, in 40.6% of accidents the other (non-bike) vehicle had adopted some faulty traffic strategy that contributed towards the accident, with over 70% of ‘other driver errors’ being the failure to see the PTW. Other vehicle drivers who hold a PTW licence are more likely to see a PTW, which shows that with some training this type of accident can be reduced (Mannering & Grodsky, 1995). Car drivers need to be trained so that they are made more aware of the needs of PTW users, as well as their vulnerability (RoSPA, 2001)

Sudlow (2003), in a report written for the Department for Transport (DfT) on motorcycle training schemes, concluded that to train a rider properly it is important to understand the rider and the motivation of riding.

Training does not have to be formalised. Opportunities can be taken to modify rider behaviour while safety is in the forefront of the rider’s mind, for example, after an accident while receiving treatment for their injuries by medical staff. A nurse’s negative attitude while treating a motorcyclist does not create an atmosphere that is conducive to educating the rider, but if the nursing staff understand the problems facing riders then they can, at the correct time, use evidence-based statements in an attempt to modify the rider’s behaviour (Blanchard & Tabloski, 2006).

Training is an area that is being used to try and reduce the number of biker casualties, but there is a need to underpin skills training with the reasons why riding has to be done in certain manners, and the consequences when it is not. Skills training alone can actually increase the risk of the rider being involved in an accident due to an over-estimation of skills (Rutter & Quine, 1996). The frequency of training should also be considered as motorcycle training may only have short-term effects. Goldenbeld, Twisk and de Craen (2004) found that the effects of PTW training were not detectable, compared to a group with no training, after a period of eleven months. With many PTW accidents, the primary cause is recorded as the ‘other vehicle’; therefore there is an argument that better ‘bike aware’ training would be useful for other road users. In the 1970s the British Government launched a public information film for this purpose, with the slogan ‘Think once, Think twice, Think bike’ (Central Office of Information for Department of Transport, 1978). RoSPA (2001) commented that “The slogan “Think Bike” is as relevant today as it ever was”. The ‘Think Bike’ message has been updated, with the current version entitled ‘Think - take longer to look for bikes’ (DfT, 2006e). Even if a higher bike awareness is

achieved this will not eradicate the problem of other road users not seeing a bike, therefore it is up to PTW users to become more defensive in their riding styles.

2.4.2 Protecting the Rider

Motorcycle helmets have been proven to be effective in injury reduction for riders involved in accidents (American College of Surgeons, 2004; Branas & Knudson, 2001; Kraus, Peek, McArthur & Williams, 1994; McGwin, Whatley, Metzger, Valent, Barbone & Rue, 2004). There is an urban myth that helmets can make riding more unsafe as they effect the ability of a motorcyclist to see and hear. However the research done by McKnight and McKnight (1995) showed that the reduction to vision and hearing is small and only has a minimal negative effect on safety.

The use of headlights during the daytime has been adopted by most PTW users to improve their visibility, however the effectiveness of daytime running lights for motorcyclist is unproven, with Elvik, Christensen & Olsen (2003) reporting a reduction of 32% of multi-party daytime accidents, however the 95% confidence interval for this was –64% to +28%, making their conclusions inconclusive.

There are considerable differences between PTW use and that of other vehicles. If the design of roads does not take this into account then motorcyclists' lives can be put into risk, for example:

- Road furniture that is not positioned to take into account the overhang of PTWs (ETSC, 1998; RoSPA, 2001; VicRoads, 2001).
- Road design and maintenance being aimed at non-two wheeled vehicles – for example metal covers and road paint that give no traction in the wet (see Figure 2.2).
- Potholes and longitudinal roadway ridges, mainly caused by HGVs. Road defects are a contributing factor in 3.6% of accidents (ACEM, 2004).
- Roadway debris (FEMA, 2004).
- Diesel spillages (BMF, 2004).
- Traffic calming measures that are not suitable for PTWs (RoSPA, 2001).

Road design to minimise PTW risk is important if the number of fatalities are to be reduced. The Institute of Highway Incorporated Engineers (2005) have issued guidelines for road design, maintenance and policy to improve PTW safety. PTW riders are more vulnerable than car drivers and have more complex tasks to undertake

in order to propel their vehicle, so specific measures may be needed to reduce KSI numbers. Measures aimed at the majority of road users, such as car drivers, may not always be sufficient for PTW users.

Figure 2.2 Example of metal on the road surface

2.4.3 Current Interventions

PTW interventions take many forms, for example engineering, training or education. There is currently a variety of voluntary training schemes in addition to those needed to obtain a licence. The Motor Cycle Industry Association or MCIA (2006) reported on a survey showing PTW users to be positive about training and that the most popular training organisation was The Institute of Advanced Motorists (IAM). The Bikesafe scheme was also popular. Bikesafe is a scheme that is run by police forces around the United Kingdom, using police motorcyclists to pass on their skills and experience (Motorcycle UK Ltd, 2007). Research into the effectiveness of this scheme showed that it was useful and concluded that riders should be encouraged to take further advanced riding training (Ormston, Dudleston, Pearson & Stradling, 2003).

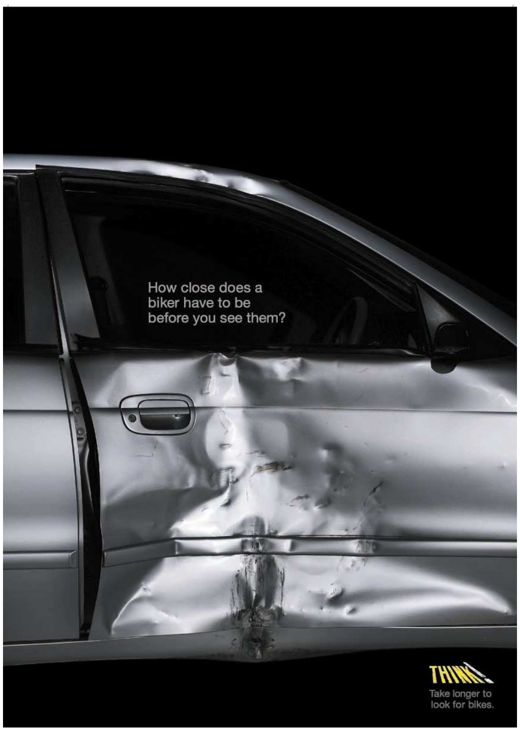
Advanced training can take many forms, often leading to a recognised qualification, such as that issued by the IAM or RoSPA. According to RoSPA (2007) advanced

riders are 20% less likely to be involved in an accident than those who are not so qualified. In 2000, 118,853 riders underwent training, compared to 90,656 (60,008 passed) taking their practical riding test (DfT, 2006a). The MCIA (2006) report stated that of the riders that haven't participated in any training, 37% state lack of time as the reason, and 21% the cost.

There are now schemes that have been designed for riders that operate on similar lines to the Driver Improvement Scheme (The Association of Chief Police Officers, 2003). This training is offered as an alternative to prosecution for Section three offences and aim to change the attitude and behaviour of these errant riders (DfT, 2005a). Section three offences include careless driving and driving without reasonable consideration (The Crown Prosecution Service, 2006).

Education is not only about training; public information advertising is also being used to educate riders, and other road users, about PTW safety, this primarily being carried out using the 'Think!' campaigns (DfT, 2005b, 2006b, 2006d). The THINK! campaign advertisements are aimed at drivers and riders independently, with the aim of preventing drivers or riders from ignoring the message (DfT, 2006e). These are designed to try and bring about behavioural change (DfT, 2006e). An example of a Think! advertisement poster aimed at non-riders is shown in Figure 2.3.

Figure 2.3 Example of Think! Motorcycle Advertisement - Source (DfT, 2006c)



2.5 Conclusion

The evidence is clear that PTWs are at a higher risk of death or injury than car drivers despite comparable accident rates. The UK Government is keen to reduce this risk, but it is unlikely that their targets will be met by the designated timescale of 2010.

Rider safety is not only being addressed by government agencies, it is also an issue high on the agenda of rider and industry groups, such as the British Motorcycle Federation (BMF), Motorcycle Action Group (MAG) and the Motor Cycle Industry Association (MCIA). These associations are addressing subjects like diesel spills (BMF, 2004, 2005), crash barriers (Motorcycle Action Group, 2005), training (MCIA, 2006) and the design and maintenance of the public highway for PTW safety (Institute of Highway Incorporated Engineers, 2005).

The statistics give some indication of the nature and type of accidents involving PTWs. The majority of these KSI accidents occur in non-urban areas where the bikes are liable to be going faster compared to urban situations. There is also a lower risk of riders in the 41-55 age group being involved in an accident, and as with car drivers the 18-25 age group is over represented in accident statistics, as are riders and drivers with less than 6 months experience.

There has been a number of interventions aimed at reducing KSI accidents; however there has been limited research on the nature of riding and the riders themselves. Any intervention that is designed to lower the accident rate for bikers, such as training, must consider what the goals and sub-goals of bikers are, and then build on these if they are to be more effective. Although PTWs are a form of transport, evidence suggests that enjoyment is a major goal for those who ride bikes (Broughton, 2005, 2006; Broughton & Stradling, 2005) and that biking has become a hobby more akin to sports like rock climbing or SCUBA diving. Therefore it may be beneficial to treat motorcycling as a sport for research purposes. The next chapter will look at enjoyment, sports psychology and psychological theories that relate to PTW use.

Chapter 3 - PTW Riding and Psychological Factors – A Literature Review

Men ought to know that from nothing else but the brain come joys, delights, laughter and sports, and sorrows, griefs, despondency and lamentations.
Hippocrates, 400 BC

3.1 Introduction

Despite the PTW being a form of transport, allowing its rider to travel from A to B, there is evidence to suggest that PTW use is more linked to hedonistic reasons than functional or practical ones. If enjoyment is a goal for those who ride PTWs it may be beneficial to treat motorcycling as a sport or hobby for research purposes. This chapter reviews the psychological literature on enjoyment, risk, sports coaching and driving behaviour.

Csikszentmihalyi's theory of flow (Csikszentmihalyi, 1990p 67; Csikszentmihalyi & Csikszentmihalyi, 1988) and its relation to enjoyment is discussed, then Fuller's (2005) model of driver attention is considered. Finally, training is considered in the light of the above, and in relation to sports psychology.

3.2 What Affects Behaviour?

Behaviour (B) can be expressed as a function of the interaction between the environment (E) and the individual characteristics of a person (P), or $B = f(P, E)$ (Lewin, 1935:63). As behaviour is an interaction of individual characteristics with the physical and social situation then it can be seen to be both complex and dynamic in nature. This thesis examines the behaviour and motivation of those who choose to ride PTWs. From the equation above, two basic areas need to be considered, the rider and the environment that s/he rides in. The following discusses various personal characteristics that are related to biking, starting with enjoyment and related topics.

3.3 Enjoyment

The verb to enjoy is defined by the Oxford Dictionary (2001) as:

> '*to take pleasure in*' (Oxford Concise Dictionary, 2001).

Pleasure, taken from the verb 'to please', is described as:

> '*a feeling of happy satisfaction, the state or feeling of being pleased or gratified.*' (Oxford Concise Dictionary, 2001).

Happiness is also related to enjoyment and pleasure:

> *'Feeling or showing pleasure or contentment.'* (Oxford Concise Dictionary, 2001).

What though can cause enjoyment or make one happy? Aristotle taught that living is best regarded as 'a longing and desire for a good life' and that people want to do good things, live well and to do well: that is people have a desire to live a happy and enjoyable life. The aim of being happy is even enshrined in the American Declaration of Independence written in 1776:

> *"We hold these truths to be self-evident, that all men are created equal, that they are endowed, by their Creator, with certain unalienable Rights, that among these are Life, Liberty, and the pursuit of Happiness."*

Lyubomirsky, Schkade & Sheldon (2005) suggest that happiness is controlled by three main factors: a genetically determined set-point of happiness; happiness relevant circumstantial factors and activity-related practices, with the activity factors offering the best possibilities for a sustained increase in a person's happiness.

The set-point model, sometimes called the 'hedonic treadmill' (Brickman & Campbell, 1971), gives the idea that every person has a set point of happiness that they will return after an event that either lowers (such as a death of a loved one) or raises (such as getting married) their happiness level (Csikszentmihalyi & Hunter, 2003). Kammann (1983) expressed this idea as:

> *'Objective life circumstances have a negligible role to play in a theory of happiness'* (Kammann, 1983).

Financial wealth is often associated with happiness and enjoyment of life. The economic view that well-being and happiness depend on 'life's circumstances'; for some this means that happiness is directly related to GDP per capita (Easterlin, 1995). However in some countries the trend in well-being and happiness has not increased with GDP, rather it has remained constant (Easterlin, 2005). The idea that resources brings happiness is one that Van Boven (2005) partially agrees with, especially when resources are used to gain life experiences. He states:

> *'that allocating discretionary resources toward life experiences makes people happier than allocating discretionary resources toward material possessions'* (Van Boven, 2005).

The use of resources for enjoyment can be demonstrated by the pleasure that some get from shopping. Here enjoyment or pleasure can be obtained from emotional satisfaction when a shopper hunts for, and obtains a bargain (Schindler, 1989) as well as giving a feeling of pride, intelligence and a sense of achievement (Mano & Elliott, 1997). Also the enjoyment gained from finding a bargain may be caused by 'beating the system' (Morris, 1987). But Lehoten and Maenpaa (1997) argue that the enjoyment from the shopping experience comes from the change of environment, that is, 'getting out of the house'.

Social interaction and friendship can be a source of enjoyment, such as spending time on joint leisure activities (Argyle & Hills, in press). It has even been suggested that some of the enjoyment that can be found in shopping may be due to people seeking out social interaction (Tauber, 1972). There can also be a social enjoyment element for those who take part in activities that are mainly solitary, for example gardeners and collectors, who may get their social pleasure from occasional meetings or club magazines (Hills, Argyle & Reeves, 2000).

Enjoyment though is not 'just an instant in time', rather it is related to a period of time (Griffin, 2002) and an activity that makes one happy would occur over a period of time. Therefore it is not surprising that enjoyment is also often related to participation in sport. Scanlan and Simons (1992) define sports enjoyment as a:

> *"positive affective response to the sport experience that reflects generalized feelings such as pleasure, liking, and fun"* (Scanlan & Simons, 1992:203-204).

Some of the pleasure that can be achieved via sport is to do with the intrinsic motivation that is obtained from competence and self-determination (Deci & Ryan, 1985). Wankel and Kreisel (1985) reported similar factors. However they also comment that extrinsic factors such as winning were also important for gaining enjoyment from sport. Within sports literature, movement sensations (Scanlan, Stein & Ravizza, 1991) and competence have been identified as sources of enjoyment (Scanlan & Lewthwaite, 1984; Wankel & Kreisel, 1985).

These elements of enjoyment, task competence and movement have all been associated with the flow state theories of Csikszentmihalyi.

3.4 Csikszentmihalyi's theory of Flow

Csikszentmihalyi's theory of flow (Csikszentmihalyi, 1990) suggests that when a person has a 'High Skill Level' and is faced with a 'High Challenge' then this person can enter into a state called 'Flow' (Table 3.1). Csikszentmihalyi describes this state as:

> *'The Holistic Sensation that people feel when they act with total involvement'.* (Csikszentmihalyi, 2000:36)

While in the state of flow, concentration is so intense that there is no attention left over to think about anything irrelevant or to worry about problems. Flow is an almost automatic, effortless, yet highly focused state of consciousness. People who have experienced flow often report nine dimensions (Csikszentmihalyi, 1990):

1. Clear goals
2. Unambiguous and immediate feedback
3. Skills that just match challenges
4. Merging of action and awareness
5. Centring of attention on a limited stimulus field
6. A sense of potential control
7. A loss of self-consciousness
8. An altered sense of time
9. An autotelic experience (intrinsically rewarding)

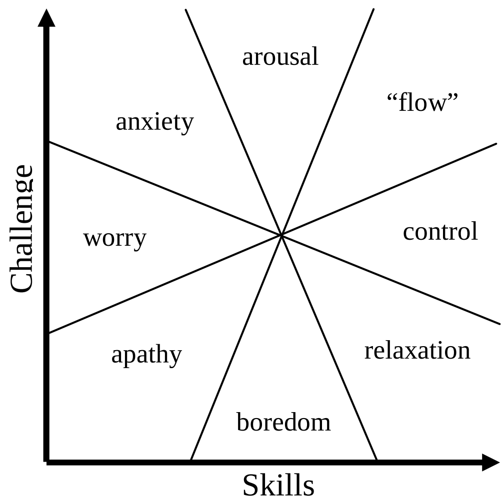
The theory of flow describes four states (Table 3.1): Apathy, Boredom, Anxiety and Flow. The flow state is entered into when one's skills are matched by the challenge faced and they are both high. When the skill level and the challenge is low then an apathetic state is entered into, however if the level of skill is higher than the level of challenge then boredom is the result; conversely when the skill level does not meet the challenge then anxiety exists. Also for the flow state to be entered into not only must an individual's skills be matched to the challenges, but these challenges, and the skills needed to confront them, must exceed the normal levels of daily occurrence (Csikszentmihalyi & Csikszentmihalyi, 1988). So the flow state can only be entered into when the challenges and skills are matched and also above the normal. As well as the skill/challenge match, clear goals and instant feedback are also conditions for enabling the flow state (Csikszentmihalyi, 2000).

Table 3.1 The four states of flow (Csikszentmihalyi, 1990 page xxx)

Challenge / Skill	Low	High
Low	Apathy	Boredom
High	Anxiety	Flow

Massimini & Carli (1988) proposed an extension to the four channel model that is shown in Table 3.1 with an eight channel model (Figure 3.1). Flow is dynamic because one cannot keep doing the same activity at the same level without one's skills increasing; therefore flow leads to growth and discovery (Csikszentmihalyi, 1990).

Figure 3.1 The eight channel model of flow (from Massimini & Carli, 1988)



While flow is basically matching a skill set to a challenge, there are traits and circumstance that can act as an inhibitor for achieving a flow experience. For example a person who is excessively self-conscious would be unlikely to experience flow (Csikszentmihalyi, 1990). Conversely certain situations or activities can be an enhancer for flow achievement. For example, activities that are rhythmic, such as dancing, can help induce a state of flow (Csikszentmihalyi, 1990).

There is obviously a neurocognitive process that is occurring when a person enters into a state of flow, and on this Dietrich (2004) comments that:

> *"A necessary prerequisite to the experience of flow is a state of transient hypofrontality that enables the temporary suppression of the analytical and meta-conscious capacities of the explicit system."* (Dietrich, 2004:746)

Therefore for flow to exist the brain must be running on the implicit system, in a fully automatic mode where there is no processing power left over to carry out other activities, such as day dreaming or analysing the task that is being undertaken. This is in agreement with the description of the flow state (Csikszentmihalyi & Csikszentmihalyi, 1988) as being "an almost automatic, effortless, yet highly focused state of consciousness" and that the "task is performed, without strain or effort, to the best of the person's ability" and that there is also "no sense of time or worry of failure". Flow therefore is tied in with the automatic, implicit brain functions.

3.5 Implicit Memory

Memory can be classified into two types – implicit and explicit. Implicit, or procedural, memory is not a memory area, rather a set of memory tasks (Graf & Schacter, 1985), with these memories being skill or experience-based. Therefore these actions or skills have to be learnt via experience or training (Haberlandt, 1999). Table 3.2 summaries the differences between the two memory types.

Table 3.2 Comparisons of Memory Types

Explicit Memory	**Implicit Memory**
Expressed by verbal communication	Not verbalisable
Conscious awareness	Inaccessible to conscious awareness
Flexible	Lacks flexibility
Slow	Fast

Procedural or implicit memory is often related to the knowledge of rules of action and procedures, which become automatic with repetition. Frequently a person will have no awareness of how an implicit skill or action was learned (Allard, 2001; Thorndike & Rock, 1934). Broadbent (1958) carried out experiments that showed that a person could learn to do a task, but not verbalise how that task was carried out, rather all they could verbalise was what was verbalised to them in the way of instructions.

Procedural memory is sometimes referred to as 'muscle memory' (Gill, 1986 p 67) as it often seems that the muscles know what actions to take without any input from the conscious, or explicit, memory; however this term is both inaccurate and misleading. Within sport it is often important that athletes respond by executing motor actions to the movement of other players while under time pressure. This primed reaction relies on learning, with practice, where the movements of players have been coupled with

the execution of motor movements. This is stored in the implicit memory and then the actions can be carried out in an automatic, fast and efficient manner (Kibele, 2006; Zeigler, 2002)

The idea of practicing skills so that they become automatic is one that is often found in sport (Hogarth, 2001; Raab, 2003). For example the skill of batting in cricket is very complex, with a batsman having to decide what trajectory the ball is moving along, where and how much it will bounce, whether to move forward to the ball or back, where the fielders are positioned, what shot to play and then to execute the motor actions required to play this shot (Andrew, 1989). A batsman often has less than second from when the ball leaves the bowler’s hand until the ball has passed him. For a batsman to carry out the above processing using explicit memory would be too slow, hence it has to be carried out automatically using implicit or procedural memory (Broughton, 2006; Kibele, 2006). For a complex skill, such as batting, to be learnt it has to be broken down into smaller sub-set of skills that can be initially carried out explicitly. With practice these skills will eventually be moved from explicit memory to the implicit and carried out automatically. Once this has been accomplished then the next skill sub-set can be taught.

Riding, like batting at cricket, is difficult and complex, involving a range of movements and responses. Therefore it can be expected to be treated like an implicit skill. This is why lessons from sports coaching, and how sportsmen train, can be applied to riding.

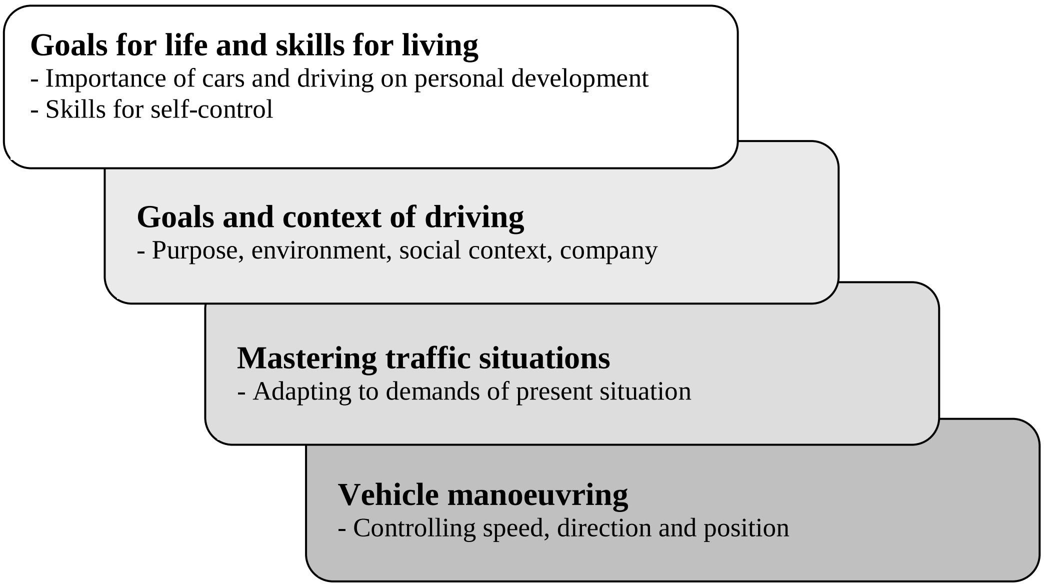
3.6 Hierarchy of Driver/Rider Training

Training can aid in improving skills of both experienced and inexperienced riders; the resultant improvement in skills may seem to be the solution to the problem of rising KSI numbers. However research shows that those who undergo further training are more likely to be at risk while using the roads (Rutter & Quine, 1996). In the evaluation of the Bikesafe Scotland scheme, a significant number of those who took part rode harder out of town after the course, probably perceiving their skills to have been enhanced (Ormston, Dudleston, Pearson & Stradling, 2003). If skills training alone does not necessarily increase safety, then how can rider training be used to reduce the KSI rate and improve PTW safety? Hatakka et al. put forward a four level

hierarchy that could be applied to training of drivers and riders (Hatakka, Keskinen, Gregersen, Glad & Hernetkoski, 2002). Figure 3.2 shows this hierarchy.

The lower two levels are concerned with gaining mastery over the vehicle by learning how to manoeuvre and how to adapt to the various demands of the present road situation. The upper two levels of the hierarchy concern wider goals, the goals of driving and the goals of life. Although this makes reference to cars and car driving the same principles can be used for the riding of a PTW.

Figure 3.2. Illustration of hierarchical levels of driver behaviour



(source Hatakka et al, 2002)

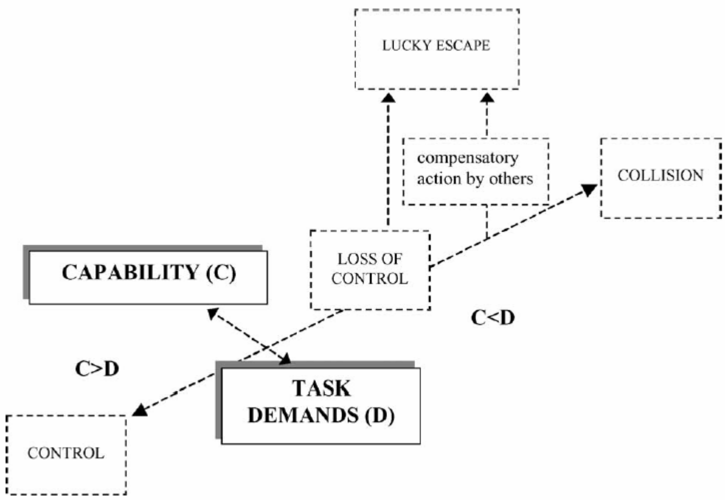
Most pre-test training, such as the compulsory basic training or CBT (see Section 1.6.1), that is required before a rider is allowed to use a bike on the public road is focused on the lower two levels: bike control and reading/reacting to the traffic situation. Post-test training, such as 'Bike Safe', a scheme where riders are assessed by police motorcyclists (Ormston, Dudleston, Pearson & Stradling, 2003), concentrates on the reading of other traffic and riding accordingly, focusing mainly on the second lowest level of the hierarchy. It is the training schemes that focus on these levels that can increase the vulnerability of riders by raising the perceived skill levels of riders (Goldenbeld, Twisk & de Craen, 2004; Rutter & Quine, 1996). This is not to say that training on these levels should not take place, as these riding skills are essential for safe riding, but training schemes need to temper the riding skills by also placing emphasis on the 'goals and context of riding'.

Skills training may increase a rider's capability, which is an element in riding task difficulty; task difficulty is therefore an important issue for riding.

3.7 Task Difficulty

It is suggested by Fuller (2005) that it is not a target level of risk that drivers subconsciously attempt to keep constant (Näätänen & Summala, 1976; Wilde, 1982), but rather task difficulty. In Fuller's model task difficulty is the "dynamic interface between the demands of the driving task and the capability of the driver." As seen from Figure 3.3, the model suggests that while a driver's task demand is lower than their capability then the driving is in control, however when task demand exceeds capability loss of control results, culminating in either 'a lucky escape' or a collision. Sometimes 'the lucky escape' is facilitated by other road users who manage to take actions that avert a collision, such as swerving or performing an emergency stop. As task difficulty increases, or capacity decreases, it would be expected that there would be a degradation of performance rather than a sudden loss of control (Wickens & Hollands, 2000), and lower priority tasks, such as checking mirrors may be neglected. As task difficulty further exceeds capability then more important tasks may not be carried out, such as proper forward observation.

Figure 3.3 Outcomes of the dynamic interface between task demand and capability. (Fuller, 2005:464)



The task demand on a rider can be affected by many factors, such as the route being ridden, type of bike used and interactions with other road users, although speed is the primary factor (Fuller, Bates, Gormley, Hannigan, Stradling, Broughton, Kinnear & O'Dolan, 2006) as the faster one rides, the higher the task demand and the risk of having a collision.

Panou, Bekiaris & Papakostopoulos (2005) derived eight driving tasks that combine to form the total task demand. Stradling & Anable (2007) expanded this to arrive at ten components, shown in Table 3.3.

Table 3.3 Ten Components of the driving task (1-8 from Panou et al. 2005).

Task	**Description**
Strategic levels	Activity choice, mode and departure time choice. Discern route alternatives and travel time
Navigation tasks	Find and follow chosen or changed route; identify and use landmarks and other cues
Road tasks	Choose and keep correct position on road
Traffic tasks	Maintain mobility (‘making progress’) while avoiding collisions
Rule tasks	Obey rules, regulations, signs and signals
Handling tasks	Use in-car controls correctly and appropriately
Secondary tasks	Use in-car equipment such as cruise control, climate control, radio and mobile telephone without distracting from performance on primary tasks
Speed task	Maintain a speed appropriate to the conditions
Mood management task	Maintain driver subjective well-being, avoiding boredom and anxiety
Capability maintenance task	Avoid compromising driver capability with alcohol or other drugs (both illegal and prescription), fatigue or distraction

Generally for PTW users the task demand is higher compared to that of car drivers due to riding being a more complex task (Mannering & Grodsky, 1995). Task demand is not only governed by the task of driving or riding but it is the total demand for all tasks being carried out. These extra tasks, such as trying to locate a particular turning, programming a satellite navigation system or using a mobile phone, can push up the total task demand beyond capability and hence place the road user at risk. Much of the research in the area of dual tasking has been concerned with mobile phone use by drivers (Haigney, Taylor & Westerman, 2000; Laberge-Nadeau, Maag,

Bellavance, Lapierre, Desjardins, Messier & Saidi, 2003; Lamble, Kauranen, Laakso & Summala, 1999).

As task capability is an important concept for riding, then riding using implicit memory may become more desirable because as more of the riding task is being controlled by the implicit system, the higher the capability. Conversely if riding is carried out using explicit memory then a much lower capability would be expected and hence task demand could easily outstrip that of capability and thus put the rider at risk.

3.8 Risk

Motorcycling is often described as a risky activity and some of the accident figures within Chapter 2 certainly add weight to that argument – but what is risk? Risk has been defined in many ways, for example:

> *The chance of injury, damage, or loss. Therefore, to put oneself "at risk" means to participate either voluntarily or involuntarily in an activity or activities that could lead to injury, damage, or loss. (Webster, 1979)*

> *The quantitative or qualitative expression of possible loss that considers both the probability that a hazard will cause harm and the consequences of that event.* (Lawrence Livermore National Laboratory, 2005)

Looking at the last definition it becomes clear that risk can be defined mathematically as:

$$\text{Risk} = f(\text{Probability, Hazard})$$

So what is a hazard? – A hazard can be defined as:

> *A source of danger (i.e., material, energy source, or operation) with the potential to cause illness, injury, or death to personnel or damage to a facility or the environment.* (Lawrence Livermore National Laboratory, 2005)

Therefore hazards and risks are two different, but related, items. A hazard can be distinguished from a risk as being a specific danger; this is expressed by Sharp,

> *"Hazards are defined in absolute terms (e.g. cliff faces, avalanche prone slopes, fast moving water, electricity, sharp knives) …"* (Sharp, 2001 Page 10)

So a hazard has the potential to cause harm while risk on the other hand is the likelihood of harm occurring and is usually qualified by some statement of the severity of the harm. Risk is particular to the person that is confronting the hazard

and also the context in which the hazard exists at that time. For example the risk of riding on a wet road by a person with limited experience would be greater than the risk on the same road being used in the dry by a highly trained police rider.

Risk is dynamic, changing as circumstances change, as it is a combination of the probability of an event occurring, the type of hazard faced and is also related to likely severity of consequences if the event occurred. The chance of something happening is related to exposure time, that is, the more time that one is exposed to a risk the greater the chance that one will be affected. The level of risk can be reduced by reducing the probability of an incident, reducing the exposure time and ameliorating the consequences.

Levels of acceptable risk also vary between people and situations. Related to risk acceptance is the amount that can be gained by undertaking a risky activity with acceptance being a trade-off between perceived risk and perceived gain (Coombs, Donnell & Kirk, 1978). Personality factors, coupled with motives, may also be a deciding factor of whether people take part in low-risk, or high-risk, sports (Diehm & Armatas, 2004).

The calculation of risk is what is being undertaken in a risk assessment. There is no fixed method for doing risk assessments, but there are various tools (Bernstein, 1996). The method used will normally be determined by the type of risk item being evaluated, such as a piece of machinery in a production environment or the financial risk of an investment. With the correct information it is possible to accurately determine what the real risk of activities are, but often in the real world imperfect information is available or a decision has to be made quickly. When information is inaccurate or a decision has to be made under time constraints then a heuristic method may be used. A heuristic is a basic rule of thumb, so that when an event occurs a predefined action is taken, and is often referred to as ‘fast and frugal’ (Gigerenzer & Todd, 1999).

When considering the consequences it is important that not only physical harm is considered, as the losses can also be financial, social or time (Rohrmann, 2002). Within biking, the financial losses can be from the loss or damage to a bike and the increase in insurance premium caused by a claim or prosecution for a driving offence. The social loss could be from loss of face by having an accident, or maybe by being

out-ridden by a fellow biker. This risk to ego could also cause an increase in the risk of an accident. Loss of time can be the loss of riding time if one cannot ride due to injury, not having a machine due to crash damage or being banned from driving/riding after being prosecuted.

3.9 Risk Takers

We all do risk assessments as part of everyday life, most of which are typically fast and frugal, such as when we cross the road or drink a hot cup of tea. How good is this assumption of risk? Often it is not good as it is clouded by other factors such as familiarity with the action, the perceived danger (which is often incorrectly estimated due to lack of knowledge) and also by how much we want to carry out an activity, that is the reward (Freudenburg, 1998)**.** The idea of how risk is viewed was expressed by Lord Rothschild:

> *"There is no point in getting into a panic about the risks of life until you have compared the risks which worry you with those that don't, but perhaps should."* (Rothschild, 1979)

Perceived risk plays an important part in road safety as 'decision skill' within driving is an area where most errors occur and therefore is the main underlying factor of road accidents (Colbourn, 1978). The decisions that drivers make are to a great extent down to how risky they perceive the situation, meaning that accidents can, and do, occur due to drivers/riders underestimating the risk of a certain situation they are faced with. Colbourn also explains that other variables, which may be task or motivationally based, may also affect how a person perceives the risk of a certain situation. Therefore the perceived risk in a given situation may be different for each individual (Rohrmann, 2002).

It is generally accepted that people have a general orientation towards risk, that is their attitude is either towards taking risks (risk propensity) or towards avoiding risks (risk aversion). Risk propensity and risk aversion are attitudes, not behaviours; that is they are cognitions that precede behaviour (Rohrmann, 2002). What one person enjoys may be highly aversive to another, for example, some may enjoy a horror film or a roller coaster while others may enjoy light classical music; some may enjoy playing sports with a high risk of injury such as rugby while for others a bowls match suits them better. Some people may indulge in 'risky' activities, as a means to satisfy their arousal needs and some people may be 'attracted to', rather than 'scared away

from' a risky situation (Lupton, 1999). Another group that may be in the 'higher incident' bracket is those who are not very good at gauging risk, that is that their perceived risk is significantly lower than the real risk that the situation poses. People in this group may not be in the 'risk propensity' class but still may undertake risky activities.

Risk taking attitudes are an important factor in road safety with drivers who are involved in accidents generally taking more risks (Iversen, 2004; Turner & McClure, 2004). Risk propensity towards driving, that is a risky driving behaviour, among young drivers is predominantly a male activity, and it is mainly males who go on to be risky drivers later in life. In general, women show high risk taking behaviour less often than men (Siegrist, Cventkovich & Gutscher, 2002). This could be partly due to attitudes to risky activities being influenced by the social ideas of masculine and feminine identity (Lupton, 1999). Some people are known to deliberately take risks, maybe for pleasure or maybe to rebel against the self-control and self-regulation that society places upon them (Lupton, 1999). Fessler et al. (2004) found that anger increases risk taking in males, while disgust reduces risk taking in females. This shows that a person's emotional state can influence their risk taking behaviours and that this differs for males and females.

What is the reaction when the risk of an activity is reduced, that is it is made safer? Peltzeman (1975) theorised that people would compensate for improvements in car transport safety by driving in a more risky way; this has often been called the theory of risk compensation. This also applies to those who ride PTWs, such that Chesham et al. (1993) said "A real reduction in motorcycling accidents can be achieved only by changing the level of risk found acceptable by riders when operating their machines" (Chesham, Rutter & Quine, 1993:425). What happens if the risk, or perceived risk, of an activity increases? Noland (1994) looked at this with regards to mode of transport and found that if the perception of risk increased for a mode of transport, such as the bicycle, then the probability of that mode being used for commuting decreased. If an improvement is made so that a mode of transport is made safer, more people may use that mode of transport and therefore the reduction in fatalities may not be proportional to the reduction in risk. Another suggestion of this research is that people will choose a route to commute that they feel minimises their risk.

3.10 Sensation seeking

One of the factors that is often associated with motorcycling and the risks involved is sensation seeking. Sensation seeking is a personality trait that has been linked to decision-making concerning risky actions (Zuckerman, 1979, 1991). Zuckerman describes sensation seeking as "the need for varied, novel, and complex sensation and experiences, and the willingness to take physical and social risks for the sake of such experiences" (Zuckerman, 1979:10). However sometimes where a high level of sensation seeking would be expected it is not found. For instance it may be believed that people who take part in contact sports would be high sensation seekers, yet O'Sullivan et al. (1998) found that this was not the case, rather that sensation seeking is a feature of "participants in high risk sports offering unusual sensation and personal challenges".

A study on risk taking and sensation seeking showed that risk takers seem to be higher in sensation seeking then other members of the population (Fischer, S & Smith, 2003; Horvath & Zuckerman, 1993), and that drivers who have a higher sensation seeking score on the Zuckerman Sensation Seeking Scale were more likely to be involved in an accident and drove in a more risky fashion (Heino, van der Molen & Wilde, 1996). The Zuckerman Sensation Seeking Scale (SSS-V) (Zuckerman, 1983) is commonly used to assesses four aspects of sensation seeking:

1. Thrill and Adventure Seeking (TAS)
2. Experience Seeking (ES)
3. Dis-inhibition (DIS)
4. Boredom Susceptibility (BS)

Generally participants of high-risk sports have significantly higher scores than the control group on TAS, ES and Total Sensation Seeking (TotSS) (Freixanet, 1991).

Another, and simplified, scale for measuring sensation seeking is Arnett's Inventory of Sensation Seeking (AISS) (Arnett, 1994). This scale measures two aspects of sensation seeking:

- Intensity
- Novelty

Risk taking behaviour plays a large role in the contribution to car/PTW accidents that result in injury. Turner and McClure (2004) hypothesised that people who have a

high risk acceptance level perceive risk differently from those that don't and drive/ride in a more risky manner, which in turn leads to them being involved in more accidents. In their study only 4.6% of people were defined as having a high-risk threshold, yet these were involved in 25.3% of the accidents involving injury. From this it was concluded that if the 'high-risk acceptance' could be removed then the injury accident rate would significantly drop. Conversely, Turner and McClure found that those who had a high thrill seeking behaviour did not have an increase in injury from accident and they suggested that thrill seekers are less likely to be injured as they are better equipped to deal with risky activities (Turner & McClure, 2004). Heino et al. (1996) reported that sensation seekers followed cars closer than those who had risk aversion, which is not unexpected.

Are there other factors that are involved with sensation seeking that can help to explain the relationship of accidents and risk taking? Fischer and Smith (2004) suggested that impulsiveness should be considered with sensation seekers. They found that individuals who experience negative life outcomes were more impulsive (less self-control and constraint) than those who do not. A lack of deliberation, or being impulsive, can be described "as a failure to plan ahead, or acting without thinking" (Fischer, Sarah & Smith, 2004:528). One can be a deliberate sensation seeker, and, as such, one is less likely to suffer negative results compared to an impulsive sensation seeker. Those sensation seekers who take part in risky sports who are from the deliberate sensation seekers sub-group are more likely to be successful and to plan ahead with safety measures than those from the impulsive sensation seekers sub-group. While there is a positive relationship between those who take part in high-risk sports and sensation seeking, Zuckerman (1992) emphasised that risk taking is not an essential motivation for sensation seeking behaviour.

3.11 Sports Psychology and Coaching

As riding a PTW has similarities with sports participation, the next section will review sports psychology and coaching.

3.11.1 Motivation

What motivates a sportsman? Achievement is often a major factor. Atkinson (1964) proposed that the motivation for achievement was a combination of two components:

the ‘motive to approach success’ and the ‘motive to avoid failure’. He suggested that everyone has both motivations, but not to the same degree. The motivation of success or failure is evaluated by the goals that the individual has set for themselves (Gill, 1986).

Cogan & Brown (1999) reported that those who take part in ‘risk sports’ may not initially pursue these because of the risk or the emotions that are invoked by the risk. Rather the involvement in the risky activity is related to mastery and gaining control over their environment (Hatzigeorgiadis, 2002).

3.11.2 Attention

Hazard perception is of vital importance for riders on the public road (Wallace, Haworth & Regan, 2005) and therefore attention is a significant skill. Attention is also important within sport. There is a capacity limit to attention, and within sport this has to be taken into account. These limits to ‘control processing’ can be overcome by moving the skill to automatic processing, which is not limited by attentional capacity (Gill, 1986). Practice is important for skills to become automatic, with those who practice more at a specific sport being better at recalling game situations (Allard, Graham & Paarsalu, 1980). With practice players can also pick up advanced cues that allow them to predict what is about to happen and react to it (Andrew, 1989; Tenenbaum & Lidor, 2005). Therefore rehearsing actions assists in improving performance; rehearsal though is only useful if it is being done correctly. It is the job of the coach to ensure that this is the case by providing fast and accurate feedback to the sportsman (Gill, 1986).

3.11.3 Coaching

There are two basic sports coaching behaviours: reactive, responding to the sportsman’s behaviour and actions; and spontaneous, where the coach instigates the coaching (Smith & Smoll, 1977). The important aspect is to ensure that bad habits are corrected before they become automatic. There are many tools that a coach can use to aid those under his tuition, two of those are discussed here: imagery and self-talk.

The fours Cs are often considered as the main pillars of the mental qualities that are required for an athlete to be successful (Mackenzie, 2007):

1. Concentration.
2. Confidence.
3. Control (keeping emotional control).
4. Commitment.

Imagery can aid in the above. Imagery is when the sportsman imagines that they are performing the skill correctly and well. This technique, when practiced correctly, can aid in increasing performance and the learning of skills (Gill, 1986).

Self-talk is a method that can be used while the athlete is participating in sport. It is the sportsman talking to himself, repeating a mantra about his performance, such as 'keep the feet moving'. Self talk can also be negative and this can undermine confidence and act as a distraction, therefore lowering the level of control (HarrowDrive, 2006), but positive self-talk is a means to keep ones attention focused and to help to overcome bad habits (Williams & Leffingwell, 1996).

Performance of athletes can be improved by coaching that teaches correct techniques and provides opportunities to use those skills to the best capability of the sportsman.

3.12 Conclusion

One of the key aspects discussed in this chapter is the idea of what Csikszentmihalyi describes as Flow. A person can enter into a flow state while participating in almost any activity, from using the internet (Pilke, 2004) to playing sport (Pates, Karageorghis, Fryer & Maynard, 2003). Flow is entered into when a person has a 'High Skill Level' and is faced with a corresponding 'High Challenge' and is also carrying out the task using implicit memory.

As riding is a highly skilled and challenging activity, it may be appropriate to discuss it in terms of flow states. The use of the theory of flow may contribute to an understanding of rider goals but skill level and challenge also relate to task difficulty. Fuller (2005) suggests that drivers and riders attempt to keep this task difficulty constant, where task difficulty is the "dynamic interface between the demands of the driving task and the capability of the driver." When task demand exceeds the task capability of the rider then loss of control results, which may result in a collision.

The skills associated with riding require that many of the functional tasks become automatic to allow the rider to focus attention on the surrounding environment and react appropriately. Implicit memory is common to task difficulty and the flow state:

riding is mainly an implicit skill. When riding skills are being learnt it is important that bad habits are corrected before they become automatic, and methods from sports coaching can aid in this.

While riding training can, and does, assist in moving tasks from explicit to implicit memory, its propensity to concentrate on vehicle and traffic skills can leave riders vulnerable. Improving skills has been shown to increase risk for some rider groups due to higher perceived skills.

Developing more effective interventions requires an appreciation of the particular hazards faced by PTW users but also a focus on the factors that create the actual risk from these hazards. While environmental factors have a bearing on risk (e.g. weather conditions and other road users), one of the key factors relating to actual risk is the rider themselves.

An understanding of riders and their goals can allow a more effective use of interventions, addressing the upper levels identified in the Hatakka, Keskinen, Gregersen, Glad & Hernetkoski (2002) hierarchy.

This thesis seeks to develop a fuller understanding of riders, examining their perceptions, attitudes and behaviours in order to identify the key components necessary for effective interventions. The following chapter discusses the methodological approach taken for this research.

Chapter 4 – Overview of Methodology

For giving me the answers when I'm asking you why
My oh my -For that I thank you
Jim Steinman (1948 -)

4.1 Introduction

In order to fulfil the objectives of any research project it is vital to use the methodologies best suited to the information being sought within the constraints of time and budgetary considerations. This chapter considers the research objectives presented briefly in the introduction in more depth. This leads to a discussion on the methodology used. The complexity of issues being addressed by this research means that the more 'traditional' approach of a large-scale, in-depth, survey was not appropriate. Instead a more disparate approach was taken to ascertain perceptions, attitudes and behaviours in a variety of environments and circumstances. A full description of the individual instruments used and the circumstances in which they were used are discussed.

Within the thesis questionnaires will be annotated as [Qx], with x being the questionnaire number. An overview of the questionnaires can be found in Table 4.1.

4.2 Overview

Two basic questions are being asked in this research: What is going on? And why is it going on? That is some descriptive research followed by explanatory research (de Vaus, 2001). The first descriptive stage is the foundation for the research (Leary, 2004) as it is necessary to understand what is going on before an examination of why can take place. De Vaus states that:

> *"good description provokes the 'why' questions of explanatory research"* (de Vaus, 2001:2).

This research seeks to assess the psychological reasons behind why people ride PTWs, and therefore its starting point is to understand the people who ride, and the reasons why they believe they ride. This descriptive work is used to develop the explanatory research that looks beneath the surface to explore the psychological 'whys' behind riding. However care must be taken when obtaining this descriptive data otherwise a large amount of trivial information that does not promote further

discussion, or aid in the design of the explanatory research, may be collected (Mills, 1959).

To avoid the research degenerating into an exercise of 'trivial data collection' the approach to the collection process must be focused. From the collected descriptive data, theories can be developed for examination through explanatory research. This is similar to the grounded theory approach where first evidence is collected and then, with as few preconceptions as possible, it is used to create a theory. The grounded theory methodology is used in qualitative and not quantitative research, but in looking at what is considered the standard definition (Miller, S. I. & Fredericks, 1999), there are marked similarities in approach, if not the method.

> *"A grounded theory is one that is inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon. Therefore, data collection, analysis, and theory stand in reciprocal relationship with each other."* (Strauss & Corbin, 1990:23)

As Yin (1989) states, research design

> *"deals with a logical problem and not a logistics problem"* (Yin, 1989:29).

Therefore at the beginning of a research project the question should not be "how the data is going to be obtained", but rather "what are the question(s) for which answers are sought". This is followed by giving attention to what evidence needs to be collected. Only when the issue of the research objectives are clear can collection methods be addressed.

4.3 Research Aims and Objectives

The aims and objectives for this research were briefly outlined in the opening chapter (see Section 1.2); this section expands on these objectives and describes how will be achieved.

The aim of this research is to understand why people ride PTWs. This, in part, comes from the author noting that bikers are often described as risk takers or reckless, yet as a PTW rider, the author cannot reconcile this either with his own riding, or that of others whom he rides with. An example of the negativity surrounding PTW use is:

> *"Bikers are also often killed due to riding at excessive speeds on bendy rural roads with pot holes, hidden junctions and other hazards." (Brake, 2004)*

Objective 1: To identify the demographics of bikers

The initial descriptive research was designed to gain an understanding of the demographics of PTW users. Data from three surveys were used to get information about riders and what non-PTW riders think of bikers:

- A questionnaire asked non-bikers what they thought of those who ride [Q1].
- A questionnaire requested basic data from bikers, such as what bikes they rode, any modifications that had been made to their machines, cost of insurance, riding habits, social group, age and gender [Q2].
- A questionnaire asked some similar questions to [Q2], such as age, gender and social grouping, however there were also some questions regarding the amount of money spent on biking and on what that money is spent on [Q3].

Objective 2: To investigate why PTW users believe that they ride

Why do people ride bikes? A central question to this research, this was investigated by asking PTW riders to list their likes and dislikes about riding [Q4].

Objective 3: To explore the goals, and sub goals, of riders and investigate how riders strive to attain these goals

An experiment was carried out at a track-day (a track-day is when the general public are allowed to use their bikes on a racetrack). On leaving the track, riders were asked about their experience while riding [Q5], and this data was then used to build upon the goals data [Q4] and produce a theory of the reasons for PTW riding.

Objective 4: Investigate the relationship between rider goals and risk

Risk is often associated with PTW use (Broughton, 2005; Labbett, 2003; Mannering & Grodsky, 1995; Sexton, Hamilton, Baughan, Stradling & Broughton, 2006), therefore an exploration of how risk relates to the goals of biking was seen as an important building block in the understanding of why people ride. The relationship between risk and goals for riders was explored by asking riders to assess various scenarios presented in the form of photographs [Q6]. Further information was also sought by asking the reasons for their assessments in the form of open questions. The 'reasons' given were analysed with themes formulated from these answers. These themes or categories were incorporated into a similar questionnaire using the same scenario pictures [Q7]. Finally a similar survey was also carried out asking car drivers the same questions to allow a comparison of riders and drivers [Q8].

Objective 5: Identify safety interventions and training methods to improve road safety.

The data obtained from the scenarios were used to construct risk and enjoyment types. These types help in understanding the risks that riders take, and can be used to give broad ideas of safety interventions. This understanding of the motivations of riders was used to suggest a set of constraints for consideration for all rider safety interventions.

4.4 Triangulation

Within this research a variety of questionnaires are being used as this can often overcome the inadequacies of individual data sources; the data from these questionnaires were triangulated in order to gain a full and valid picture of motorcyclist behaviour. Triangulation is a term that is taken from surveying; it is an area that is divided into a series of triangles in order to measure the position of a point (Oxford Concise, 2001). Within research triangulation is when different methodologies, or various data sources, are used to develop an understanding of a research problem (Leary, 2004:57).

Some critics claim that triangulation is an attempt to improve the validity of a study by using variety in research methods with little logic to the approach and a tendency to create confusion and a loss of focus (Clark, Riley, Wilkie & Wood, 1998). However, Greene, Caracelli & Graham (1989) commented that triangulation can allow for convergence of results; complementary overlapping; allowing for differing facets to emerge; sequential information to be gathered; the emergence of contradictions and fresh perspectives; and expansion where the different elements can add depth and scope to a study. Maxwell has a more positive view:

> *"Triangulation reduces the risk of systematic distortions inherent in the use of only one method, because no single method is completely free from all possible validity threats"* (Maxwell, J. A., 1998: 93)

Fielding and Fielding (1986) also emphasise the need to design strategies that overcome the fallibility of any one method. Although triangulation is often used with qualitative data, it is still useful when faced with datasets that, as individual entities, may not contain sufficient information to draw conclusions, but offers a window to shed light on the situation under scrutiny.

4.5 Data Collection

Table 4.1 is an overview of the data collection exercises, their delivery methods and the chapters most relevant to their analysis in the thesis. The full questionnaires can be found in Appendix A, with detailed analysis in Appendix B through to Appendix I.

Table 4.1. Summary of Questionnaires

Ref	Description	Method	Chapter	Number of respondents	Collection Period
Q1	A questionnaire about non-riders think about bikers	Online	5	102	2006 – Q3
Q2	Collection of basic data on bikers	Online	5	554	2004 – Q3
Q3	Collection of demographics with economic data	Online	5	101	2006 – Q4
Q4	Questionnaire asking for likes and dislikes	Paper	6	53	2004 – Q2
Q5	Data collected at a track-day	Paper	7	23	2004 – Q3
Q6	Simple Risk and Goals questionnaire using scenarios	Online	8	127	2005 – Q1
Q7	Risk and Goals questionnaire using scenarios	Online	9	296	2005 – Q3
Q8	Risk and Goals questionnaire using scenarios (drivers)	Online	10	176	2005 – Q4

The key to any data collection method is that it must be able to answer the research questions (Bouma & Atkinson, 1999). The data collected for this research used surveys, thereby collecting information directly from the people that this research concerns (Leung, 2001).

The majority of the questions used for this research are closed questions, but some of the data collected used open questions. Closed questions allow for answers within a finite set and are used to collect both factual information, such as gender and age, and data on attitudes and opinions thus providing a high-level of control over the questionnaire (Oppenheim, 1996). This control also aids in the analysis of the questionnaire, as there is uniformity across all the responses. It is also easier to input the data into a software package therefore reducing errors (Newell, 1995). The use of closed questions also reduces the effort needed by the respondent to complete the questionnaire and therefore can increase the response rate. However closed questions can only be used when the set of potential answers is already known; therefore some open questions were asked within this research to provide guidance for the potential

responses to some of the closed questions. Stacey's (1969) comments on the use of open and closed questions highlight the use of these two methods.

> *"closed questions should be used where alternative replies are known, are limited in number and are clear-cut. Open-ended questions are used where the issue is complex, where relevant dimensions are not known, and where a process is being explored"* (Stacey, 1969)

When closed questionnaires were used for this research that sought an opinion or attitude a Likert scale was implemented, with the scale balanced around the mid point. The questionnaires were designed to reduce demand characteristic bias, which can occur when respondents want to be good participants and try to give the answers that they feel the researcher wants (see for example Orne & Scheibe, 1964). To eliminate this bias, where practical, the exact purpose of the questioning was not given to the participants.

The data collection was carried out using two methods:

- Self-completed paper questionnaires
- Self-completed online questionnaires

The advantages and disadvantages of using an online questionnaire were considered before deciding to use this method. One of the advantages of online data collection is the elimination of transcribing errors, as the data can be pre-coded and automatically stored into a database (Harris, 1997; Watt, 1997). However there may be problems in the data collection itself that cause errors in the data as the respondents are not monitored therefore allowing for dishonesty in answering questions such as misreporting age or gender (Dillman, 2000; Schmidt, 1997). Another reason that respondents may not always give honest answers is because they may want to be seen to conform to what is socially desirable (Social Desirable Response Bias). Although this bias cannot be eliminated completely, neutral wording of questions and assurances that all responses are anonymous can reduce it (Nunnally, 1978). Therefore the anonymity of respondents via an online survey can be a positive characteristic (Hewson, Yule, Laurent & Vogel, 2003).

With unmonitored online surveys, there is a risk that people may respond more than once (Schmidt, 1997), but there are also advantages in the respondent not being monitored, as it allows time to consider responses (Levinson, 1990). Another

drawback to online surveys is that all respondents must have access to the Internet and have the confidence to use it, however internet based surveys can include as well as exclude certain members of the population (Bosnjak, Tuten & Bandilla, 1991).

The literature suggests that the quality of data collected via online methods is as valid as traditional methods (Denscombe, 2003), although respondent selection is considerably different for the former as there is little point in having a web page and setting up an online survey and passively 'waiting' for eligible respondents to find the site. A more active strategy is needed to encourage users to complete an online survey (Coomber, 1997), however invitations to participate in online research are increasingly considered 'spamming' (Harris, 1997). This can result in online surveys often having lower response rates than onsite surveys, with response rates of 10% or lower being common (Witmer, Colman & Katzman, 1999). By their very nature, online surveys are participant self-selecting and therefore they are not random and may not be representative of the full study population (Dillman, 2000). However online self-selection is suitable to use when researching a particular group of Internet users, especially when connecting with groups that are not bound in a particular area but that share a common interest (Coomber, 1997). This was the case for this research. People who ride PTWs were surveyed with the invitation to take part in the survey being made via motorcycling websites.

The technical issues of running an online questionnaire also have to be considered. Internet technology allows a fast turn-around of online questionnaires (Watt, 1997) and can also be low cost (Gaiser, 1997), however difficulties may be experienced by users due to computer or internet problems (Clarke, 1998) as well as the possibility of non-internet users being overlooked (Konstan, Rosser, Ross, Stanton & Edwards, 2005). There is also the issue that a level of technical expertise is needed to design and implement an interactive webpage. Some of these technical issues are described in Appendix J.

The design of an online questionnaire is different from the design of a paper one in other aspects as well. For instance if 'radio-buttons' are used to ensure that the user can only select one option, it is important to ensure that the possible responses do not make respondents feel that they want to select more than one option (Couper, Traugott & Lamias, 2001). It is also important that the default option is a null, so that

the researcher knows that the user did not select any of the available responses, otherwise a non-answered question may be wrongly coded.

The questionnaires used for this research heavily relied on Likert scales, and when these are implemented online it is important to pay particular attention to the labels, and their spacing, otherwise it is possible that incorrect data may be entered (Dillman, 2000). It is also imperative that the questionnaire is readable, therefore where possible each question should be in the same format, easily read, and have a question number (Couper, Traugott & Lamias, 2001).

Paper questionnaires have the advantage over online ones in that they can reach people who do not have access to the Internet. They also allow for research to be carried out at specific times, such as just after someone has finished riding. Therefore, the data collection for this thesis utilised both online and paper surveys to access a range of respondents.

4.6 The Sample

The sample is the fraction of the population that answer a questionnaire (Fowler, 1988). The purpose of surveys is to generalise from the sample to the population so that suppositions regarding behaviour, attitudes, and the like, can be made (Babbie, 1990), therefore how respondents are selected is important. Within this research the sample is 'convenience self-selecting' (McQueen & Knussen, 1999), mainly using a sub-population of PTW riders. The online surveys were promoted by using the snowballing technique (Kalton & Anderson, 1986) where known riders, members of bike clubs and users of motorcycling web forums, were contacted and asked not only to do the questionnaire, but also to forward on the survey details to other riders. For the questionnaires aimed at non-riders the snowballing method was also used.

The paper questionnaires were offered for completion in two manners. One questionnaire [Q4] was distributed via motorcycle shops in Central Scotland; to increase the response rate a prepaid envelope was included (Fink & Kosecoff, 1985). Motorcycle outlets were used to reach a general population of riders, rather than the general public. The other paper questionnaire [Q5] was designed for riders who were attending a track-day, and only those who had ridden on the track that day were asked to complete it, hence gaining insight into their riding experience during that day.

4.7 Description of Questionnaires

4.7.1 Questionnaire 1, What non-riders think of PTW users

This questionnaire sought to obtain the views of respondents about motorcycle riders. The view was obtained via an open question. Respondents were also asked about any motorcycling experience.

4.7.2 Questionnaire 2, Data on Riders

Questionnaire 2 asked riders about their bike and bike use. The main aim of the questionnaire was to collect information on the amount of time spent in various types of riding, such as commuting. Information was also sought on what safety equipment was worn or used on the bike.

4.7.3 Questionnaire 3, Rider and Economic Data

How much do riders spend on biking? How much do riders earn? What economic-social group do riders come from? From some of the literature reviewed in Chapter 2 it may be expected that riders come from the lower paid echelons of society. Data from this survey will be used to confirm, or refute, this assumption.

4.7.4 Questionnaire 4, Rider Likes and Dislikes

What do riders like and dislike about riding in general, and in Scotland? This set of open questions was posed using a paper-based survey as part of the descriptive research.

4.7.5 Questionnaire 5, Track Enjoyment and Risk

Mannering & Grodsky (1995) stated that riding a PTW may attract 'thrill seeking' individuals because of the danger involved in riding. If that were the case then it would be expected that risk and enjoyment would be linked. This part of the research utilised the relatively controlled environment of a public day at a racetrack to investigate the links between rider risk and enjoyment.

4.7.6 Questionnaire 6, Risk and Goals with Scenarios

What are the goals of riders when they are riding on the open road? This question was investigated with a webpage that presented respondents with six scenario photographs, asking for them to be rated for risk and enjoyment. Open questions for each scenario asked about the reasoning behind the risk and enjoyment ratings.

4.7.7 Questionnaire 7, Extended Risk and Goals with Scenarios

This questionnaire was developed by utilising themes extracted from the open questions in [Q6]. Detailed quantitative data was sought concerning the scenarios by asking for ratings of factors that may give rise to risk and enjoyment.

4.7.8 Questionnaire 8, Extended Risk and Goals with Scenarios for Drivers

Do PTW riders and car drivers have the same view of risk and enjoyment? This questionnaire, a version of [Q7], was used to solicit data from car drivers, and thus allow the two road user groups to be compared.

4.8 Analysis

The majority of statistical analysis was carried out using SPSS for Windows, version 11. Microsoft Excel was also used for some preliminary data screening and creating visual outputs. Apart from basic analysis, such as frequencies, means and standard deviations, cross-tabulation of variables was also carried out, with Chi Squared being used to check the significance of the data (Dancey & Reidy, 2004).

Some factor analysis was carried out on some of the data. Factor analysis is often used to simplify interrelated measures and classify similarities, therefore aiding in making sense of a complex situation (Child, 1970). However factor analysis does not reveal the underlying cause for specific behaviours. Within this research, factor analysis was carried out using the function within SPSS (Dancey & Reidy, 2004). Using a Varimax rotation as the primary factor analysis is improved by this procedure. The output from the SPSS factor analysis function was examined and only variables with a loading that exceeded a magnitude of plus or minus 0.40 were considered to be significant (Gorsuch, 1983). Within the SPSS dataset new variables were created to reflect each factor, these were constructed using a unweighted summation method (Hair, 1992; Maxwell, 1961).

As well as using SPSS for analysis, some of the profiling of riders used neural network technology to carry out pattern recognition on datasets. Pattern recognition using neural networks has many applications, such as identifying fingerprints and handwriting recognition (Ripley, 1996). In these applications human expertise has been replaced by computer software, with the software application being trained on

similar data. For the application used in this research the network was trained on a synthesised data set. Appendix K describes the use of this technology in more detail.

The data obtained using open questions ([Q1], [Q4] and [Q6]) not only provided the direction to the research, but also guidance for some of the closed questions used to expand on the initial theories (McQueen & Knussen, 1999). The analysis method used for these open questions is of paramount importance to this research and a content analysis method was used (Fink & Kosecoff, 1985; Moser & Kalton, 1971). The data from the open questions was analysed using 'Thematic analysis'. This method identifies patterns or themes within the data (Braun & Clarke, 2006; Daly, Kelleher & Gliksman, 1997; Miller, W. L. & Crabtree, 1992) with the themes being established by careful reading of the data (Rice & Ezzy, 1999). The established themes were finally coded, with these codes being entered into the SPSS software package for statistical analysis.

The following Chapters describe how these analysis techniques are used, and the conclusions that have been drawn from the data.

Chapter 5 – Who Rides PTWs?

A man who dares to waste an hour of time has not discovered the value of life.
Charles Darwin, 1809-1892

5.1 Introduction

This chapter presents the demographic data from the surveys to develop a portrait of the PTW riders who participated in this research. While it is always necessary to establish the characteristics of a survey sample and their likely representation of the overall population, this is particularly important where, as in the case of PTW riders, there is a paucity of research in the area. The Department for Transport has published two reports on motorcycle statistics, one in 2004 and a follow-up in 2006 (DfT, 2004a, 2006a). These statistical bulletins give an insight into the characteristics of bikes and riders allowing a comparison of some of the demographic data collected for this research. This will establish the validity of the sample. The characteristics of the biking population is of particular interest given the image portrayed in popular culture of the 'rebellious law breaker' as discussed in Chapter One and the perception that riders are risk takers. This chapter begins with analysis of data collected from the general population on their image of bikers before presenting the profile of respondents taken from the biker surveys.

5.2 Image of Bikers

In Chapter One, the popular culture image of bikers as 'Wild One' rebels or law breaking 'Hell's Angels' was discussed. In order to ascertain whether such media images were prevalent amongst the general population, a survey was developed to ask members of the public what they thought about those who rode PTWs. A copy of this survey (Questionnaire One) can be found in Appendix A. Comments about their views of riders were solicited via an open-ended question. A total of 105 responses were received. These responses were categorised into 23 themes, using a method based upon Miller & Crabtree (1992); some respondents' answers reflected more than one theme. Appendix L contains a list of the responses and the themes developed. The themes were further categorised into positive and negative comments, Table 5.1 shows this in terms of both responses (Rpse) and respondents (Rdnts). The responses of over two-thirds of the respondents reflected negative views with the majority commenting that bikes are dangerous or ridden in a manner that makes them

dangerous; although comments on enjoyment and the practical elements of riding also featured.

Table 5.1 Themes of Thoughts on Bikers

Positive Themes				Negative Themes			
Theme	**#**	**Rpse**	**Rdnts**	**Theme**	**#**	**Rpse**	**Rdnts**
Riding is fun	16	8%	15%	Bikes are dangerous	46	22%	44%
Bikes are practical	14	7%	13%	Risk takers/reckless	28	14%	27%
Riders have good skills	13	6%	12%	Do not like bikes weaving/filtering	14	7%	13%
Riders have good camaraderie	8	4%	8%	Riders have a bad attitude/no consideration	13	6%	12%
Riders are brave	4	2%	4%	Riders have no respect for traffic laws	10	5%	10%
Other vehicles cause bike accidents	3	1%	3%	Bikes are not easily seen	9	4%	9%
Riders are sensible	3	1%	3%	Bikes are Noisy	7	3%	7%
Riders are passionate	2	1%	2%	Vulnerable	6	3%	6%
Riders are OK/Good people	1	0%	1%	Riders need to be restricted	2	1%	2%
				Riders are intimidating	2	1%	2%
				Riders are thugs	2	1%	2%
				Riders blame cars for accidents	1	0%	1%
				Bikes are not environmental	1	0%	1%
				Riding would not be enjoyable	1	0%	1%
Total	***64***	***31%***		***Total***	***142***	***69%***	

Information was also sought on whether respondents held a PTW licence, if they have ever ridden a PTW on the public road or if any of their friends or family ride. This was used to ascertain if such considerations influenced the responses given. The data suggest that those who hold a bike licence are more positive towards biking than those who do not (Table 5.2). A similar pattern is evident for those who have ridden a PTW on the public roads in the past (Table 5.3). Those who have friends and family that ride also have a more positive view of riders, but this is not as distinct as in the other two categories (Table 5.4).

Table 5.2 Positive and Negative Themes by Licence Held

	No Bike Licence		Hold Bike Licence		Total	
	#	%	#	%	#	%
Positive	32	42%	10	67%	42	46%
Negative	45	58%	5	33%	50	54%
Total	***77***	***100.00%***	***15***	***100.00%***	***92***	***100.00%***

Chi squared $p < 0.074$

Table 5.3 Positive and Negative Themes by Ridden a PTW in the Past

	Not Ridden		Ridden Bike		Total	
	#	%	#	%	#	%
Positive	25	39%	17	61%	42	456%
Negative	39	61%	11	40%	50	54%
Total	***64***	***100%***	***28***	***100%***	***92***	***100%***

Chi squared $p < 0.055$

Table 5.4 Positive and Negative Themes by Friends or Family Ride

	No		Yes		Total	
	#	%	#	%	#	%
Positive	18	37%	24	56%	42	46%
Negative	31	63%	19	44%	50	54%
Total	***49***	***100%***	***43***	***100%***	***92***	***100%***

Chi squared $p < 0.067$

Exploration of these themes would suggest that although the extreme image of bikers as ‘bad boy’ renegades, as per the movie image, may not be held by members of the general public, some still hold the view that bikers/biking is reckless/dangerous especially if they do not have personal experience of biking and/or riders. The following section examines the demographic data collected through surveying PTW bikers.

5.3 Who Rides Bikes?

According to the DfT (2006), there are currently around 1.62 million PTWs within the UK compared to an estimated 33 million cars (DfT, 2003a) and they account for roughly one journey for every twenty car journeys taken. The highest PTW ownership rate is in the South West of England and the lowest are in Scotland; in 2004 the ownership rate for Great Britain was lower than any other main EU country (DfT, 2006a). Given the image of bikers, it might be expected that riders would tend

to have a young, predominantly male, low-income profile. With the exception of being predominantly male, this profile is not generally the case. For this section information from the survey data is explored alongside available national data from the Department for Transport (DfT) and other published sources. This allows a demographic profile of the survey respondents to be developed and gives an indication of how representative of the general biking population the survey respondents are.

5.3.1 Age and gender of PTW riders

In the Department for Transport (2006a) compendium of motorcycle statistics an age profile is given for riders of PTWs. The groupings used by the DfT are slightly different to the ones used in this research but close enough to allow some comparison of data. The figures from each are presented side-by-side in Table 5.5a and 5.5b; the main difference in the research data to the DfT data is that the youngest age group (Under 21) and the oldest age group (Over 60) are under represented in the survey. There is a corresponding peak in the mid-ranges for both data-sets, which is most marked in the 40-49/41-50 grouping.

Table 5.5 Age of Riders

Table 5.5a Age of riders (DfT)

Age	**%**
Under 20	10%
20 - 29	10%
30 - 39	27%
40 - 49	25%
50 - 59	17%
60+	10%

Table 5.5b Age of riders (from Survey)

Survey	**#**	**%**
Under 21	37	3%
21 - 30	147	13%
31 - 40	351	32%
41 - 50	351	32%
51 - 60	172	16%
61+	43	4%
Total	***1101***	***100%***

The DfT compendium does not present data on the current gender split for riders, however the 2002 National Traffic Survey stated that males were seven times more likely to make a PTW trip than females (Clarke, Ward, Bartle & Truman, 2004), therefore it can be approximated that about 14% of riders are female; there was a similar gender split found in these research data (Table 5.6).

Females are well represented in the younger age groups (Table 5.7), with the number of female riders reducing at about 50 years of age. This may be an effect of riding

being a physical activity and older females may feel that they no longer have the strength to control a PTW.

Table 5.6 Gender of PTW rider respondents

	#	%
Male	944	86%
Female	156	14%
Total	***1100***	***100%***

Approximately half of all female riders surveyed are aged between 36 and 45; only 7% are over 50, whereas 22% of male riders are aged over 50 (Table 5.7).

Table 5.7 Gender profile by age groups with percentage split of male to female for each age group

	Male		**Female**		**Total**
	#	**%**	**#**	**%**	**#**
<21	31	3%	6	4%	37
21 - 25	57	6%	12	8%	69
26 - 30	62	7%	16	10%	78
31 - 35	135	14%	19	12%	154
36 - 40	157	17%	38	25%	195
41 - 45	185	20%	38	25%	223
46 - 50	112	12%	15	10%	127
51 - 55	109	12%	6	4%	115
56 - 60	53	6%	3	2%	56
60+	41	4%	2	1%	43
Total	***942***	***100%***	***155***	***100%***	***1097***

Chi-squared p = 0.003

5.3.2 Income and occupation of PTW riders

Data collected on the income of PTW riders suggests that half the respondents earned more than the national average (Table 5.8). The Office of National Statistics (Dobbs, 2006) showed that for the 2005/06 tax year median gross annual earnings for full-time employees on adult rates who have been in the same job for at least 12 months was £23,600, with a mean value calculated at around £25,800 (Office for National Statistics, 2007).

Table 5.8 Earnings of PTW Riders

Earning	#	%	Cum %
<10K	8	7.9	7.9
10K to 15K	8	7.9	15.8
15K to 20K	25	24.8	40.6
20K to 25K	12	11.9	52.5
25K to 30K	7	6.9	59.4
30K to 35K	11	10.9	70.3
35K to 40K	11	10.9	81.2
40K to 45K	7	6.9	88.1
45K to 50K	7	6.9	95.0
50K to 55K	3	3.0	98.0
55K to 60K	1	1.0	99.0
>60K	1	1.0	100.0
Total	***101***	***100.0***	

This is reflected in the occupational profile of the respondents where nearly half (47%) of the respondents indicated that they hold middle/upper managerial or professional position (Table 5.9) against the national Figure (NRS, 2006) of approximately a quarter (Table 5.10). Note that the category of 'lowest levels of subsistence' includes the unemployed, students, casual workers and those who have retired.

Table 5.9 Occupational groupings of respondents

Occupational groupings	#	%
Upper management	6	6%
Middle management/professional	41	41%
Junior management/clerical	17	17%
Skilled manual	10	10%
Semi-skilled/unskilled	11	11%
Unemployed	1	1%
Student	2	2%
Retired	3	3%
Other	10	10%
Total	***101***	***100.0***

The demographics and occupational data suggest a relatively older, affluent, predominately male PTW rider in occupations associated with responsibility. This is at odds with the image held by non-riders. The following section analyses data on their spending habits related to PTWs.

Table 5.10 National Occupational Groupings

Occupational groupings	**%**
Upper management	4%
Middle management/professional	22%
Junior management/clerical	29%
Skilled manual	21%
Semi-skilled/unskilled	16%
Lowest levels of subsistence	8%
Total	***100.0***

5.4 Spending on PTWs

Riders were asked about spending habits, including not just spending on the PTW, but also on consumables (fuel, oil, etc), accommodation when on biking trips and biking events (Bikefest at Kelso, National Bike Show in Birmingham, etc). The respondents' average spend per annum on bikes and biking kit was £1210 with a total of £3,500 per year being spent on bike related activity. According to the Expenditure and Food Survey, the average household has a weekly spend of £0.60 on PTW purchases and £0.16 on accessories, spares etc giving a total spend of £0.76 (Office for National Statistics, 2004). However, this spending is spread across all households, despite only 2.3% households within the UK owning a PTW (DfT, 2003c). Therefore the weekly spend for households owning a PTW on PTW purchases and accessories is approximately £33 per week (£0.76 $\times$ 100/2.3) equating to £1731 per year. Even this recalculation of the ONS figures to account for the small proportion of PTW owners in the survey is still less than half the spending suggested by the survey responses (Table 5.11). This may partly be due to elements of spending associated with PTW use being allocated elsewhere in the Expenditure and Food Survey (e.g. spending on accommodation while on biking trips being allocated to leisure/holiday spending).

Table 5.11 Mean Spending on Bike Related Activities

	Mean
Bike and Kit	£1210.40
Consumables	£1195.05
Accommodation (UK only)	£611.88
Events (UK only)	£150.35
Other	£292.90
Total spend	***£3500.25***

In 2004, 2.3% of British households owned a PTW (DfT, 2006a) compared to 73% of households owning at least one car. Ownership of a PTW was more common in households that owned one, or more, cars (DfT, 2006a). This may indicate that the PTW is often a vehicle of choice rather than a main mode of transport. Respondents were asked to give a value for their current bike; the average value of the respondent's bike was around £3,000 (Table 5.12). This suggests a high level of capital commitment and on-going expenditure on a vehicle that is often a non-essential/additional transport mode and owned for pleasure rather than necessity (see section 6.3).

Table 5.12 Value of Bikes

Bike Value	#	%	Cumulative %
Less than £1000	45	8.4%	8.4%
£1000 to £1999	105	19.6%	28.0%
£2000 to £2999	105	19.6%	47.7%
£3000 to £3999	87	16.3%	63.9%
£4000 to £4999	71	13.3%	77.2%
£5000 to £5999	35	6.5%	83.7%
£6000 to £6999	30	5.6%	89.3%
£7000 to £7999	21	3.9%	93.3%
£8000 to £8999	11	2.1%	95.3%
£9000 to £9999	4	0.7%	96.1%
More than £10,000	21	3.9%	100.0%
Total	535	100.0%	

Having explored who the PTW riders are, the following section analyses the data collected on the type of bikes being ridden in terms of category, size and performance.

5.5 Powered Two-Wheelers

As discussed in Chapter Two, there is dispute over the degree to which PTW engine size impacts on issues of safety. In order to assess its impact and develop a riding profile, information was sought on the type of PTWs being ridden by respondents.

5.5.1 Categories of PTWs

Using the bike make and model information supplied by respondents, bikes were classified into 'bike types' using the categories widely used in biking publications such as the Used Bike Guide (UBG, 2006). Nearly 70% of respondents stated they ride either Sports bikes, Tourers or Sports Tourers.

However, the gender split across the bike types is not even with females being over represented in the Sports Tourer category and underrepresented in Tourer bikes (Table 5.13); this may be because Tourer bikes are generally heavy machines and females may opt for a lighter Sports Tourer instead.

Table 5.13 Gender by Bike type

	Male		**Female**		**Total**	
Bike Type	**#**	**%**	**#**	**%**	**#**	**%**
Sports	226	29%	32	27%	258	29%
Sports Tourer	194	25%	45	38%	239	26%
Tourer	186	24%	15	13%	201	22%
Classic/Custom	60	8%	11	9%	71	8%
All rounder	121	15%	15	13%	136	15%
Total	***787***	***100%***	***118***	***100%***	***905***	***100%***

Chi-squared $p = 0.009$

When bike types were analysed against age, there appeared to be a progression from the Sportier bikes to Tourers as the rider gets older (Table 5.14). Younger riders may be attracted to the Sports bike due to the glamour associated with high-profile racing events such as British Super Bikes, especially as for a relatively modest outlay a bike can be obtained with a similar performance to that being raced. For example, the Virgin Mobile Yamaha team that is competing in the 2007 British Super Bike series are riding Yamaha YZF R1 bikes (BSB, 2006), with a road legal version costing under £9,000 (Yamaha Motor Company, 2007). The riding position on a Sports bike is hunched over the front of the bike, providing a poise that is liable to give back problems, therefore it is not surprising that as some riders get older they may opt for bikes with a more ‘body friendly’ riding position.

Table 5.14 Bike type by Age

	35 and under		**36 to 50**		**51 and older**		**Total**	
Bike Type	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Sports	92	37%	117	27%	25	15%	234	27%
Sports Tourer	61	25%	127	29%	42	25%	230	27%
Tourer	27	11%	100	23%	64	38%	191	22%
Classic/Custom	10	4%	47	11%	13	8%	70	8%
All rounder	58	23%	44	10%	26	15%	128	15%
Total	***248***	***100%***	***435***	***100%***	***170***	***100%***	***853***	***100%***

Chi-squared $p < 0.001$

5.5.2 PTW performance

The make and model information on the PTWs allows further analysis of their characteristics and performance such as bike power and engine size. Engine size is often used in categorising bikes (for example see DfT, 2004a; EuroRap, 2004; Huang & Preston, 2004; Sexton, Hamilton, Baughan, Stradling & Broughton, 2006; Yannis, Golias & Papadimitriou, 2005). However this method of categorising machines does not take into account the actual performance capability of the machine. For example a Honda SL650 has an engine size of 649cc, but only a top speed of 95 mph while a Suzuki GSXR 600 has a smaller engine size of 600cc yet a top speed of 160 mph (UBG, 2006). Power and weight data was used to develop a performance index to allow a better comparison of the bikes. The equation for performance index (Pi) is:

$$Pi = (Power/Weight) * Top\ Speed$$

This calculation, using data from Used Bike Guide (UBG, 2006), was undertaken for all bikes indicated by respondents; a list of bikes, with their performance index, is presented in Appendix M.

Five categories of performance index were created, ranging from ‘very low’ to ‘very high’; Table 5.15 indicates a fairly even spread across the range of performance levels.

Table 5.15 Performance Index

	#	%	Cumulative %
Very low	72	15.7%	15.7%
Low	96	20.9%	36.5%
Medium	102	22.2%	58.7%
High	98	21.3%	80.0%
Very high	92	20.0%	100.0%
Total	***460***	***100.0%***	

When cross-tabulating performance index with age of bikers it was found that the percentage of riders who ride high, or very high, performance machines varies very little with age, however younger and older riders are more likely to ride low or very low performance machines compared to those in the middle age group (Table 5.16).

The overrepresentation of younger riders in the very low performance group may be due to the current licensing restrictions that do not allow riders under 21 to ride

powerful machines (DSA, 2004), and once the age of 21 is reached it will take time for a young rider to pass the test to gain access to larger machines and then to obtain one. One of the other barriers for young riders wanting a more powerful PTW is the cost of insurance with many insurance companies loading their premiums. There were no significant differences found when comparing gender with the performance index of PTW ownership (chi squared p = 0.316).

Table 5.16 Performance index against age of respondents

	35 and under		36 to 50		51 and older		Total	
Pi	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Very low	32	24%	27	11%	13	16%	72	16%
Low	19	14%	53	22%	24	29%	96	21%
Medium	27	20%	61	25%	14	17%	102	22%
High	28	21%	52	21%	17	21%	97	21%
Very high	27	20%	49	20%	14	17%	90	20%
Total	133	100%	242	100%	82	100%	457	100%

Chi-squared p = 0.028

5.6 Summary

Despite the image that would seem to be prevalent amongst the general population that ‘bikers’ are dangerous and irresponsible, the profile of the PTW riders from this research suggest that they are likely to be middle-aged, be in positions of responsibility in the work place and be relatively affluent. This profile, together with PTWs not being the sole transportation in most households, suggests that ‘biking’ has become a ‘middle class’ hobby rather than simply a cheap/alternative mode of transport for those on lower incomes (Chapter 1). Nor is it the ‘young rebels’ who are riding the most powerful bikes, but those in the middle age ranges.

Knowing who is riding is only an initial step in understanding this group of people. The following chapter examines the motivations involved in riding to establish why people choose to ride.

Chapter 6 - Why do People Choose to Ride PTWs?

Riding a race bike is an art - a thing that you do because you feel something inside.
Valentino Rossi, 1979 -

6.1 Introduction

The previous chapter explored the question ‘who rides PTWs?’, this chapter examines why riders choose to ride PTWs. The image of ‘bikers’ as reckless risk takers, as discussed in Chapter 1 and Chapter 5, would suggest that riders of PTWs should be thrill seekers. This chapter examines some of the reasons for PTW use and the ‘likes’ and ‘dislikes’ of riders.

6.2 Datasets

This chapter analyses data from Questionnaire 2, examining commuting and recreational riding, and Questionnaire 4 examining the ‘likes’ and ‘dislikes’ of riders. Questionnaire 2 was administered online collecting information on PTW riders and their riding habits; 554 respondents completed the survey. Questionnaire 4 was a paper-based survey, distributed via biking retail outlets around Scotland. Its purpose was to examine aspects of why riders ride, specifically concerning the ‘likes’ and ‘dislikes’ of riding; 53 respondents returned the questionnaire. Full results for both questionnaires can be found in Appendix C [Q2] and Appendix E [Q4].

6.3 Riding Trip Purpose

The National Traffic Survey (DfT, 2003c) categorises “reasons for trips” into various purposes: work/business/education; shopping; visiting friends; and other leisure (Table 6.1).

Table 6.1 Trip Reasons for Car and PTW vehicles (Categories from the DfT(2003c)

	PTW		**Car**	
Trip reason	**Trips per rider per week**	**Average trip length (Miles)**	**Trips per driver per week**	**Average trip length (Miles)**
Other leisure	0.7	24.9	1.6	12.8
Visit friends	0.9	10.6	2.3	10.6
Work, business and education	5.1	9.5	4.7	11.5
Shopping	0.7	4.3	3.3	5.2
All trips	**8.0**	**10.5**	**16.4**	**8.4**

Although the ‘work/business/education’ category showed similarities between car and PTW use, in other leisure trips PTWs were used less frequently but the trips were almost double the length, implying that the actual ride was for leisure rather than the PTW being used to visit a leisure destination.

The figures from the Department for Transport indicate the purpose of the trip, but the data does not explore the reason why the PTW was used. This is an important distinction, as for most riders there is a car within the household (DfT, 2006a) and therefore the PTW may be being used as a vehicle of choice.

6.4 Reasons for Riding

Two of the main purposes for riding can be categorised as work-related or leisure-related; these were explored with respondents being asked about leisure and commuting riding [Q2].

6.4.1 Commuting

Riders were asked if they used their bike for commuting to work, and if they did, why. Around two-thirds of respondents (62%) commuted by PTW; a similar figure (64%) was reported in the National Traffic Survey (DfT, 2006a). The majority of those who commuted stated they did so because they enjoyed the ride, with the convenience of using a PTW also being a major factor; only 6% felt that they had no option but to use the PTW to get to work (Table 6.2). Some of the respondents may fall into more than one of these categories, but the questionnaire only allowed one option to be chosen.

Table 6.2 Why riders commute

	#	%
I use my bike to get to work because I enjoy the ride	176	58%
I use my bike to get to work because it is more convenient than other forms of transport.	109	36%
I use my bike to commute to work, as it's the only means of getting there.	18	6%
Total	***303***	***100%***

Convenience is often associated with PTW use; with cited reasons including the economics of running a machine; easier, and often cheaper, parking; and the ease of access through traffic resulting in reduced journey times (City of York Council, 2005;

National Motorcycle Council, 2000). Some of these convenience factors are expressed in Staffordshire County Council's (2005) local transport plan:

> *Powered Two-Wheelers (PTW's) offer the same potential for personal mobility as private cars whilst contributing less congestion, pollution and damage to roads. PTW's are not subject to the same delays in congested traffic and so spend less time wasting fuel idling in queues. They are lighter, generally more fuel-efficient and take up less space, whether parked or moving.* (Staffordshire County Council, 2005)

For the majority of riders who chose to use their PTWs for commuting, enjoyment was a main consideration.

6.4.2 Leisure Riding

When riders were asked about their leisure riding only 22 out of 544 (4%) indicated that they did not use their bike for recreational riding at all; of these, 15 used their bike to get to work because it was more convenient and 4 enjoyed riding to work. All the females said that they did recreational riding. Cornwall County Council conducted a survey amongst PTW riders in their area, with one question asking about trip purpose; only 1% stated that they never used their bike 'purely for fun', with 49% riding for fun at least 2 to 3 times a week, or at weekends; 15% rode purely for fun everyday. (Cornwall County Council, 2004). Hence it can be concluded that fun and enjoyment are major reasons for riding.

When riders were asked how they spent their leisure riding [Q2], over half of the respondents stated that they carried out their recreational riding as a solo activity, with a third going out for rides with friends and 10% as part of an organised group, such as a motorcycle club (Table 6.3).

Table 6.3 Recreational riding

	#	%
I spend most of my recreational riding time riding by myself	297	55%
I spend most of my recreational riding time riding with friends	173	32%
I spend most of my recreational riding time riding in an organised group	52	10%
I do not use my bike for recreational riding	22	4%
Total	***544***	***100%***

An examination of the recreational riding gender split shows that females are more gregarious with 59% preferring to ride with friends (Table 6.4).

Table 6.4 How Recreational Riding is carried out by Gender

	Male		**Female**		**Total**	
	#	**%**	**#**	**%**	**#**	**%**
I spend most of my recreational riding time riding by myself	275	61%	21	33%	296	57%
I spend most of my recreational riding time riding with friends	132	29%	38	59%	170	33%
I spend most of my recreational riding time riding in an organised group	47	10%	5	8%	52	10%
Total	***454***	***100%***	***64***	***100%***	***518***	***100%***

Chi squared $p < 0.001$

Riding alone is the preferred mode of riding for most respondents (Table 6.3), but this becomes more prevalent as the rider gets older (Table 6.5).

Table 6.5 How Recreational Riding is carried out by Age Group

	35 and under		**36 to 50**		**51 and older**		**Total**	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**
I spend most of my recreational riding time riding by myself	84	52%	136	55%	74	70%	294	57%
I spend most of my recreational riding time riding with friends	64	39%	83	34%	25	24%	172	33%
I spend most of my recreational riding time riding in an organised group	15	9%	28	11%	7	7%	50	10%
Total	***163***	***100%***	***247***	***100%***	***106***	***100%***	***516***	***100%***

Chi squared $p = 0.032$

Analysis of riding mode against bike types ridden suggests that with the exception of sports bike riders who are more likely to spend time riding with friends, riding alone is generally the preferred option for riders of all types of bikes (Table 6.6).

This section has established that riding is predominantly a leisure activity, the next section explores the way riders feel about aspects of riding.

Table 6.6 How Recreational Riding is carried out by Bike Types

	Sports bike		Sports Tourer		Tourer		Custom Classic		All rounder		Scooter		Total	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
I spend most of my recreational riding time riding by myself	44	40%	66	61%	63	63%	25	58%	60	71%	30	58%	288	58%
I spend most of my recreational riding time riding with friends	57	51%	36	33%	27	27%	12	28%	14	17%	15	29%	161	32%
I spend most of my recreational riding time riding in an organised group	10	9%	6	6%	10	10%	6	14%	10	12%	7	13%	49	10%
Total	***111***	***100%***	***108***	***100%***	***100***	***100%***	***43***	***100%***	***84***	***100%***	***52***	***100%***	***498***	***100%***

Chi squared $p < 0.001$

6.5 'Likes' and 'Dislikes' of Biking

Bikers in Scotland were asked what were their 'likes' and 'dislikes' about riding generally, and riding specifically in Scotland [Q4]. Comments about their 'likes' and 'dislikes' were solicited via open-ended questions. The responses were categorised into 15 'likes' and 10 'dislikes', using a method based upon Miller & Crabtree (1992). The total numbers of likes and dislikes is shown in Table 6.7. Some respondents comments were coded into more than one theme. Detail of this coding, along with a complete listing of the comments, is provided in Appendix E.

Table 6.7 Number of Likes and Dislikes

	General	Scotland	Total
Likes	116	100	216
Dislikes	95	72	167

Where there was only one or two comments on a theme, such as 'cool factor' or 'better for the environment', these were categorised as 'other'.

6.5.1 Elements Riders Liked About Riding

Riders were asked to give their general ‘likes’ about biking (Table 6.8). ‘Freedom’ was the most common reason for riding. The sense of belonging to ‘the biking community’ was also considered important as illustrated in these quotes:

> *“Being part and feeling part of the biking community, all the biking events, races, rallies, runs, etc. Mutual respect between bikers”*

> *“All bikers I have met are so nice, the fact that most bikers, including myself, always give a wave in passing.”*

The convenience of riding a PTW was one of the major ‘likes’ for riders, with convenience taking several forms such as access through traffic and ease of parking, as seen from these quotes from the survey:

> *“Getting through traffic queues (filtering) more quickly than in a car.”*

> *“Ease of parking and the ability to avoid hold-ups.”*

This correlates with the results presented previously on reasons for using PTWs for commuting.

Table 6.8 Rider General ‘likes’

	#	%
Freedom	31	22%
Camaraderie/Social	22	16%
Convenience	19	14%
Excitement	11	8%
Fresh air/Nature/Scenery/Places	9	7%
Speed	8	6%
Enjoyment	6	4%
Mechanics	6	4%
Solitude	5	4%
Use of skills	5	4%
Economics	4	3%
Drivers/People	1	1%
Other	11	8%
Total	***138***	***100%***

Five respondents commented that one of their ‘likes’ was using their riding skills; for example:

> *“The kick from co-ordination in using a m/cycle – balance, speed, judgement.”*

"Satisfaction of control and use of skill."

Elements that relate to risk, such as speed (6% within the general 'likes') and excitement (8% in general 'likes') did not appear often, rather the 'likes' of riding are mainly related to gaining enjoyment (freedom and social elements) and the convenience of PTW use.

6.5.2 Elements Riders Liked About Riding in Scotland

'Quiet/good roads' was the most frequently mentioned 'like' relating to riding in Scotland with the 'Fresh air/Nature/Scenery/Places' theme highly rated (Table 6.9). Scotland is also highly rated within the motorcycle press (Henshaw, 2006) due to the nature of roads being well suited to enjoyable riding. Therefore 'Quiet/Good Roads' being mentioned by two fifths of the respondents was not unexpected. Scotland is an enjoyable place to ride, as one female respondent stated:

"The roads and scenery in Scotland, it's a great way to explore and you gain total appreciation of the country (and I'm English)"

Table 6.9 Riding in Scotland 'likes'

	#	%
Quiet/Good roads	35	38%
Fresh air/Nature/Scenery/Places	27	29%
Camaraderie/Social	9	10%
Drivers/People	4	4%
Freedom	3	3%
Law enforcement	3	3%
Convenience	2	2%
Enjoyment	2	2%
Excitement	1	1%
Speed	1	1%
Mechanics	1	1%
Solitude	1	1%
Use of skills	1	1%
Economics	1	1%
Other	2	2%
Total	***93***	***100%***

6.5.3 Rider 'dislikes'

Riders were also asked to give their general 'dislikes' (Table 6.10) and their dislikes about riding in Scotland (Table 6.11). As stated above, one of the 'likes' about riding was to get out in the fresh air and enjoy nature. But that 'like' has a flip side in bad

weather, and by far the most 'disliked' thing concerning biking, especially within Scotland, was bad weather. Nearly half of respondents commented on this, for example:

> "*Being wet in summer.*"
>
> "*Cold wet and bloody miserable winters.*"

The 'other' category was used for the more unusual responses that could not be placed in a theme, such as 'Germans', 'Sheep' and 'Insects'. Another area of interesting comparison is that of those who dislike car drivers to those who dislike other road users; within these two categories the majority of riders did not give a blanket disliking, rather their distain was reserved for those who put themselves, or other road users, in danger, although one respondent did single out 'Volvo drivers' for particular attention. Riders, in general, seem to dislike those who drive cars more than other road users. As the main mode of transport on the public roads is cars, it is more likely that riders will have had a near miss, or another negative experience, involving a car that may have coloured their judgement. A typical comment regarding car drivers was:

> "*Lack of space/distance by some car drivers*"

Table 6.10 Riding General 'dislikes'

	#	**%**
Weather	23	23%
Car drivers	20	20%
Poor/bad road surface	9	9%
Law enforcement	9	9%
Other road users	9	9%
Cost	8	8%
Others attitude to riders	6	6%
Poor bike/kit quality	3	3%
Congestion	2	2%
Other	9	9%
Total	***98***	***100%***

Table 6.11 Riding in Scotland 'dislikes'

	#	%
Weather	32	48%
Poor/bad road surface	17	26%
Congestion	4	6%
Car drivers	3	5%
Law enforcement	3	5%
Cost	2	3%
Other road users	1	2%
Other	4	6%
Total	***66***	***100%***

As discussed in Chapter 2, motorcyclists prefer a consistent road surface because they only have a limited tyre contact area on the road making them unstable compared to cars and other similar vehicles (Institute of Highway Incorporated Engineers, 2005). This is reflected by the number of riders stating that poor road surface quality is one of their 'dislikes'.

Almost one in ten commented on law enforcement as a factor that they did not like. Speed cameras, attitudes and inconsistencies of the police and police forces were included in this theme. These particular dislikes are expressed by one respondent who said:

> *"Difference of police forces attitude i.e. one booking for a noisy can or small number plate, and another saying that noisy cans and small number plates didn't kill anyone."*

A very small proportion of the riders surveyed complained that they found congestion a problem, and then it was often a specific congestion problem as expressed by one rider:

> *"The roads can get choked with tourists, caravans and sheep."*

The part of the survey seeking rider 'likes' found that convenience, including access through traffic, was a major plus, so the fact that only a small number state that congestion is a problem should not be surprising. It is interesting to note that the responses for 'likes' were considerably more than for dislikes, as shown in Table 6.7.

As PTW use is more dangerous than most other forms of transport, it is often thought that riders enjoy risk and that this attracts 'thrill seekers' (Mannering & Grodsky, 1995). How was risk categorised within the 'likes' and 'dislikes'?

6.5.4 Risk

Riding is a more risky activity than driving a car (RoSPA, 2001), so there is a popular belief that those who choose to ride do so because of the risk (Mannering & Grodsky, 1995). However many people engage in risky activities while driving for other reasons than enjoying the risk, for example the use of mobile phones while driving (Townsend, 2006). It is noticeable that in the responses on 'likes' and 'dislikes' not one respondent mentioned risk as a 'like'. Within the 'dislikes', although risk was not directly mentioned, there were statements regarding vulnerability of riders. Comments about road surface quality also indicate that riders are aware that they are at risk.

6.6 Conclusion

When asked what they liked about riding, most bikers gave answers citing ideas associated with pleasure, such as freedom, or convenience; however some authors argue that riding a PTW cannot be enjoyable due to the high level of risk involved, considering it 'an extremely risky venture' (Bellaby & Lawrenson, 2001). But there is also a pervasive public perception that enjoyment is sought, and found, in the high levels of risk that riders face.

Most current safety initiatives are founded on the assumption that the goal of the road user is simply to reach their destination safely so that they may then fulfil their trip purpose – work, shop, enjoy a social occasion, etc. Transport is a method that joins up places where people go so that they can meet their obligations (Stradling, 2003); however a transport mode may also serve affective as well as instrumental functions (Steg, 2004; Steg, Vlek & Slotegraaf, 2001; Stradling, Meadows & Beatty, 2001). The driving of a car, or riding a PTW, is a skill-based, rule-governed expressive activity involving on-going, real-time negotiation with co-present, transient others in order to avoid intersecting trajectories. PTW use may be described as having an expressive function with many recreational bikers going out 'just for a run', often without a specific destination in mind except to eventually arrive back home. For this A to A rather than from A to B riding, while accomplishing a safe return is surely a consideration, the goal of the trip will be found in the manner of riding rather than the destination.

How do these results help in answering the question of why people ride bikes? Freedom and enjoyment are important reasons for riding, but what is it that gives the enjoyment? The following chapter explores the aspects of riding that bring enjoyment.

Chapter 7 - The source of enjoyment?

Happiness is not achieved by the conscious pursuit of happiness; it is generally the by-product of other activities.
Aldous Huxley 1894 – 1963

7.1 Introduction

The previous chapter explored the reasons for PTW use finding that PTWs are ridden predominantly for pleasure rather than functionality. Even where PTWs use is associated with non-expressive reasons, such as convenience, enjoyment is still often cited as a factor. Enjoyment is a key factor for most riders. Many PTW riders make trips that are expressive and even a considerable amount of functional riding is carried out for expressive purposes. Why though is riding so enjoyable? As riding is often categorised as a risky activity (DfT, 2006a; RoSPA, 2001), where does the element of risk fit into the riding experience? Do riders ride because of the risk, or despite it? This chapter explores the ways that enjoyment is derived from riding and examines the relationship between risk and enjoyment.

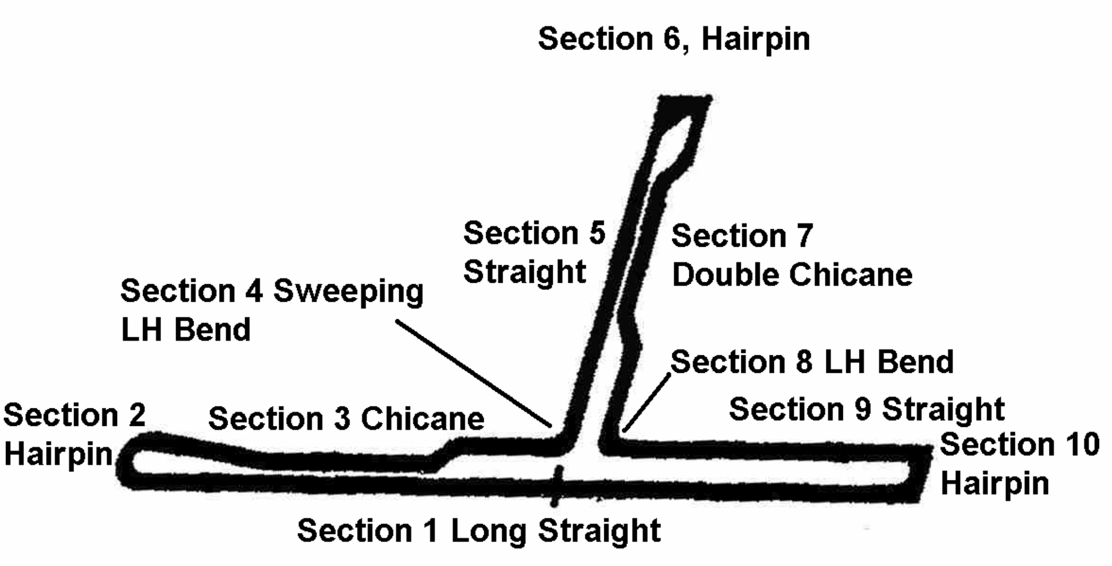
7.2 Dataset

In order to explore the various elements associated with the riding experience, a controlled environment incorporating a variety of road features was sought: racetracks have such features. Several racetracks exist that hold “track day” events for ordinary PTW riders that allow them to test their skills on a racetrack. ‘Track days’ are when the track is turned over for use by the general public riding their own PTWs; however this is not a “free-for-all” use of the track. UK ‘track day’ organisers insist, as a minimum, that all riders having an unrestricted UK driving licence, that they wear a one piece leather/protective suit, and a helmet that meets BSI 6658 type A with an ACU gold stamp (Focused Events, 2007). During the event only riders of a similar ability are allowed out on the track at the same time. This is to prevent a clash of skill levels that may place riders at undue risk. A track day is not a race situation, but an opportunity to test skills off the public highway.

Edzell was an ideal track for this purpose as it has clearly definable features that could be mapped and easily indicated to riders. Edzell is a small Scottish town situated between Dundee and Aberdeen, near Brechin and is more famous for its castle than motorcycle racing. However part of the former air base has been converted into a race track with many events being held around the year. Figure 7.1 shows the layout

of the track; a track layout with photographs of sections of the track can be found in Appendix N.

Figure 7.1 Edzell Track



Co-operation was sought from the organisers of the 'track day', who allowed questionnaires to be administered to participants while they waited between their skill cohort's turn on the track (riders were split into three skill groups and rotated with 20 minutes on the track and forty minutes off, allowing ample time for interviews).

Riders were asked to indicate on a map of the track where they felt most at risk, the most enjoyment, the most excitement and used the most concentration (see Questionnaire 5 in Appendix A). Some riders indicated more than one section. As task difficulty and task demand have been identified as a potential key aspect to driving and riding (Fuller, 2005), a selection of riders were also asked about how difficult various areas of the track were to ride. This allowed for a task difficulty rating to be created for each track section.

7.3 Around the Track

The track contains a collection of corners, chicanes, hairpins and straights (Figure 7.1). The first section, the main straight, is the fastest section of the track where the rider will work up through the gears before braking hard in the run in to the hairpin (section 2). The rider will accelerate out of the hairpin before leaning the bike to the left and the right while negotiating the chicane (section 3) then braking prior to taking the left hand corner (section 4). The rider accelerates along the straight (section 5),

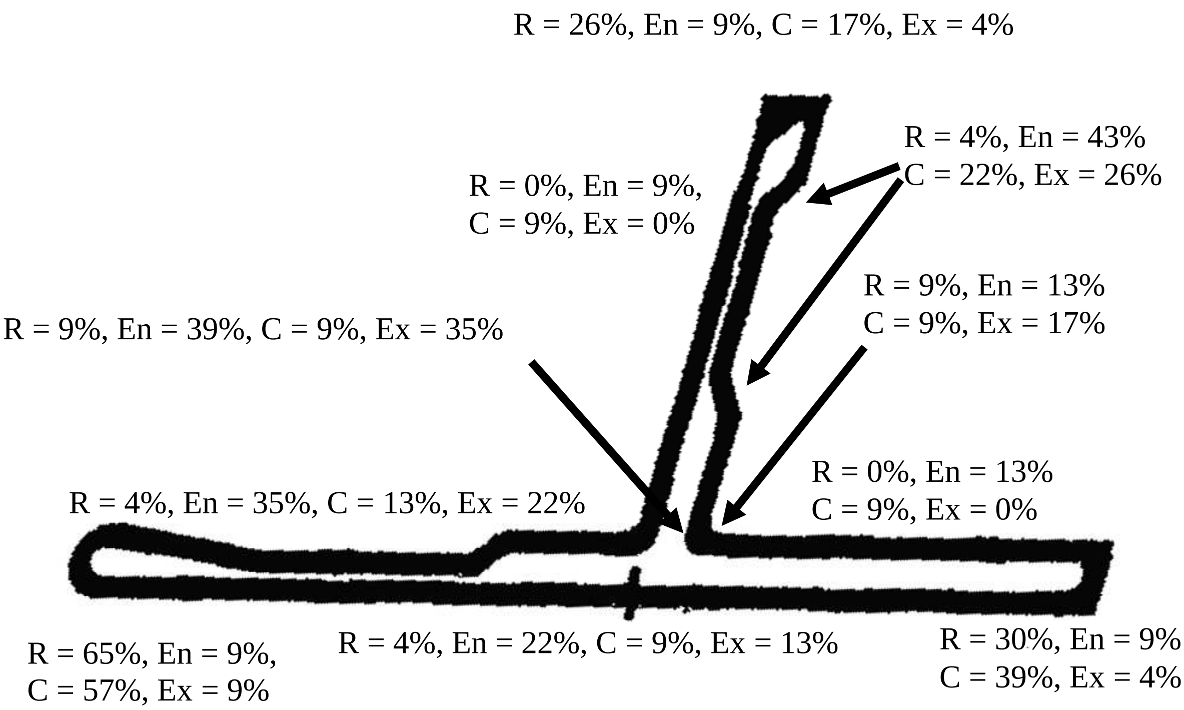
braking ahead of the hairpin (section 6), and then picking up speed through the double chicane (section 7), braking into the left hand bend (section 8), then picking up speed along section 9 prior to the final hairpin (section 10) and back onto the main straight (section 1).

Table 7.1 shows the percentage of the sample rating for maximum risk, enjoyment, concentration and excitement for each track section. These figures are also indicated on the map shown in Figure 7.2.

Table 7.1 Profile of track sections

Section	Risk	Enjoyment	Concentration	Excitement
1 – Straight	4%	22%	9%	13%
2 – Hairpin	65%	9%	57%	9%
3 – Chicane	4%	35%	13%	22%
4 – Curve	9%	39%	9%	35%
5 – Straight	0%	9%	9%	0%
6 – Hairpin	26%	9%	17%	4%
7 – Chicane	4%	43%	22%	26%
8 – Bend	9%	13%	9%	17%
9 – Straight	0%	13%	9%	0%
10 – Hairpin	30%	9%	39%	4%

Figure 7.2 Edzell Ratings



An interesting finding from this dataset was that areas assessed as risky were rated low for enjoyment, and conversely the sections that were rated as highly enjoyable were not rated as risky. Therefore there does not seem to be a link between risk and enjoyment. This is further emphasised when the data are examined for riders reporting highest levels of risk in the same section as highest levels of enjoyment; only three out of the 23 riders (13%) reported this.

7.4 Task Difficulty

The ten sections of the track were classified into five levels of task difficulty; this was accomplished by asking riders who were participating in the track day to rate each section for task difficulty. (Figure 7.3 and Table 7.2).

Figure 7.3 Task Difficulty Ratings of Edzell Track

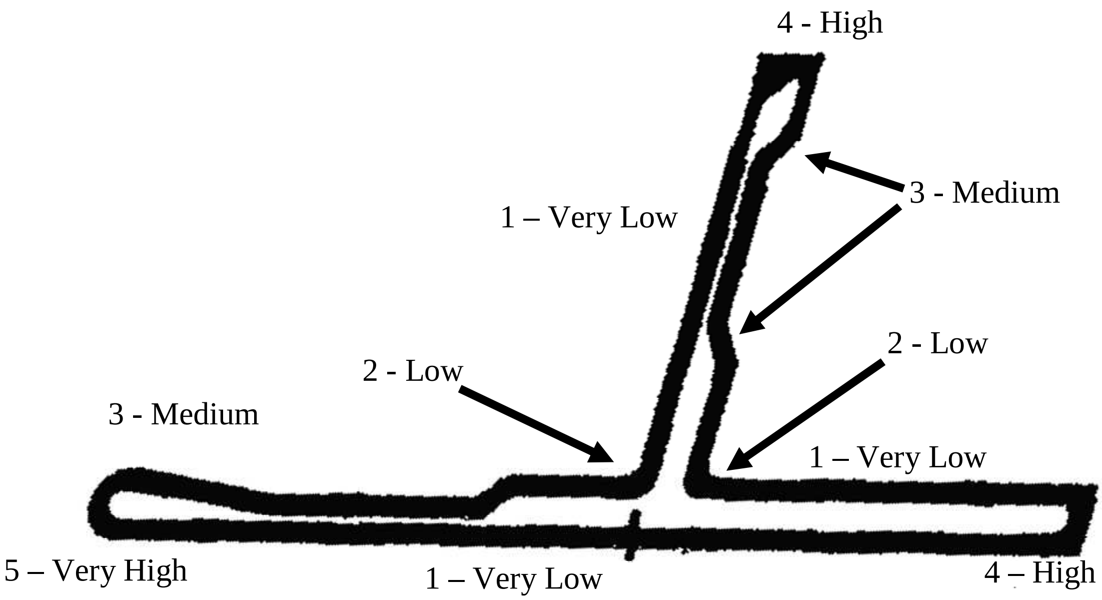


Table 7.2 Track Sections and Task Difficulty

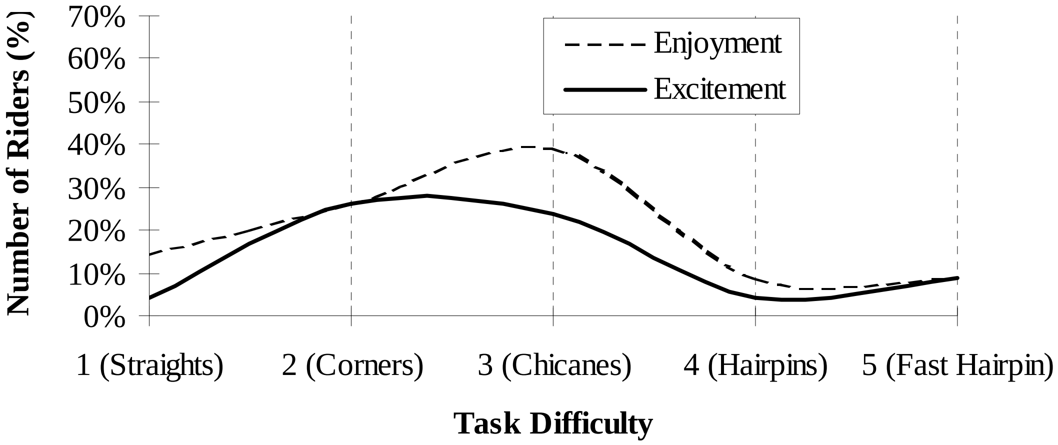
Task Difficulty	Track Section	Reasoning
1 Very Low	1 – Straight 5 – Straight 9 – Straight	Even though these sections are high-speed sectors, the level of skill needed to ride in a straight line is low and therefore very little thought about riding line, or other features, is needed.
2 Low	4 – Corner 8 – Corner	A single corner is the next step up from a straight road, it is just a straight road with a single deviation in it, and therefore the task difficulty is slightly higher than for the straights.
3 Medium	3 – Chicane 7 – Double Chicane	Chicanes comprise a series of corners that alternate between left and right and therefore the task difficulty is higher than for the corners. The rider has to select a riding line for the first part of the chicane, before adjusting for the second half.
4 High	6 – Hairpin 10 – Hairpin	Each hairpin has a fast section in its approach, therefore heavy braking is required before it is negotiated. Any braking on a PTW increases bike instability, heavy braking more so. During this manoeuvre the riders has to consider not only the riding line of the corner, but also where to brake, change gear and the position of other riders (hairpins are often a bottle neck for riders).
5 Very High	2 – Hairpin	This hairpin is rated higher than the other two as it is approached from the long straight, hence most riders will be going at, or close to, maximum speed. This will add to the task difficulty as there will be less time compared to the other hairpins.

7.4.1 Task Difficulty and Enjoyment

Figure 7.4 graphs the relationship between task difficulty and enjoyment; it shows that as task difficulty increases so does enjoyment, until a threshold point is reached where enjoyment then drops off.

Excitement has a similar, but not as distinct, profile to that of enjoyment. It peaks and remains almost constant over task difficulty levels 2 and 3, before dropping. Riders may have been unable to distinguish between enjoyment and excitement and this may have produced the similarities between these two measures.

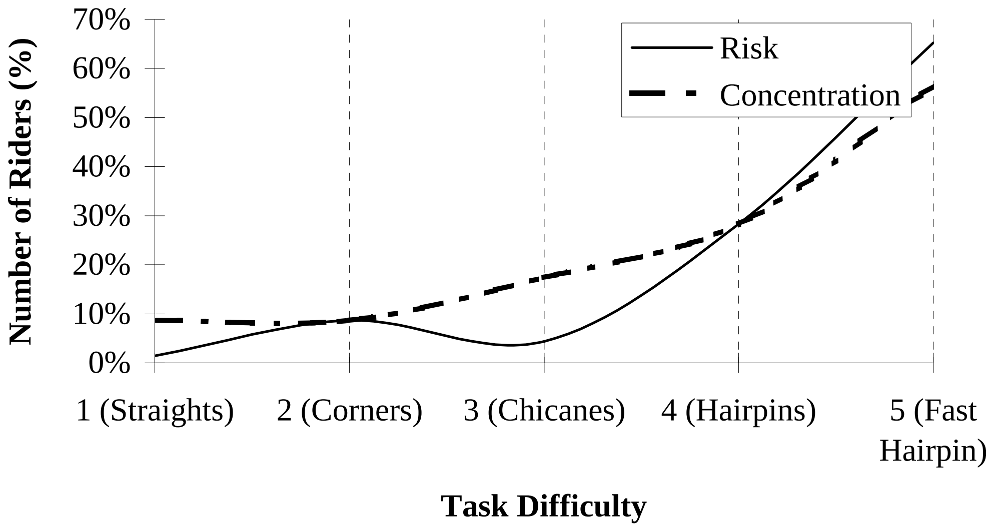
Figure 7.4 Task Difficulty, Enjoyment and Excitement



7.4.2 Task Difficulty, Risk and Concentration

Risk is related to task difficulty (Pearson correlation of 0.876, significance = 0.052), as is concentration (Pearson correlation of 0.908, significance = 0.033).

Figure 7.5 Task Difficulty, Risk and Concentration



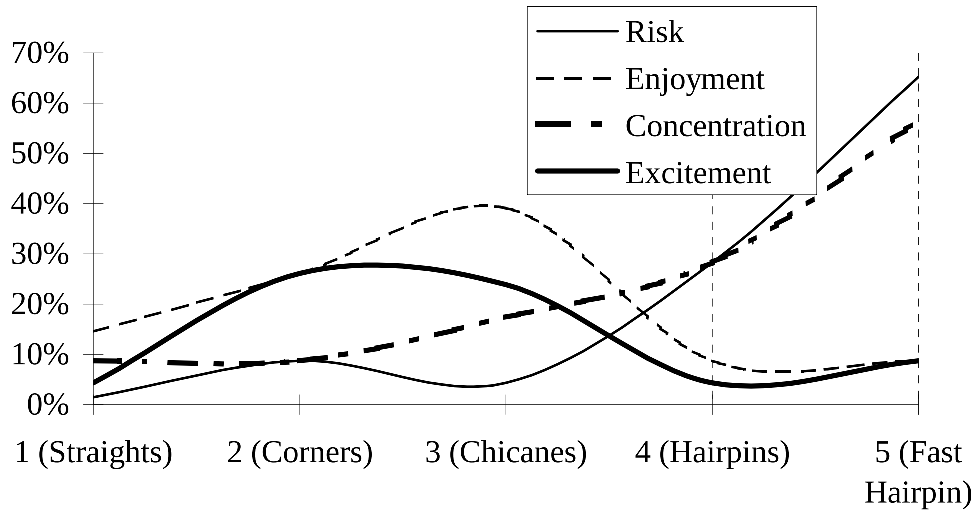
However risk and concentration have an even closer correlation with each other (Pearson correlation of 0.978, significance = 0.004), therefore the higher risk a rider feels that he is at, the higher his level of concentration. Although Pearson correlation was used, Spearman's Rank correlation may have been more appropriate as the comparisons being made is for frequencies, i.e. the number of riders that rated a section as highest risk/concentration.

Figure 7.5 graphs the relationship between risk and concentration with task difficulty. Risk is at a very low constant level until task difficulty level 3, and then risk increases rapidly over level 4 and 5.   Concentration has a very similar profile, however the sudden upturn is not so evident and this occurs at a higher task difficulty level.

7.4.3 Task Difficulty and Flow

Figure 7.6 graphs all four variables against task difficulty. The relationship between risk and enjoyment shows that at the point that risk starts to increase, enjoyment takes a downturn. This relationship can be explained using Csikszentmihalyi's theory of flow (Csikszentmihalyi, 1990, 2000; Csikszentmihalyi & Csikszentmihalyi, 1988).

Figure 7.6 Task Difficulty, Risk, Enjoyment, Concentration and Excitement



As described in Chapter 3, Flow is a very enjoyable state that a person can enter into, it has been defined as:

> *'The Holistic Sensation that people feel when they act with total involvement'.* (Csikszentmihalyi, 2000:36)

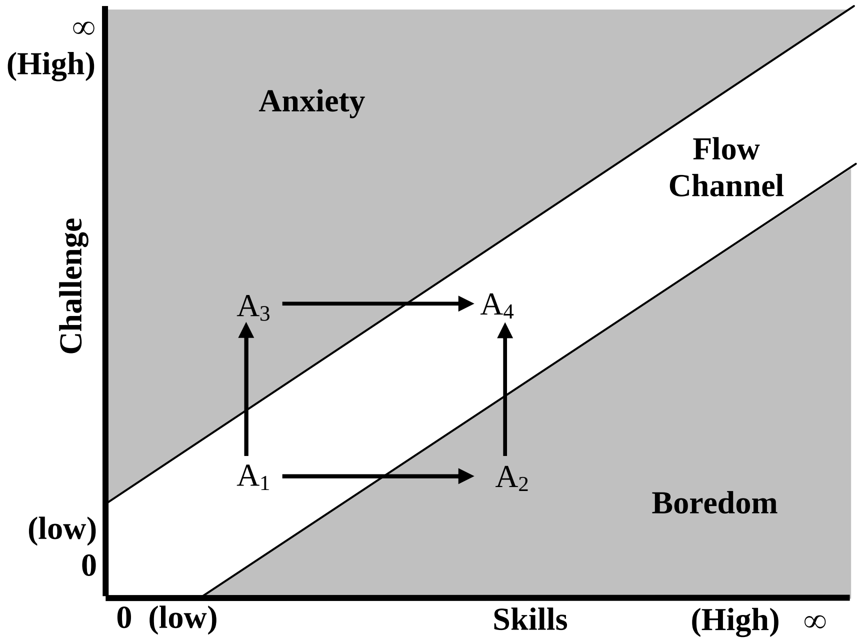
This total involvement is achieved by matching one's skills at a task with the level of skill needed to carry out that task; Table 7.3, Csikszentmihalyi's matrix of flow, illustrates how skill and challenge interact to give the flow, and the other states, within the model.

Table 7.3 The Four States Within the Flow Model

Challenge / Skill	**Low**	**High**
Low	Apathy	Boredom
High	Anxiety	Flow

If a person has a low level skill set, and they face a low challenge then apathy is the resultant state. If the challenge outstrips the skill set then anxiety is the result, conversely with a high level skill set and a lower level challenge then a boredom state will be entered. Figure 7.7 shows how the states of anxiety, boredom and flow can result by a change in either the level of challenge or skill set.

Figure 7.7 Flow (Source 'Flow: the psychology of optimal experience' by Csikszentmihalyi (1990) page 74)



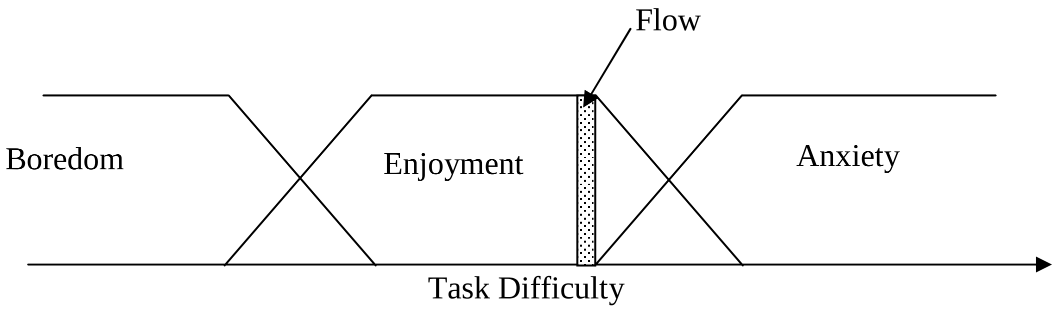
How does the theory of flow, and the movement between boredom, anxiety, apathy and flow, explain the relationship between risk and enjoyment of riders (Figure 7.6). A modified model of flow was developed that took into account rider risk and enjoyment. In modifying the model of flow, in light of the Edzell data, two assumptions are made:

1. That the level of skill of the rider and the skill challenge are never both low, so apathy does not exist in this situation.
2. That the level of rider skill remains constant during the lap.

With these two assumptions a model was built that clarifies the enjoyment and risk profiles shown in Figure 7.4 using the theory of flow. This model, shown in Figure 7.8, is a linear model showing, the states a person goes through as task difficulty changes.

When task difficulty is low, boredom results, as task difficulty increases then the state of enjoyment is passed through and on to anxiety. The change of states is not instantaneous, that is one does not go directly from boredom to enjoyment, rather the boundaries are fuzzy. At the peak of enjoyment, just before the anxiety state begins, is the flow state.

Figure 7.8 Linear Model of Task Difficulty



Considering the rider data, at low levels of task difficulty there is a low level of risk and enjoyment, which is a state of boredom. As the task difficulty increases then boredom decreases and enjoyment starts to increase until a point is reached where the rider's skill level is matched to the challenge faced, the flow state. Once task difficulty approaches the limits of the skill level then the flow state is exited, and as shown in Figure 7.6, the state moves from A_1 to A_3 (into anxiety). This anxiety is felt as being at risk. The area of flow shown in figure 7.8 is speculatively drawn for both position and width, further experimental work needs to be undertaken to determine to what extent the level of task difficulty affects the flow state.

7.5 Conclusion

The results from the track day data showed that enjoyment is not linearly related to risk, but rather it comes from a moderate level of matching of skills with task difficulty. This suggests that PTW riders seek challenge but do not want to put themselves in risky situations. However in seeking challenge they may find themselves in risky situations. When the task demand on riders approaches the limit of, or outstrips, their skill set then anxiety is felt, manifesting itself as feeling at risk. It could be summarised that PTW riders ride in spite of the risk, rather than because of it. The following chapter explores this dichotomy between risk and enjoyment to ascertain the way that PTW riders react to various environments.

Chapter 8 - Enjoyment and Risk

People who like this sort of thing will find this the sort of thing they like.
Abraham Lincoln (1809-1865)

8.1 Introduction

The information gathered in the previous chapter concerned riding on an off-road racetrack. While the findings suggest that risk does not lead to enjoyment and can in fact impair enjoyment, this information was gathered in an atypical situation within a controlled environment with only other riders and changes in weather to complicate the situation. This racetrack situation may also only attract a specific subset of riders. This is a very artificial situation that is not often replicated on the public highways. In order to appreciate the validity of the results for riding in general, it was necessary to gather similar information for road situations. To achieve this, six scenarios were developed using photographs of actual roads that a rider may come across. The use of such real-life riding situations allowed replication of results in a systematic manner (i.e. all riders were faced with exactly the same scenarios to assess). This chapter presents the results from this experiment

8.2 Dataset

The dataset (Questionnaire 6) used in this chapter was collected by asking respondents to rate photographs of various road scenarios (see Figure 8.1), with each scenario rated for risk and enjoyment using a five point Likert scale (very low to very high). Respondents were also asked, via open questions, the reasons for their ratings. These were used to create risk and enjoyment factors and were subsequently used to construct questionnaire 7 and questionnaire 8.

8.2.1 The Rationale of Using Photographic Scenarios

Ideally risk and enjoyment ratings would be gathered as a rider rode a particular road, however there are problems to carrying out research this way. The very act of asking someone to carry out a secondary task while riding may influence the activity, therefore asking riders to rate a road while riding could affect rider safety. The ethics of such real-road experiments are questionable. Also, for the ratings for riders to be comparable the rides have to be identical, however in the real world this is not possible; a real-world riding experiment may be influenced by other factors that are outwith the researcher's control. Using a riding simulator can eliminate these

problems, but this option was not available for this research. The use of photographic scenarios was seen as an acceptable compromise

8.2.2 The Six Scenarios

A total of six scenario photographs were selected for presentation to PTW riders (Figure 8.1). These photographs were selected as being representative of typical road settings that riders may ride on.

Figure 8.1 Scenario Pictures

Scenario 1

Scenario 2

Scenario 3

Scenario 4

Scenario 5

Scenario 6

Scenario 1 is the B908, heading from Alva towards Alloa, just off the A91. It was selected because it is a long straight road, mimicking the straights at Edzell. However there is also a junction on the right, and access from a field to the left. There are three drain covers on the right hand side of the road, surrounded by repair work with a tar seam (over-banding). These features are common elements of public roads.

Scenario 2 is the B910, heading from Clackmannan towards the A977 junction near Forest Mill. This scenario was selected because the main feature is a sweeping right hand bend. The bend goes under a bridge followed by left-hand corner in the distance. The road under the bridge is in shadow. There are national speed limit signs visible so there is no ambiguity regarding the maximum legal speed. In the distance, past the bridge, there is a triangular warning sign.

Scenario 3, an urban scene on the A907 in the centre of Alloa, shows the approach to a busy roundabout. There is a green coloured bus lane on the left hand side. In the foreground there is a drain on the boundary of the road and the pavement, and also grooves in the road towards the outside of the lane. Oil may be deposited within the bus lane. There are four other roads converging on the roundabout, with vision being partly obscured by shrub and tree growth within its centre. A lorry carrying a skip is waiting to enter the roundabout. On the roundabout is a red car, followed by a black one, with a vehicle joining the roundabout from the right. On the approach the car within the bus lane is braking as it gets closer to the skip lorry, there is also a vehicle in the outside lane. A pedestrian, who is crossing the road, is waiting on an island in the middle of the carriageway.

Scenario 4 is on the A907 heading from Tullibody towards Stirling, with the Wallace Monument and Stirling Castle visible in the background. This scenario was selected because it is an open road with a significant amount of traffic using it. In the mid-distance there is signage indicating a garage, beyond the garage there is a shaded out section in the centre of the road. A car is directly in front, with a line of three more vehicles some distance ahead of that. Four cars are approaching in the immediate vicinity, and at least one of these has its front lights on.

Scenario 5 is an urban setting in the centre of Falkirk and this picture was selected because of its obviously urban setting, with shops lining the road. There is no moving traffic present, although there are some parked cars. There are four pedestrians within

the picture, with two walking on the road carrying shopping. In the mid-distance a junction emerges from the left, and in the foreground the road shows signs of repair.

Scenario 6, the final scenario, was selected because it is a rural road with a sweeping right hand corner. This road is the A9 heading from Falkirk towards Torwood. The centre of the road is marked with double white lines. The road is lined with trees and, due to the autumn season, they are losing their leaves that have been deposited on the roadside. On the inside of the bend there is a pavement bounded by a wall, and there is a grass verge on the outside of the corner. A carrier bag is lying on the pavement.

Hence the six selected scenarios give a representation of a number of different road conditions, layouts and potential hazards that can be used as a basis for analysing attitudes and perceptions in a variety of situations.

8.3 The Rating of Factors

Using the open questions investigating the reasons for risk and enjoyment, a set of factors was generated; details of this process are shown in Appendix O. Six factors for risk were identified; these are listed below along with example quotes taken from the open questions [Q6]:

1. Road surface quality

   "Surface looks uneven (bumpy), smooth patches where tar has worked up indicates heavy use, manhole covers staggered and is potentially dangerous to bikers in a emergency situation such as heavy braking." (Scenario 1)

2. Risk caused by road features, such as road size, roadside objects, junctions, etc.

   "Possibly traffic emerging from side roads and farm tracks." (Scenario 1)

3. Level of visibility

   "Quiet road, but with a bend that prevents a view into the distance." (Scenario 2)

4. Likelihood of a rider distraction.

   "Slow, busy, stop and go, with lots of distractions" (Scenario 3)

5. Risk presented by other road users (including pedestrians)

   "AAAAhhhhhhhhhhhh PEDESTRIANS .. shopping .. No brains." (Scenario 5)

   "Other road users not signalling, cars taking up other lane (sneaking in) … and cars pulling out on me." (Scenario 3)

6. Riding in an enthusiastic manner (temptation)

   "*Very straight therefore temptation to go too fast*" (Scenario 1)

Five enjoyment factors were identified, and are listed with example quotes:

1. Surroundings, scenery, etc

   "*I would enjoy this road because I like to travel in the country and look at the crops and animals.*" (Scenario 1)

2. Challenge

   "*Challenging curve but limited line of site*" (Scenario 6)

3. Bends

   "*Negotiating the bends and it being a country road*" (Scenario 2)

4. Speed of riding

   "*Chance to open the throttle*" (Scenario 1)

5. Overtaking opportunities

   "*Yes there's traffic but we can get some good overtakes in.*" (Scenario 4)

Most of the risk factors, such as road quality and other traffic, are third party. Only one, 'Riding in an enthusiastic manner' is directly attributable to the rider's behaviour although good hazard perception skills could help to protect the PTW user from the other risk factors. Four of the five enjoyment factors are related to riding, with one factor being external to riding, the surroundings. A main difference between a bike and a car is that in a car the driver is surrounded by metal and glass, on a bike the rider is more open and therefore in a better position to experience the 'great outdoors'.

8.4 Profiling Risk and Enjoyment.

One of the conclusions drawn from the Edzell track data was that risk was not positively related to enjoyment, with enjoyment low at high levels of risk. The ratings for risk and enjoyment can be used to ascertain if this is also apparent for riding on public roads. Table 8.1 shows the comparison of risk and enjoyment data from the scenarios.

The data in Table 8.1 show that for scenarios of high risk, such as scenario three, the level of enjoyment is low, yet for a high enjoyment scenario, such as number six, the

risk is assessed as medium. This is further emphasised in the comparison of mean answers for each scenario shown in Table 8.2 (1 = very low, 5 = very high).

Table 8.1 Comparison of risk and enjoyment rating by scenario

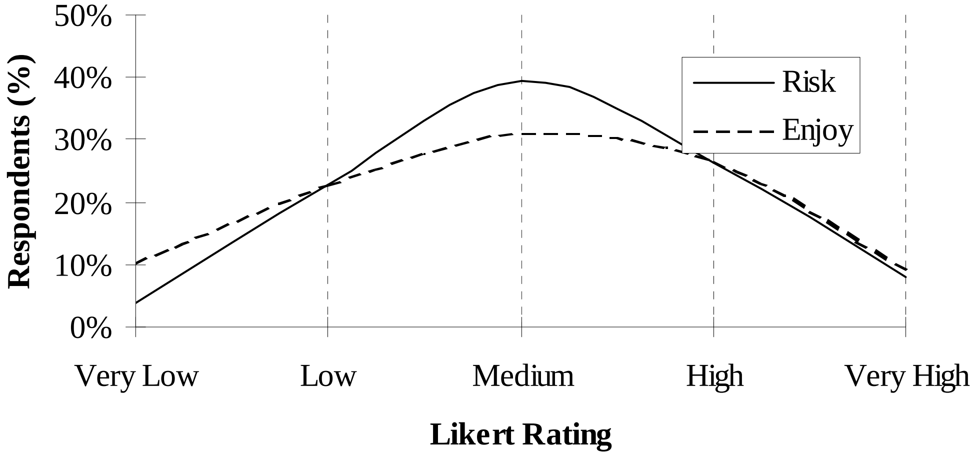
	Likert Rating					
	Very low	**Low**	**Medium**	**High**	**Very High**	**Total**
Risk, Scenario 1	4%	38%	46%	11%	1%	100%
Enjoyment, Scenario 1	4%	19%	45%	26%	5%	100%
Risk, Scenario 2	3%	11%	52%	30%	4%	100%
Enjoyment, Scenario 2	3%	16%	48%	29%	5%	100%
Risk, Scenario 3	1%	10%	25%	45%	18%	100%
Enjoyment, Scenario 3	20%	44%	23%	11%	2%	100%
Risk, Scenario 4	10%	41%	36%	9%	4%	100%
Enjoyment, Scenario 4	3%	14%	39%	38%	7%	100%
Risk, Scenario 5	2%	9%	25%	46%	18%	100%
Enjoyment, Scenario 5	31%	43%	16%	9%	1%	100%
Risk, Scenario 6	3%	27%	51%	17%	2%	100%
Enjoyment, Scenario 6	0%	3%	14%	46%	37%	100%
Mean Risk	***4%***	***23%***	***39%***	***26%***	***8%***	***100%***
Mean Enjoyment	***10%***	***23%***	***31%***	***27%***	***9%***	***100%***

Table 8.2 Means of Risk and Enjoyment Rating by Scenario

	Risk	**Enjoyment**
Scenario 1	2.66	3.09
Scenario 2	3.22	3.18
Scenario 3	3.70	2.31
Scenario 4	2.56	3.33
Scenario 5	3.70	2.05
Scenario 6	2.89	4.17
Overall	***3.75***	***3.61***

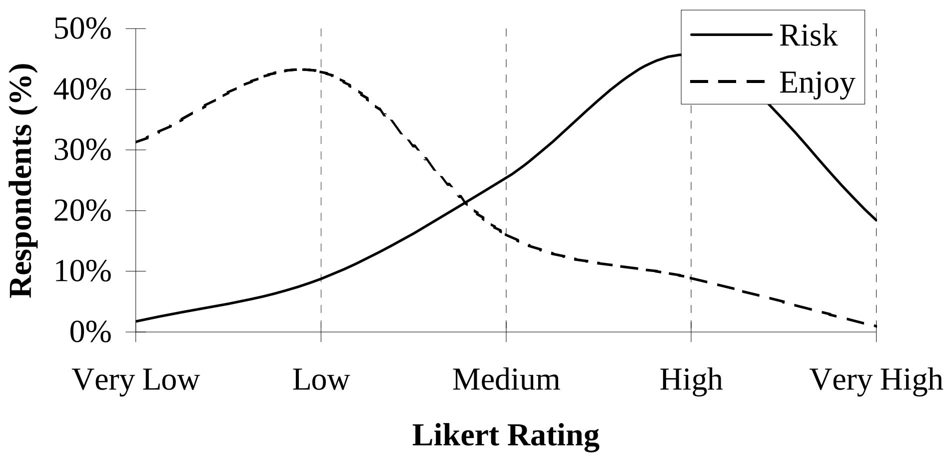
There is very little difference in the distribution of risk and enjoyment ratings over categories (Figure 8.2) and therefore it may be concluded that there is very little difference between risk and enjoyment. However consideration of risk and enjoyment for each scenario shows a different picture, with Figures 8.3 to Figure 8.8 illustrating this, with scenarios presented in reverse order of risk (high to low).

Figure 8.2 Risk and Enjoyment (All Scenarios)



Scenario 5, a road in Falkirk, has a very high-risk rating (mean of 3.70), coupled with a low enjoyment rating (mean of 2.05), with the plotted profiles (Figure 8.3) being an approximate mirror image of each other. Only 11% did not comment about risk, with 66% saying that other traffic was a risk concern; however 96% made no comments regarding enjoyment suggesting that most riders could not see how they would find enjoyment in this scenario (Figure 8.3).

Figure 8.3 Risk and Enjoyment for Scenario 5



There is a large difference between risk (mean of 3.70) and enjoyment (mean of 2.31) for scenario 3, the busy urban roundabout in Alloa. Figure 8.4 clearly shows this characteristic. The main reason given for the high level of risk was other traffic (54%), followed by road features (21%). Most respondents did not give any reasons

for enjoyment (87%), however 10% did mention that the curve of the roundabout might give enjoyment. As with the previous scenario, most riders would not find enjoyment here.

Figure 8.4 Risk and Enjoyment for Scenario 3

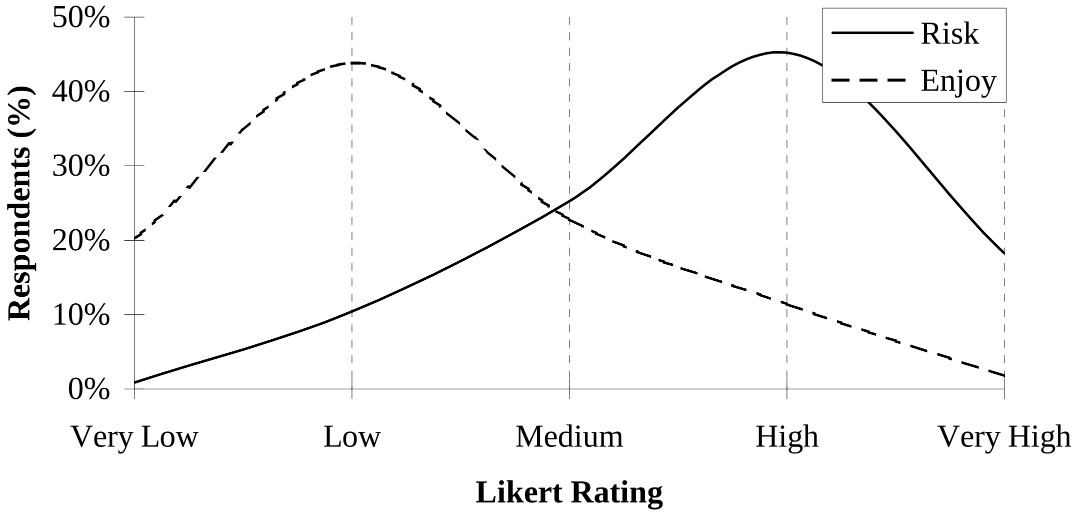
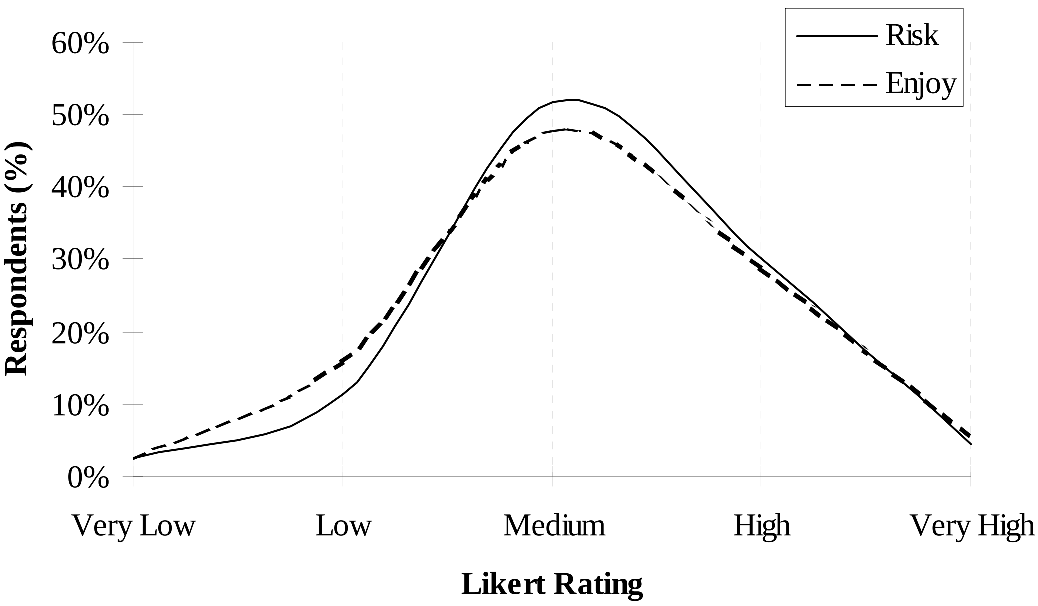


Figure 8.5 Risk and Enjoyment for Scenario 2

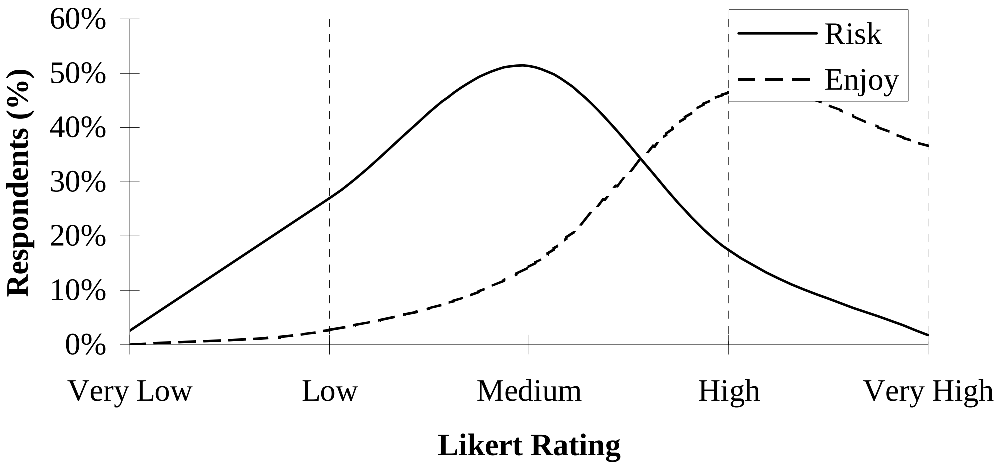


Risk and enjoyment for Scenario 2, the right hand sweeping corner going under the bridge, are closely matched. The responses are slightly skewed towards the upper ratings (Figure 8.5). Over 60% of respondents comments concerning risk were coded

as poor or lack of visibility. Bends (34%) and pleasant scenery (10%) were the most frequent responses for enjoyment.

The profile for scenario six is shown in Figure 8.6. This scenario is a right hand sweeping curve in a rural setting and has a very high enjoyment rating (mean of 4.17) with a medium risk rating (mean of 2.89). Bends was the most given reason for enjoyment (42%), with 33% not giving any reason at all; lack of visibility was the main reason for risk (33%), with 35% not giving any reason at all. This scenario was rated as the most enjoyable.

Figure 8.6 Risk and Enjoyment for Scenario 6



The mean risk and enjoyment for scenario 1, the long straight road in a non-urban setting, are both less than the ‘all scenario’ means (risk = 2.66, enjoyment = 3.09), as can be seen in Figure 8.7. Examining the reasons for risk and enjoyment for this scenario, nearly 50% identified the road surface as the main cause of risk, followed by road features (28%); for enjoyment, half gave no reason for enjoyment with 26% giving pleasant surroundings and 23% speed. Despite the road being a long straight road only a quarter said that speed was an enjoyment factor, with more commenting on the pleasant scenery.

In scenario 4, the straight main road with some traffic on it, enjoyment (mean of 3.33) outstrips risk (mean of 2.56). Figure 8.8 clearly shows this. Just over half made no comment about enjoyment, 25% said enjoyment could be found in speed and 19% said overtaking could provide enjoyment.   When commenting on risk, 61% did not make any comments, with 35% saying that other traffic was a cause of risk.

Figure 8.7 Risk and Enjoyment for Scenario 1

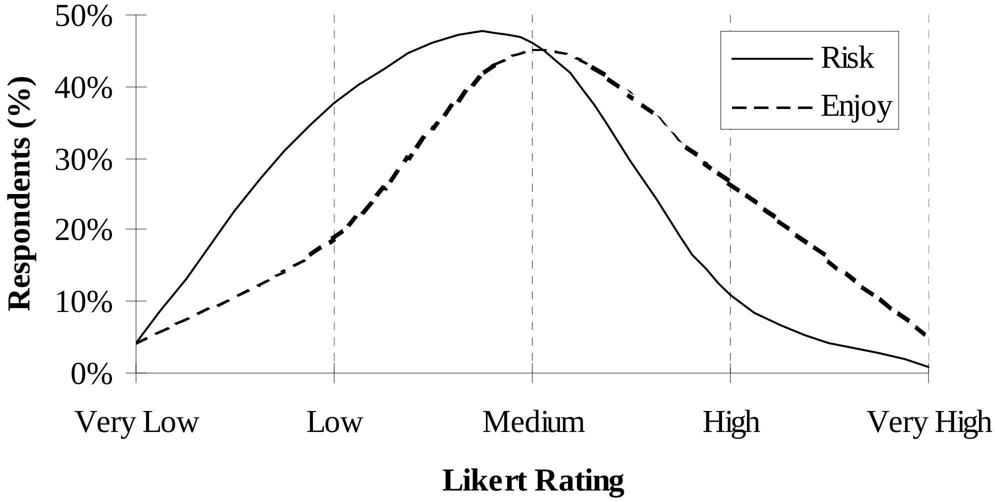
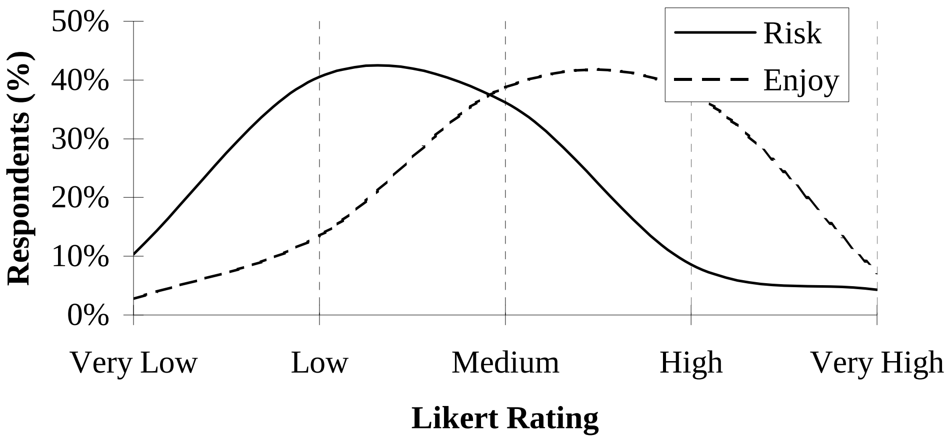


Figure 8.8 Risk and Enjoyment for Scenario 4



Analysis of the data relating to risk and enjoyment for the six scenarios suggests a complex relationship. The interaction between risk and enjoyment varied with each scenario and the reasons given were also scenario specific. Further analysis was undertaken to assess the impact of demographic characteristics on perception of risk and enjoyment, but was found to have no significance when cross-tabulated (Chi Squared $p > 0.1$).

8.5 Interaction between Risk and Enjoyment

Figure 8.9 shows the interaction between risk and enjoyment using mean value for each scenario and plotted in risk order. As risk increases so does enjoyment, until a peak of enjoyment is reached; as risk further increases enjoyment drops off rapidly. The data were further examined to see if other patterns existed by using neural network pattern recognition software (Pao, 1989).

Neural networks have to be exposed to a training dataset in order to carry out the pattern recognition tasks (see Appendix K). The training dataset was synthesised consisting of patterns that may be present in the data. Six potential pattern types were used to construct the dataset (Figure 8.10 shows these types in graphical form):

1. Constant risk as enjoyment varies;
2. Constant enjoyment as risk varies;
3. As risk increases so does enjoyment, until a threshold point is reached, then enjoyment decreases as risk increases;
4. As risk increases enjoyment decreases, until a threshold point is reached, then enjoyment increases as risk increases;
5. Enjoyment increases as risk increases;
6. Enjoyment decreases as risk increases.

Figure 8.9 Risk against Enjoyment

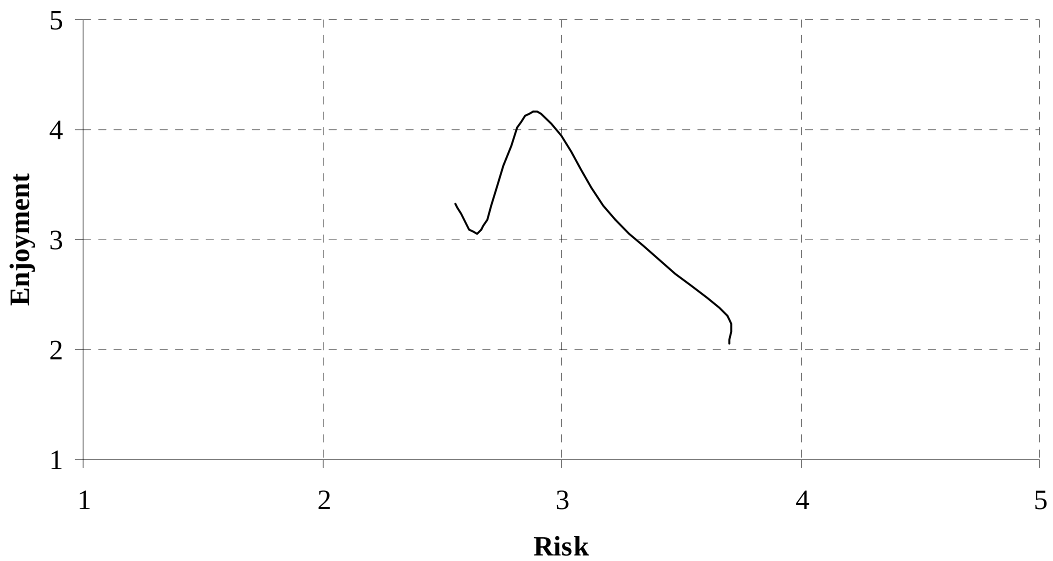
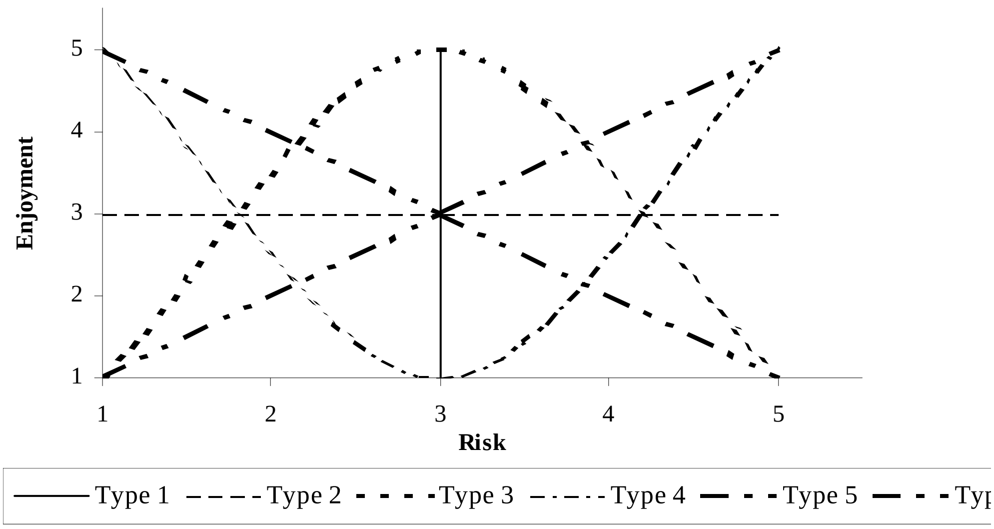
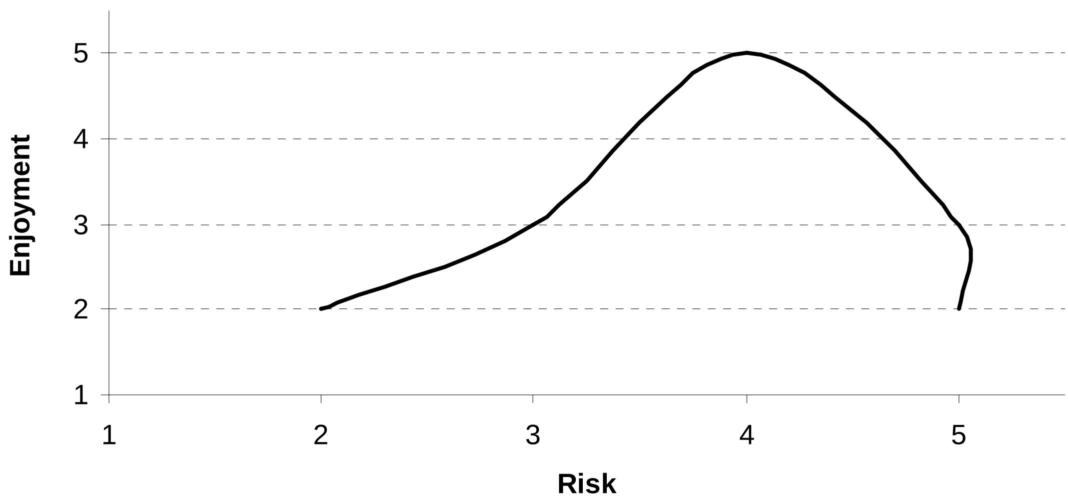


Figure 8.10 Potential Risk Types



Using Microsoft Excel a training dataset of 450 records, 75 of each of the above types, was created. The training records, based upon the six types, had noise added to make them more like 'real life' records. A graphical representation of an example noisy type 3 training record is shown in Figure 8.11.

Figure 8.11 Example of a type 3 training record



The neural network identified three of the six types within the collected dataset; type 3 (risk acceptors); type 5 (risk seekers) and type 6 (risk averse). This was made up of

48% risk acceptors, 42% risk averse and 8% risk seekers. Two percent of the sample was not classified (Table 8.3).

Table 8.3 Risk Type Groupings

Risk Type	**%**
Risk acceptor	48%
Risk aversive	42%
Risk seeker	8%
Undetermined	2%

The three identified rider types were explored in more detail to ascertain how they relate to risk and enjoyment.

8.5.1 Risk Acceptors

The risk acceptors profile is very similar to the overall profile (Figure 8.9), which should not be surprising as this group makes up nearly half of the sample. Enjoyment increases with risk, until an enjoyment maximum is reached before rapidly declining as risk continues to increase. The mean value of enjoyment and risk for risk acceptors was calculated, and then sorted into 'risk order' (Table 8.4)

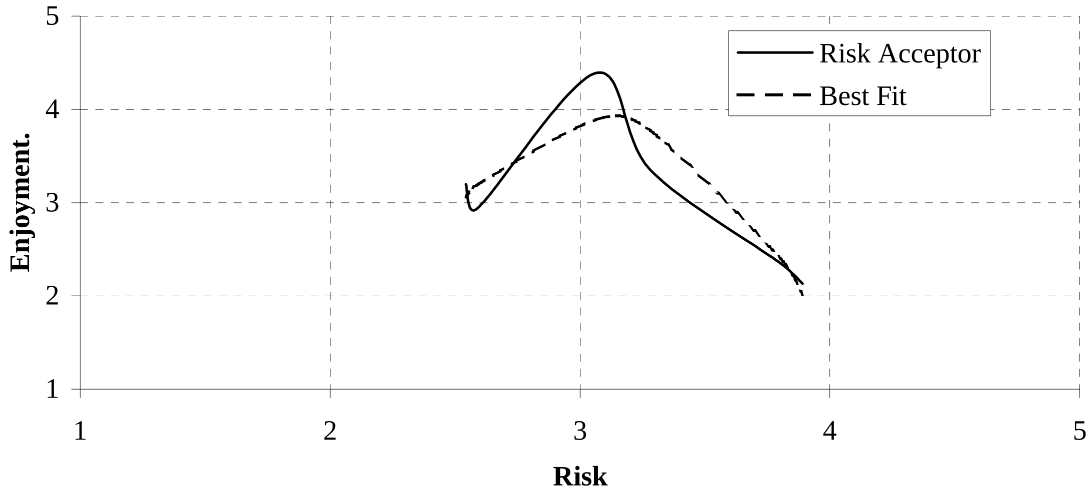
Table 8.4 Mean Risk and Enjoyment Values for Risk Acceptors

Scenario	**Risk**	**Enjoyment**
4	2.54	3.20
1	2.59	2.93
6	3.07	4.39
2	3.28	3.35
3	3.80	2.35
5	3.89	2.13

Using the regression feature with SPSS, a 'best fit' quadratic equation was established and, in Figure 8.12, overlaid on the mean risk and enjoyment data (Dancey & Reidy, 2004). The quadratic equation produces a curve not unlike the profile for risk acceptors shown in Figure 8.8. The quadratic equation is:

$$\text{Enjoyment} = (-2.86 * \text{Risk}^2) + (17.63 * \text{Risk}) - 23.28 \quad \text{(significance 0.068)}$$

Figure 8.12 Risk Acceptors

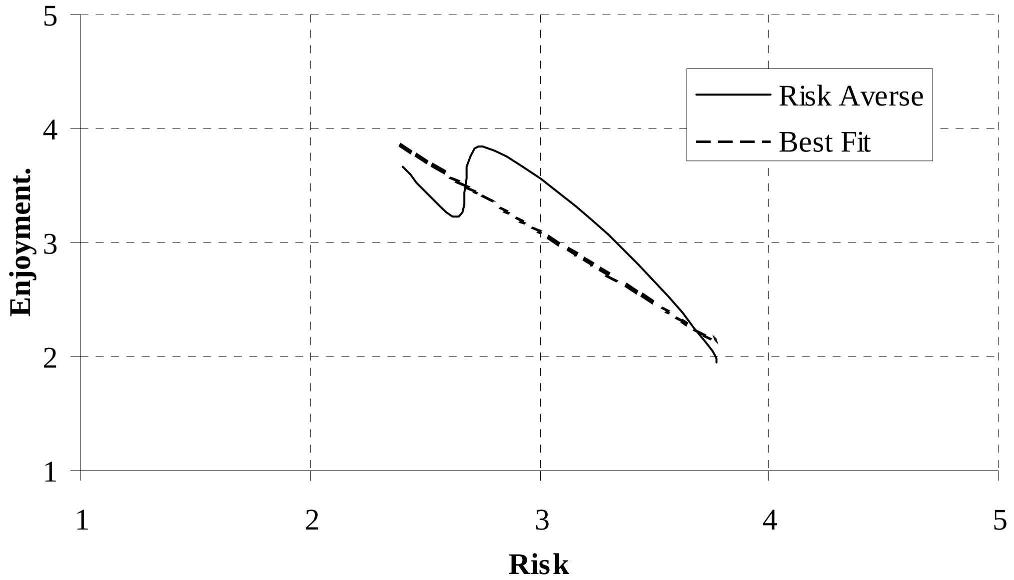


Risk acceptors gain their most enjoyment at mid risk. These riders are happy to accept a level of risk to enable them to enjoy their riding, but once this level has been exceeded then the activity becomes less enjoyable. Examining these data in terms of flow (see Chapter 3, Table 3.1), it would seem that risk acceptors seek a middle way between boredom and anxiety.

8.5.2 Risk Averse

The risk averse profile is shown in Figure 8.13.

Figure 8.13 Risk Averse



The risk averse profile tends towards a straight line with a negative slope, demonstrating that for this group enjoyment reduces as risk increases. The mean risk and enjoyment values were calculated and ordered by risk in the same way as for the risk acceptors (Table 8.5).

Table 8.5 Mean Risk and Enjoyment Values for Risk Averse

Scenario	Risk	Enjoyment
4	2.40	3.68
1	2.65	3.23
6	2.75	3.85
2	3.30	3.08
3	3.75	2.05
5	3.78	1.95

The regression technique was again used, but this time as a straight line was expected (risk α enjoyment) so a linear equation was calculated (Dancey & Reidy, 2004). This is overlaid with the risk averse profile in Figure 8.11. The equation is:

$$\text{Enjoyment} = (-1.26 * \text{Risk}) + 6.88 \quad \text{(significance 0.009)}$$

The gradient of the best-fit line is -1.26, so for every unit that risk increases, enjoyment decreases by 1.26 units, and thus it is approaching a one to one relationship.

The risk averse rider does not equate risk with enjoyment; as risk increases enjoyment decreases, their enjoyment is low where there is perceived risk.

8.5.3 Risk Seekers

Risk seekers are the opposite of risk averse; as risk increases, enjoyment increases therefore a positive correlation would be expected. The mean risk and enjoyment for risk seekers is shown in Table 8.6, ordered by risk as with the other groups.

Table 8.6 Mean Risk and Enjoyment Values for Risk Seekers

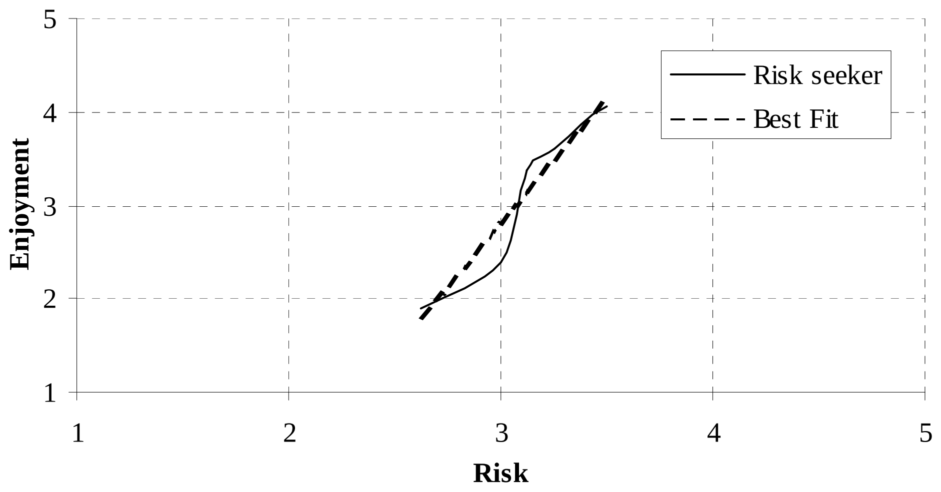
Scenario	Risk	Enjoy
4	2.63	1.90
1	3.00	2.40
6	3.13	3.38
2	3.25	3.60
3	3.38	3.88
5	3.50	4.05

The linear equation for the best fit, found by regression is:

Enjoyment = 2.66 * Risk –5.26   (significance 0.002)

The gradient of this equation is steeper than for the risk averse, and has the opposite polarity. For every unit that risk increases, enjoyment increases by over two and a half. The data and best fit line are shown in Figure 8.14.

Figure 8.14 Risk Seeker



For risk seekers, enjoyment significantly increases with perceived risk. It may be for this class of rider that there would be a threshold where the risk becomes too high to give them enjoyment, but this threshold point is considerably higher than for the other rider types and was not captured in the set of six stimuli used.

8.5.4 Demographics

Risk and Enjoyment for the risk averse and risk acceptor types were cross-tabulated against age, gender, performance index and bike type, but were not found to be significant (Chi Squared $p > 0.1$). Due to low numbers, no such analysis was undertaken with the risk seeker category.

8.6 Task Difficulty

While the complexity of the relationship between risk and enjoyment has been considered, attention now turns to how these factors relate to task difficulty

8.6.1 Riding Tasks

Research on drivers has attempted to breakdown the aspects comprising the driving task. Stradling & Anable (2007) expanded the components of the driving task developed by Panou, Bekiaris & Papakostopoulos (2005) to arrive at ten components; shown in Table 8.7.

Table 8.7 Ten Components of the driving task (1-8 from Panou et al 2005).

Task	**Description**
Strategic levels	Activity choice, mode and departure time choice. Discern route alternatives and travel time
Navigation tasks	Find and follow chosen or changed route; identify and use landmarks and other cues
Road tasks	Choose and keep correct position on road
Traffic tasks	Maintain mobility ('making progress') while avoiding collisions
Rule tasks	Obey rules, regulations, signs and signals
Handling tasks	Use in-car controls correctly and appropriately
Secondary tasks	Use in-car equipment such as cruise control, climate control, radio and mobile telephone without distracting from performance on primary tasks
Speed task	Maintain a speed appropriate to the conditions
Mood management task	Maintain driver subjective well-being, avoiding boredom and anxiety
Capability maintenance task	Avoid compromising driver capability with alcohol or other drugs (both illegal and prescription), fatigue or distraction

Given the similarities of car driving and PTW riding, the ten components of the driving task can be applied to riders. However, within these components, there are some differences. For example, there are limited secondary tasks while riding compared to driving. Car drivers are enclosed in metal boxes that give opportunity for a plethora of secondary tasks, such as tuning the radio, programming the satellite navigation equipment, adjusting the heating controls, smoking a cigarette, and occasional even extreme and illegal activities such as using a mobile phone or shaving (BBC, 2007; Haigney, Taylor & Westerman, 2000; Laberge-Nadeau, Maag, Bellavance, Lapierre, Desjardins, Messier & Saidi, 2003; Townsend, 2006). Some PTWs are now being fitted with Satellite Navigation equipment that has been adapted for rider use (Global Positioning Systems, 2006), however the majority of secondary tasks for riders are different from drivers. Tasks might include the adjustment of the

helmet visor to demist it, or the acknowledgement of other riders. Therefore a PTW riding task list was developed from these driving tasks (Table 8.8).

For driving, ‘avoiding collisions’ is included in the ‘traffic’ tasks. However as PTWs are vulnerable road users (BBC, 2003; DfT, 2006a; RoSPA, 2001), and adverse interaction with road hazards are more likely to be serious or fatal (Clarke, Ward, Bartle & Truman, 2004), hazard perception for riders is a very high level task. Therefore hazard perception as a major task has been included separately.

Table 8.8 Eleven components of the riding task, adapted from Panou et al (2005) and Stradling et al (2007)

Task	**Description**
Strategic levels	Activity choice (Functional and/or expressive) Departure time choice Discern route alternatives and travel time
Navigation tasks	Find and follow chosen or changed route; identify and use landmarks and other cues
Hazard perception	Detection of hazards
Road tasks	Choose and keep correct position on road, road position may be modified by road surface quality hazards.
Traffic tasks	Maintain mobility (‘making progress’) while avoiding collisions (reaction to hazards)
Rule tasks	Obey rules, regulations, signs and signals
Handling tasks	Use PTW controls correctly and appropriately Interaction of PTW and rider (leaning at corners, etc)
Secondary tasks	Keeping visor clean/demisted. Acknowledgment of other riders Using Satellite Navigation equipment
Speed task	Maintain a speed appropriate to the conditions; speed will be modified by hazard perception.
Mood management task	Maintain rider subjective well-being, avoiding boredom and anxiety
Capability maintenance task	Avoid compromising rider capability with alcohol or other drugs (both illegal and prescription), fatigue or distraction

Hazard perception also interacts with many of the other tasks; for example, the road task as road position is partly defined by the perceived hazards presented by the road, such as over-banding and metal drain covers. The speed task is also dependent upon hazard perception as selecting the correct speed is partly hazard related, as well as being related to mood management. The inclusion of hazard perception as a task brings the task components up to eleven. The modified components for riders are

listed in Table 8.8. The tasks in this list can be either proximal to the riding activity or distal. Task such as handling and speed are proximal as these are a direct response to the environment that the ride is occurring in. The strategic task is more distal, although decisions made such as the route taken will have an affect on the proximal tasks.

Riding tasks are undertaken in the context of the environment the rider finds himself in. Therefore an appreciation of the task difficulty for each scenario was sought from experienced PTW riders.

8.6.2 Scenarios and Task Difficulty.

In order to ascertain 'task difficulty' for each scenario experienced riders, including members of the Scottish Motorcycle Club (SMC), were asked to rank the scenarios in 'task difficulty order'. The riders who ranked the scenarios were a subset of those who were invited to complete questionnaire 7. Riders were asked to refer to the eleven tasks listed in Table 8.8 and the following was requested of them:

> *"Please rate the six pictures for how difficult it would be to ride. Please take into account the various tasks, and the difficulty of those tasks, which you will be performing, see the attached task list."*

A total of 25 riders ranked the scenarios, with a summary of rankings shown in Table 8.9. The full listing of responses is shown in Appendix P. The mean ranking was calculated for each scenario (one for a high task difficulty and six for low) showing the task difficulty interval is not linear; scenarios 3 and 5 are very close.

Table 8.9 Summary of Rankings of Task Difficulty

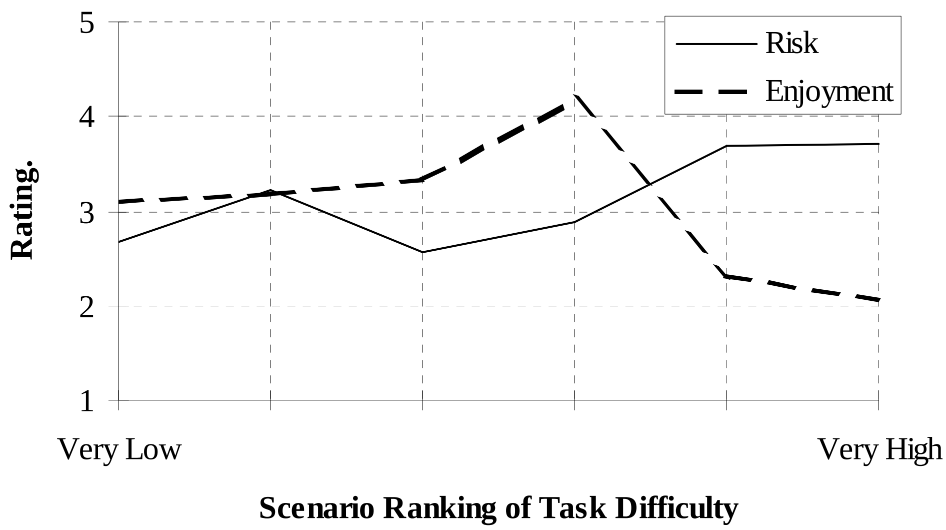
	Scenario Number					
	One	**Two**	**Three**	**Four**	**Five**	**Six**
Mean	*5.96*	*4.12*	*2.08*	*3.68*	*1.84*	*3.32*

Table 8.10 shows the resulting ranking, from lowest to highest, of the six scenarios for task difficulty. Figure 8.15 is a graphical representation of the interaction of risk and enjoyment with respect to task difficulty. This graph suggests that a certain level of task difficulty is enjoyable. When task difficulty reaches too high a level then enjoyment reduces rapidly while risk continues to rise.

Table 8.10 Task Difficulty, From Lowest to Highest

Task Difficulty	**Scenario**	**Description**
Lowest	1	Long straight road leaving Alva
Very Low	2	Road going under bridge near Clackmannan
Low	4	Long straight main road between Alloa and Stirling
High	6	Sweeping right hand bend in non-urban area
Very High	3	Roundabout in Alloa
Highest	5	Urban road in Falkirk, with pedestrians walking near/on road

Figure 8.15 Task Difficulty (All Scenarios)



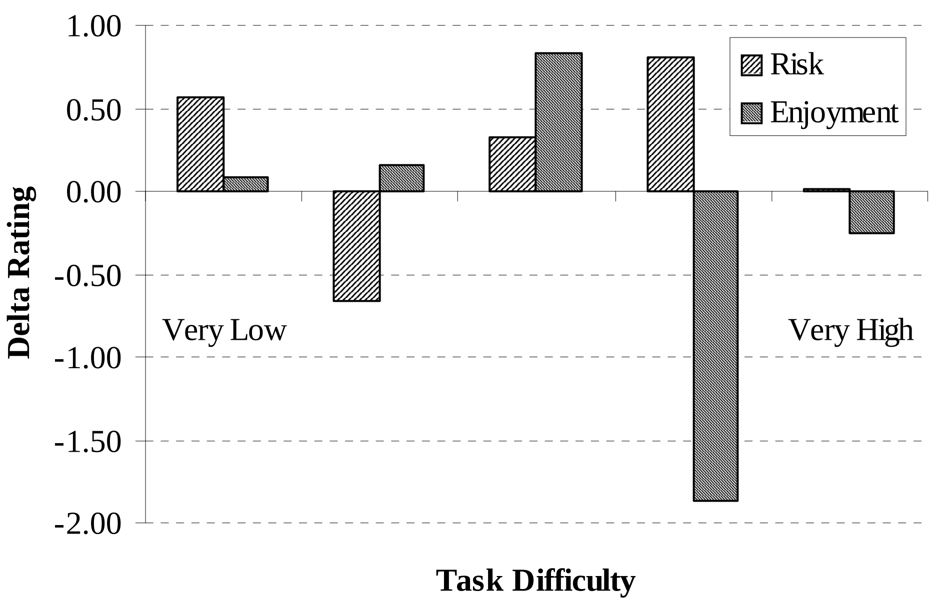
A first differential (Δ rating) was calculated to see the amount of change in risk (Δrisk) and enjoyment (Δenjoyment) between scenarios. For example if risk went from 3.3 to 4.1 then Δrisk would be 0.8, or if enjoyment changed from 3.4 to 2.3 then Δenjoyment would be negative 1.9.

Table 8.11 shows the rate of change of enjoyment and risk, with a graphical representation in Figure 8.16. The greatest change in risk occurs when the task difficulty is high, accompanied by a very large reduction in enjoyment. The largest positive increase in enjoyment occurs just before risk rises steeply. This relationship of enjoyment with task difficulty has elements of Csikszentmihalyi's (1990) theory of flow. When the riders skill set is matched to task difficulty, then a flow type enjoyment is achieved. However when the task difficulty rises to the limits of the skill level possessed then the anxiety state is entered into. This anxiety is felt as risk (see Table 3.1).

Table 8.11 First Differential of Risk and Enjoyment by Task Difficulty (A Scenarios)

Task Difficulty	Risk	Enjoyment
Very Low	0.56	0.09
Low	-0.66	0.15
Medium	0.33	0.84
High	0.81	-1.86
Very High	0.01	-0.25

Figure 8.16 First Differential of Risk and Enjoyment by Task Difficulty.



The rankings for task difficulty were applied to the three rider type groupings identified earlier.

8.6.3 Task Difficulty and Risk Acceptors

Figure 8.17 shows enjoyment and risk with respect to task difficulty for risk acceptors. The enjoyment and risk profiles for risk acceptors are very similar to the data for all scenarios (Figure 8.13). There is a large increase in enjoyment once difficulty reaches some kind of threshold, but this drops dramatically as task difficulty becomes greater.

An examination of the differential data (Table 8.12 and Figure 8.18) emphasises how enjoyment decreases with the largest increase in risk, this occurs after the peak in enjoyment.

Figure 8.17 Task Difficulty for Risk Acceptors

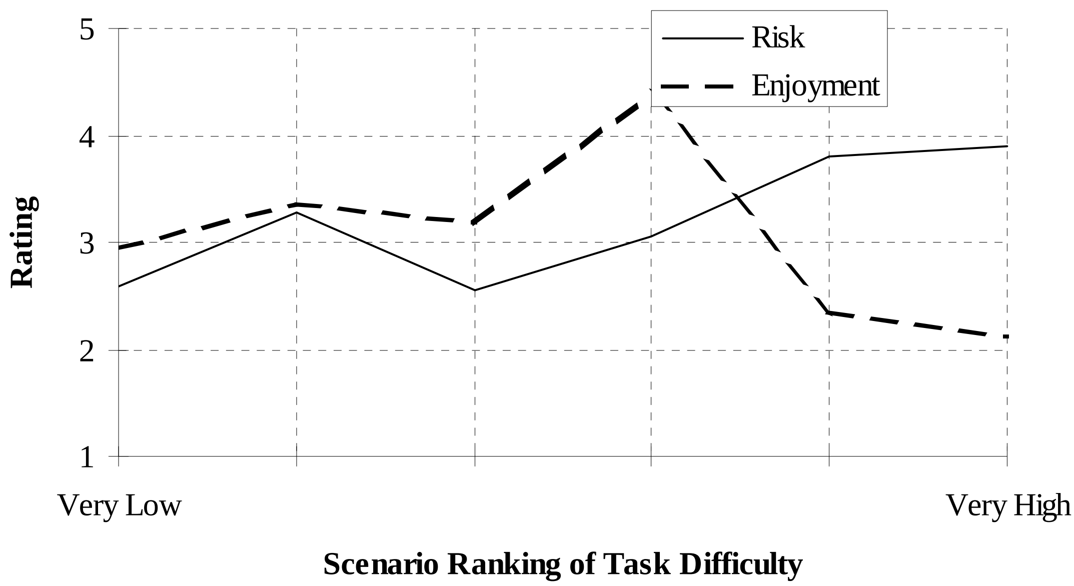
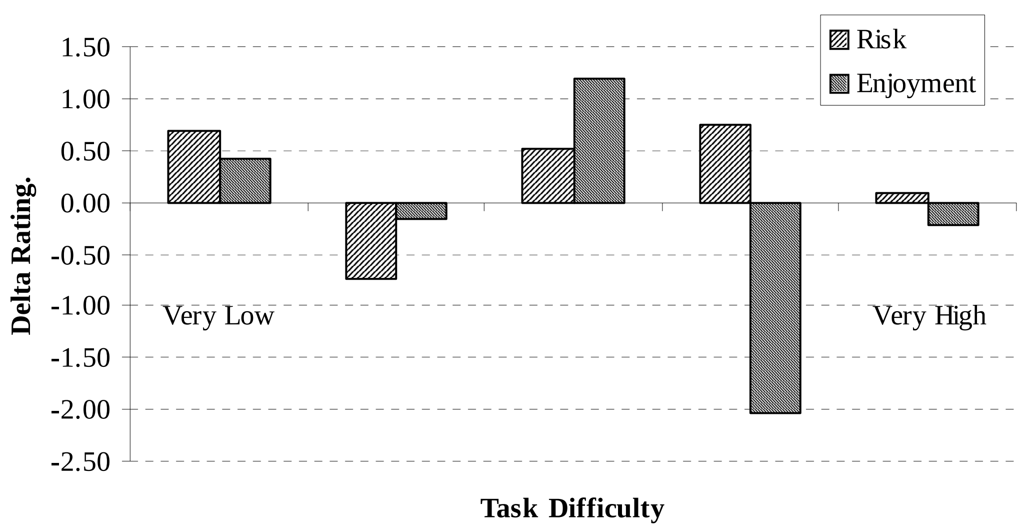


Table 8.12 First Differential of Risk and Enjoyment by Task Difficulty for Risk Acceptors.

Task Difficulty	Risk	Enjoyment
Very Low	0.70	0.41
Low	-0.74	-0.15
Medium	0.52	1.20
High	0.74	-2.04
Very High	0.09	-0.22

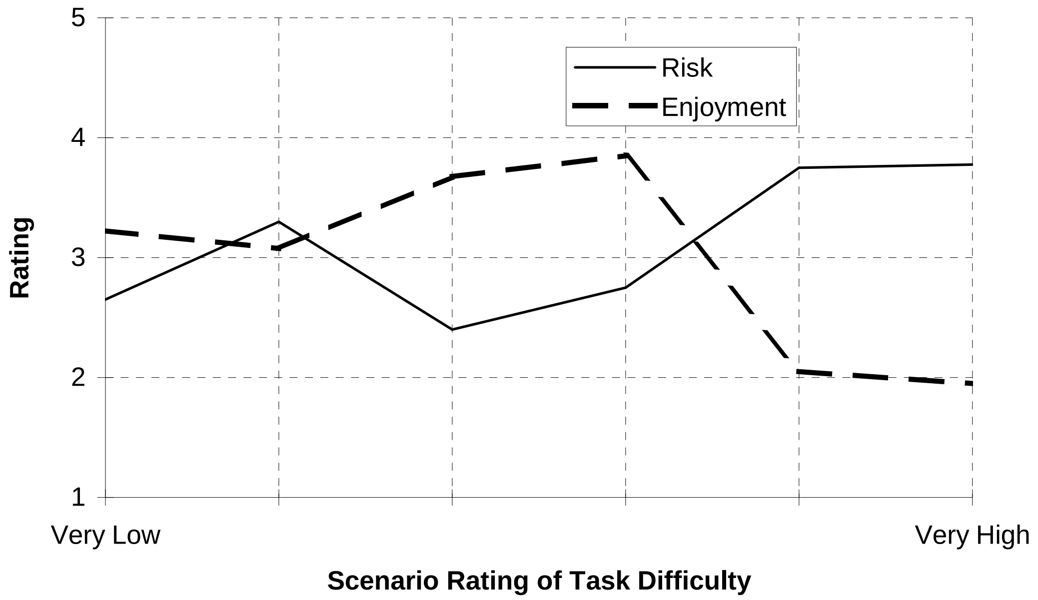
Figure 8.18 First Differential of Risk and Enjoyment by Task Difficulty for Risk Acceptors.



8.6.4 Task Difficulty and Risk Averse

The profile of risk averse riders is similar to risk acceptors, but the enjoyment is spread over a larger task difficulty (Figure 8.19).

Figure 8.19 Task Difficulty for risk aversive

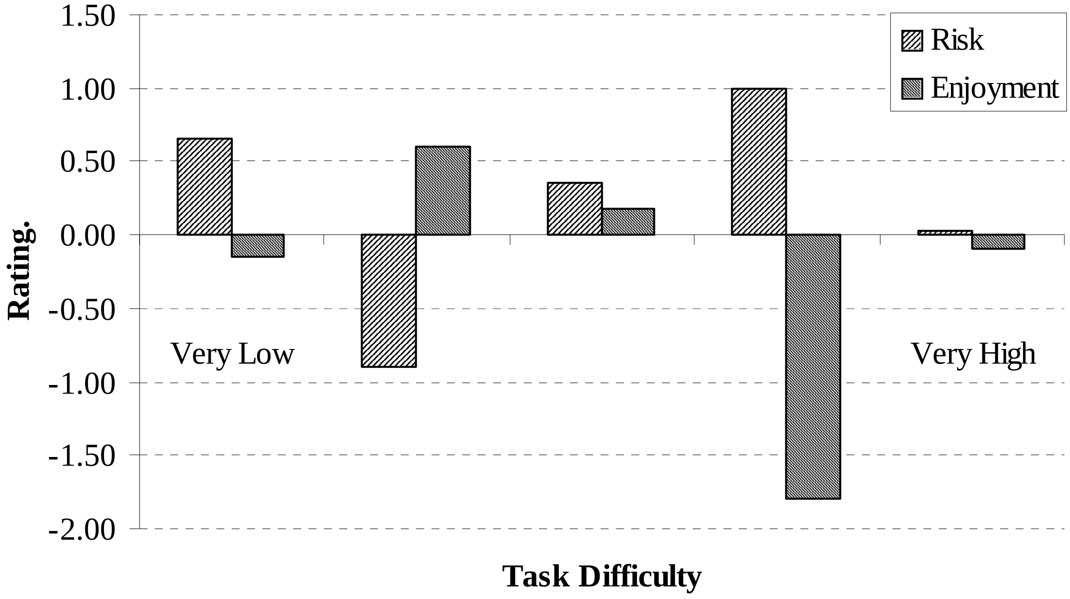


The differential data shown in Table 8.13 and Figure 8.20 shows a marked downturn in enjoyment when risk increases substantially, however there is not such a rise in enjoyment prior to this negative trend.

Table 8.13 First Differential of Risk and Enjoyment by Task Difficulty for Risk Averse.

Task Difficulty	**Risk**	**Enjoyment**
Very Low	0.65	-0.15
Low	-0.90	0.60
Medium	0.35	0.18
High	1.00	-1.80
Very High	0.02	-0.10

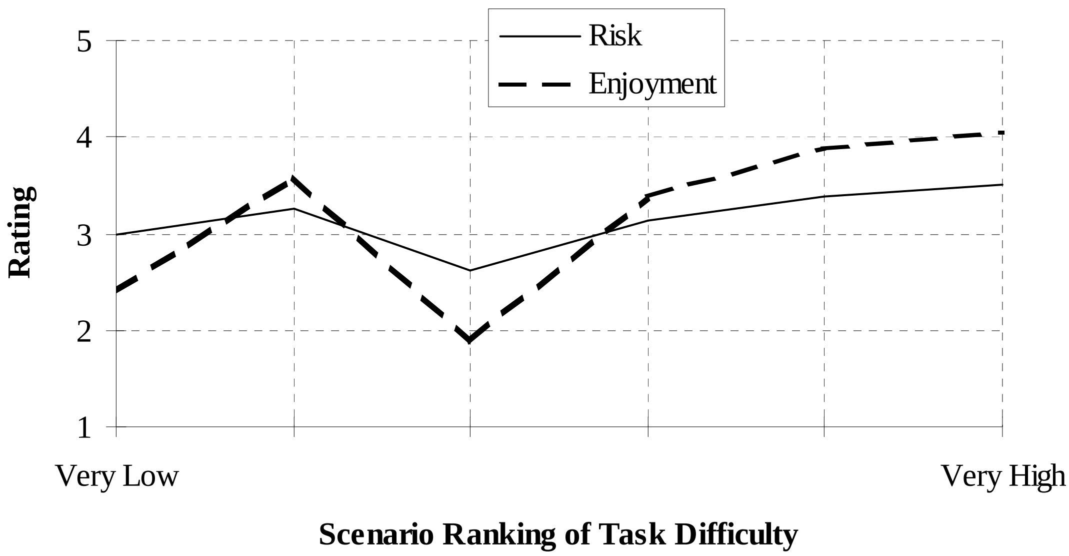
Figure 8.20 First Differential of Risk and Enjoyment by Task Difficulty for Risk Averse.



8.6.4 Task Difficulty and Risk Seekers

The profile for risk seekers is completely different from the other two rider types (Figure 8.21).

Figure 8.21 Task Difficulty for risk seekers



A comparison of the delta ratings for risk averse (Table 8.13 and Figure 8.18) and risk acceptors (Table 8.12 and Figure 8.16) shows that the greater positive upturn in risk with respect to task difficulty occurs later for the risk averse group

Enjoyment tracks risk, but the overall risk range is smaller than that for the other types, oscillating just above 3 (Table 8.14). For this group increasing task difficulty does not inversely affect enjoyment.

Table 8.14 Risk and Enjoyment by Task Difficulty for Risk Seekers

Task Difficulty	Risk	Enjoyment
Very Low	3.00	2.40
Low	3.25	3.60
Medium	2.63	1.90
High	3.13	3.38
Very High	3.38	3.88

Figure 8.22 Delta rating by Task Difficulty for Risk Seekers.

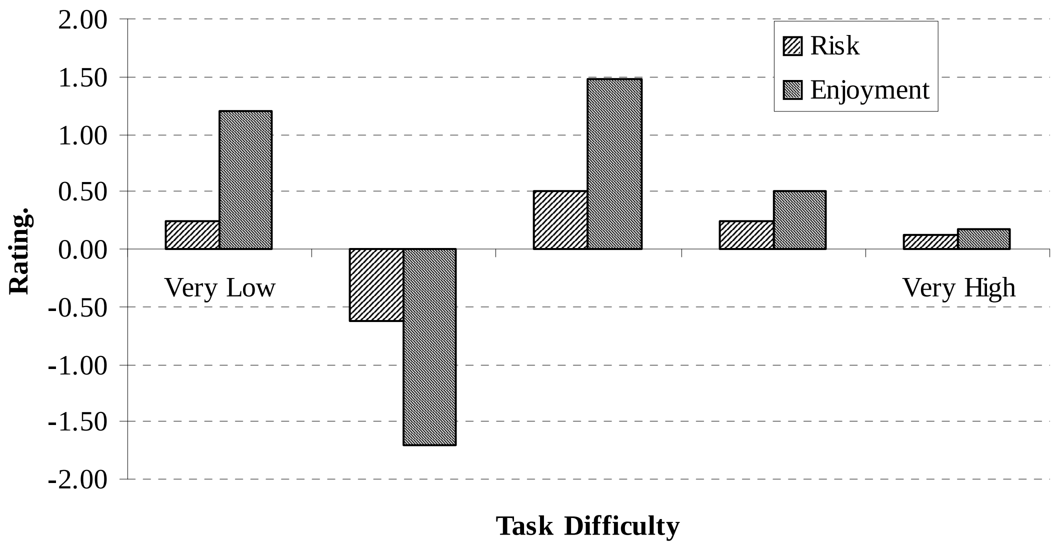


Table 8.15 Delta rating by Task Difficulty for Risk Averse.

Task Difficulty	Risk	Enjoyment
Very Low	0.25	1.20
Low	-0.63	-1.70
Medium	0.50	1.48
High	0.25	0.50
Very High	0.13	0.18

The differential data shows that when risk reduces, so does enjoyment and when risk increases the converse is true (Figure 8.22 Table 8.15); their polarity is always the same.

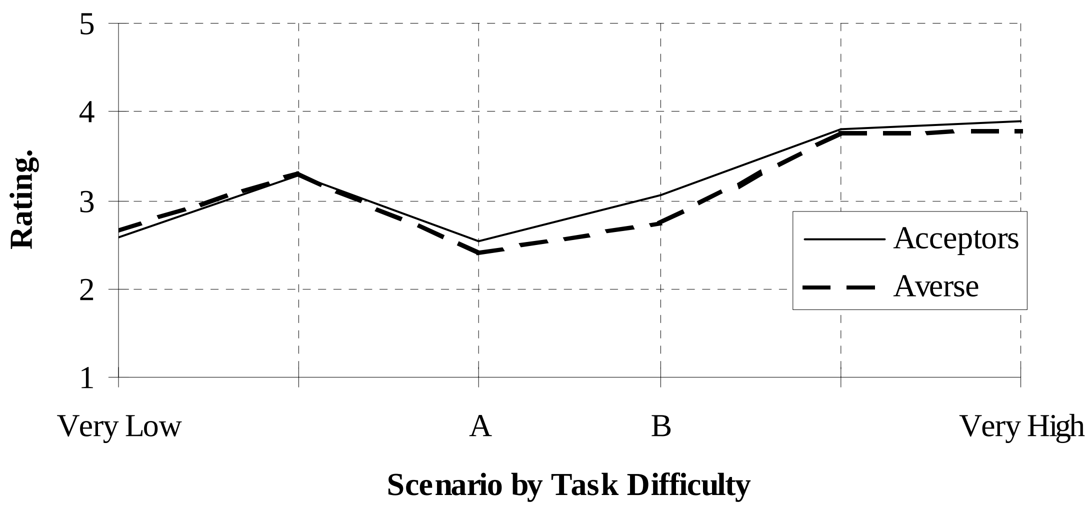
8.7 Comparison of Risk Acceptors and Risk Averse with Respect to Task Difficulty

Only the risk and enjoyment profiles of the acceptor and averse groups will be compared as the numbers in the risk seeker category are consider to be too low for further analysis. Table 8.16 shows a comparison of the two types with respect to Risk and Enjoyment. Figure 8.23 compares risk profiles for risk acceptors and risk averse riders.

Table 8.16 Comparison of Risk and Enjoyment Profiles by Risk Type

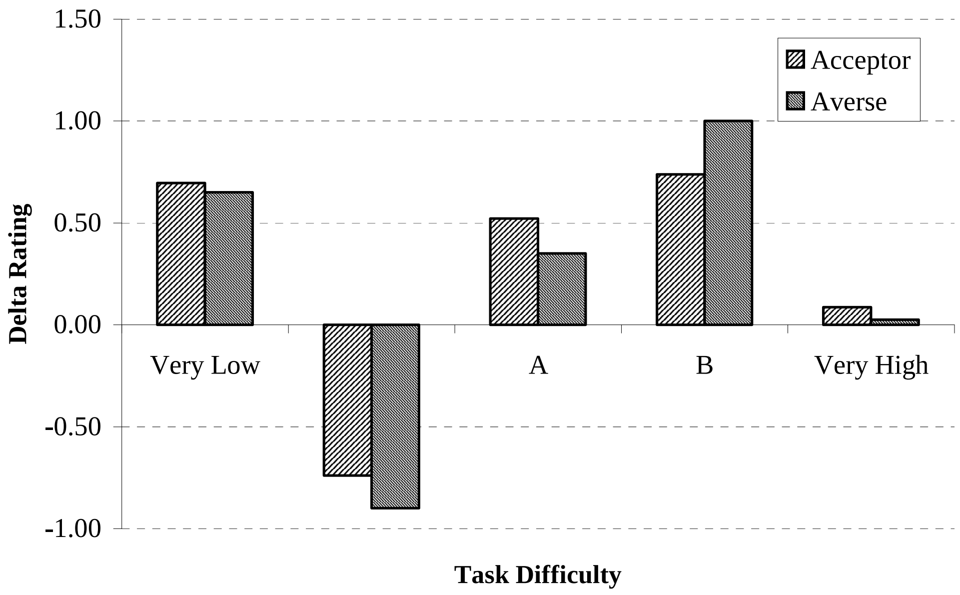
	Risk		**Enjoyment**	
	Acceptors	**Averse**	**Acceptors**	**Averse**
Very Low	2.59	2.65	2.93	3.23
	3.28	3.30	3.35	3.08
	2.54	2.40	3.20	3.68
	3.07	2.75	4.39	3.85
	3.80	3.75	2.35	2.05
Very High	3.89	3.78	2.13	1.95

Figure 8.23 Comparison of Risk Profiles by Risk Type



Risk acceptors and risk averse riders judge the risks of each scenario in a similar way, this is illustrated in Figure 8.23 and Figure 8.24.

Figure 8.24 Comparison of Risk Differential Profiles by Risk Type



8.8 Risk and Enjoyment Factors

The issue of what factors contribute to risk and enjoyment is explored by using the data from the open questions asking for the reasons why each scenario was rated the way it was.

8.8.1 Risk and Risk Factors

There is not one single factor that makes a particular scenario risky (Table 8.17). For the two most risky scenarios, road surface is the main reason given for 'feeling at risk'. Visibility is a major influence on risk for two scenarios (numbers 2 and 6), with other traffic being a major risk factor for scenario 1. This suggests that risk is a complex issue that has many influencing elements.

Table 8.17 Risk Factors by Scenario, Ordered by Risk

Scenario	**4**	**1**	**6**	**2**	**5**	**3**	***Total***
Road surface	87%	5%	9%	11%	70%	56%	35%
Other traffic	0%	57%	27%	15%	16%	8%	23%
Visibility	0%	5%	57%	65%	2%	0%	22%
Road features	9%	31%	7%	9%	11%	35%	19%
Distraction	4%	2%	0%	0%	0%	0%	1%
Total	100%	100%	100%	100%	100%	100%	100%

There is also a difference in what riders perceive as risk factors when examining the previously identified rider types. Risk seekers were not analysed by scenario due to their low numbers. Risk acceptors are more worried about other traffic than the risk averse riders, especially for scenario 4 (long main road with other traffic), scenario 5 (urban town with parked cars and pedestrians) and scenario 3 (urban roundabout).

Table 8.18 Risk factors by scenario for risk acceptors, Ordered by Risk

	4	**1**	**6**	**2**	**5**	**3**	***Total***
Other traffic	87%	7%	10%	13%	80%	60%	41%
Visibility	0%	4%	55%	65%	0%	0%	21%
Road surface	0%	57%	20%	13%	7%	10%	19%
Road features	7%	32%	15%	10%	13%	30%	19%
Distraction	7%	0%	0%	0%	0%	0%	1%
Total	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***

These three scenarios are the only ones that contain other traffic and/or pedestrians, therefore it is concluded that risk acceptors are more concerned about their interactions than those who are risk averse (Table 8.18 and Table 8.19).

Table 8.19 Risk factors by scenario for risk averse, Ordered by Risk

	4	**1**	**6**	**2**	**5**	**3**	***Total***
Other traffic	3%	9%	53%	88%	61%	8%	30%
Road surface	58%	18%	6%	0%	26%	33%	27%
Visibility	6%	65%	0%	0%	3%	58%	24%
Road features	30%	9%	41%	13%	10%	0%	19%
Distraction	3%	0%	0%	0%	0%	0%	1%
Total	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***

The hierarchy of the risk factors is also different for the two risk types, with road surface quality scoring higher than visibility for risk averse riders. Road surface also scored almost as high as other traffic for risk averse riders, hence road surface quality is a major risk consideration for this group.

The two highest rated scenarios for task difficulty, five and three, score very high for risk caused by other traffic. This is the case for the overall data and the two risk types. Road surface quality scored high in the low task difficulty scenarios. Hence task difficulty is higher when the rider has to interact with traffic, but road surface quality does not appreciably increase task difficulty.

8.8.2 Enjoyment and Enjoyment Factors

There is not one individual factor that indicates enjoyment (Table 8.20), with bends (33%), speed (27%) and pleasant surroundings (23%) all scoring highly. Overtaking and Challenge as enjoyment factors are rated significantly lower. As challenge may be a more obscure factor, especially when asking for enjoyment reasons with an open question, the real enjoyment from challenge may not be reflected in the responses.

Table 8.20 Enjoyment Factor by Scenario

	5	**3**	**1**	**2**	**4**	**6**	**Total**
Bends	0%	100%	0%	65%	0%	56%	33%
Speed	0%	0%	47%	3%	55%	12%	27%
Pleasant surroundings	0%	0%	50%	19%	3%	22%	23%
Overtaking	50%	0%	0%	0%	39%	0%	9%
Challenge	50%	0%	3%	13%	3%	10%	8%
Total	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***

The comparison of risk acceptors (Table 8.21) and risk averse (Table 8.22) shows that risk acceptors prefer bends, while risk averse riders mention challenge far more often. But apart from this distinction there is very little difference in how enjoyment is found.

Table 8.21 Enjoyment Factor by Scenario for Risk Acceptors

	5	**3**	**1**	**2**	**4**	**6**	**Total**
Bends	na	100%	0%	71%	0%	50%	38%
Speed	na	0%	60%	6%	50%	13%	27%
Pleasant surroundings	na	0%	40%	18%	7%	33%	24%
Overtaking	na	0%	0%	0%	43%	0%	8%
Challenge	na	0%	0%	6%	0%	4%	3%
Total	***na***	***100%***	***100%***	***100%***	***100%***	***100%***	***100%***

Table 8.22 Enjoyment Factor by Scenario for Risk Averse

	5	**3**	**1**	**2**	**4**	**6**	**Total**
Bends	0%	100%	0%	57%	0%	65%	29%
Speed	0%	0%	37%	0%	59%	12%	27%
Pleasant surroundings	0%	0%	58%	21%	0%	6%	21%
Challenge	50%	0%	5%	21%	6%	18%	13%
Overtaking	50%	0%	0%	0%	35%	0%	10%
Total	100%	100%	100%	100%	100%	100%	100%

Enjoyment from bends, such as scenario 2 (right hand bend going under the bridge) and scenario 6 (right hand bend in a non-urban setting) requires a rider to have

confidence in their skill level and bike (maintaining traction during cornering). This may be a main difference between the two rider types.

8.9 Conclusion

The relationship between risk, enjoyment and task difficulty in scenarios that riders face regularly on the public highways suggests that outwith the constrained and controlled environment presented in the track day situation the relationship becomes even more complex.

In the track day the riders had a fairly stable riding situation that allowed them to practice skills in a relatively unfettered situation that is only possible in such a controlled arena. In real road situations, such as presented on the scenarios, the environment is far more volatile. Those scenarios rated more highly for enjoyment tended to be those with fewer interactions with other road users, including pedestrians and such interactions increased task difficulty without adding enjoyment. Given that, as discussed in Chapter 2, other road users are often the cause of accidents for PTW users, the belief that such interactions increase risk is justified by the statistics.

Enjoyment would seem to derive from the actual riding process: riding around bends and overtaking. The only external factor evident for enjoyment is the surroundings. This suggests that being in control is important to the riders. This idea of being in control relates to task difficulty and ideas of flow. Riding enjoyment is greatly amplified when a rider feels able to ride expressively, matching the challenge of the situation with his skills and ability.

Having identified the factors contributing to risk and enjoyment, the themes were further developed through quantitative analysis. Although risk was a key element in the scenarios, of the three rider types only one was identified as risk seekers and they comprised only 8% of the sample. The two main groups were quite evenly split between risk acceptors (48%) and risk averse (42%). For risk acceptors, enjoyment increased as risk increased but then rapidly decreased after a threshold of acceptable risk had been reached. For the risk averse group, risk has an inverse relationship with enjoyment, as risk increases enjoyment decreases. This is further evidence to suggest that while risk is an inherent part of PTW use it is not actually sought as a means of increasing enjoyment.

Chapter 9 – Enjoyment and Risk Factors

People who enjoy what they are doing invariably do it well.
Joe Gibbs, 1940

9.1 Introduction

As explored in the previous chapter, the relationship between risk and enjoyment is complex. The ways in which riders experience and perceive risk influences enjoyment but for most riders high risk was not a factor that led to enjoyment. Of the three identified rider types (risk averse, risk acceptors and risk seekers) only risk seekers gained enjoyment from high levels of risk. This was the smallest group making up approximately 8% of the respondents.

For the majority of riders, while risk was accepted as a factor in riding, it is not actively sought. Risk is perceived when levels of task difficulty approached the upper limit of skill level of the rider, but enjoyment is maximised where task difficulty matches the rider's perceived skill; the boundary between states is small. This chapter explores further the factors that influence risk and enjoyment.

9.2 Datasets

In order to explore the factors affecting risk and enjoyment, the same scenario photographs used for the analysis presented in Chapter 8 ([Q6]) were used to discover the aspects that influenced the scenario ratings. Eleven themes were extracted from the open questions asked in [Q6], as described in Section 8.3 and Appendix O. The eleven extracted themes or factors were:

1. Road surface quality.
2. Risk caused by road features, such as road size, roadside objects, junctions.
3. Level of visibility.
4. Likelihood of the rider/driver being distracted.
5. Traffic (risk presented by other road users, including pedestrians).
6. Temptation to ride in an enthusiastic manner.
7. Surroundings, (scenery, etc).
8. Challenge.
9. Bends.
10. Speed of riding.
11. Overtaking opportunities.

Questionnaire seven collected respondents ratings for these eleven features, as well as ratings for enjoyment and risk for the six scenarios. These data was collected using a ten-point Likert scale, [Q6] used a five-point scale. The thirteen variables for each scenario allow analysis of the interaction of the themes, enjoyment and risk.

9.3 Enjoyment and Risk Types

The eleven features, or themes, as well as enjoyment and risk were analysed using factor analysis (see page 94). Three factors were produced (Table 9.1). Two of these factors related to enjoyment and one with risk. Components with a weighting of 0.40 were considered to be relevant, these values are highlighted in bold.

Table 9.1 Enjoyment and Factors

	1	**2**	**3**
Surface	**0.46**	**0.64**	0.14
Features	-0.06	0.04	**0.82**
Visibility	**0.88**	-0.07	0.18
Distraction	-0.04	0.00	**0.88**
Traffic	0.16	0.12	**0.87**
Temptation	**0.80**	**0.41**	-0.17
Surroundings	**0.63**	**0.58**	-0.16
Challenge	0.03	**0.88**	0.09
Bends	-0.08	**0.90**	0.20
Speed	**0.85**	0.38	-0.06
Overtaking	**0.87**	-0.19	-0.02
Risk	-0.02	0.19	**0.72**
Enjoyment	**0.48**	**0.52**	0.16

Factors 1 and 2 have enjoyment significantly weighted (0.48 and 0.52 respectively), with factor 3 having risk as a heavily weighted factor (0.72).

9.3.1 Features of Enjoyment

Within the two factors that relate to enjoyment (factors 1 and 2) there are eight components:

1. Road surface quality
2. Visibility
3. Temptation to ride enthusiastically
4. The surroundings
5. Challenge

6. Bends
7. Speed
8. Opportunity for overtaking

Of the eight components, two are common across both the factors: temptation and surroundings. How though do these components relate to enjoyment?

9.3.1.1 Enjoyment and Road Surface Quality

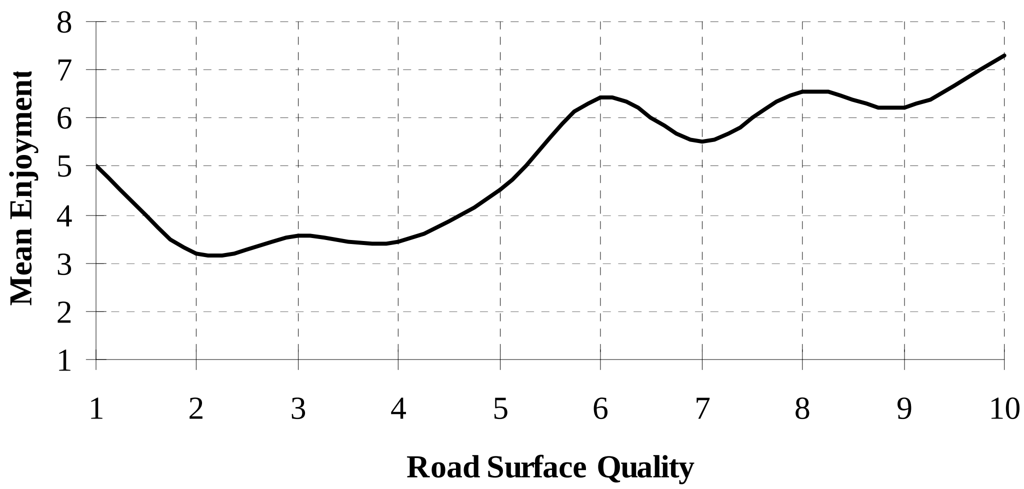
As road surface quality increases so does enjoyment, with 62% of those rating a scenario for low enjoyment also rating it low for road surface quality (Table 9.2). Also 56% of those who rated scenarios as high enjoyment also rated the road surface quality as high.   Figure 9.1 shows how enjoyment rises steadily with road surface quality. Road surface quality does not feature as an element of risk within the factor analysis (Figure 9.1), despite the need of good traction for PTWs. This lack of correlation with risk, coupled with its relationship with enjoyment, suggests that poor road surface quality is an enjoyment inhibitor rather than a risk enhancer.

Table 9.2 Enjoyment and Road Surface Quality

		Road Surface Quality			
		Low	Med	High	Total
Enjoyment	Low	62%	31%	7%	100%
	Med	42%	33%	25%	100%
	High	20%	24%	56%	100%
	Total	46%	31%	24%	100%

Chi Squared $p < 0.001$

Figure 9.1 Road Surface Quality and Mean Enjoyment



9.3.1.2 Enjoyment and Visibility

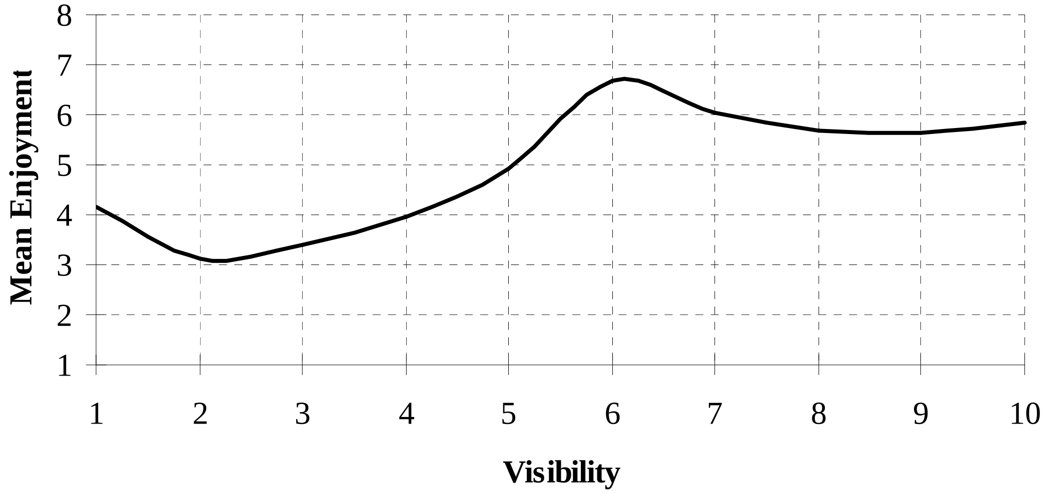
58% who rated a scenario low for enjoyment also rated it low for visibility, where only 38% of those rating a scenario as high enjoyment rated visibility as high (Table 9.3). When visibility is below a certain threshold then enjoyment is curtailed, as shown in Figure 9.2. Once the visibility exceeds this threshold then enjoyment is relatively constant.

Table 9.3 Enjoyment and Visibility

		Visibility			
		Low	Med	High	Total
Enjoyment	Low	58%	36%	6%	100%
	Med	27%	35%	38%	100%
	High	14%	48%	38%	100%
	Total	36%	38%	26%	100%

Chi Squared $p < 0.001$

Figure 9.2 Visibility and Mean Enjoyment



9.3.1.3 Enjoyment and Temptation

In areas where a rider might be tempted to 'ride in an enthusiastic manner' then enjoyment is high (Table 9.4), but more significantly in areas of low temptation there was also low enjoyment (87%).

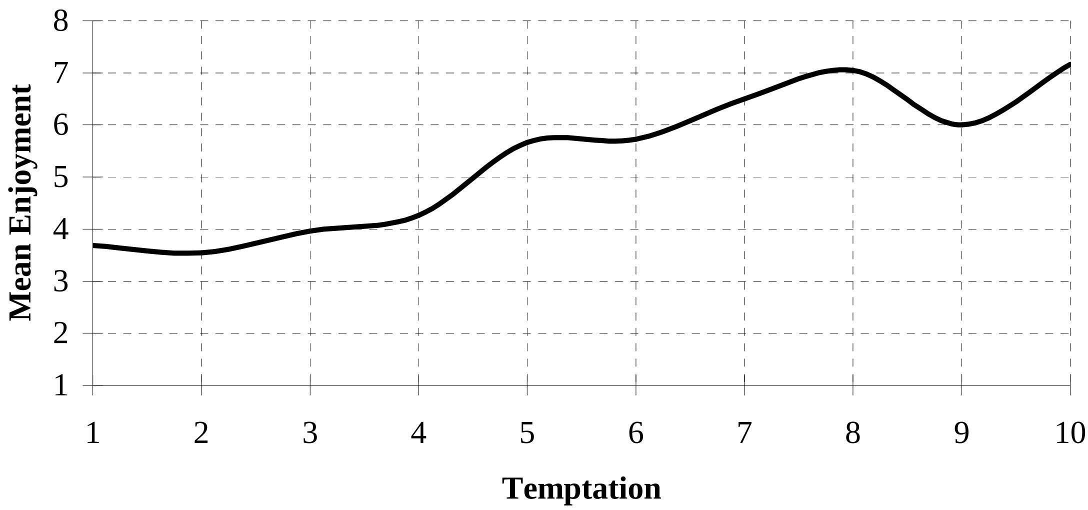
Table 9.4 Enjoyment and Temptation

		Temptation			
Enjoyment		Low	Med	High	Total
	Low	87%	11%	2%	100%
	Med	52%	25%	23%	100%
	High	32%	24%	44%	100%
	Total	61%	20%	19%	100%

Chi Squared $p < 0.001$

There is a slow rise in enjoyment as temptation increases, with enjoyment rising about one point for every two in temptation (Figure 9.3). Therefore in areas where a rider might be tempted to ride in an enthusiastic manner enjoyment is found: enjoyment is found by riding enthusiastically.

Figure 9.3 Temptation and Mean Enjoyment



9.3.1.4 Enjoyment and Surroundings

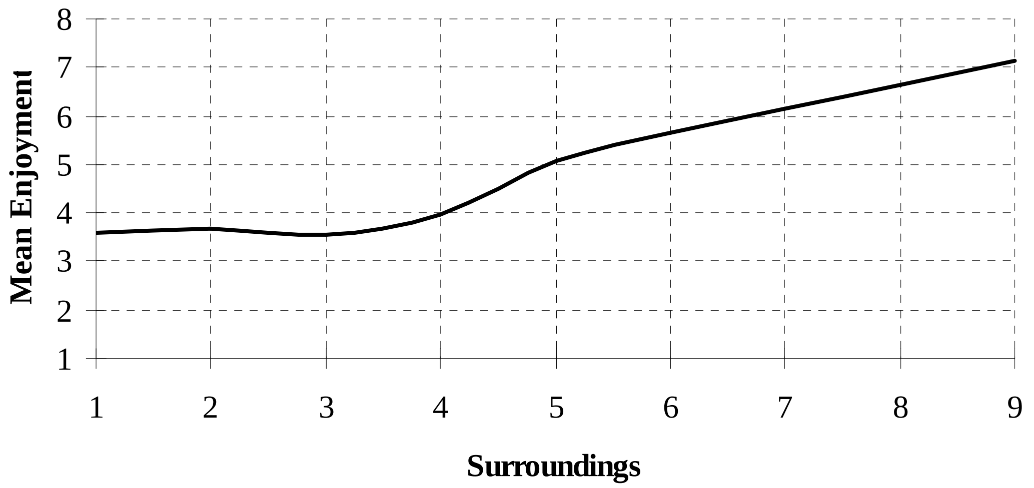
Areas that have good surroundings are areas of high enjoyment, with only 4% of those rating a scenario as low enjoyment rating the pleasantness of the surroundings as high (Table 9.5). The linear relationship between areas of pleasant surroundings and enjoyment in riding is shown in Figure 9.4.

Table 9.5 Enjoyment and Surroundings

	Surroundings				
Enjoyment		Low	Med	High	Total
	Low	80%	16%	4%	100%
	Med	43%	32%	25%	100%
	High	26%	18%	56%	100%
	Total	53%	24%	23%	100%

Chi Squared $p < 0.001$

Figure 9.4 Surroundings and Mean Enjoyment



9.3.1.5 Enjoyment and Challenge

Challenge is related to enjoyment, but as with visibility, lack of challenge may be an inhibitor of enjoyment for most riders with 82% of those rating scenarios as low enjoyment as also having a low challenge (Table 9.6). However for some riders, challenge may not be needed for enjoyment, 34% found high enjoyment in areas of low challenge.

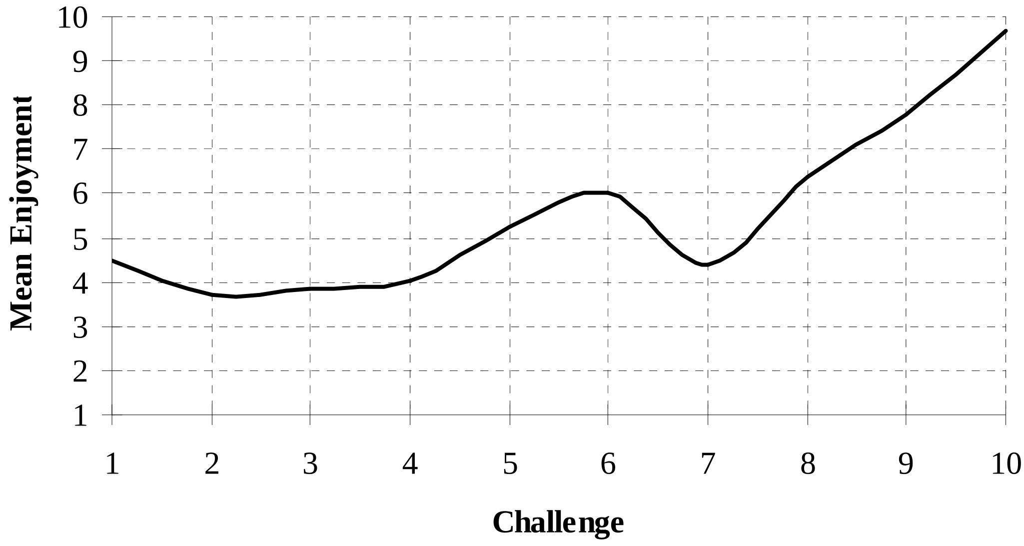
Table 9.6 Enjoyment and Challenge

	Challenge				
Enjoyment		Low	Med	High	Total
	Low	82%	11%	7%	100%
	Med	57%	34%	9%	100%
	High	34%	22%	44%	100%
	Total	62%	24%	14%	100%

Chi Squared $p < 0.001$

The profile seen in Figure 9.5 shows how enjoyment changes with challenge. For a challenge rating of up to seven, enjoyment is relatively constant, however once this challenge threshold is exceeded then enjoyment increases rapidly.

Figure 9.5 Challenge and Mean Enjoyment



9.3.1.6 Enjoyment and Bends

In scenarios where the road is straight then enjoyment is low for most riders (85%), however 36% of those who rated a scenario's enjoyment as high also rated the road as straight (Table 9.7). Very few rate a non-straight road as low enjoyment. The ratings of high enjoyment scenarios for bends is polarised, with enjoyment seeming to come from straight roads (36%) or very bendy roads (58%) and only 6% saying that they would find high enjoyment in a scenario rated medium for bends. The number of those finding enjoyment from straight roads (36%) is a similar value to those who found high enjoyment from low challenge (34%)

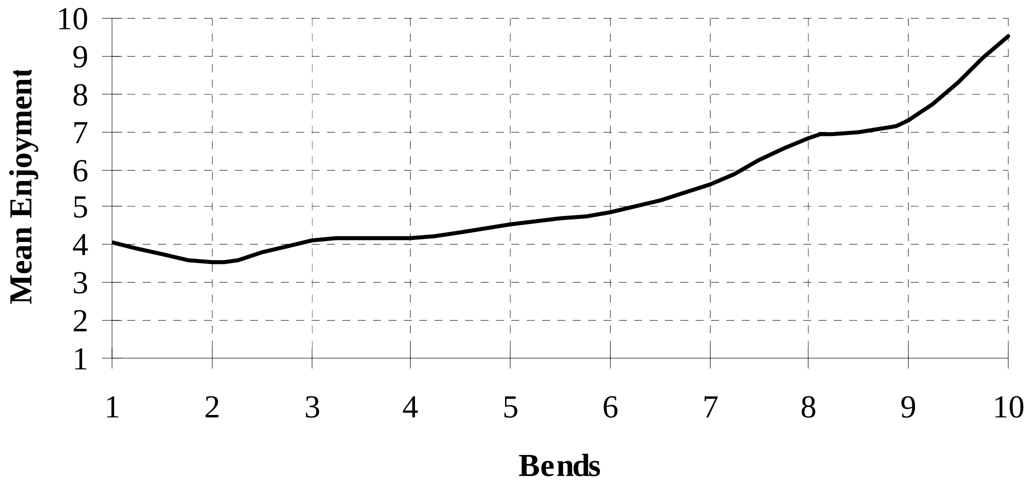
Table 9.7 Enjoyment and Bends

		Bends			
		Low	Med	High	Total
Enjoyment	Low	85%	9%	6%	100%
	Med	56%	28%	16%	100%
	High	36%	6%	58%	100%
	Total	63%	17%	19%	100%

Chi Squared $p < 0.001$

Plotting mean levels of enjoyment against bends suggests that there is a positive correlation between bends and enjoyment levels (i.e., as the road becomes bendier, enjoyment increases, as shown in Figure 9.6). However there are signs of the relationship being exponential.

Figure 9.6 Bends and Mean Enjoyment



9.3.1.7 Enjoyment and Speed

Speed is related to enjoyment, but not in a direct relationship. In scenarios where riders said that they would ride at slow speed they also rated it as low enjoyment (Table 9.8). Only 1% rated a high-speed scenario as low enjoyment.

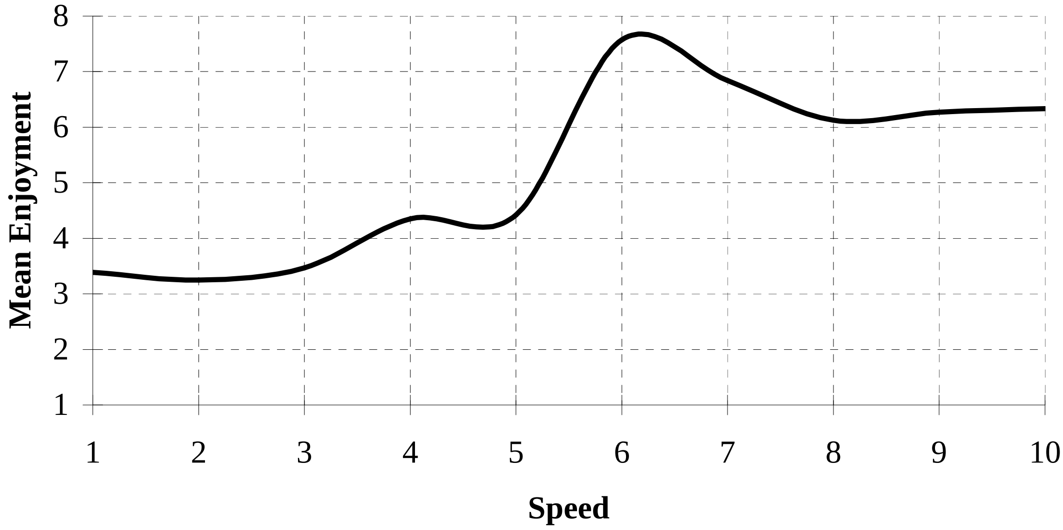
Table 9.8 Enjoyment and Speed

		Speed			
Enjoyment		Low	Med	High	Total
	Low	84%	15%	1%	100%
	Med	35%	35%	30%	100%
	High	18%	32%	50%	100%
	Total	50%	27%	23%	100%

Chi Squared $p < 0.001$

The relationship with speed and enjoyment is a step function (Figure 9.7). Enjoyment is at a near constant level of around four until a threshold is reached (speed rating of 6). At the threshold point enjoyment rises and settles at a value of just over six.

Figure 9.7 Speed and Mean Enjoyment



9.3.1.8 Enjoyment and Overtaking

In a similar manner to speed, only 1% rated a high-overtaking situation as being low enjoyment (Table 9.9).

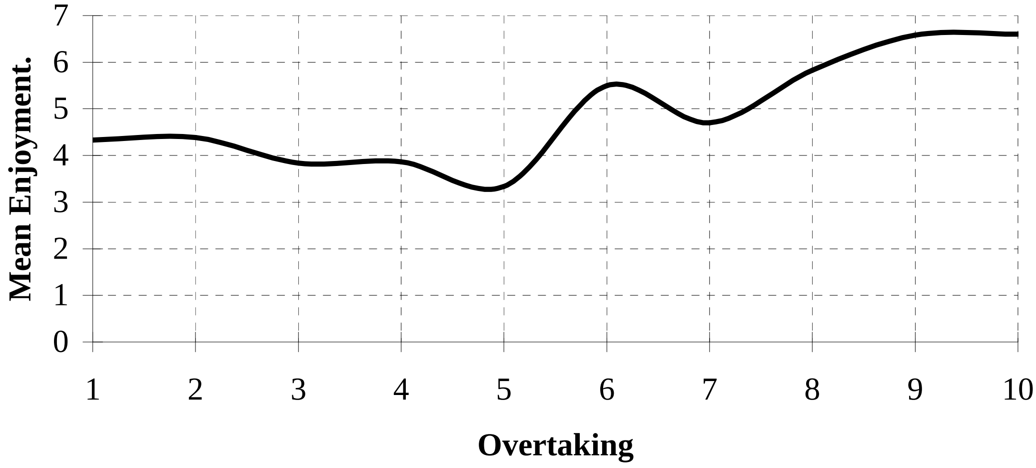
Table 9.9 Enjoyment and Overtaking

		Overtaking			
Enjoyment		Low	Med	High	Total
	Low	82%	17%	1%	100%
	Med	57%	13%	30%	100%
	High	68%	4%	28%	100%
	Total	68%	13%	19%	100%

Chi Squared $p < 0.001$

Figure 9.8 shows that there is a step function in enjoyment when the overtaking rating is at five. The basic shape of the line is similar to the speed with mean enjoyment graph, however the data range is compressed (3 ½ to 6 ½ compared to 3 ¼ to 7 ½)

Figure 9.8 Overtaking and Mean Enjoyment



9.3.2 Enjoyment Factors

Factor 1, with an enjoyment weighting of 0.48, is related to road surface quality, visibility, temptation, surroundings, speed and overtaking. This factor is concerned with riders gaining enjoyment from riding fast on straight roads, hence the weighting of speed at 0.85. Bends are not related to this factor (-0.08). The inclusion of visibility and overtaking is because good visibility is a factor of most straight roads where it is easy to ride fast, and overtake. This factor is linked to speed, therefore it is about getting an 'Adrenalin Rush' without having to push oneself skill-wise. This factor is designated as 'Rush Based Enjoyment'.

Factor 2, which has an enjoyment weighting of 0.52, is related to road surface quality, temptation, surroundings, challenge and bends. This factor is about gaining enjoyment from the challenge of riding around bends, with both these components having large weightings (0.88 and 0.90 respectively). As this factor is challenge related, with the challenge being provided mainly by bends, this type of enjoyment is associated with the flow state (Csikszentmihalyi, 1990), and designated 'Challenge Based Enjoyment'.

Three components are found in both factors: road surface, temptation and surroundings. Two of these elements, temptation and surroundings, are enjoyment enablers being required for both types of enjoyment. Road surface quality is an enjoyment inhibitor and the lack of road quality prevents a ride being enjoyable.

The two enjoyment types can be compared to the difference between bungee jumping and rock climbing. Both of these activities can be enjoyable, yet enjoyment is found in completely different ways. Bungee jumping does not require much skill in throwing oneself off a high place with a piece of elastic saving one from death, yet this is very enjoyable for those who are seeking an adrenaline buzz. Rock climbing on the other hand is a sport where a climber pits ones' skills against the challenge presented by the rock face with enjoyment found in the skill/challenge match. Enjoyment can be found in either, or both, types of activity.

9.3.3 Features of Risk

There are three features that relate to risk; road features, distraction and other traffic.

9.3.3.1 Risk and Road Features

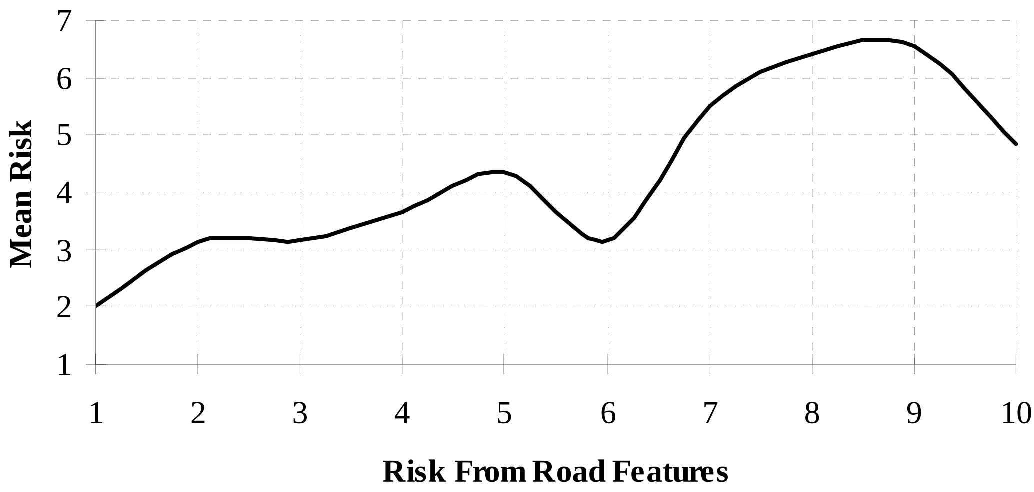
Road features have a high correlation to risk (Table 9.1), and this can be seen in the data presented in Table 9.10.

Table 9.10 Risk and Road Features

		Road Features			
		Low	Med	High	***Total***
Risk	Low	59%	29%	12%	***100%***
	Med	32%	36%	32%	***100%***
	High	10%	19%	71%	***100%***
	Total	***43%***	***29%***	***29%***	***100%***

Chi Squared $p < 0.001$

Figure 9.9 Risk from Road Features and Mean Risk



About half who rated a scenario as low risk also rated it low for road features, 71% rated road features as high risk when the scenario had a high road features rating. Figure 9.9 clearly shows that the risk from road features has a positive generally linear relationship with overall risk.

9.3.3.2 Risk and Likelihood of Distraction

The likelihood of a rider being distracted has a positive relationship with risk, with high-risk scenarios being rated high for distraction (Table 9.11), with this relationship being identifiable when the mean risk is plotted against distraction (Figure 9.10)

Table 9.11 Risk and Distraction

		Distraction			
		Low	Med	High	Total
Risk	Low	69%	22%	9%	100%
	Med	42%	32%	26%	100%
	High	19%	32%	49%	100%
	Total	52%	26%	21%	100%

Chi Squared p < 0.001

Figure 9.10 Rider Distraction and Mean Risk

9.3.3.3 Risk and Other Traffic

Other traffic has the highest loading on the risk task (Table 9.1) with the data (Table 9.12) showing that 97% of those selecting a scenario as being high risk also stating that risk from other traffic was not low. Over half of those rating a scenario as low risk also stated that the risk from other traffic was low.

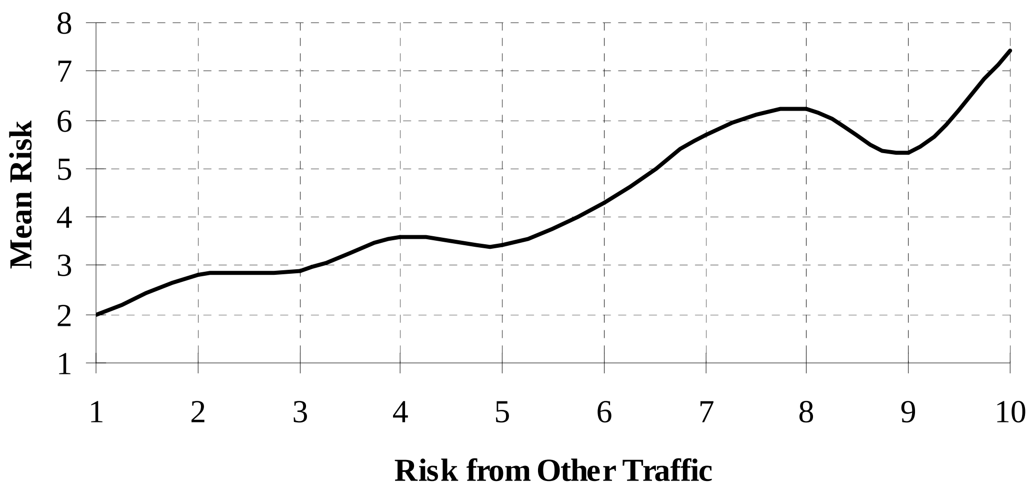
Table 9.12 Risk and Other Traffic

		Other Traffic			
		Low	Med	High	***Total***
Risk	Low	55%	34%	11%	***100%***
	Med	19%	35%	46%	***100%***
	High	3%	22%	75%	***100%***
	Total	***36%***	***32%***	***32%***	***100%***

Chi Squared $p < 0.001$

Figure 9.11 illustrates the strong relationship between overall risk and the risk from other traffic.

Figure 9.11 Risk from Other Traffic and Mean Risk



9.3.4 External Risk

The components of this risk factor are road features (0.82), rider distraction (0.88) and other traffic (0.87), with risk having a weighting of 0.72. These elements are 'third party' to the rider, and maybe even viewed as out of the rider's control, with the exception of rider distraction. It could be argued that if the PTW user was focused on riding then they would not be distracted, however as this element has scored high in

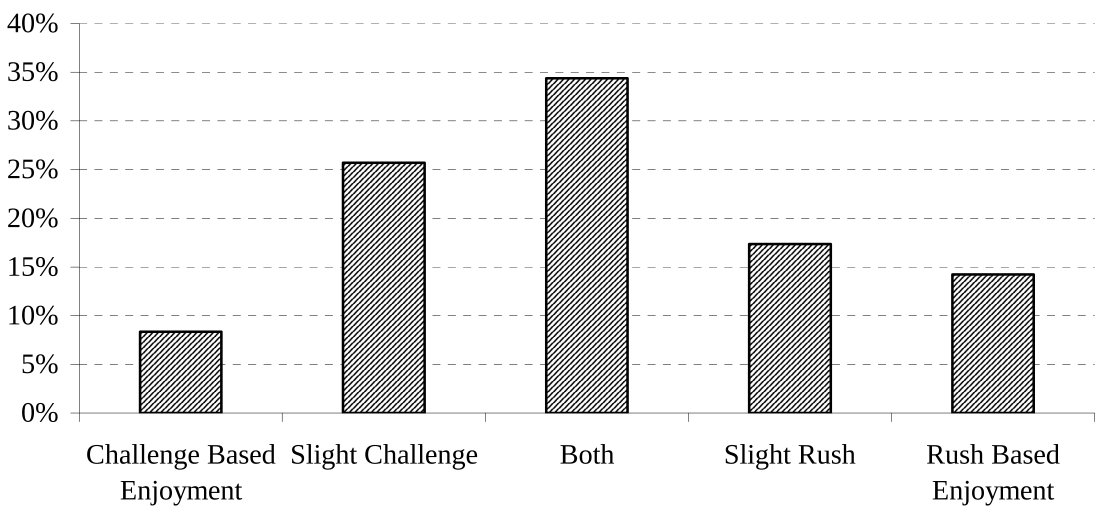
the external risk factor some riders must consider that they do get distracted causing perceived risk. As the three elements are external to the rider then this factor is designated as ‘external risk’.

9.3.5 Risk, Enjoyment and Demographics

Within the SPSS database variables were created for each factor, being constructed using an unweighted summation method (Hair, 1992), as described in the methodology section (Chapter 4). For example, ‘Rush Based Enjoyment’ was calculated by the summation of road surface quality, visibility, temptation, surroundings, speed and overtaking and ‘Challenge Based Enjoyment’ calculated by adding together road surface quality, temptation, surroundings, challenge and bends.

A further enjoyment variable (enjoyment type) was created to give an indication of the amount of enjoyment being felt from the two types. This was generated by subtracting the ‘Challenge Based Enjoyment’ from ‘Rush Based Enjoyment’, and categorising into 5 groups (Challenge Based Enjoyment, Slight Challenge, Both, Slight Rush and Rush Based Enjoyment). Figure 9.12 shows the profile of enjoyment types across all scenarios. The middle category is entitled ‘both’ rather than neither as only 2% of those in the middle category had low ‘Challenge Based Enjoyment’ coupled with low ‘Risk Based Enjoyment’

Figure 9.12 Frequency of Enjoyment Types



The newly created variables were cross-tabulated with demographic data; the majority of the results were not significant.   Three tabulations with the ‘Rush Based

Enjoyment' factor were significant (bike performance index, age and gender), and two for the enjoyment type variable (age and gender).

Those who ride the lower performance bikes are more likely to have 'Rush Based Enjoyment' experiences than those riding machines towards the upper end of the performance spectrum. For those experiencing high Rush Based Enjoyment, 57% ride either low, or very low performance PTWs (Table 9.13).

Table 9.13 Rush Based Enjoyment and Bike Performance

		Bike Performance					
Rush Based Enjoyment		Very low	Low	Medium	High	Very high	Total
	Low	10%	18%	21%	30%	21%	100%
	Med	24%	20%	22%	15%	20%	100%
	High	21%	36%	19%	15%	9%	100%
	Total	18%	22%	21%	21%	19%	100%

Chi Squared $p < 0.001$

Figure 9.13 Mean Rush Based Enjoyment and Bike Performance

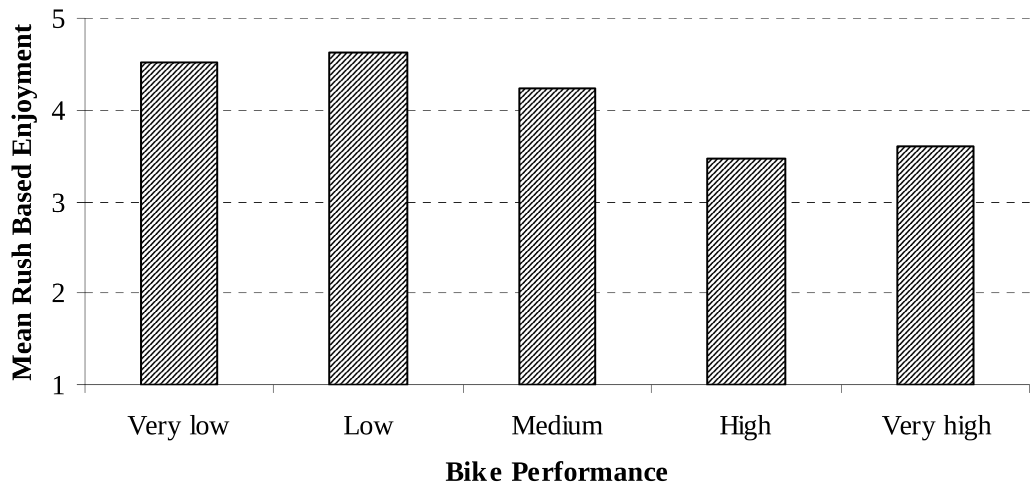


Figure 9.13 shows that as bike performance increases then mean enjoyment from rush decreases. This dichotomy may be due to rider experience. Experienced riders are more likely to ride the higher performance machine and as these riders generally have a better skill set they are less likely to gain enjoyment just from 'rush' and more likely to gain enjoyment from challenge.

This is further emphasised when rider age is considered for ‘Rush Based Enjoyment’ (Table 9.14). The oldest age group are under represented in the upper ends of ‘Rush Based Enjoyment’ (2%), and over represented at the lower end (28%).

Table 9.14 Rush Based Enjoyment and Age

		35 or younger	36 to 50	51 or older	Total
Rush Based Enjoyment	Low	23%	49%	28%	100%
	Med	27%	55%	18%	100%
	High	51%	47%	2%	100%
	Total	29%	51%	19%	100%

Chi Squared $p < 0.001$

When comparison is made of age against Enjoyment Types (Table 9.15), it also shows that younger riders tend more towards ‘Rush Based Enjoyment’, with older riders more likely to be ‘Challenge Based’.

Table 9.15 Enjoyment Types and Age

	35 or younger	36 to 50	51 or older	Total
Challenge Based Enjoyment	17%	63%	21%	100%
Slight Challenge	26%	49%	26%	100%
Both	23%	58%	19%	100%
Slight Rush	42%	36%	22%	100%
Rush Based Enjoyment	44%	54%	2%	100%
Total	***30%***	***51%***	***19%***	***100%***

Chi Squared $p = 0.010$

The Gender split shows that females are more likely to be in the upper category of ‘Rush Based Enjoyment’ compared to males (Table 9.16).

Table 9.16 Rush Based Enjoyment and Gender

		Male	Female	Total
Rush Based Enjoyment	Low	42%	40%	41%
	Med	44%	31%	42%
	High	14%	29%	16%
	Total	100%	100%	100%

Chi Squared $p = 0.032$

However when gender is compared to ‘Enjoyment Types’ it is noticeable that females are over represented at the extreme ends, being more likely to be either ‘Challenge

Based' or 'Rush Based' (Table 9.17). Males are more likely to be within the middle groupings ('Slight Challenge' to 'Slight Rush'). Females make up a small proportion of riders, and therefore it is may be less socially acceptable for them to ride. The females who ride therefore are less likely to be attracted to riding because of the image and may be attracted because they probably seek the enjoyment that riding can give them.

Table 9.17 Enjoyment Types and Gender

	Male	**Female**	**Total**
Challenge Based Enjoyment	8%	11%	8%
Slight Challenge	28%	13%	26%
Both	35%	33%	34%
Slight Rush	18%	16%	17%
Rush Based Enjoyment	12%	27%	14%
Total	***100%***	***100%***	***100%***

Chi Squared p = 0.048

This section has explored how risk and enjoyment interact with other identified factors. The next section explores how these factors relate to task difficulty.

9.4 Task Difficulty

In order to identify the relationship between enjoyment and risk with task difficulty, the task difficulty ratings for scenarios developed in Chapter 8 were used to compare enjoyment and risk types.

Table 9.18 shows that 'Rush Based Enjoyment' is more likely at low and medium task difficulty, 41% and 42% respectively. However at high task difficulty 'Rush Based Enjoyment' is much lower (12%). Challenge based enjoyment does not alter much across task difficulties, but 'both' is highest at high task difficulty.

Table 9.18 Enjoyment Types and Task Difficulty

	Low Task Difficulty	Med Task Difficulty	High Task Difficulty
Challenge Based Enjoyment	12%	8%	4%
Slight Challenge	23%	27%	27%
Both	24%	23%	57%
Slight Rush	15%	25%	12%
Rush Based Enjoyment	26%	17%	0%

Chi Squared p < 0.001

Therefore where the riding is less demanding (task difficulty is low), ‘Rush Based Enjoyment’ is more likely to be found compared to areas of high task difficulty. ‘Challenge Based Enjoyment’ seems to be less affected by task difficulty (Figure 9.14). ‘Rush Based Enjoyment’ tends to be negatively related to task difficulty (Table 9.19), with low enjoyment being over represented at high task difficulty (73%). At high task difficulty, there were no respondents with corresponding high enjoyment. The relationship is shown in graphical form in Figure 9.15, where the best-fit line has a negative gradient.

Figure 9.14 Task Difficulty and Enjoyment Types

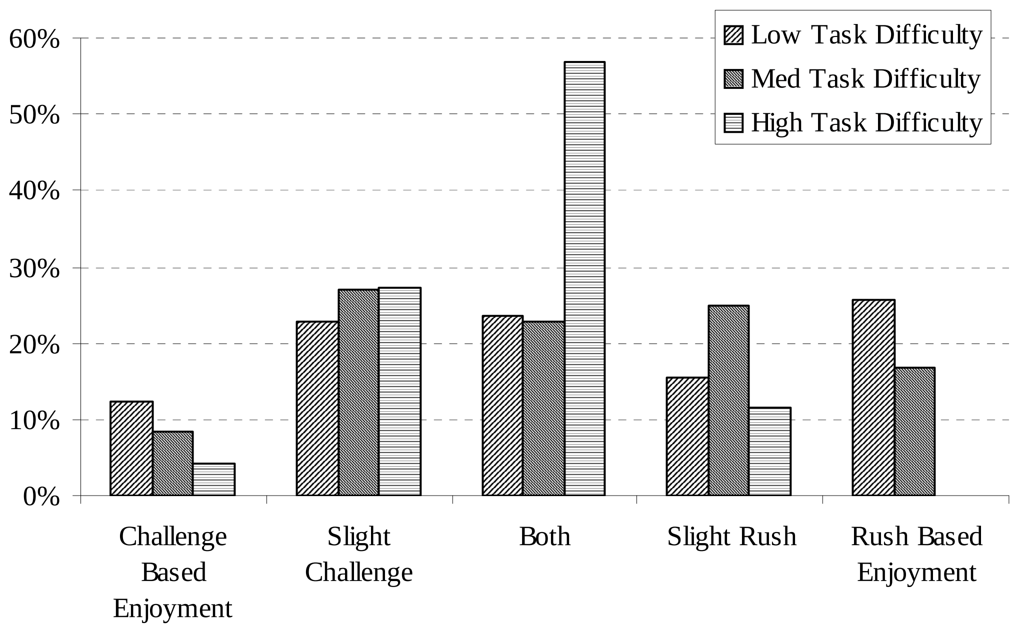
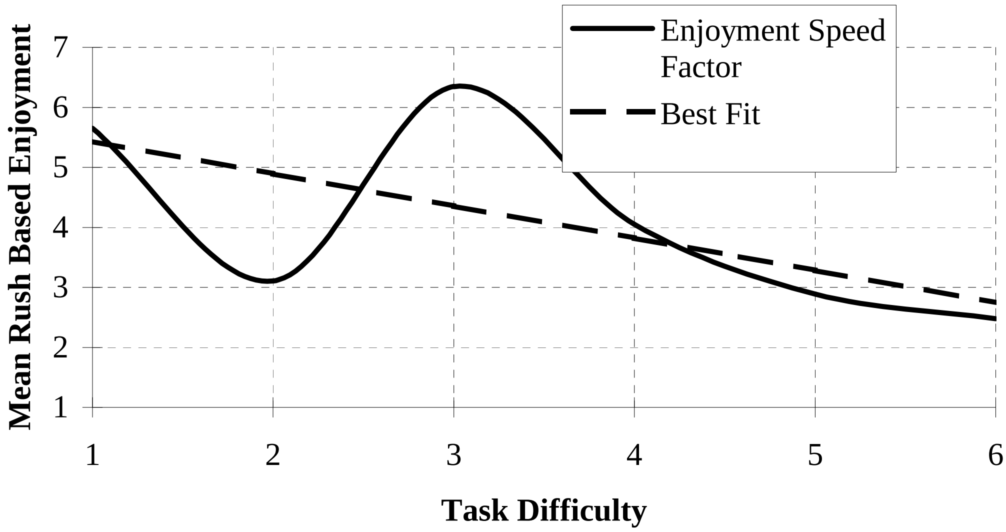


Table 9.19 Rush Based Enjoyment and Task Difficulty

		Rush Based Enjoyment			
		Low	Med	High	Total
Task Difficulty	Low	33%	47%	20%	100%
	Med	19%	53%	29%	100%
	High	73%	27%	0%	100%
	Total	41%	42%	16%	100%

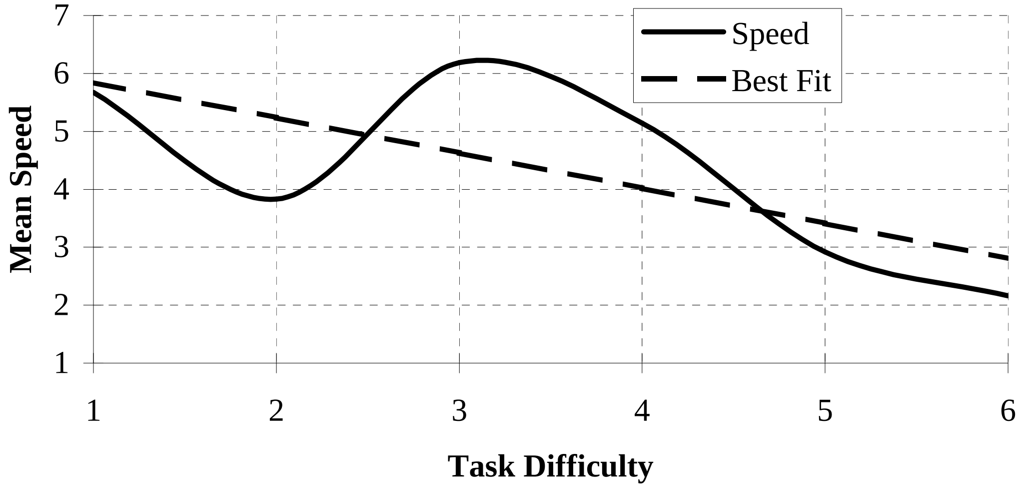
Chi Squared $p < 0.001$

Figure 9.15 Mean Rush Based Enjoyment and Task Difficulty



As ‘Rush Based Enjoyment’ is related to speed, speed may be inversely related to task difficulty. This is further supported by the similar negative gradient when mean average speed is compared to task difficulty (Figure 9.16).

Figure 9.16 Mean Speed and Task Difficulty



‘Challenge Based Enjoyment’ has a different relationship to task difficulty than ‘Rush Based’; with high enjoyment being found at medium task difficulty, and very low enjoyment at low and high task difficulty. This is a flow type enjoyment profile, with maximum enjoyment being found at a level when skills are matched to the task difficulty (Table 9.20). When task difficulty is low, then an apathetic state is

produced, which is not enjoyable. At the other end of the scale, with a high task difficulty that approaches the limits of the rider's skills, anxiety results being felt as the non-enjoyable state of risk

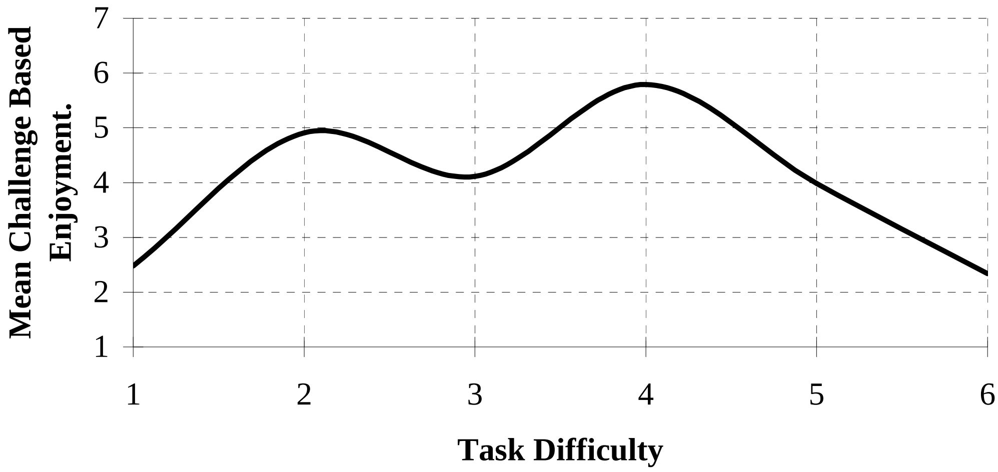
Table 9.20 Challenge Based Enjoyment and Task Difficulty

		Challenge Based Enjoyment			
		Low	Med	High	Total
Task Difficulty	Low	57%	35%	8%	100%
	Med	32%	45%	23%	100%
	High	65%	30%	5%	100%
	Total	51%	37%	12%	100%

Chi Squared $p < 0.001$

Figure 9.17 reflects this flow interpretation. Low enjoyment from challenge is present at low task difficulty where the skill set is not being tested. At higher task difficulty, where the skill set is being challenged, enjoyment also reduces. In the mid-range difficulties, where challenge is matched by the rider's skills, enjoyment is greater.

Figure 9.17 Mean Challenge Based Enjoyment and Task Difficulty



At high task difficulty risk is significantly over represented (Table 9.21) at 47%, with high risk at medium and low task difficulty having a total rating of 6%. Low risk is also under represented at high task difficulty.

Figure 9.18 demonstrates that risk generally rises with task difficulty, however the deviation from the best-fit line also shows that this increases does not tend towards being linear. Rather risk swings between 3.5 and 4.5 for lower task difficulties, before rising steeply at a task difficulty of 5 and remaining high. This suggests that

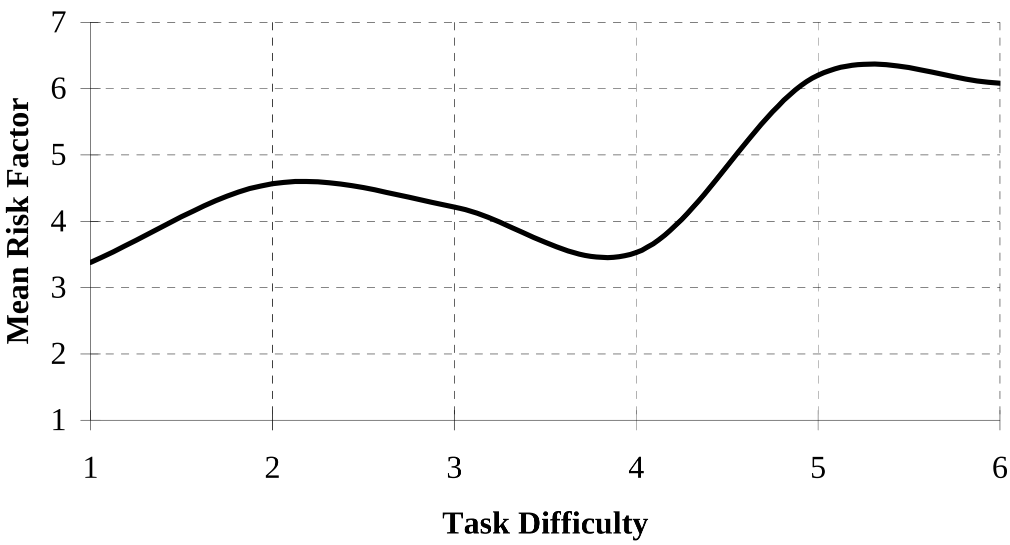
below a task difficulty threshold risk is fairly constant, but once that threshold has been exceeded then risk increases with a step function. This step function with the data is consistent with the theory of task homeostasis (Fuller, 2005)

Table 9.21 Risk Factor and Task Difficulty

		Risk Factor			
		Low	Med	High	Total
Task Difficulty	Low	39%	58%	3%	100%
	Med	45%	52%	3%	100%
	High	13%	39%	47%	100%
	Total	33%	49%	18%	100%

Chi Squared $p < 0.001$

Figure 9.18 Mean Challenge Based Enjoyment and Task Difficulty



9.5 Conclusion

Through developing themes evident from the scenario analysis, the way in which individual aspects of riding influence risk and enjoyment was explored. Bends are important to enjoyment, with the relationship between enjoyment and bends tending towards being exponential. There is a relationship between challenge and enjoyment; however, lack of challenge is more likely to be an enjoyment inhibitor. Speed is important for enjoyment, but this relationship is a step function rather than linear, a minimum speed is needed for enjoyment.

Factor analysis on the data gave two factors that are enjoyment related. One of these factors is 'Challenge Based', with bends being highly weighted, and the other 'Rush Based' with speed as a major factor. 'Rush Based Enjoyment' is rated higher when riding is less difficult. However 'Challenge Based Enjoyment' is less affected by task difficulty.

This chapter has profiled the enjoyment and risk factors for PTW riders, how though is this different from car drivers? The next chapter compares these PTW profiles with car drivers.

Chapter 10 – Cars and Bikes

"Speed has never killed anyone, suddenly becoming stationary... That's what gets you."

Jeremy Clarkson (1960 -)

10.1. Introduction

The analysis of the factors influencing risk and enjoyment for riders suggests that risk was found where riders did not feel in control. Enjoyment was found in two ways; 'Rush Based' where speed was a key element and 'Challenge Based' where pleasure was derived through feeling 'at one' with their bike, while meeting the challenges of the bendy road.

This identification of factors relating to risk and enjoyment for PTW users can help in understanding their rider goals. But are these factors the same for all road users? In order to establish any differences from other road users a similar exploration was undertaken with car drivers. This chapter compares the risk and enjoyment factors of car drivers with those of PTW riders

10.2. Dataset

A similar questionnaire to the one that was used to investigate enjoyment factors for riders was employed to explore enjoyment factors for drivers. This questionnaire (Questionnaire 8) presented the respondent with only one of the scenario photographs, with the web-based software rotating the scenario photographs and ensuring that there were a comparable number of respondents for each scenario. The respondent was asked for ratings of various aspects relating to the presented scenario. These aspects were the same ones that were used for the collection of data from riders. Respondents indicated their answers on a five-point Likert scale, however the data collected from riders [Q7] employed a ten-point scale. Therefore rescaling of data was required to allow comparison.

A total of 176 drivers responded to the online questionnaire ().

10.3. Risk and Enjoyment

The data presented in Chapter 9 demonstrated that there is not a linear relationship between risk and enjoyment for PTW riders.

For drivers there is an inverse relationship (Table 10.1) where high risk correlates with low enjoyment, and low risk with high enjoyment.

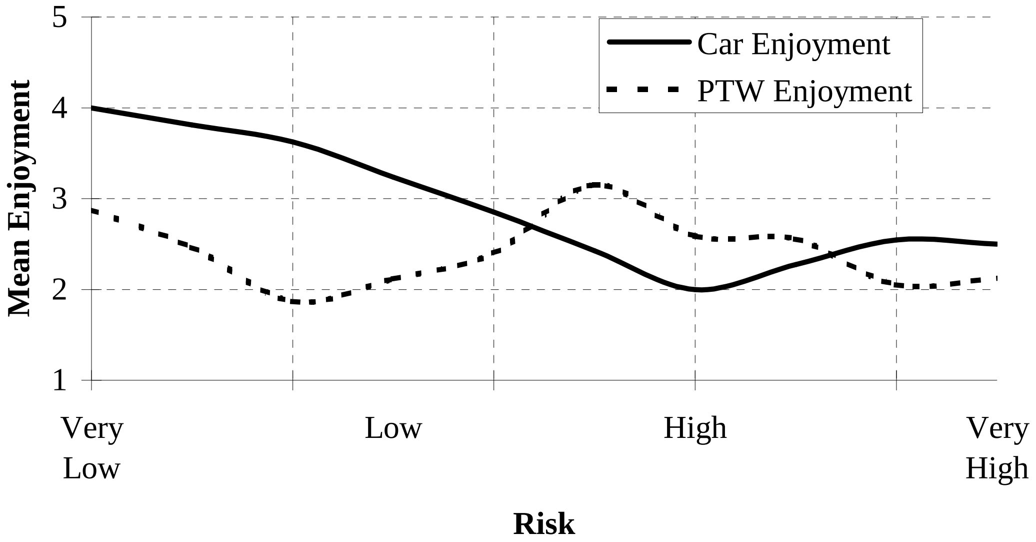
Figure 10.1 shows a comparison of rider and driver risk/enjoyment profiles, demonstrating the differences between the two road user groups. Drivers' enjoyment decreases with an increase in risk, while rider enjoyment peaks at a mid-risk value.

Table 10.1 Driver Risk and Enjoyment

		Enjoyment			
		Low	Med	High	Total
Risk	Low	6%	7%	21%	34%
	Med	14%	19%	7%	39%
	High	21%	2%	4%	26%
	Total	41%	28%	31%	100%

Chi Squared $p < 0.001$

Figure 10.1 Risk and Enjoyment for Drivers and Riders



Generally drivers gain enjoyment in less risky situations compared to riders with the driver profile being similar to the rider 'Risk Averse' type. Therefore, in general, drivers are risk averse.

10.4 Risk

There is a perceptible difference in how risk relates to the assessed factors for drivers and riders. Tables 10.2a and 10.2b indicate significant Pearson correlations of driver

and rider variables with risk. There are only two common variables that have a high correlation – road features and other traffic.

A comparison of road features for the two vehicle types, with respect to risk, shows quite similar profiles (Figure 10.2). There is a linear increase in risk with rated road features, until a threshold is reached where risk plateaus at a constant level.

Table 10.2 Pearson Correlation for Car and PTW Risk

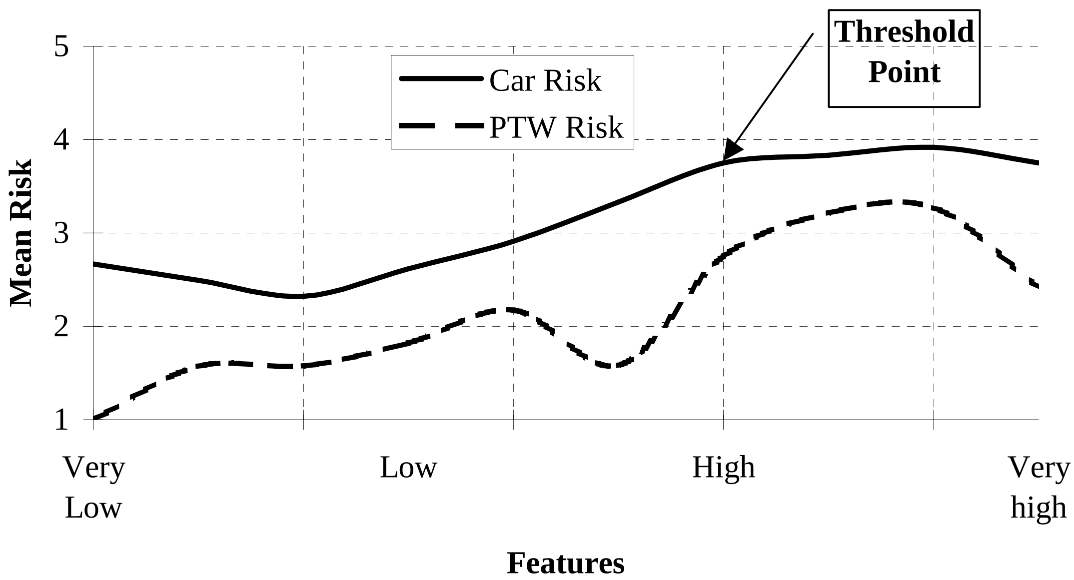
Table 10.2a Pearson Correlation and Car Risk

	Pearson Correlation	Sig
Speed	-0.51	<0.001
Temptation	-0.40	<0.001
Visibility	-0.33	<0.001
Features	0.56	<0.001
Traffic	0.62	<0.001

Table 10.2b Pearson Correlation and PTW Risk

	Pearson Correlation	Sig
Road Surface	0.30	<0.001
Distraction	0.45	<0.001
Features	0.52	<0.001
Traffic	0.58	<0.001

Figure 10.2 Risk and Road Features for Drivers and Riders



There is also a parallel relationship between car drivers and PTW riders when risk is compared to the ratings for other traffic (Figure 10.3). The three other elements that correlated with risk: speed, temptation and visibility – were all with a negative correlation (Table 10.2). Drivers are therefore less likely to be tempted to drive

enthusiastically, or willing to drive fast, in areas that are consider risky. They also feel that it is more risky when visibility is reduced.

Figure 10.4 illustrates the difference between the interaction of speed and risk for drivers and riders, clearly demonstrating that at low risk drivers are more willing to drive faster. At medium to very high speeds risk is constant, showing that once risk reduces to a certain level then risk is no longer a speed inhibitor. For riders the relationship between risk and speed is less clear.

Figure 10.3 Risk and Other Traffic for Drivers and Riders

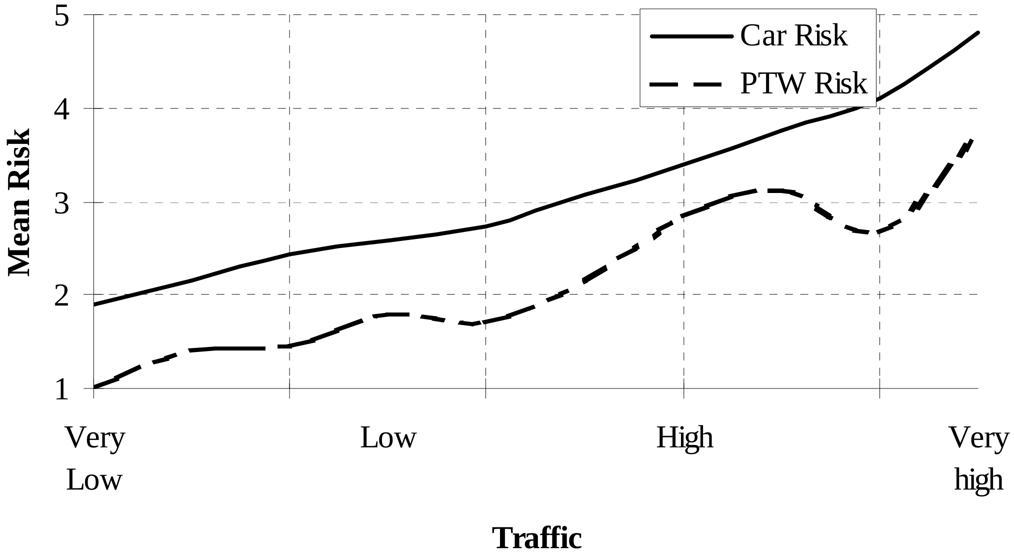
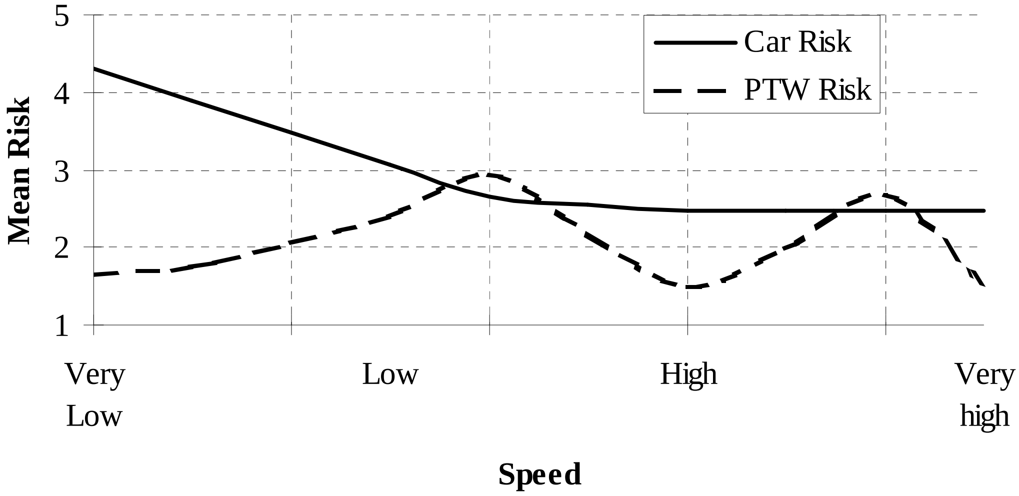


Figure 10.4 Driver Risk and Speed



This comparison of data suggests that risk perception for car drivers and PTW users is quite distinct in the factors that influence risk. The next section compares enjoyment for car drivers and PTW riders.

10.5 Enjoyment

Out of the seven variables that correlate with enjoyment for car drivers, five also correlate for riders (Table 10.3): Road surface quality; bends; temptation; speed; and surroundings. Other traffic and road features appear in the car enjoyment list, but not PTW enjoyment, with visibility and challenge correlating for PTWs and not drivers.

Table 10.3 Pearson Correlation of Car and PTW Enjoyment

Table 10.3a Pearson Correlation and Car Enjoyment

	Pearson Corr	**Sig.**
Traffic	-0.49	< 0.001
Road Features	-0.39	< 0.001
Road Surface Quality	0.32	< 0.001
Bends	0.34	< 0.001
Temptation	0.61	< 0.001
Speed	0.70	< 0.001
Surroundings	0.80	< 0.001

Table 10.3b Pearson Correlation and PTW Enjoyment

	Pearson Corr	**Sig.**
Visibility	0.42	< 0.001
Bends	0.43	< 0.001
Road Surface Quality	0.45	< 0.001
Challenge	0.46	< 0.001
Temptation	0.51	< 0.001
Surroundings	0.52	< 0.001
Speed	0.55	< 0.001

Four out of the five correlated items for risk (Table 10.2b) also correlate with enjoyment (Traffic, Road Features, Temptation and Speed), however the direction of correlation for these items is reversed (Table 10.2b and Table 10.3b). This should not be surprising because, as described in Section 10.3, there is a negative correlation between risk and enjoyment for drivers (Figure 10.1). Both drivers and riders find more enjoyment in areas that have a higher road surface quality (Figure 10.5) where both profiles are very similar. Similar profiles also exist when comparing drivers and riders with respect to bends (Figure 10.6), despite the challenge variable not correlating with enjoyment for drivers. The lack of correlation gives the impression that drivers may not believe that driving around bends is challenging their skill set in a rewarding way.

Figure 10.5 Enjoyment and Road Surface Quality for Drivers and Riders

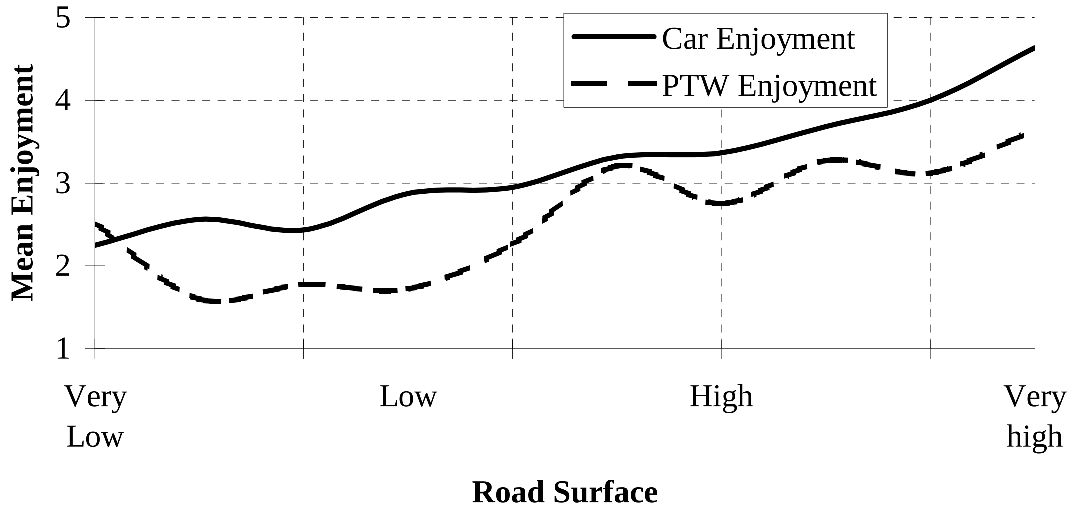
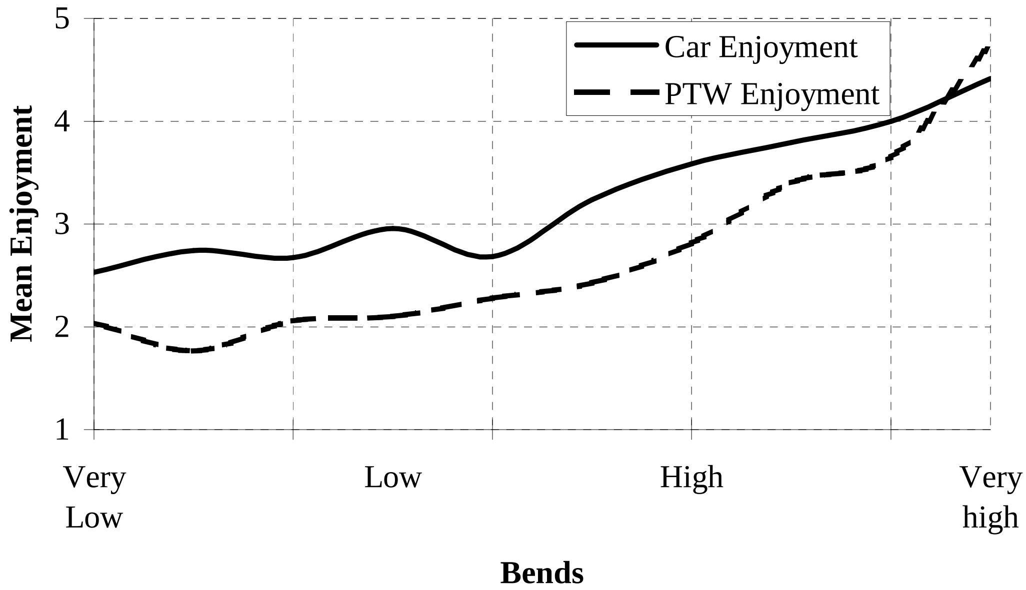
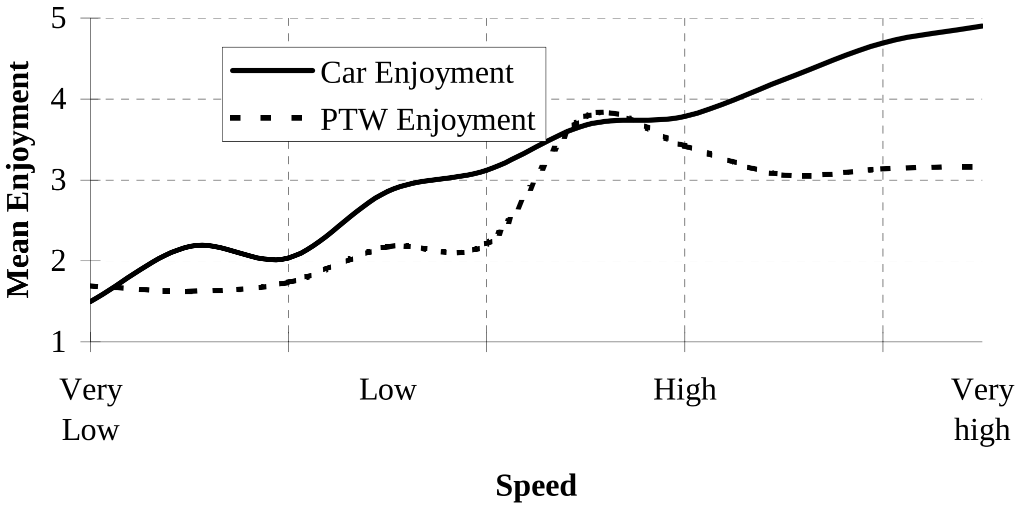


Figure 10.6 Enjoyment and Bends for Drivers and Riders



One of the elements that relate to both risk and enjoyment for drivers is speed, with a positive correlation of 0.70 for enjoyment and a negative correlation of minus 0.51 for risk. Figure 10.7 compares enjoyment for drivers and riders in relation to speed. For car drivers, enjoyment increases linearly, while for riders enjoyment is a step function occurring at a mid-speed rating.

Figure 10.7 Enjoyment and Speed for Drivers and Riders



Enjoyment for PTW riders and car drivers are similar in many ways. However, as demonstrated there are also differences.

10.6 Enjoyment and Risk Types

Factor analysis on the car data resulted in similar factors being extracted to the PTW data (Section 9.5); a comparison is shown in Table 10.4.

Table 10.4 Enjoyment and Risk Factors for Cars and PTWs

Table 10.4a Enjoyment and Risk Factors (Car)

Factor	**RBE**	**CBE**	**ER**
Surface	0.21	**0.54**	-0.19
Features	-0.12	-0.05	**0.79**
Visibility	**0.76**	-0.35	-0.09
Distraction	-0.08	-0.05	**0.86**
Traffic	-0.27	-0.05	**0.81**
Temptation	**0.80**	0.22	-0.27
Surroundings	**0.54**	**0.49**	**-0.45**
Challenge	-0.14	**0.79**	0.13
Bends	-0.17	**0.89**	0.04
Speed	**0.81**	0.15	-0.36
Overtaking	**0.87**	-0.25	-0.08
Risk	-0.30	0.10	**0.77**
Enjoyment	**0.60**	**0.50**	**-0.42**

Table 10.4b Enjoyment and Risk Factors (PTW)

Factor	**RBE**	**CBE**	**ER**
Surface	**0.46**	**0.64**	0.14
Features	-0.06	0.04	**0.82**
Visibility	**0.88**	-0.07	0.18
Distraction	-0.04	0.00	**0.88**
Traffic	0.16	0.12	**0.87**
Temptation	**0.80**	**0.41**	-0.17
Surroundings	**0.63**	**0.58**	-0.16
Challenge	0.03	**0.88**	0.09
Bends	-0.08	**0.90**	0.20
Speed	**0.85**	0.38	-0.06
Overtaking	**0.87**	-0.19	-0.02
Risk	-0.02	0.19	**0.72**
Enjoyment	**0.48**	**0.52**	0.16

Factor 1, 'Rush Based Enjoyment' (RBE) contains the same elements as the equivalent PTW factor, with the exception of road surface quality, which is excluded. Factor 2, 'Challenge Based Enjoyment' (CBE) is also similar to the PTW factor, but without the temptation element. External Risk (ER) is also compared in Table 10.4.

The inclusion of road surface quality for riders in 'Rush Based Enjoyment' shows that riders are less likely to ride fast unless the road surface quality allows it. Drivers may feel that cars are stable enough to drive fast in a straight line, even with poor road surface quality.

The enjoyment weighting for car drivers in the 'Rush Based Enjoyment' factor is somewhat higher than its corresponding PTW factor (0.60 and 0.48 respectively). This could imply that 'Rush Based Enjoyment' is a more significant way of gaining enjoyment for drivers.

Using the same method that was employed for analysing the PTW data (Section 9.5.3), driver responses were categorised into 'enjoyment types', depending where they sat on the 'Rush Based' / 'Challenge Based' spectrum. One main difference for car drivers is that the middle category is designated as neither/both rather than just both as 51% of drivers in this group had both low 'Challenge Based Enjoyment' and low 'Rush Based Enjoyment', compared to 2% of riders.

Figure 10.8 Driver Enjoyment Types

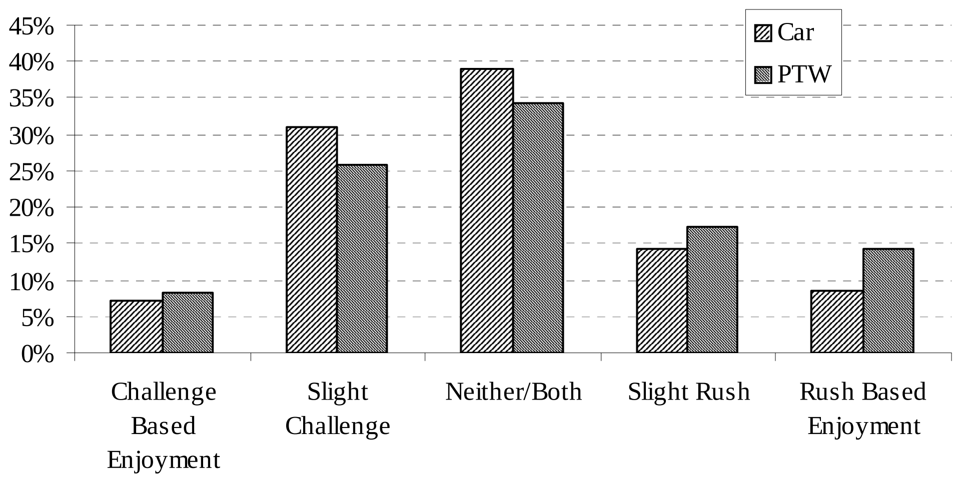


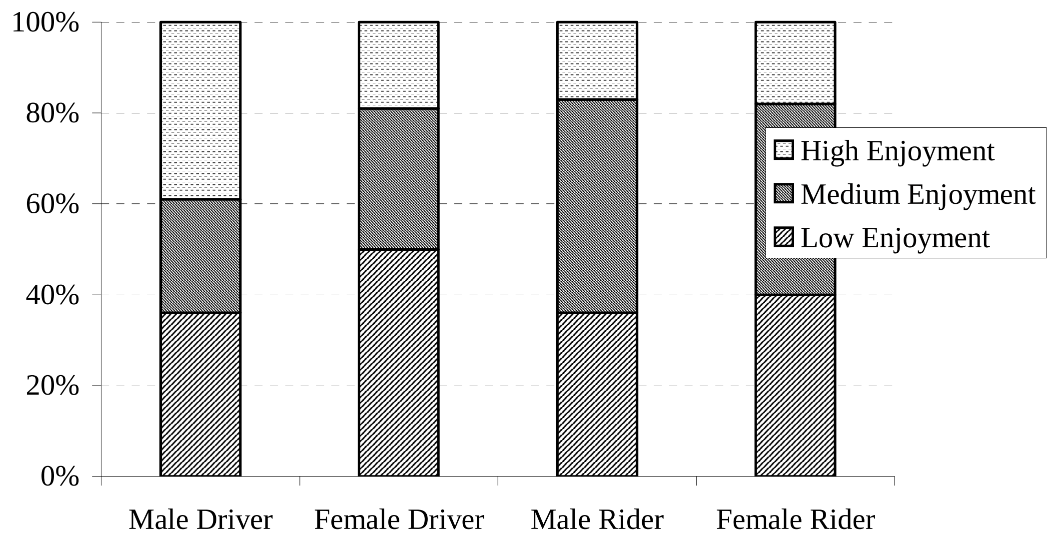
Figure 10.8 compares these types, showing that car drivers are less likely to gain enjoyment from rush than riders, but are more likely neutral or slightly biased to challenge. PTW riders have a greater representation at the extremes of the scale,

implying that riders are more polarised in how they get their enjoyment than drivers. When comparing how enjoyable the genders find riding and driving, the suggested evidence is that males enjoy driving more than females. However there is no discernable difference between the genders for PTW riders (Table 10.5 and Figure 10.9).

Table 10.5 Enjoyment and Gender

		Enjoyment				
		Low	**Med**	**High**	**Total**	
Car	Male	36%	25%	39%	100%	p = 0.018
	Female	50%	31%	19%	100%	
PTW	Male	36%	47%	17%	100%	p = 0.846
	Female	40%	42%	18%	100%	

Figure 10.9 Enjoyment and Gender



'Rush Based Enjoyment' was the only enjoyment type that was significant for PTWs when cross-tabulated with gender. The rider profile is in some ways different from that of car drivers (Table 10.6 and Figure 10.10).

Table 10.6 Rush Based Enjoyment and Gender

		Low	**Med**	**High**	**Total**	
Car	Male	40%	38%	23%	100%	p = 0.094
	Female	56%	30%	14%	100%	
PTW	Male	42%	44%	14%	100%	p = 0.034
	Female	40%	31%	29%	100%	

Figure 10.10 Comparison of Rush Based Enjoyment

For riders, females have a higher representation at the higher enjoyment levels than males, with this being reversed for car drivers. As discussed earlier, this may in part be explained by the type of females attracted to riding and its association with activity choice. Car driving is more likely to be a functional means of getting from A to B.

10.7 Task Difficulty

Thirty-two drivers were asked to rank the task difficulty of the six scenarios, using the same methodology that was used for PTWs (Chapter 8). Table 10.7 shows the mean ratings; the full data are contained in Appendix P. The scenario task difficulty ranking is the same for drivers as riders (from low task difficulty to high being scenarios 1, 2, 4, 6, 3, 5).

Table 10.7 Scenario Rankings for Task Difficulty

ID	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Mean	*1.50*	*2.44*	*5.00*	*3.00*	*5.19*	*3.88*

As the scales used for collecting the car and PTW data were not the same the data were rescaled to allow for a comparison, the absolute values are not directly comparable. However comparisons can be made regarding the trends within the data.

A comparison of car and PTW task difficulty by enjoyment types demonstrates that they are very similar. Riders tend to have a larger increase in 'Rush Based Enjoyment' at mid-task difficulty and a larger reduction at the higher end of risk

(Figure 10.11). However there are no appreciable differences for 'Challenge Based Enjoyment' (Figure 10.12)

Figure 10.11 Comparison of Car and PTW Rush Based Enjoyment with Task Difficulty

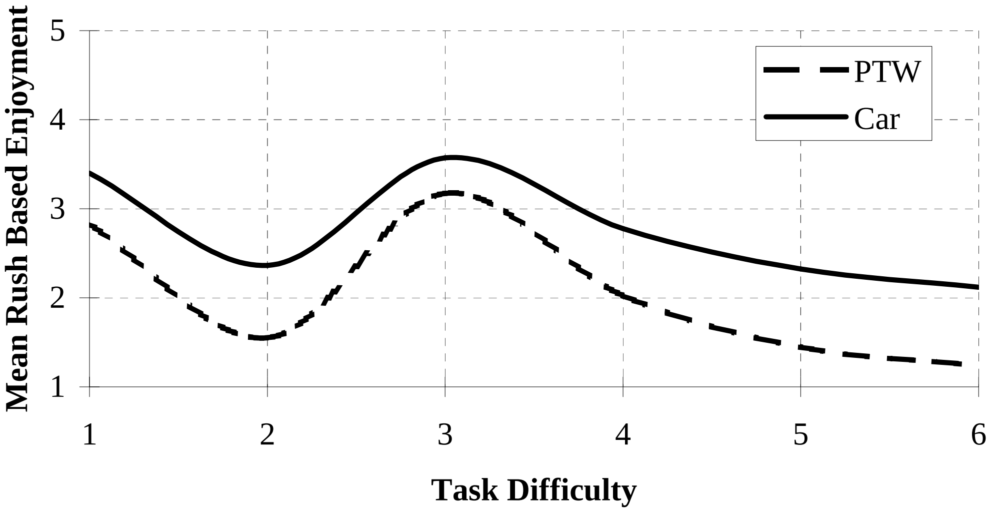
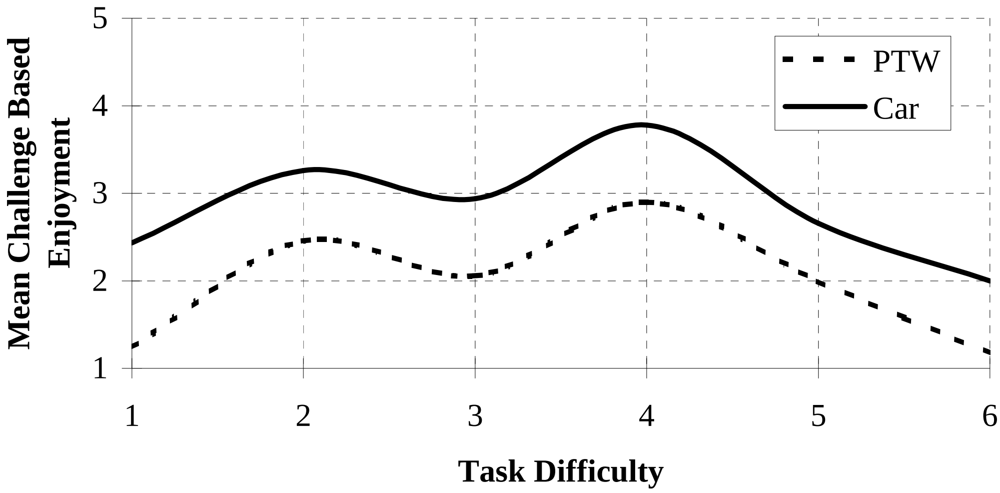
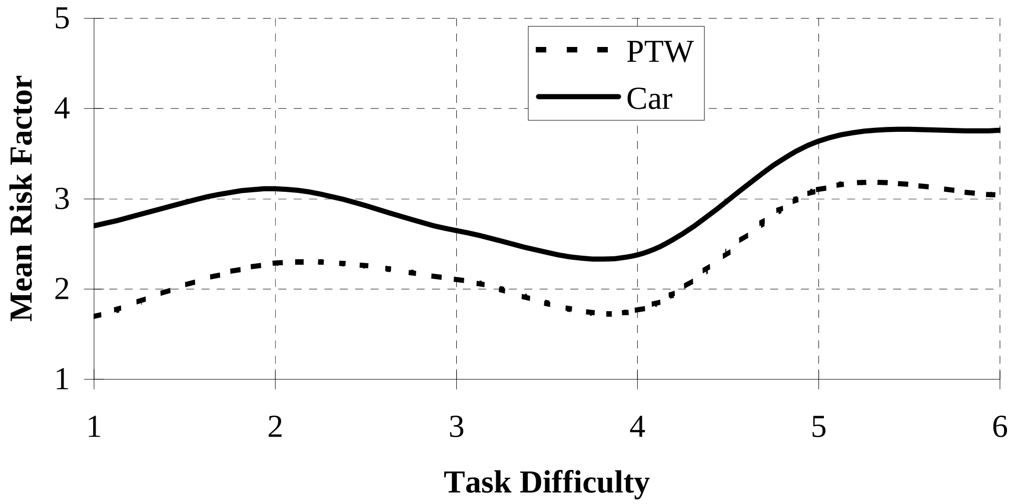


Figure 10.12 Comparison of Car and PTW Challenge Based Enjoyment with Task Difficulty



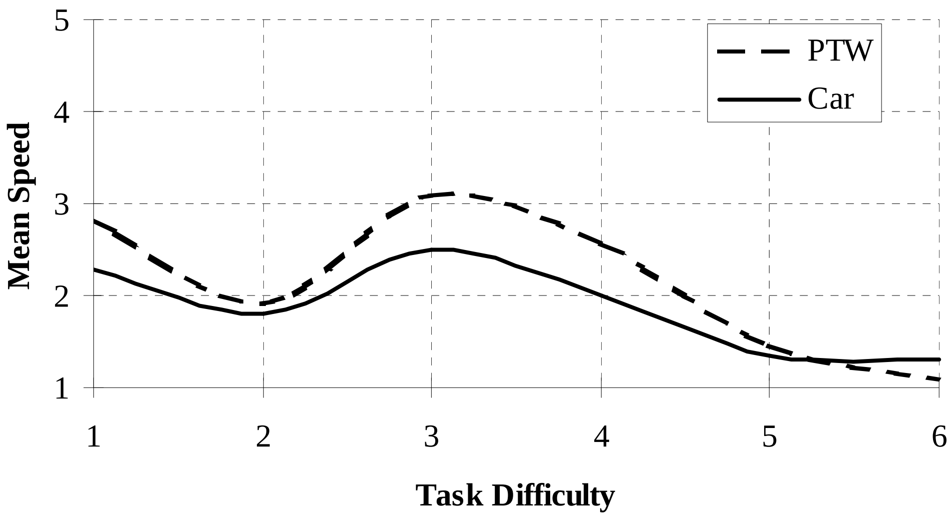
The 'External Risk' profile comparison illustrates that PTWs and Cars are also very similar (Figure 10.13), with risk being high for the upper task difficulties with a step function at a task difficulty rating of 4.

Figure 10.13 Comparison of Car and PTW External Risk Factor with Task Difficulty



Speed is a major element in the control of task difficulty (Fuller, 2005). Figure 10.14 compares task difficulty and speed for Cars and PTWs. For both the trend is for lower speeds at the high end of difficulty, with higher speeds at mid-range difficulty. However the increase in speed at this mid point is more prominent for PTW riders than car drivers.

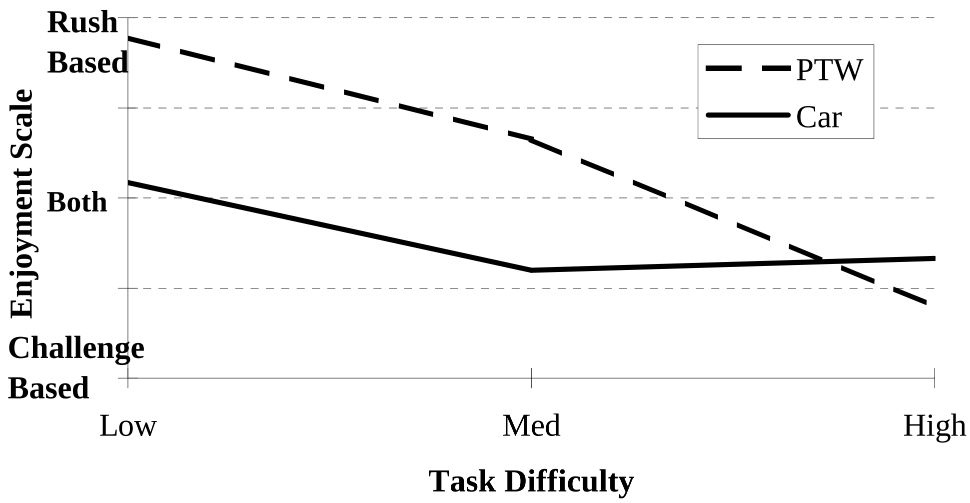
Figure 10.14 Comparison of Car and PTW Speed with Task Difficulty



Another difference between the types of vehicle users is found when a comparison of enjoyment types is carried out using a RBE/CBE scale (Figure 10.15). For car drivers and bike riders ‘Rush Based Enjoyment’ is higher at low task difficulty, but

'Challenge Based Enjoyment' is more likely at a higher task difficulty. However the driver profile is more linear than the one for riders, with riders having an appreciably higher rush based enjoyment at low difficulty.

Figure 10.15 Comparison of Car and PTW Enjoyment Types with Task Difficulty



10.8 Young Drivers and Riders

Young drivers and riders are over-represented in KSI accidents (DfT, 2004c, 2005b, 2006a; Harre, 2000; Stradling, 2005). This higher risk for both warrants investigation to uncover any differences between the young and old, but also between young PTW riders and young car drivers.

Table 10.8 Young Riders/Drivers and Enjoyment

Table 10.8a Young Riders and Enjoyment

Enjoyment	Under 26	26 and Older	Total
Low	13%	39%	37%
Med	63%	45%	46%
High	25%	17%	17%
Total	***100%***	***100%***	***100%***

Chi Squared p = 0.037

Table 10.8b Young Drivers and Enjoyment

Enjoyment	Under 26	26 and older	Total
Low	20%	45%	43%
Med	13%	30%	28%
High	67%	25%	28%
Total	***100%***	***100%***	***100%***

Chi Squared p = 0.003

The level of enjoyment is different for younger road users (Table 10.8). Unlike riders, young drivers are more likely to find driving highly enjoyable (67%) than older

drivers (25%). Nearly half of older drivers rated enjoyment as low, suggesting that their driving is more out of necessity; need rather than want.

Younger drivers were much more likely to rate the scenarios as having a higher enjoyment level than riders or their older compatriots. This is illustrated in Figure 10.16 and Table 10.8

Figure 10.16 Enjoyment Comparison for Young Drivers and Riders

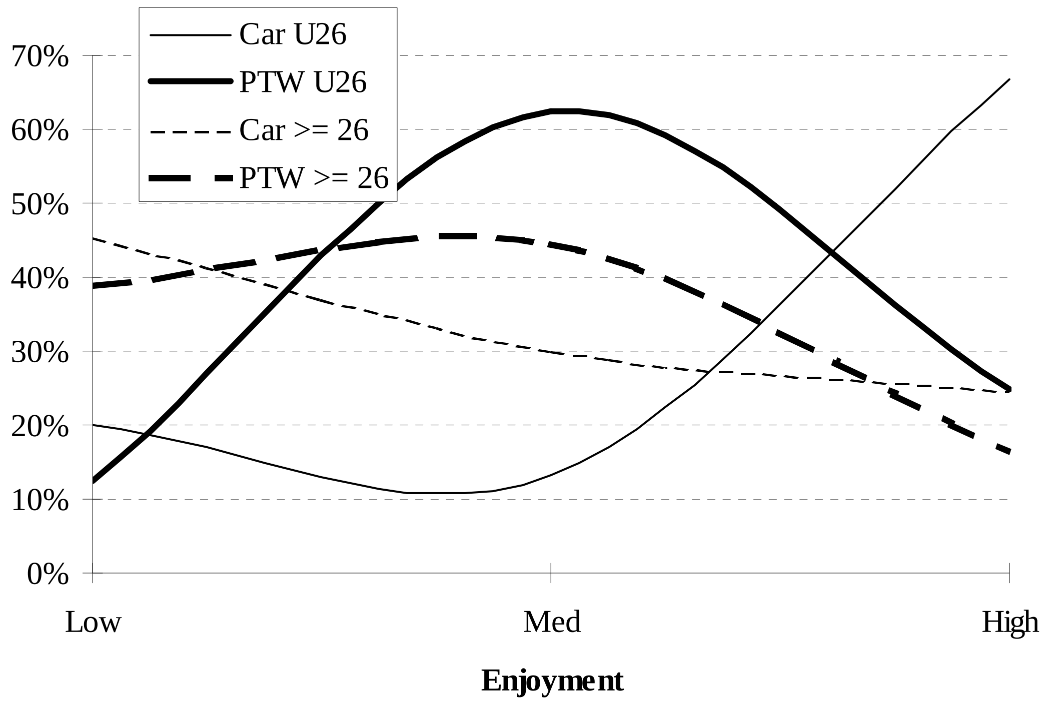


Table 10.9 Young Drivers/Riders and Enjoyment Type

Table 10.9a Young Riders and Enjoyment Type

	Under 26	26 and Older	Total
Challenge Based Enjoyment	17%	36%	34%
Neither/Both	13%	36%	34%
Rush Based Enjoyment	71%	28%	32%
Total	***100%***	***100%***	***100%***

Chi Squared $p < 0.001$

Table 10.9b Young Drivers and Enjoyment Type

	Under 26	26 and older	Total
Challenge Based Enjoyment	13%	41%	38%
Neither/Both	27%	41%	40%
Rush Based Enjoyment	60%	18%	22%
Total	***100%***	***100%***	***100%***

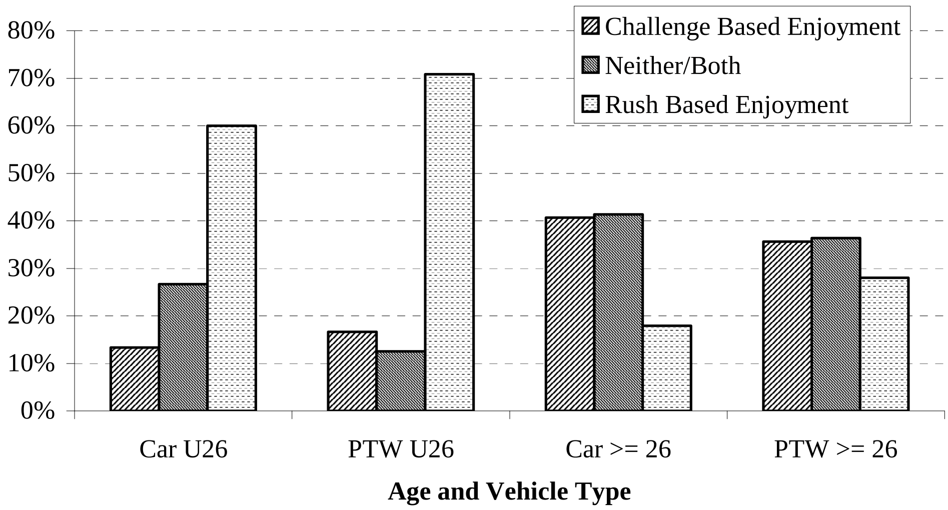
Chi Squared $p = 0.001$

Generally riding is more enjoyable than driving, perhaps reflecting the expressive nature of PTW use. However younger drivers' enjoyment ratings are substantially

higher than young riders. How though, is this enjoyment for young drivers and riders generated?

Young drivers are more likely to gain ‘Rush Based Enjoyment’ (60%) compared to older drivers (18%). ‘Rush Based Enjoyment’ is higher for riders than drivers – 71% for younger riders and 60% for younger drivers (Table 10.9 and Figure 10.17).

Figure 10.17 Enjoyment Type Comparison for Young Drivers and Riders



There is a plethora of publications that demonstrates that younger riders and drivers are more liable to be sensation seekers or risk takers (for example see RoSPA, 2002). This type of behaviour pattern is reflected in gaining ‘Rush Based Enjoyment’. Speed is one of the main factors that was identified in Section 9.5 and Section 10.6 as being related to ‘Rush Based Enjoyment’. Table 10.10b shows that around three-quarters of young drivers rated their speed within the scenarios as fast, compared to only about half of young riders (Table 10.10a). However 96% of riders aged under 26 gave a speed rating of medium or high, a similar number to drivers.

Table 10.10 Young Riders/Drivers and Speed

Table 10.10a Young Riders and Speed

Speed	Under 26	26 and Older	Total
Low	4%	54%	49%
Med	42%	26%	27%
High	54%	20%	23%
Total	***100%***	***100%***	***100%***

Chi Squared $p < 0.001$

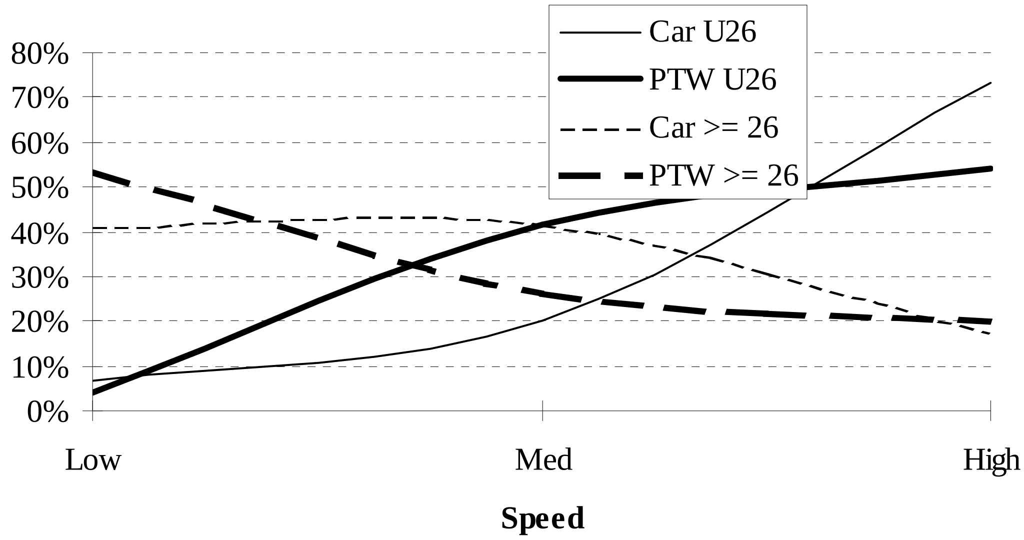
Table 10.10b Young Drivers and Speed

Speed	Under 26	26 and older	Total
Low	7%	41%	38%
Med	20%	42%	40%
High	73%	17%	23%
Total	***100%***	***100%***	***100%***

Chi Squared $p < 0.001$

This suggests that although young riders don't want to ride slowly, they are more conservative in their speed choice than young drivers. Figure 10.18 shows that the speed choice profile for the older age group is very similar for riders and drivers.

Figure 10.18 Speed Comparison for Young Drivers and Riders



Overtaking is another activity that is related to 'Rush Based Enjoyment'. Therefore it would be expected that younger riders and drivers would rate scenarios higher for overtaking opportunities than their older counterparts. This is shown in Tables 10.11a and 10.11b.

Table 10.11 Young Drivers/Riders and Overtaking

Table 10.11a Young Riders and Overtaking

Overtaking	**Under 26**	**26 and Older**	**Total**
Low	17%	73%	68%
Med	29%	11%	13%
High	54%	16%	19%
Total	***100%***	***100%***	***100%***

Chi Squared $p < 0.001$

Table 10.11b Young Drivers and Overtaking

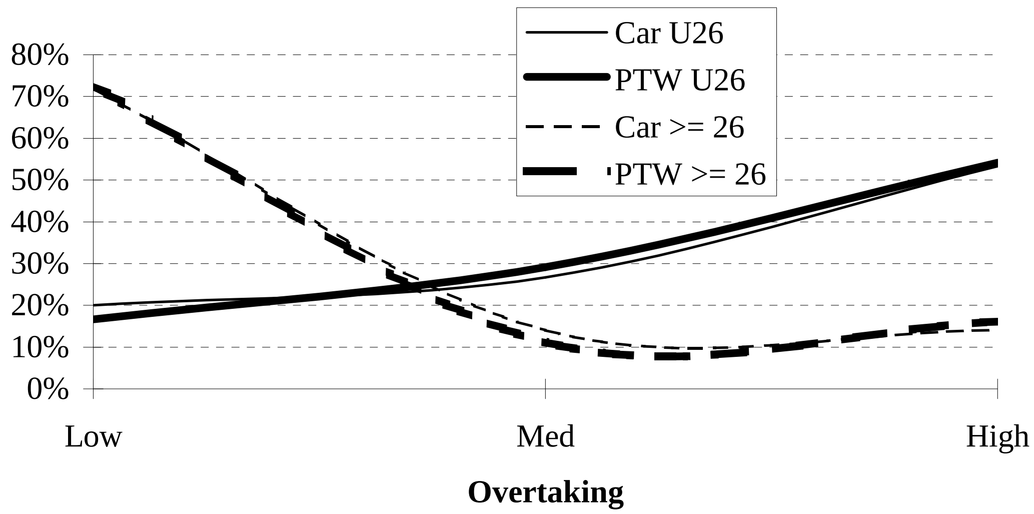
Overtaking	**Under 26**	**26 and older**	**Total**
Low	20%	72%	67%
Med	27%	14%	15%
High	53%	14%	18%
Total	***100%***	***100%***	***100%***

Chi Squared $p < 0.001$

Figure 10.19 shows that the driver and rider overtaking profiles are almost identical, with younger road users seeing more opportunity for overtaking than older road users. Other research has shown that young riders and drivers are over represented in overtaking accidents (Clarke, D.D., Ward, P., Truman, W. & Bartle, C. 2007).

Younger riders (DfT, 2006a) and drivers (DfT, 2004c) are over represented in the accident statistics, with these road users often taking part in road based risky activities (Stead, McDermott, Broughton, Angus & Hastings, 2006). The data collected using Questionnaire 7 and Questionnaire 8 supports this, but also show that there are differences, as well as similarities, between young drivers and riders. Young riders are more likely to find enjoyment from rush than young drivers, and both these groups rated the scenarios for overtaking opportunities in a similar way. However young drivers rated the scenarios for higher speed than riders, with this slower speed rating for riders perhaps being a reflection on riders being aware of being more vulnerable than drivers.

Figure 10.19 Overtaking Comparison for Young Drivers and Riders

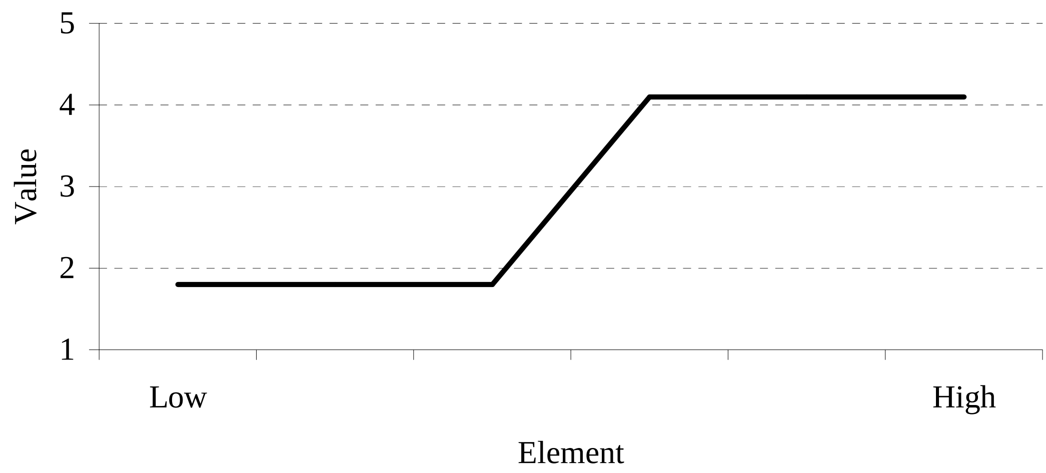


10.9 Causes of Enjoyment

An examination of the elements that affect rider and driver enjoyment reveals that they operate in one of two ways, either as being essential for enjoyment or enhancing enjoyment. Enjoyment-essential elements must be present at a certain level for enjoyment to be found and below this level enjoyment is low. Once the threshold level has been exceeded then enjoyment can be found, but any further increase in the element does not further increase enjoyment (Figure 10.20). The elements of visibility, speed and overtaking have similar properties.

Enjoyment-enhancer elements have a linear relationship with enjoyment; as they increase, enjoyment also increases. Road surface quality, temptation, pleasant surroundings, bends and challenge are enjoyment enhancer elements.

Figure 10.20 Example of Threshold Element



Although challenge and bends are enjoyment enhancers, they may not be a requirement for all riders or drivers. An examination of enjoyment from bends showed some polarisation, with enjoyment either coming from straight roads or very bendy roads, but not as noticeable from roads falling between these two extremes. Similarly, some riders found high enjoyment in areas of low challenge.

10.10 Conclusion

There would appear to be appreciably differences between motorcycle riders' views of risk and enjoyment compared to those of car drivers. For drivers as risk increases enjoyment decreases, while for PTW riders the relationship is more complex with a peak of enjoyment occurring at a mid-risk point. There is also a clear relationship between the speed a driver would be willing to drive at and risk, with drivers going slower as risk increases. This is not seen for riders.

However, many similarities exist for the two road user groups and factor analysis demonstrated that the three factors found for riders (Section 9.5) were also found for drivers, albeit with some noticeable differences. For 'Rush Based Enjoyment', drivers did not have the road surface quality element as a factor and the temptation element was not present in the drivers 'Challenge Based Enjoyment' factor.

Further analysis of the demographics of the two groups revealed a significant difference in enjoyment gender profiles; males enjoy driving more than females while there is no discernable gender differences for riders. This dissimilarity between riders and drivers may be due to females who do not enjoy driving, but feeling that they have to drive; it is not a choice activity. Riding is more of a choice activity and females who ride do so because they want to. Female riders are also more likely to want to experience 'Rush Based Enjoyment' than males, with the opposite being true for drivers. This may also be an effect of riding being a choice activity and females who choose to ride may be attracted to riding because they are sensation or thrill seekers.

The scenario ranking with respect to task difficulty was identical for drivers and riders, however there were differences in how riders and drivers felt. Riders have a high 'Rush Based Enjoyment' at low difficulty, with high 'Challenge Based Enjoyment' at greater difficulty. Drivers' profile of task difficulty and enjoyment type is more constant compared to riders. As a general statement, riding is more enjoyable than driving, however younger drivers rate scenarios higher for enjoyment than riders do.

This chapter shows that there are some similarities between riders and drivers, but there are also appreciable differences, such as how risk and enjoyment interact. There are also some divergences with elements relating to task difficulty. The significance of task difficulty to the riding experience is discussed in the next chapter.

Chapter 11 – Task Capability, Demand and Difficulty

Iron rusts from disuse, stagnant water loses its purity and in cold weather becomes frozen; even so does inaction sap the vigors of the mind.
Leonardo da Vinci (1452-1519)

11.1 Introduction

In previous chapters risk and enjoyment have been assessed with respect to task difficulty. According to Fuller (2005):

> *"task difficulty arises out of the dynamic interface between the demands of the driving task and the capability of the driver"* (Fuller, 2005 page 463).

Task difficulty therefore is a function of task demand and rider capability:

$$T_{dif} = f(T_{demand}, R_{Capability})$$

Where task demand can be defined as:

$$T_{demand} = \Sigma(Task_n) \quad \text{for n = 1 to number of tasks}$$

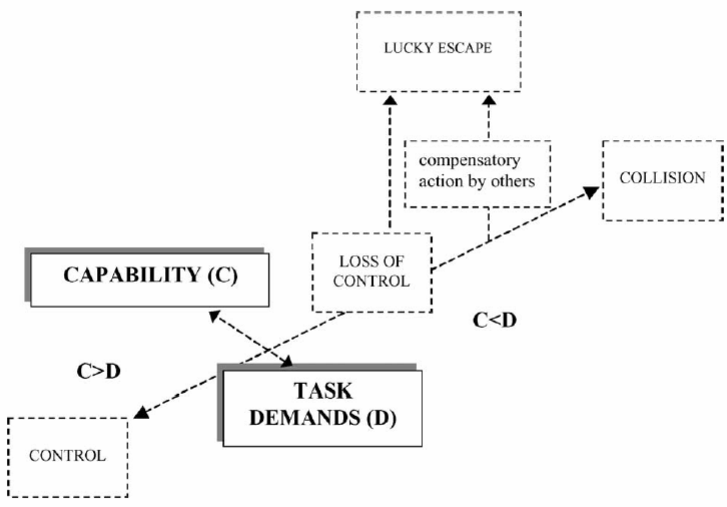
Various tasks can be associated with riding. Table 11.1 lists eleven components that include navigation, handling and speed selection. It is the sum of the demands for these individual tasks that gives the total task demand.

Table11.1 Eleven components of the riding task, adapted from Panou et al. (2005) and Stradling et al (2007)

Task	Description
Strategic levels	Activity choice (Functional and/or expressive) Departure time choice, route alternatives and travel time
Navigation tasks	Find and follow chosen or changed route
Hazard perception	Detection of hazards
Road tasks	Choose and keep correct position on road, road position may be modified by road surface quality hazards.
Traffic tasks	Maintain mobility ('making progress') while avoiding collisions (reaction to hazards)
Rule tasks	Obey rules, regulations, signs and signals
Handling tasks	Use PTW controls correctly and appropriately Interaction of PTW and rider (leaning at corners, etc)
Secondary tasks	Keeping visor clean/demisted; Acknowledgment of other riders; Using Satellite Navigation equipment
Speed task	Maintain a speed appropriate to the conditions; speed will be modified by hazard perception.
Mood management task	Maintain driver subjective well-being, avoiding boredom and anxiety
Capability maintenance task	Avoid compromising driver capability with alcohol or other drugs, fatigue or distraction

If a rider's capability exceeds the demands of all the tasks being undertaken during riding then the task will be in control. If the capability is lower that task demand then loss of control results. Figure 11.1 illustrates this loss of control resulting when Capacity is less than Demand (C<D), culminating in either a lucky escape or a collision.

Figure 11.1 Outcomes of the dynamic interface between task demand and capability. (Fuller, 2005:464)



The results of Fuller's (2005) task difficulty experiment are plotted in Figure 11.2 where a scenario was used to assess driver speed, task difficulty and risk.

For a given scenario task difficulty and experience of risk is related to speed. Statistical risk (risk of having an accident) is zero until a speed threshold is reached, then rises in a linear fashion.

Figure 11.3 is the same data that is shown in Figure 11.2, but plotted against task difficulty, indicating that the risk experienced has a linear relationship with task difficulty. Estimated crash risk is zero until a task difficulty threshold of just over 4 is reached, then this type of risk rises proportionally to task difficulty.

Figure 11.2 Ratings of Task Difficulty, Estimates of Crash Frequency and Ratings of Risk Experience. (Data extracted from Fuller, 2005:469)

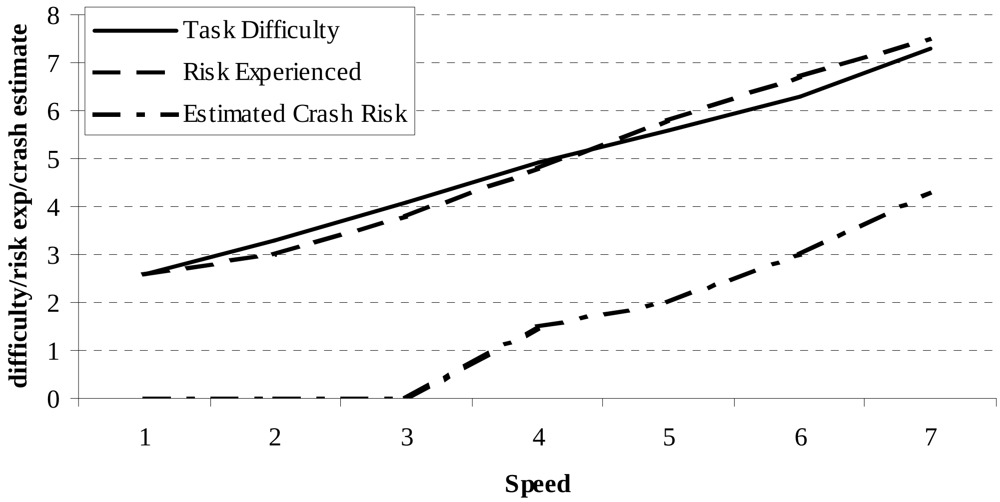
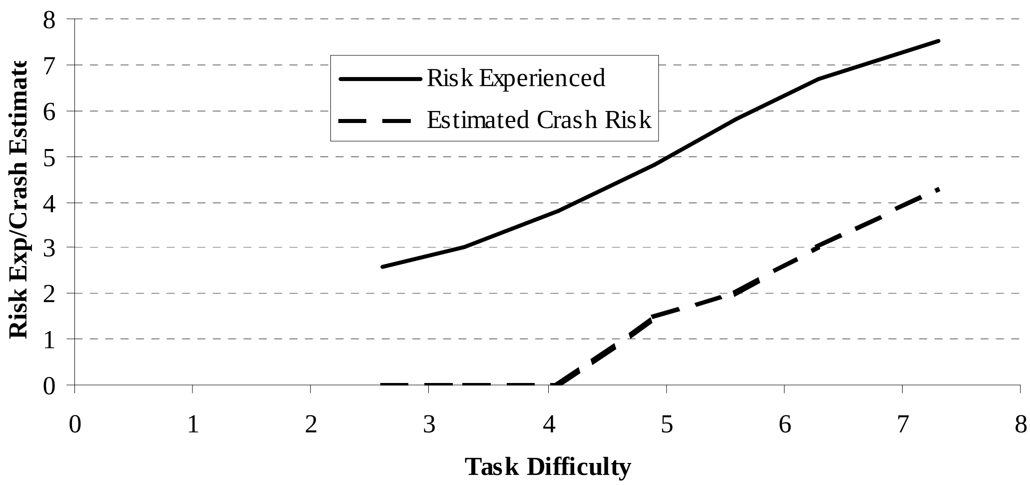


Figure 11.3 Estimates of Crash Frequency and Ratings of Risk Experience with Ratings of Task Difficulty. (Data extracted from Fuller, 2005:469)

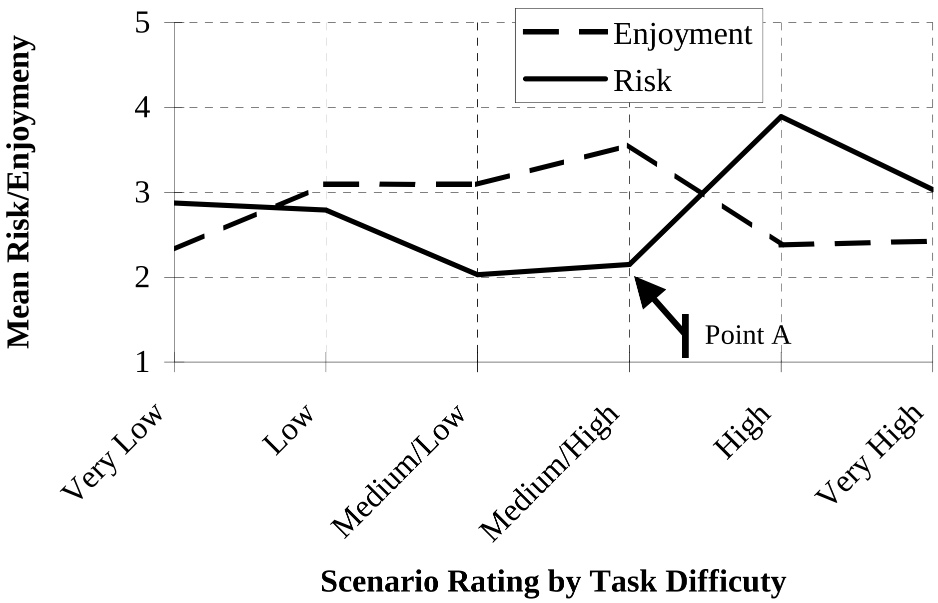


The data presented above were collected for one scenario, a country road, although in the original study three different road types were used (Fuller, 2005). However the data collected for this thesis were from six scenarios. This multiple scenario approach allowed for different riding/driving situations to be compared. The research for this thesis was less 'type' specific when asking respondents about risk, asking: 'How risky is this road to ride/drive'. The responses are most likely an assessment of perceived risk related to estimated crash risk and not statistical risk.

11.2 Task Difficulty and Riding Enjoyment and Risk

Two datasets comparing risk and enjoyment were collected by asking respondents to rate various scenarios for, amongst other elements, risk and enjoyment (Chapter 8 and Chapter 9). A smaller sub-set of respondents was used to assess the same scenarios for task difficulty (Section 8.5.2). Both Questionnaire 6 and Questionnaire 7 collected risk and enjoyment data for scenarios; the combined risk and enjoyment data are plotted against task difficulty in Figure 11.4. This demonstrates that risk is low (below 3) until point A, where a threshold is reached that causes a large rise in risk. At a similar point there is a large curtailment in enjoyment. This change in risk with the multi-scenario data (Figure 11.4) is not so precise as the single scenario data (Figure 11.3 and Table 11.2) because there is more variability between the scenarios used in this research compared to the single scenario reported from Fuller (2005). However, it does give a broader indication of the interaction of risk and enjoyment with task difficulty situation that is the reality of most riding/driving circumstances.

Figure 11.4 Risk and Enjoyment by Task Difficulty (All Scenarios)



This phenomenon at point A is emphasised by examining the change in risk and enjoyment across the task difficulties (ΔRisk and ΔEnjoyment).

Table 11.2 First Differential of Risk and Enjoyment

Task Difficulty	**Risk**	**Enjoyment**	**ΔRisk**	**ΔEnjoyment**
Very Low	2.9	2.3		
			-0.1	0.8
Low	2.8	3.1		
			-0.8	0.0
Medium/Low	2.0	3.1		
			0.1	0.5
Medium/High	2.2	3.6		
			1.7	-1.2
High	3.9	2.4		
			-0.9	0.0
Very High	3.0	2.4		

Point A

Between the Medium/High and High task difficulty there is a rise in risk of 1.7, this magnitude is approximately twice as large as any other increase, or decrease, in risk. At the same point of task difficulty there is a large decrease in enjoyment (-1.2).

To explore this further the risk and enjoyment variables were used to calculate a new variable in SPSS (riskenj):

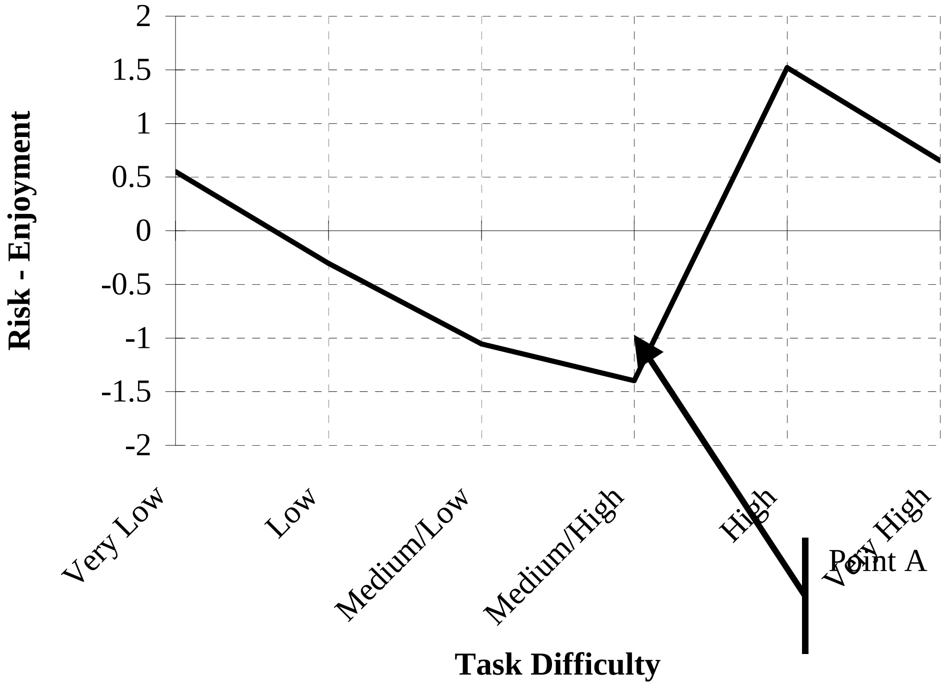
riskenj = risk – enj.

When risk is greater than enjoyment then riskenj is positive, and negative when enjoyment exceeds risk. Figure 11.5 is a plot of this variable against task difficulty.

At 'Point A' the decline in enjoyment and large increase in risk is clearly visible, with a total net swing of nearly 3 points.

The risk result is in line with the task difficulty graph shown in Figure 11.3, where risk increases at a threshold of task difficulty. The data also shows that at this task difficulty threshold point enjoyment declines rapidly. This enjoyment profile, rising at mid-difficulty and declining at a point of higher difficulty, is consistent with Csikszentmihalyi's (2000) theory of flow.

Figure 11.5 Differences Between Risk and Enjoyment by Task Difficulty (All Scenarios)



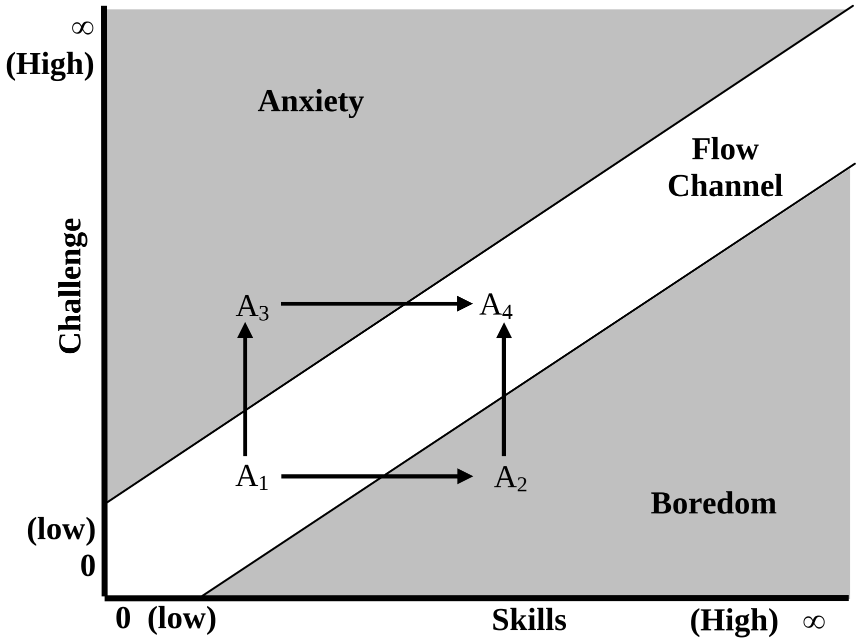
11.3 Task Difficulty and Flow

Figure 11.6 shows three of the four states of Csikszentmihalyi's (1990) theory of flow (Apathy is not shown as it is assumed that riders have a reasonable skill level, partly due to the level of training required prior to riding):

1. Boredom – Resulting when skills are higher than the required challenge.
2. Anxiety – Resulting when skills are lower than the required challenge.
3. Flow – The state entered into when skills and challenge are matched.

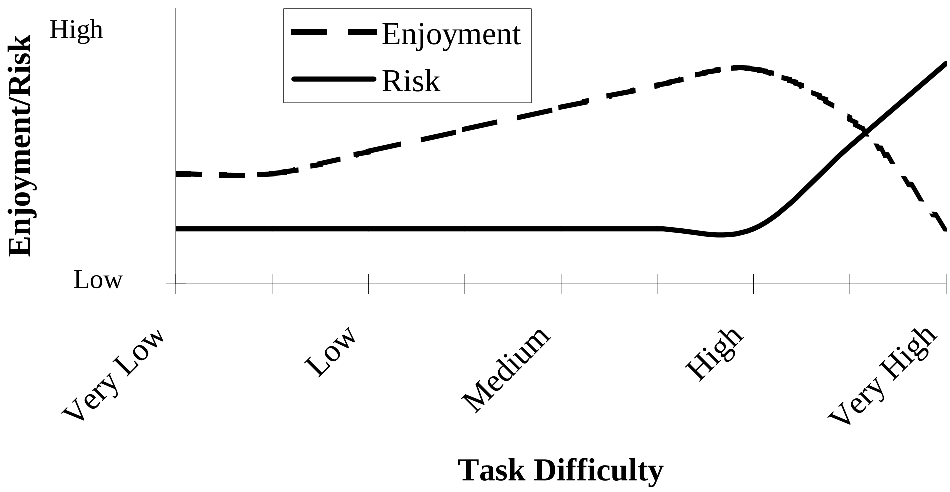
As challenge is being compared to skills, a high difficulty of the task at hand could also be described as challenging. The flow state itself is highly enjoyable, with boredom and anxiety being less so. Therefore if skill level is assumed to be constant, then enjoyment can be plotted against difficulty. For riders, the state of anxiety would most likely be felt as risk.

Figure 11.6 Flow (Source 'Flow: the psychology of optimal experience' by Csikszentmihalyi (1990) page 74)



It may be hypothesised that risk would remain relatively constant as task difficulty increased, until the point of flow is exceeded, when risk will suddenly rise. Figure 11.7 is an illustration, using synthesised data, of this interaction of risk and enjoyment with task difficulty.

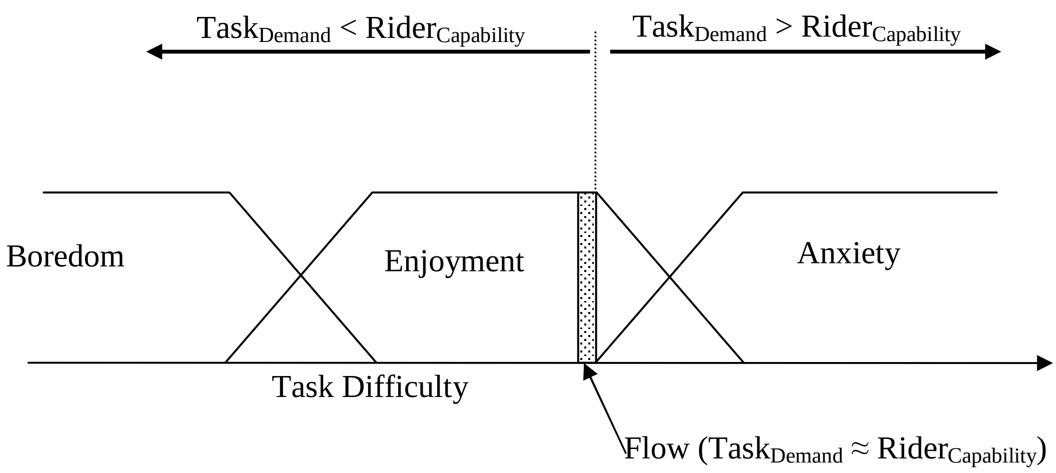
Figure 11.7 Enjoyment, Risk and Task Difficulty



A similar profile to the synthesised one is noticeable in Figure 11.4, with risk rising at

the same point that enjoyment deceases. How this relates to the states of flow is illustrated diagrammatically in Figure 11.8.

Figure 11.8 Linear Relationship of Flow States and Task Difficulty



The data, and the flow model, show that task difficulty is not only related to risk, but also to enjoyment. Once a threshold of task difficulty is reached then enjoyment declines and risk increases. As task difficulty is a function of task demand and rider capability, then a change in either of these will have an effect on task difficulty.   The task demand element can be affected directly by the nature of the road being ridden. Road elements that were identified as being related to enjoyment and risk were discussed in Chapter 9. How though do these elements interact with task difficulty?

11.4 Task Difficulty and Road Elements

The eleven elements identified as being related to risk and enjoyment (Chapter 8) can be split into two groups, those related to the external environment (road surface quality, road features, visibility, distractions, other traffic, challenge, surroundings and bends) and ones related to behaviour (speed, temptation and overtaking). Table 11.3 shows the Pearson correlation of these features with task difficulty.

The task of riding is made more difficult by two environmental aspects: distraction and other traffic. The environmental element of surroundings has a negative correlation with task difficulty. At first glance it may seem improbable that surroundings are inversely proportional to task difficulty. However the surroundings element is probably related to non-urban environments and riding around town may

be considered a harder task, as there are more potential hazards. This, in part, may be illustrated by surroundings having a high correlation with visibility (0.447, significance < 0.001), suggesting that visibility is reduced in an urban environment.

Table 11.3 Pearson Correlation with Task Difficulty

	Pearson Correlation	Significance
Road Surface Quality	-0.090	0.127
Road Features	0.184	0.002
Visibility	-0.283	< 0.001
Likelihood of Distraction	0.468	< 0.001
Other Traffic	0.399	< 0.001
Temptation to Ride Enthusiastically	-0.383	< 0.001
Surroundings	-0.377	< 0.001
Challenge	-0.003	0.963
Bends	-0.009	0.881
Speed	-0.448	< 0.001
Overtaking	-0.382	< 0.001

Three behavioural items correlate with task difficulty, with all of the correlations being negative: Speed, overtaking and temptation. Therefore where task difficulty is high the rider tends to ride slower, is less likely to overtake and would not be tempted to ride enthusiastically. This is logical, as for a rider to overtake or ride enthusiastically a high level of speed would be expected, which would, in turn, add further to the level of task demand.

Figure 11.9 Overtaking and Temptation with Speed.

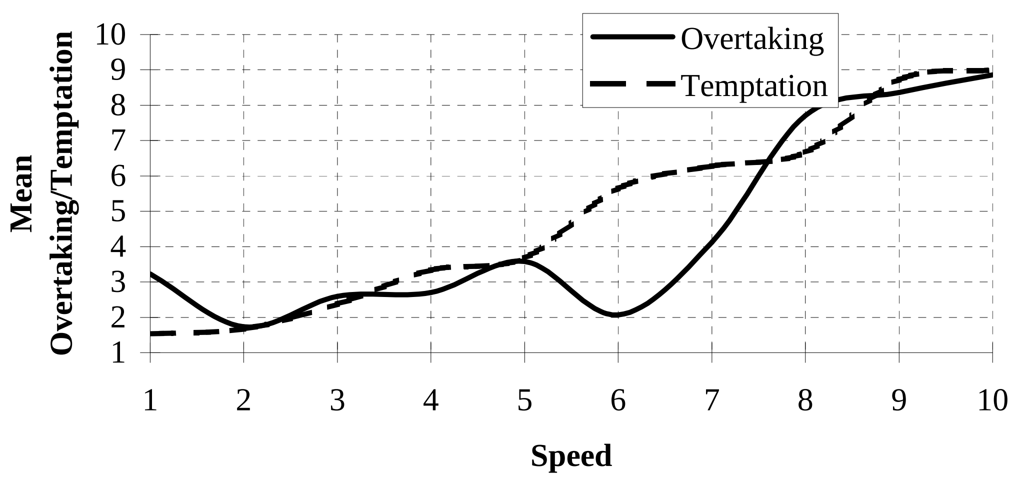


Figure 11.10 Task Difficulty with Mean Speed

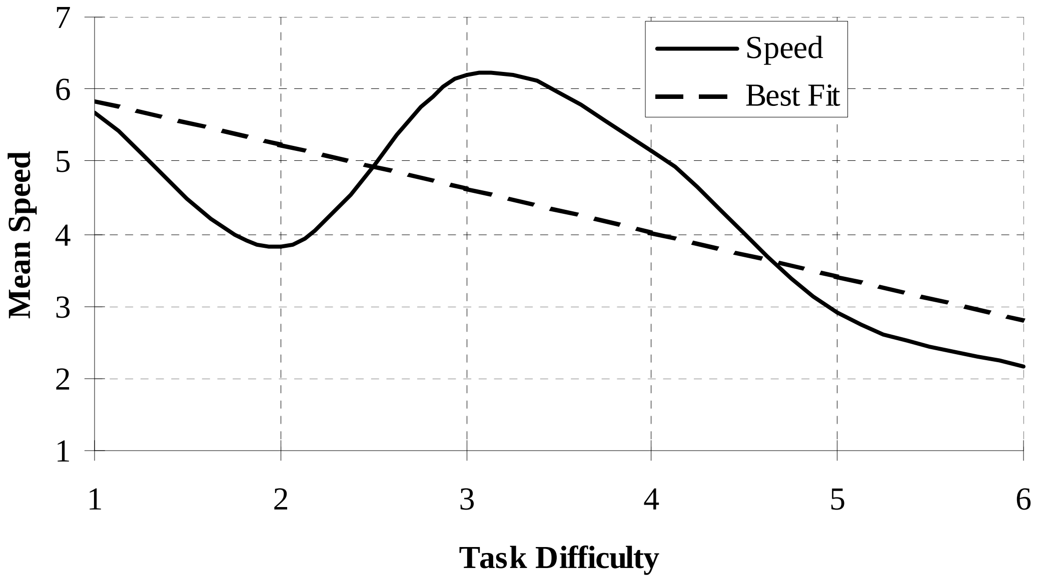


Figure 11.9 illustrates the positive linear relationship of overtaking and temptation with speed. The model of task difficulty discussed earlier showed that task difficulty is moderated by controlling task demand, which can be achieved by using riding speed (Figure 11.2). The evidence from the dataset collected using Questionnaire 7 is in line with this as speed, and elements relating to speed, are negatively correlated with task difficulty (Figure 11.10).

The data show that one of the main ways of reducing task demand is by reducing riding speed. Another way of reducing the overall task difficulty is to increase rider capability; this can be done by using more efficient implicit memory.

11.5 Implicit and Explicit Memory: Interaction with Capability.

Section 11.3 discussed how task difficulty and flow interact, with the state of flow being entered just before task demand begins to approach the limits of rider capability. In the discussion of neuro-cognitive mechanisms that underpin flow experience, Dietrich (2004) explains that for flow to exist then the activity being undertaken must be run exclusively using implicit memory. However Horswill & McKenna (2004) suggest that some conscious effort, or explicit memory use, is required for hazard perception. This implies that a rider who is in flow cannot be employing hazard perception techniques, or at best some very rudimentary heuristic version that can be implemented implicitly. Also when a rider is in a near flow state

then only the small amount of explicit memory that is available can be used to carry out hazard perception.

When a rider is operating mostly "on automatic", then the decisions made concerning potential threats have to be made quickly by the 'hazard stimulus' triggering a schema that implements a course of action. For example, braking when one sees the brake lights on the vehicle in front activate. When the stimulus does not align with one of these simple, but well-practiced, schemas then a higher level of cognitive demand is required to decide on what action is required (Klein, 1998). To allow for this the level of automation will decrease, and therefore rider capability will also decrease. This sudden reduction in capability can mean that task demand exceeds this lower capability level and create an 'out of control' situation (Figure 11.1 and Figure 11.8). The resulting out of control state can culminate either in a lucky escape or a collision; therefore the main causes of PTW accidents should be explainable by task demand exceeding rider capability.

11.6 Task Difficulty and Accidents

This section examines two types of common PTW accidents; loss of control on bends and crashes while overtaking, and applies task difficulty homeostasis to explain them.

Loss of control by the rider on bends is a major cause of KSI accidents. Clarke, Ward, Bartle & Truman (2004) reported that loss of control accidents on bends accounted for around 12% of all accidents, 7% on left-hand bends and 5% on right hand bends. In a similar study that looked at Scottish PTW accidents between 1992 and 2002, Sexton, Fletcher & Hamilton (2004) reported that 9% were 'going ahead on at right hand bend' and 11% 'going ahead on a left hand bend'. In Chapter 9 it was shown that bends are a major factor for 'Challenge Based Enjoyment'. This type of enjoyment is flow based, and therefore riders will be attempting to match their skill level with the demands presented by the environment, that is task demand equals rider capability. If the rider makes a mistake in assessing either skill level or task demand, or if an event occurs that increases task demand, or reduces rider capability, then loss of control will result.

Another common PTW maneuver being carried out during an accident is overtaking. Sexton, Fletcher & Hamilton (2004) reported 9% of PTWs were carrying out this manoeuvre just prior to the accident, with Clarke, Ward, Bartle & Truman (2004)

reporting a Figure of 14%. Despite ‘Rush Based Enjoyment’ not being skill based, task demand must still exceed rider capability for loss of control to result. Speed is an enhancer of task difficulty, and also a major element of this type of enjoyment. As PTWs can generally accelerate significantly quicker than cars (for example, Ford Focus ST, 0-60mph in 6.8 seconds, BMW F800s, 0-60mph in 3.5 seconds), task difficulty can rapidly increase to a point where task demand exceeds rider capability. The resulting loss of control can occur before the rider is aware of what is happening or has time to reduce task demand. These two examples show that a sudden change in capability or difficulty can place a rider into an out of control situation.

11.7 Conclusion

Developing an understanding of the different ways that enjoyment is obtained and risk perceived is an important first step in appreciating the goals of PTW users. When this understanding is coupled with an appreciation of task difficulty, then the information can be used to assess possible reasons for PTW accidents.

Task difficulty is the interaction of task demand with rider capability, and when a rider matches task demand with their capability then the flow state can be entered into. Being in the state of flow implies that the rider is operating in a fully automatic mode, with this mode leaving little cognitive ability for other tasks such as hazard perception. Therefore if a sudden need to react to an unexpected hazard occurs then task demand is likely to increase rapidly and may exceed capability. This may occur when enjoyment is sought through challenge (‘Challenge Based Enjoyment’). It may also be the result of a rider overestimating his capability or underestimating the challenge faced.

For those experiencing ‘Rush Based Enjoyment’, speed is a key element, but one that raises task demand. The increase in task demand through excessive speed may result in task demand exceeding the rider’s capability and resulting in loss of control.

The data within this thesis has been analysed in the light of the theories of flow and task homeostasis. The next chapter reviews these theories in relation to riding.

Chapter 12 – Review of Theories

No theory is good unless
one uses it to go beyond
André Gide (1869-1951)

12.1 Introduction

Before proceeding to the safety implications inherent from this research, this chapter briefly reviews the main aspects of the research and how the results relate to theory in this, and other areas. The interlinking of theories, supported by the research can assist in broadening our understanding of riders and their motivations, allowing a more informed basis for further research into effective interventions for this vulnerable group of road users.

12.2 Task Capability, Demand and Difficulty

Fuller's task homeostasis theory states that when a driver's capability is outstripped by the task demand of the situation then the driver is out of control. It can be supposed that riders face similar issues in terms of task demand matched to capabilities. This supposition was supported by the data collected in the photographic scenarios (Figure 11.7) where it was found that as the riding task became more difficult the risk felt by the rider was greater (Figure 11.3). This data also showed that where risk increased rapidly enjoyment decreased. These phenomena can be explained by the risk rising when the rider gets close to an out of control situation (that is capability approaching demand). When a rider is close to, or beyond, this 'out of control point' enjoyment diminishes (Figure 8.15).

Explanation for this rapid decrease in enjoyment may be found in Csikszentmihalyi's Theory of Flow.

12.3 The Theory of Flow

The majority of riders who participated in research for this thesis seemed to gain enjoyment from riding because they were challenged and had to use their skill-set. The results from the track day experiment reported in Chapter 7 demonstrated that enjoyment is related to the matching of skills with task difficulty (see Figure 7.6), suggesting that PTW riders seek a challenge but do not want to put themselves in risky situations. Cogan et al. (1999) suggested that some might take part in dangerous

sports, not because of risk, but rather to gain mastery of skill (Hatzigerogiadis, 2002). This would seem to be the case for the majority of PTW riders.

Csikszentmihalyi (1990) states that when the challenge outstrips the skill set then anxiety is felt, and for riders this is manifest as feeling at risk. This aspect of flow was demonstrated within the Edzell data as the most difficult parts of the track, the hairpins, were most often rated as 'most risky' (see Figure 7.2 and Figure 7.3).

One of the main aspects of the theory of flow the matching of skills sets to challenge. Task difficulty homeostasis (Fuller 2005) is based around rider capability, therefore flow and task difficulty share at least one variable.

12.4 Behaviour, Individual Characteristics and Environment

Prior to introducing measures to change behaviour, it is vital to understand that behaviour and the underlying factors that contribute to it. Previous interventions seeking to reduce KSIs in PTW users have tended to take a similar approach to those for other road users, particularly car drivers. Given that the rider motivations apparent from this research suggest a stronger focus on expressive rather than functional riding, this may not be an effective approach. Lewin (1935) conjectured that behaviour (B) could be expressed as a function of the interaction between the environment (E) and the individual characteristics of a person (P), expressed in equation form as $B = f(P, E)$. Therefore, an understanding of the riding environment and the characteristics of PTW users can give some indication and explanation for their behaviour.

12.4.1 Environment

Examining rider assessments of their riding showed how riding style varied in different environments, with the sample environments being provided in the form of photographic scenarios (see Figure 8.1). As the environment becomes harder to ride in then the rider behaviour changes by tending to ride slower and being less likely to overtake (see Table 11.3). Two main environmental factors seem to increase task difficulty, the likelihood of being distracted and other traffic.

The environment has an influence on behaviour but not all riders will react in the same way to a particular environment/situation.

12.4.2 Individual characteristics of a person

The research carried out found that demographics had an influence in the way in which riders reacted to different scenarios, for example rider age affected reported behaviour. Younger riders were more likely to seek enjoyment from a 'rush' experience, with older riders more likely to gain enjoyment from using their skills. This, in part, may explain why younger riders see more opportunities to overtake and ride fast than their older compatriots.

However, this research suggests that riders can be categorised by the way they react to risk. Three risk types are proposed, risk averse, risk acceptors and risk seekers. The behaviour of a rider may be influenced by how they react to risk, as risk seekers actually enjoy risk, while risk acceptors tolerate a level of risk so that they can gain enjoyment from challenging their skill set.

This clearly links to the idea of flow. While individual riders, linked with their personality/risk profile, may seek flow in different ways but their common desire is to feel challenge and gain enjoyment through their riding. In seeking challenge they may inadvertently place themselves in a situation where changes in environment pushes their capabilities over their limit. This understanding of the underlying motivational factors involved in riding may assist in appreciating how riders may find themselves in 'out of control' situations as described by Fuller in relation to car drivers.

While the heightened levels of KSIs amongst riders must in part be attributed to their inherent vulnerability, research on the nature and type of incidents experienced by PTW riders, suggests that there is scope for interventions to reduce KSIs by adjusting behaviours. This analysis of how PTW riders seek to enjoy riding can assist in understanding some of the causes of accidents, which can then be used to develop suitable interventions. The following chapter discusses the implications for safety of this research.

Chapter 13 – Safety Implications of the Research

Insisting on perfect safety is for people who don't have the balls to live in the real world.

Mary Shafer, NASA

13.1 Introduction

PTW users are vulnerable road users, but reducing their risk of being killed or seriously injured requires an understanding of the nature and type of accidents that they are exposed to, as well as the elements of rider behaviour that might place them at greater risk. While the statistical evidence on where, how and why accidents occur is useful in assessing accidents, methods designed to reduce the number and severity of such accidents require an understanding of rider goals.

Wyatt, O'Donnell, Beard and Busuttil (1999), in their analysis of 59 fatal PTW accidents in Scotland, drew the conclusion that post-accident medical attention was limited in effectiveness for preventing death. Rather the greatest reduction in deaths of riders can be achieved by accident reduction and injury prevention methods. One way of achieving this is by interventions that change rider behaviour. The understanding of riders' attitudes to risk, enjoyment and riding goals that has been developed within this thesis has implications for intervention design.

13.2 Intervention Targeting

Interventions are more likely to be successful and accepted by riders if the rider believes that the intervention is applicable to them. Therefore interventions should address specific problems that are predominately an issue for particular sub-group of riders and any marketing relating to such interventions should be designed to reach the specific groups being targeted.

The research presented in this thesis identified three rider risk types: 'Risk Averse'; 'Risk Acceptors'; and 'Risk Seekers'. 'Risk Seekers' are a small proportion of riders, but these riders may be over represented in the KSI accident statistics because they get enjoyment from risk and may deliberately ride where task demand approaches, or exceeds, the limits of their capability; that is their enjoyment may be amplified by a touch of anxiety. The data to test this hypothesis were not collected. If however this small group are over represented in accident statistics then it could be cost effective to target interventions at them. Further research into the representation of each group in

the accident statistics may assist in targeting appropriate interventions. Gaining an understanding of rider attitudes to risk is helpful but the research indicated that most riders accept some risk as an inherent part of the activity or attempt to minimise it. Of potentially more use in designing interventions than risk types, is an understanding of why people ride. If feeling at risk is not an aim of riding for most riders then appreciating the ways in which enjoyment is found in riding may offer more insight into the reasons for behaviour and hence may allow interventions that address the riskier elements of that behaviour without reducing enjoyment levels.

This research showed that riding enjoyment could be found in two ways: “Rush Based Enjoyment” and “Challenge Based Enjoyment”. Generally younger riders are biased towards “Rush Based Enjoyment”, while older riders tend to find more enjoyment from “Challenge Based Enjoyment”.

With individual enjoyment profiles for riders being complex, profiling prior to any non-mass media interventions could be beneficial. With profiling, the intervention can be targeted to the needs and goals of the rider; a software package is currently being developed by Owl Research Ltd to use the information from this research to profile riders. The enjoyment profile differences between riders can also be considered for mass media intervention design, as one size does not necessarily fit all!

13.3 Respecting the Goals of Riding

Despite the image of ‘Bikers’ being risk-taking outlaws, this research has shown that the main goal for most riders is enjoyment, which can be experienced as ‘Rush Based’ or ‘Challenge Based’. Most riders indicated that their riding had an expressive element, even if there is a functional aspect to the ride, for example they may use their PTW to commute to work but part of the reason for doing so is the enjoyment gained from this method of transport. The majority of PTW riders know the risks involved in riding, yet in order to experience enjoyment from riding they are willing to experience this risk – that is they ride despite the risk, not because of the risk.

As enjoyment is a major riding goal, then any safety intervention must respect this. If an intervention fails to acknowledge, or attempts to remove, this goal, it is likely that riders will reject the intervention and it will be ineffective.

13.4 Skills Training

Hatakka et al. (2000) suggested that driver training has four levels, with the lowest two levels being skill based and the upper two goal based. This driver hierarchy can also be applied to rider training. Skill based training interventions, as described by the lower two levels, aimed at reducing KSI crashes are common. However, an increase of skills can also increase the threshold where task demand approaches capability due to an increase, or perceived increase, in capability. A basic level of skill is needed to ride, and it is not suggested that these, or more advanced skills, should not be taught. However any skills-based training, needs to be designed to inoculate the rider against riding harder and faster because of the training. To accomplish this, psychological techniques could be employed to address the upper two levels of the hierarchy of driver training, which emphasises that the rider skill levels may be lower than they believe. Consideration could also be given to simple aspects of training, for example the title of 'advanced training' may suggest to those who have undertaken this training that they are now highly skilled and their riding may reflect this belief.

Training could provide a rider with the aptitude to prevent a misjudgement of speed that could cause task demand to exceed capability ($C < D$). Riders inclined to gain 'Rush Based Enjoyment', where speed is a main component, may benefit from training to give them the ability to correctly judge their ridden speed. As younger riders are more likely to gain enjoyment from 'Rush Based Enjoyment' (see Table 9.18), and they are over-represented in the KSI accident figures, speed and task demand awareness training for younger riders may be effective as an accident reduction strategy. Riders seeking 'Challenge Based Enjoyment' may benefit more from skills based on greater hazard perception and techniques designed to improve defensive riding – appealing to the challenge that can be found in developing safer riding techniques.

Evidence was presented in this thesis that riders may be seeking a flow type experience by matching their riding skills to the challenge presented by the riding environment. This is equivalent to task demand being closely matched to capability (Fuller, 2005), which can be expressed as $C \approx D$. When a rider is in this state then there is a very small safety margin. If task demand rises, or capability drops, ($C < D$) then a rider would be out of control which may result in a collision. Skills training

may increase rider capability; therefore a higher task demand would be required to achieve a C ≈ D state. As speed is a major enhancer of task demand then it would be logical that skills training may entice riders who are seeking a flow experience to ride faster. Because of this, any skills based intervention should look at inoculating against this phenomenon (Mannering & Grodsky, 1995; Ormston, Dudleston, Pearson & Stradling, 2003). As this research has shown that riding is more about enjoyment than simply a mode of transport for getting from A to B, it may be more productive to examine interventions in the light of sports coaching than to follow more traditional road safety interventions aimed at more functional road users such as car drivers.

13.5 Sports Coaching Techniques

For a flow state to be entered into then the brain must have been predominantly using implicit memory (Dietrich, 2004). The implication of this is that riding skills must be proceduralised, or automatic. The learning of an automatic skill is an issue that is often confronted within sports coaching; therefore those designing interventions can draw upon the methods of sports coaches. Only by practicing a skill can it be proceduralised to run automatically, however if the skill is not being practiced correctly then it will not be correctly recalled for automatic running. The responsibilities of a coach or trainer do not only include showing the correct way to carry out an activity, but also to provide fast and accurate feedback to correct bad habits before they are proceduralised.

Skills also deteriorate over time. This is why top sportsmen have a coach who can make minor adjustments to their game before deviations from the optimum become ingrained and seriously affects performance. For example Tiger Woods, one of the greatest golfers ever, has a coach (Hank Haney) who helps ensure that he is not developing bad habits (Smith & Smoll, 1977). For Woods, a mistake on the golf course may cost him a championship win, however for a PTW rider a mistake may well cost them their life. For all riders to have a full-time coach working with them is impractical, but the principle is still valid. Riders should be taught the correct skills, and these should be refreshed often.

One method used in sports coaching is imagery. This is where the sportsman (or rider) imagines that he is performing the skill correctly (Gill, 1986). A rider can take the time to imagine riding a known route, spotting and reacting to hazards, selecting

the correct line and speed for bends. The rider should carry out the imaginary ride using previously taught correct skills, and this will help these skills to be carried out automatically. Self-talk is another method that can be used. This is used while the athlete is participating in sport, where he keeps repeating a mantra about his performance (HarrowDrive, 2006), helping to keep focused and overcoming bad habits (Williams & Leffingwell, 1996). Self-talk can be used by riders to aid in overcoming specific problems or working to improve a skill. For example a rider can be saying to himself as he approaches a corner ‘slow in, fast out’, in order to improve cornering technique. However self-talk should be used with care as this will create another task, and therefore increase task demand.

Teaching such techniques during training may assist in longer-term re-enforcement of skills taught. As with sports-people, most riders need some encouragement to maintain good habits, therefore regular assessment and re-alignment of behaviours is necessary. While the fiscal implications of further testing may be an issue, given the relatively high KSI crashes experienced by this road group, it may be justified. There may be possibilities of using computer technology to re-assess trained riders after a period of time. Programs similar to those used in psychology to modify thinking patterns and behaviour, such as cognitive behavioural therapy, could be utilised to help riders ride in a safe manner.

With new skills should come a way for rider to assess that the new skills are being used correctly (self assessment). With helmet cameras becoming cheaper and more accessible it is now practical for riders to record their rides and then for the footage to be reviewed by the rider to evaluate it against what they had been taught. However equipping riders with helmet cameras may also cause problems due to audience effect by proxy, resulting in showing off by riding in a way that they feel will be acceptable to their peers.

As discussed above, techniques used in sports coaching can be applied to improving and developing safe riding habits. The visualisation technique allows for a sportsman to rehearse in absentia being in a specific position so that when they find themselves in that situation for real they react correctly. Within sport, rehearsal helps players pick up advanced cues to what is happening (Andrew 1989), and this remains true for riding. Learning hazard perception and reacting correctly to these hazards is important for riding and a proficiency that should be taught to all riders. It is

especially important as, if a rider has to react unexpectedly to a hazard, this can reduce capability at the same time as task demand increases, a double whammy that increases the chance of being out of control.

13.6 Non-Rider Based Interventions

Interventions that change rider behaviour indirectly, such as allowing riding in bus lanes (Figure 13.1), can also be assessed using the task difficulty model by determining if the engineering or environmental change will affect the task difficulty, and how riders will react to this change. The design of these types of interventions needs to take into account the reaction of riders, including changing goals and reactions to risk. For example, in areas where a rider can see an opportunity for enjoyment, there may be a temptation to ride hard (see Figure 9.3), also some road features can make a road look risky (see Figure 9.9). Therefore if a road is engineered so as to look risky and not tempting then a rider is likely to ride more carefully.

Figure 13.1 Riding in Bus Lanes

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13.7 Conclusion

As PTW riders are a vulnerable road user group, interventions for their safety are needed. This thesis has shown that rider goals and motivations are different from car drivers so generic road safety solutions may not be effective. For any intervention to

be effective it must be designed specifically around PTW rider goals and not the goals that the intervention designers' and policy makers' believe riders have. Interventions need to be built around the principle that an appreciable number of riders use their PTWs for expressive riding with enjoyment, not risk seeking, being the main goal. Therefore interventions must be built around safe enjoyable riding rather than trying to convert riders from the stereotype of 'risk junkies', which is rarely a true depiction. As the majority of riders do not ride because of the risk, most would accept interventions that reduce the risk provided there was not a significant erosion of enjoyment.

Riders ride because they enjoy it, finding enjoyment in a combination of rush and challenge. Both of these elements need to be considered when interventions for PTWs are being designed. Further to this, riders also view risk in three distinct ways, some not enjoying risk, some accepting a level of risk to gain enjoyment and a small minority who enjoy risk. It is theorised that riders who seek risk are more likely to be involved in a crash, and therefore could be specifically targeted by safety interventions. The main aspect of any intervention must respect the goal of enjoyment – attempting to remove this goal will only alienate those whom the intervention is designed to help.

This thesis has shown some of the enjoyment aspects of riding, but it does not provide specific answers regarding safety interventions. Follow-up research to this however can be carried out to identify 'best practice' for PTW interventions and therefore make a significant difference to the safety of rider. The next section will discuss the author's ideas on how this research should be extended.

Chapter 14 – Further Work

You live and learn. At any rate, you live.
Douglas Adams, 1952 - 2001

14.1 Introduction

This thesis has examined enjoyment as one of the main PTW rider's goals. Using the findings some 'broad brush' suggestions for safety interventions were explored in the previous chapter. For these, and other, interventions to be designed in a way that gives the maximum chance of reducing the KSI accident numbers for riders, more information is required. This chapter makes some suggestions on how the research presented in this thesis can be built upon to provide that information.

14.2 Datasets

The datasets within this thesis have been used to develop the risk and enjoyment types, and to relate these to task difficulty. These datasets can be built upon to expand on the theories of this research.

Extra data can be collected for rider typing so that a better understanding of the risk and enjoyment groups can be obtained. Some exploratory research will be needed to identify what data would be relevant. It may prove to be enlightening if some of this extra data is based upon established measures, such as Arnett's Inventory of Sensation Seeking (AISS).

As well as collecting new data variables, similar data to that presented in this document can be collected, but aimed at riders of groups that have a low sample quantity number. Two of the main areas where there is limited data is for the under 21 age group and 'risk seekers'. It is known that the under 21's are over represented in accident statistics, and within the thesis it is theorised that 'risk seekers' would also be over represented. It would therefore aid in intervention design if more detailed profile information on these riders were known.

Accident statistics can also be married up with rider and enjoyment types thus allowing for 'problem groups' to be identified. Suitable interventions can then be targeted at these groups.

14.3 Behavioural Aspects

One of the aspects of riding that varies from driving is 'riding in groups'. It is known that group dynamics can affect behaviour by such mechanisms as peer pressure and audience effect, and it is likely that this may have a negative effect on rider safety. Knowing which of the rider types are more susceptible to group effects will hep in designing targeted safety interventions.

One of the other aspects of this is the type of bike owned and how this is ridden. While it may seem logical that those who buy the higher performance machines ride faster, this seems not to be the case. This research showed that those on the lower performance machines are more likely to seek 'Rush Based Enjoyment' – an enjoyment type associated with speed. If the types of rider can be associated with the bike type then an intervention can be targeted by using bike ownership information, or via dealerships.

14.4 Other road users

Data were collected from car drivers for comparison with PTW users, showing that in some ways riders are different from drivers. In a similar manner it would be expected that other road users would also differ from each other. By collecting data from different road users and then analysing using similar methods to the ones used in this research, these road users can be profiled. These profiles can be used to design safety interventions for each road user group, along with the sub-types within each group, with a specific, targeted message for the most vulnerable groups.

The road user types are varied, from cyclists, walkers and horse riders to HGV and PSV drivers. For some of these groups it is clear that the majority of the road use is functional, such as HGV drivers; for other road use it may be mainly expressive, for example horse riders. However for some road users this is less clear, for example cyclists. Profiling these users for both functional and expressive road use will likely show a distinction in risk and enjoyment types, allowing for intervention targeting by road use type as well as road user types.

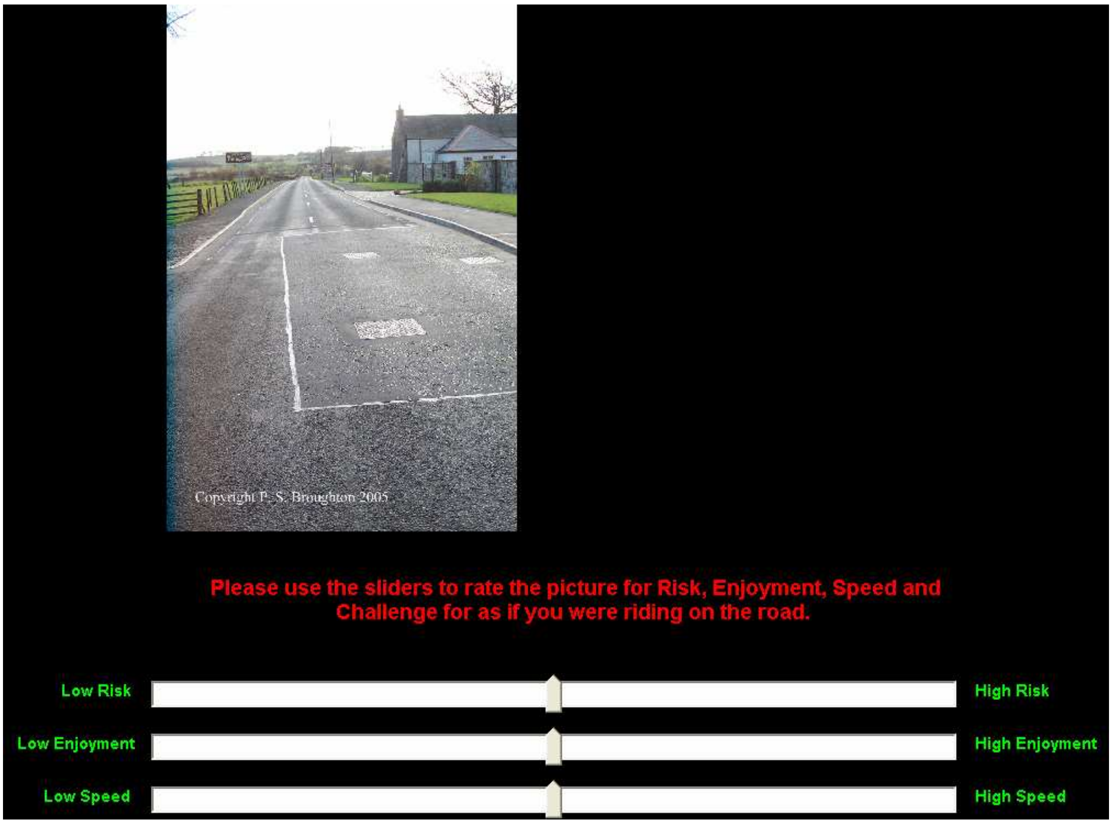
14.5 Practical Adaptation

The methods described analysing the data and typing riders can be automated with software including implementing the pattern recognition neural network system. This

expert software system, after asking riders a set of questions based around the six scenarios, will produce a profile of risk and enjoyment types. Figure 13.1 illustrates part of the data input.

The profiles can be used in various ways, for example profiling riders who are attending training courses (including those attending Rider Improvement Courses in lieu of prosecution for a traffic violation).

Figure 14.1 Example of profiling software data input screen



14.6 Conclusion

This thesis lays a foundation of a method for typing riders with respect to enjoyment and risk. These types have a practical application in developing effective interventions. The further research suggested here extends this to make targeting interventions even more effective, as well as using the methods for other road users.

By effective targeting of interventions then roads can be made safer, and that has to been a primary goal for this research, and it is hoped for the research that follows.

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There are known knowns. These are things we know that we know. There are known unknowns. That is to say, there are things that we know we don't know. But there are also unknown unknowns. There are things we don't know we don't know.

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Volume Two Contents

Appendix A - Questionnaires

Included in this section are the questionnaires that have been used for this research, table A.1 gives an overview of the questionnaires

Table A.1 Overview of Questionnaires

Ref	Description
Q1	A questionnaire asking what non-riders think about bikers
Q2	Collection of basic data on bikers
Q3	Collection of demographics with economic data
Q4	Questionnaire asking for likes and dislikes
Q5	Data collected at a track-day
Q6	Simple Risk and Goals questionnaire using scenarios
Q7	Risk and Goals questionnaire using scenarios
Q8	Risk and Goals questionnaire using scenarios (drivers)

Q1

As part of my PhD that is investigating the motivations and attitudes surrounding motorcycling I am trying to find out what non-bikers feel about those who ride. By filling out this questionnaire you would be helping my research, which would be greatly appreciated.

Thank you,

Paul Broughton
Student at the Transport Research Institute
Napier University.
p.broughton@napier.ac.uk
For further details of the research please visit the Napier website (click here):

Also thanks to ORL for the use of the webspace for this survey.

Do you hold a motorbike licence?	☐ Yes	☐ No
Have you ever ridden a motorbike on a public road?	☐ Yes	☐ No
Do any of your friends or family ride a motorbike?	☐ Yes	☐ No

What do you think about bikers?

Biking Questionnaire

My name is Paul Broughton and I am a student who is doing research aimed at reducing the number of bikers involved in accidents. I am biker and therefore have a vested interest in this research. Currently I am riding an old GPZ 500, as pictured here - it's all a poor student can afford.

As part of my research I need the help of bikers so that I can collect some baseline data, please help me with this by filling out the form below. Please feel free to skip any questions that you do not want to answer. If you have any questions please email at p.broughton@napier.ac.uk. Thank you for your help.

Q1. What type of bike do you mainly ride?

- ☐ Sports Bike
- ☐ Tourer
- ☐ Sports-Tourer
- ☐ All-rounder
- ☐ Off road
- ☐ Custom/Classic
- ☐ Scooter
- ☐ Moped
- ☐ Other

Q2. How old is your main bike?

- ☐ Under 1 year old
- ☐ 1 to 2 years old
- ☐ 2 to 3 years old
- ☐ 3 to 4 years old
- ☐ 4 to 5 years old
- ☐ 5 to 6 years old
- ☐ More than 6 years old

Q3. What is the estimated value of your main bike?

- ☐ Less that £1,000
- ☐ £1,000 to £1,999
- ☐ £2,000 to £2,999
- ☐ £3,000 to £3,999
- ☐ £4,000 to £4,999
- ☐ £5,000 to £5,999
- ☐ £6,000 to £6,999
- ☐ £7,000 to £7,999
- ☐ £8,000 to £8,999
- ☐ £9,000 to £9,999
- ☐ More than £10,000

Q4. How much do you pay in insurance each year?

- ☐ Less that £100
- ☐ £100 to £199
- ☐ £200 to £299
- ☐ £300 to £399
- ☐ £400 to £499
- ☐ £500 to £599
- ☐ £600 to £699
- ☐ £700 to £799
- ☐ £800 to £899
- ☐ £900 to £999
- ☐ More than £1,000

Q5. Please indicate which of these statements describes you best

- ☐ I use my bike to commute to work, as it's the only means of getting there
- ☐ I use my bike to get to work because I enjoy the riding
- ☐ I use my bike to get to work because it is more convenient that other transport methods
- ☐ I use other forms transport to get to work
- ☐ I do work or I work from home

Q6. What is the average number of hours you spend commuting by bike each week?

- ☐ None
- ☐ Less than 3 hours
- ☐ 3 to 5 hours
- ☐ 6 to 8 hours
- ☐ 9 to 11 hours
- ☐ 12 to 14 hours
- ☐ 15 to 17 hours
- ☐ 18 to 20 hours
- ☐ More than 20 hours

Q7. Please indicate which of these statements best describes your recreational riding

- ☐ I spend most of my recreational riding time riding by myself
- ☐ I spend most of my recreational riding time riding in an organised group, such as a club
- ☐ I spend most of my recreational riding time riding with friends
- ☐ I do not use my bike for recreational riding

Q8. What is the average number of hours you spend recreational riding each week?

- ☐ None
- ☐ Less than 3 hours
- ☐ 3 to 5 hours
- ☐ 6 to 8 hours
- ☐ 9 to 11 hours
- ☐ 12 to 14 hours
- ☐ 15 to 17 hours
- ☐ 18 to 20 hours
- ☐ More than 20 hours

Q9. Do you use your bike for work (not commuting)?

☐ Yes ☐ No

Q10. What is the average number of hours you spend riding for work each week?

- ☐ None
- ☐ Less than 3 hours
- ☐ 3 to 5 hours
- ☐ 6 to 8 hours
- ☐ 9 to 11 hours
- ☐ 12 to 14 hours
- ☐ 15 to 17 hours
- ☐ 18 to 20 hours
- ☐ More than 20 hours

Q11. I wear full protective kit while riding, including jacket, trousers, boots and gloves

☐ Always ☐ Often ☐ Sometimes ☐ Never

Q12. I use a tinted visor

☐ Always ☐ Often ☐ Sometimes ☐ Never

Q13. I have a loud, non-standard, exhaust fitted to my bike

☐ Yes ☐ No

Q14. I read bike magazines

☐ Always ☐ Often ☐ Sometimes ☐ Never

Q15. Which bike magazine do you most frequently read:

Q16. How old are you?

- ☐ Under 20
- ☐ 21 to 25
- ☐ 26 to 30
- ☐ 31 to 35
- ☐ 36 to 40
- ☐ 41 to 45
- ☐ 46 to 50
- ☐ 51 to 55
- ☐ 56 to 60
- ☐ 61 to 65
- ☐ 65 to 70
- ☐ 71 or older

Q17. Are you

☐ Male ☐ Female

Q18. Please indicate which best describes your job

- ☐ Upper management
- ☐ Middle management/professional
- ☐ Junior management/clerical
- ☐ Skilled manual
- ☐ Semi-skilled/unskilled
- ☐ Unemployed
- ☐ Student
- ☐ Retired
- ☐ Other

Q19. What is your postcode:

Q3

This questionnaire is designed to obtain some information about who bikers are, and how much they spend. The information will be used to write a report that will be put into the public domain and can be used to encourage local and national authorities that bikers are worth listening to as they spend money.

If you are unsure on some the answers, please provide estimates.

Thanks for your help in promoting biking and bikers

UK Bikers only please

Firstly some questions about you and your riding habits

Q1. Are you

☐ Male ☐ Female

Q2. How old are you?

- ☐ Under 20
- ☐ 21 to 25
- ☐ 26 to 30
- ☐ 31 to 35
- ☐ 36 to 40
- ☐ 41 to 45
- ☐ 46 to 50
- ☐ 51 to 55
- ☐ 56 to 60
- ☐ 61 or older

Q3. What type of motorcycle licence do you hold?

- ☐ None
- ☐ Provisional (CBT taken)
- ☐ Restricted (A1)
- ☐ Full (A)

Q4. How much do you earn per year?

- ☐ Under £10,000
- ☐ £10,000 to £14,999
- ☐ £15,000 to £19,999
- ☐ £20,000 to £24,999
- ☐ £25,000 to £29,999
- ☐ £30,000 to £34,999
- ☐ £35,000 to £39,999
- ☐ £40,000 to £44,999
- ☐ £45,000 to £49,999
- ☐ £50,000 to £54,999
- ☐ £55,000 to £59,999
- ☐ More than £60,000

Q5. Please indicate which best describes your job

- ☐ Upper management
- ☐ Middle management/professional
- ☐ Junior management/clerical
- ☐ Skilled manual
- ☐ Semi-skilled/unskilled
- ☐ Unemployed
- ☐ Student
- ☐ Retired
- ☐ Other

Q6. How many days a year do you ride for recreation?

- ☐ 10 or Less
- ☐ 11 to 15
- ☐ 16 to 20
- ☐ 21 to 25
- ☐ 26 to 30
- ☐ 31 to 35
- ☐ 36 to 40
- ☐ 41 to 45
- ☐ 46 to 50
- ☐ More than 50

Q7. And now some questions on your spending, please indicate how much you spend, within the UK, on these items each year.

Bike and bike kit (helmets, repairs, etc)	£
Consumables (food, drink, Petrol, etc)	£
Accommodation	£
Events (Track days, Kelso, TT races, etc)	£
Other biking related spending	£

Q4

I am a biker doing research into the pleasures and perils of biking in Scotland for my PhD.

The research will cover all types of bikes (i.e. mopeds, scooters and motorbikes) and riders at all stages of their riding career (e.g. learner, newly qualified, experienced and born again).

It would be a great help to me if you could fill in this brief questionnaire and return it in the pre-paid envelope.

The information supplied will only be used for research and your details will not be passed on to any other parties.

If there are any questions that you would prefer not to answer, please feel free to leave them blank.

If you have any questions or queries, please do not hesitate to contact me:

Email p.broughton@napier.ac.uk
Phone 0131 455 5171
Mobile07850 697769

Many thanks for your help.

Paul Broughton

Q4

What bike do you normally ride?

Make (e.g. Kawasaki): ______________________________

Model (e.g. ZXR750 L3): ______________________________

Age of bike: ______________________________

Why did you pick this bike? ______________________________

____

____

Year passed test ____________________

Years of riding ____________________

Please provide details below of time off/breaks you have had from riding (e.g. 1987 to 1991)

Do you only ride during the summer only? Yes / No

How many accidents have you been involved in while riding that were:

Mainly your fault _______________

Mainly someone else's fault _______________

Please indicate approximately how much time you spend riding for the following reasons

Reason for riding	**Hours spent each month**
Pleasure	
Getting to work	
Getting around the local area	
Touring	
Other	

Q4

Some things I like about biking	
In General	In Scotland

Q4

Some things I dislike about biking	
In General	In Scotland

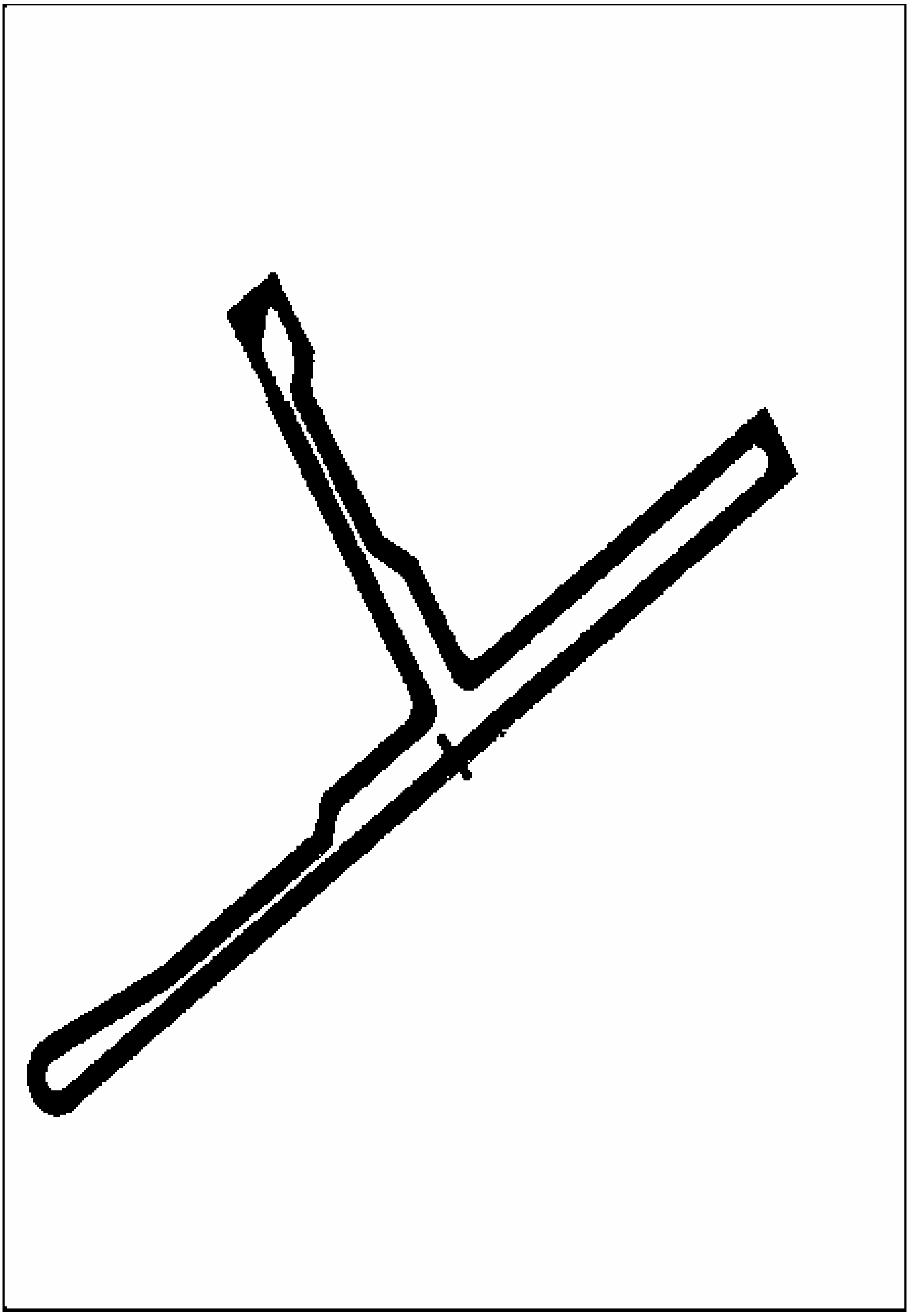
Personal Details

Age: ____________________________

Gender: Male / Female

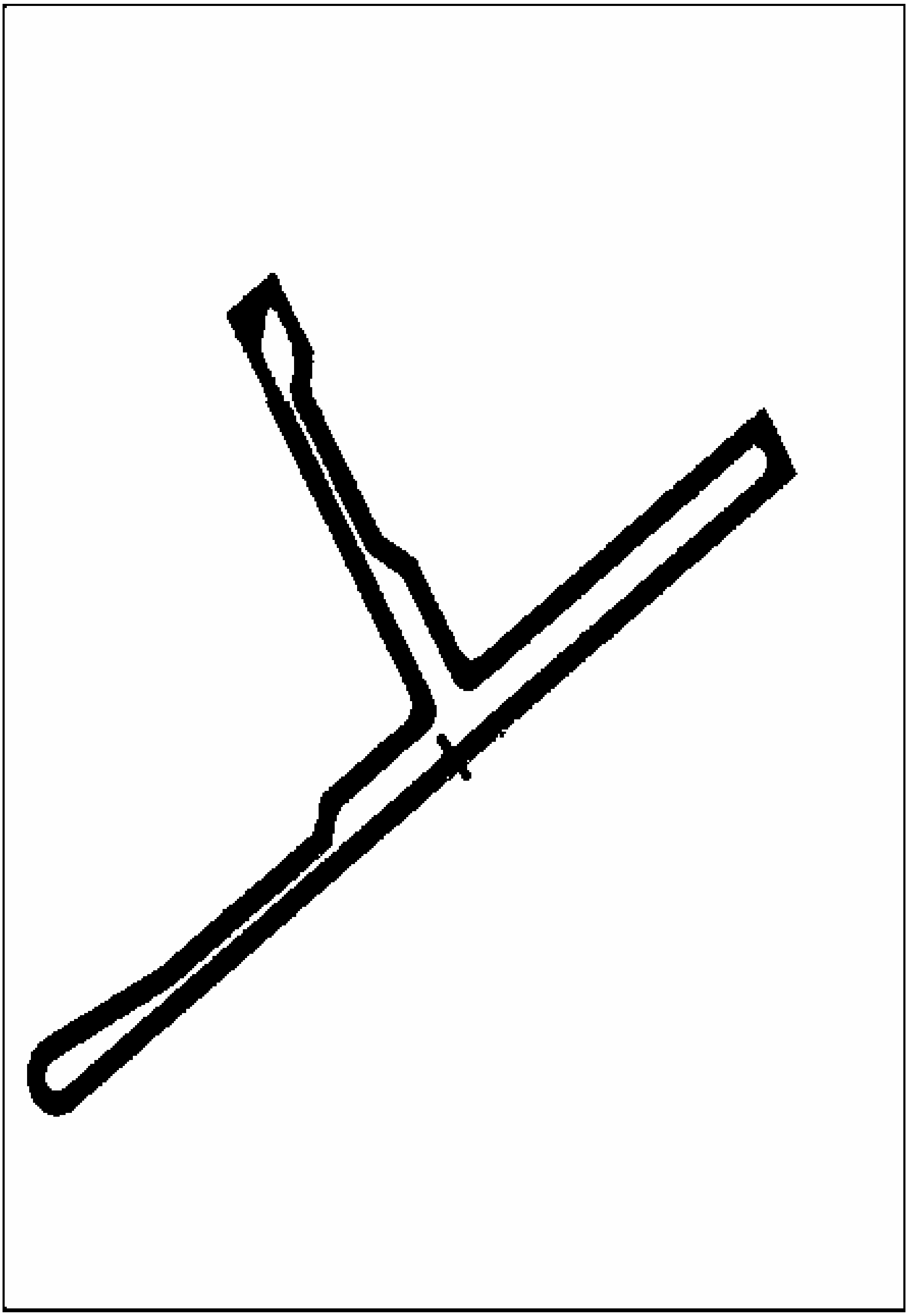
Thank you for your time, Happy Biking

Please mark the part of the track where you experienced the most *Excitement*



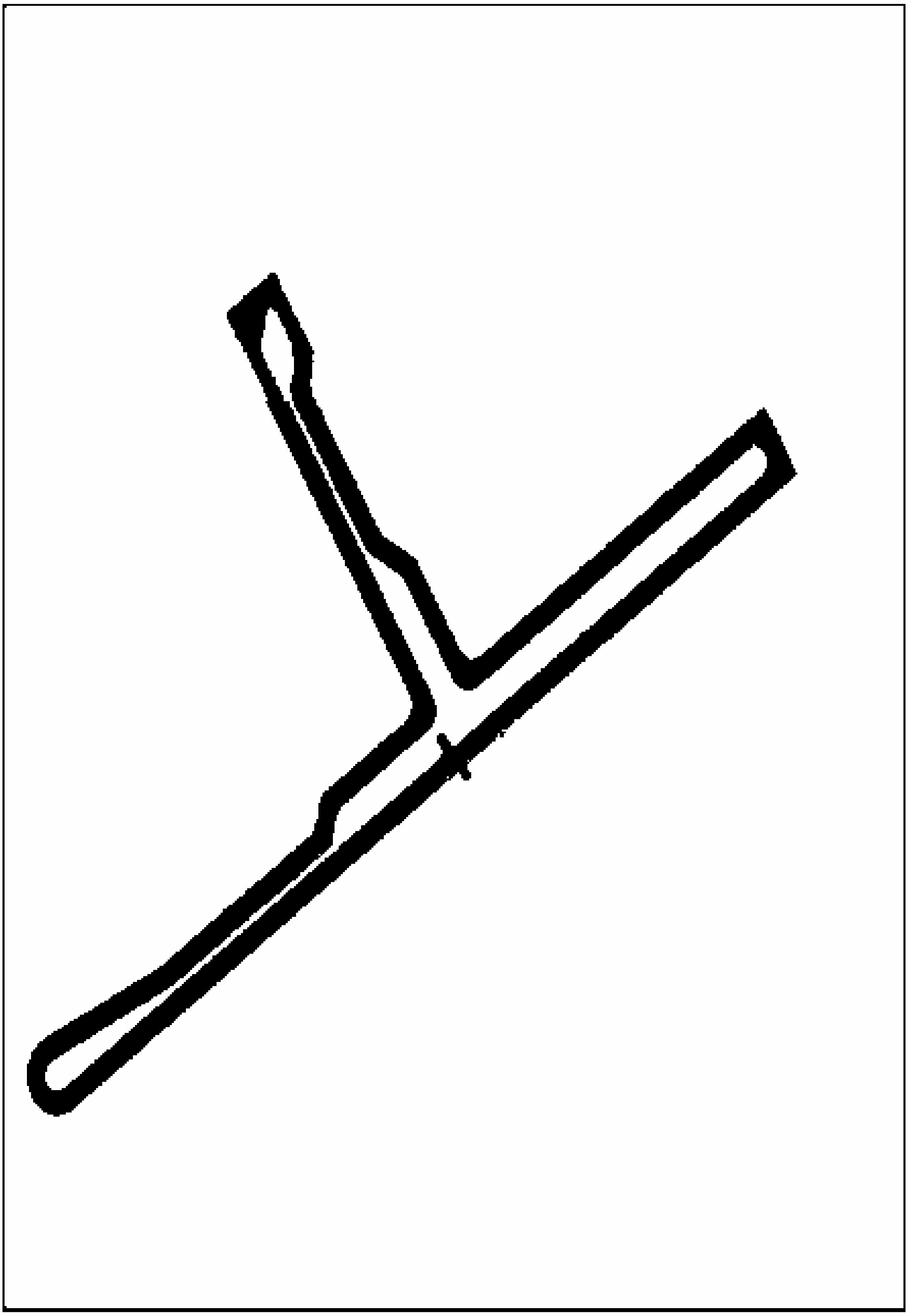
Q5

Please mark the part of the track where you experienced the most *Enjoyment*



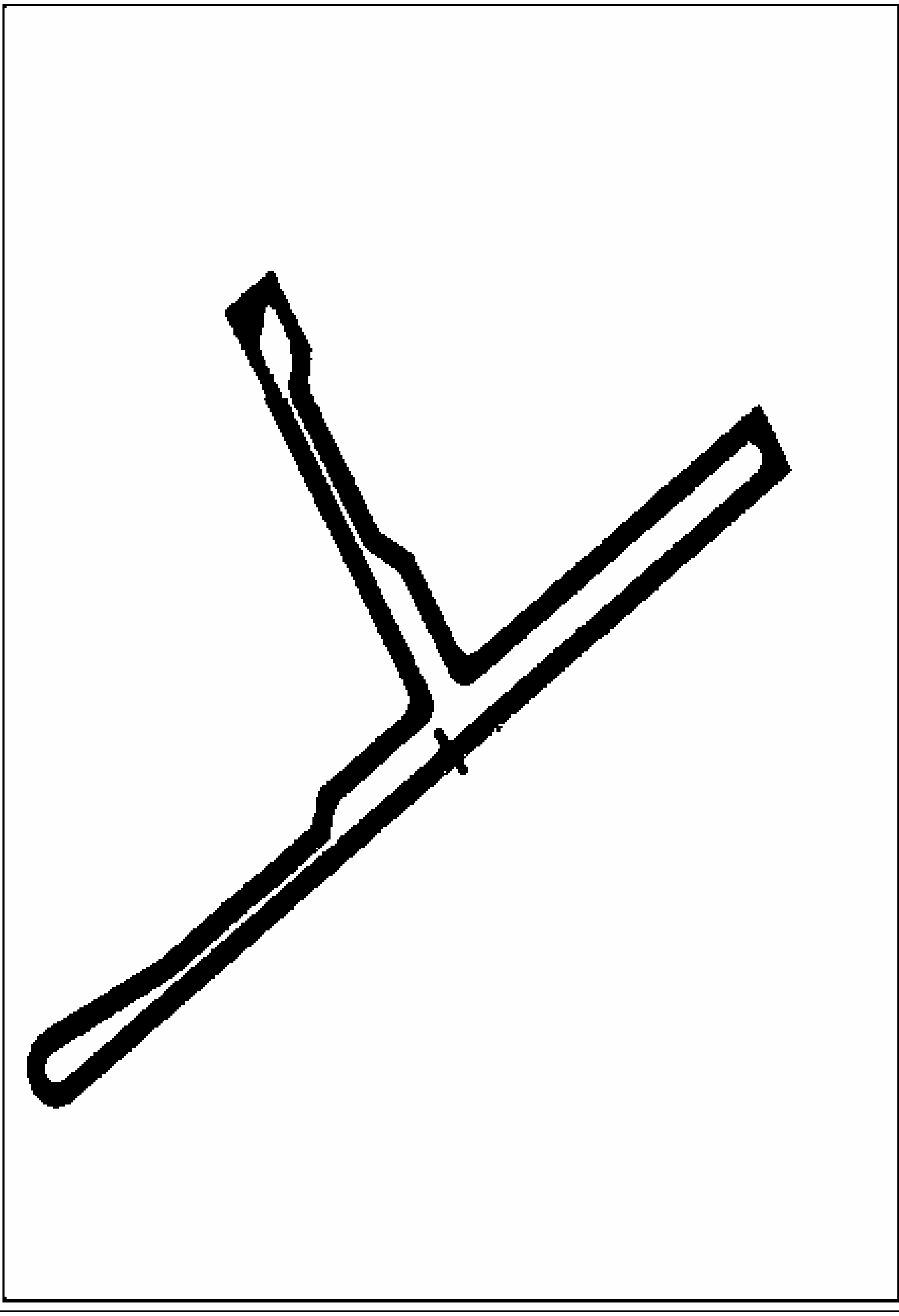
Q5

Please mark the part of the track where you experienced the most Concentration



Q5

Please mark the part of the track where you experienced the most *<u>Risk</u>*



Q6

Please look at the 6 pictures below and then rate, assuming that you are riding a bike, the road for risk and how enjoyable it would be to ride, please can you also supply some comments as to why.

Thank you for your help

Picture 1

How risky is this road to ride?

Very Low Risk	Low Risk	Medium Risk	High Risk	Very High Risk
☐	☐	☐	☐	☐

Why?

How enjoyable would this road be to ride?

No Enjoyment	Very Little Enjoyment	OK	Enjoyable	Very Enjoyable
☐	☐	☐	☐	☐

Why?

Q6

Picture 2

How risky is this road to ride?

Very Low Risk	Low Risk	Medium Risk	High Risk	Very High Risk
☐	☐	☐	☐	☐

Why?

How enjoyable would this road be to ride?

No Enjoyment	Very Little Enjoyment	OK	Enjoyable	Very Enjoyable
☐	☐	☐	☐	☐

Why?

Q6

Picture 3

How risky is this road to ride?

Very Low Risk	Low Risk	Medium Risk	High Risk	Very High Risk
☐	☐	☐	☐	☐

Why?

How enjoyable would this road be to ride?

No Enjoyment	Very Little Enjoyment	OK	Enjoyable	Very Enjoyable
☐	☐	☐	☐	☐

Why?

Q6

Picture 4

How risky is this road to ride?

Very Low Risk	Low Risk	Medium Risk	High Risk	Very High Risk
☐	☐	☐	☐	☐

Why?

How enjoyable would this road be to ride?

No Enjoyment	Very Little Enjoyment	OK	Enjoyable	Very Enjoyable
☐	☐	☐	☐	☐

Why?

Q6

Picture 5

How risky is this road to ride?

Very Low Risk	Low Risk	Medium Risk	High Risk	Very High Risk
☐	☐	☐	☐	☐

Why?

How enjoyable would this road be to ride?

No Enjoyment	Very Little Enjoyment	OK	Enjoyable	Very Enjoyable
☐	☐	☐	☐	☐

Why?

Picture 6

How risky is this road to ride?

Very Low Risk	Low Risk	Medium Risk	High Risk	Very High Risk
☐	☐	☐	☐	☐

Why?

How enjoyable would this road be to ride?

No Enjoyment	Very Little Enjoyment	OK	Enjoyable	Very Enjoyable
☐	☐	☐	☐	☐

Why?

Q6

And finally:

How old are you? ____________________

Are you Male ☐ Female ☐

What make is your main bike? __________________

What model is your main bike? _________________

Thank you for visiting this page, which is part of on-going research being undertaken by the Transport Research Institute at Napier University, Edinburgh. The research is looking at motorbikes, and other forms of two wheeled powered vehicles. I am a biker myself (currently riding a GPZ 500 - pictured left) and I am hoping that this research can move biking forward. Once again, thanks for your time, any questions or comments, please feel free to email me - p.broughton@napier.ac.uk

Please refer to the picture below, and then from your view as a biker, rate the road, from 'Low to High' for the indicated features. (Please note that by revisiting this site other pictures of roads may also be shown, please feel free to rate these roads).

[Note that the online version showed one of the pictures in the above questionnaire, rotating to the next picture after each set of answers were submitted]

Feature	Very Low	Low	Medium	High	Very High
Road surface quality	☐	☐	☐	☐	☐
Risk caused by road features, such as road size, roadside objects, junctions, etc.	☐	☐	☐	☐	☐
Level of visibility	☐	☐	☐	☐	☐
Likelihood of a distraction to you, as a rider	☐	☐	☐	☐	☐
Risk presented by other traffic, including pedestrians	☐	☐	☐	☐	☐
How tempted you would be to ride in a more enthusiastic manner	☐	☐	☐	☐	☐
How pleasant it would be to ride in these surroundings - (scenery, etc)	☐	☐	☐	☐	☐
The level of challenge presented by the road	☐	☐	☐	☐	☐
How bendy the road is - (low for a straight road, high for a road that bends like a bendy thing)	☐	☐	☐	☐	☐
The speed that you would ride the road	☐	☐	☐	☐	☐
The chance for overtaking other vehicles	☐	☐	☐	☐	☐
How risky the road would be to ride	☐	☐	☐	☐	☐
How enjoyable the road would be to ride	☐	☐	☐	☐	☐

And finally:

Q7

How old are you?

20 or Under	☐
21 to 25	☐
26 to 30	☐
31 to 35	☐
36 to 40	☐
41 to 45	☐
46 to 50	☐
51 to 55	☐
56 to 60	☐
61 to 65	☐
66 to 70	☐
Older than 70	☐

Are you Male ☐ Female ☐

What make is your main bike? ________________

What model is your main bike? ________________

Q8

Thank you for visiting this page and answering a few brief questions. This piece of research is part of a larger project that is undertaken by the Transport Research Institute at Napier University, Edinburgh and Trinity College, Dublin - Some more details of the project aims are described on the page following this questionnaire.

The questionnaire should take less that 5 minutes to complete.

Please refer to the picture below, and then from your view as a car driver, rate the road, from 'Low to High' for the indicated features. (Please note that by revisiting this site other pictures of roads may also be shown, please feel free to rate these roads).

[Note that the online version showed one of the pictures in the questionnaire [Q8], rotating to the next picture after each set of answers were submitted]

Feature	Very Low	Low	Medium	High	Very High
Road surface quality	☐	☐	☐	☐	☐
Risk caused by road features, such as road size, roadside objects, junctions, etc.	☐	☐	☐	☐	☐
Level of visibility	☐	☐	☐	☐	☐
Likelihood of a distraction to you, as a driver	☐	☐	☐	☐	☐
The amount of traffic, including pedestrians	☐	☐	☐	☐	☐
How tempted you would be to drive in a more enthusiastic manner	☐	☐	☐	☐	☐
How pleasant it would be to drive in these surroundings - (scenery, etc)	☐	☐	☐	☐	☐
The level of challenge presented by the road	☐	☐	☐	☐	☐
How bendy the road is - (low for a straight road, high for a road that bends like a bendy thing)	☐	☐	☐	☐	☐
The speed that you would drive the road	☐	☐	☐	☐	☐
The chance for overtaking other vehicles	☐	☐	☐	☐	☐
How risky the road would be to drive	☐	☐	☐	☐	☐
How enjoyable the road would be to drive	☐	☐	☐	☐	☐

Q8

And finally:

How old are you?

20 or Under	☐
21 to 25	☐
26 to 30	☐
31 to 35	☐
36 to 40	☐
41 to 45	☐
46 to 50	☐
51 to 55	☐
56 to 60	☐
61 to 65	☐
66 to 70	☐
Older than 70	☐

Are you Male ☐ Female ☐

For which class of vehicle do you hold a full licence?

Car	☐
Motorbike	☐
HGV	☐
PSV	☐
Other	☐

Appendix B – Data from Questionnaire 1

B.1 Frequencies

The first part of this appendix reports the frequencies of answers to questions asked in questionnaire 1, and also for variables that were created from the collected data.

Table B.1 Do you hold a motorbike licence?

	Frequency	Percent
No	87	85.3
Yes	15	14.7
Total	102	100.0

Table B.2 Have you ever ridden a motorbike on a public road?

	Frequency	Percent
No	68	66.7
Yes	34	33.3
Total	102	100.0

Table B.3 Do any of your friends or family ride a motorbike?

	Frequency	Percent
No	53	52.0
Yes	49	48.0
Total	102	100.0

Table B.4 Themes developed from the comments

	Frequency	Percent	Valid Percent
Bikes are Noisy	7	3.0	3.4
Bikes are dangerous	46	19.8	22.3
Riders need to be restricted	2	.9	1.0
Riders have good skills	13	5.6	6.3
Bikes are not easily seen	9	3.9	4.4
Bikes are practical	14	6.0	6.8
Riders blame cars for accidents	1	.4	.5
Riders have a bad attitude/no consideration	13	5.6	6.3
Do not like bikes weaving/filtering	14	6.0	6.8
Bikes are not environmental	1	.4	.5
Risk takers/wreckless	28	12.1	13.6
Vulnerable	6	2.6	2.9
Riding would not be enjoyable	1	.4	.5
Riders are OK/Good people	1	.4	.5
Other vehicles cause bike accidents	3	1.3	1.5
Riding is fun	16	6.9	7.8
Riders are brave	4	1.7	1.9
Riders are passionate	2	.9	1.0
Riders have no respect for traffic laws	10	4.3	4.9
Riders are intimidating	2	.9	1.0
Riders are thugs	2	.9	1.0
Riders have good camaraderie	8	3.4	3.9
Riders are sensible	3	1.3	1.5
Total	206	88.8	100.0
System (Missing)	26	11.2	
Total	232	100.0	

Table B.5 Positive and Negative Themes

	Frequency	Percent	Valid Percent
Positive	64	27.6	31.1
Negative	142	61.2	68.9
Total	206	88.8	100.0
System (Missing)	26	11.2	
Total	232	100.0	

B.2 Cross tabulations

This section reports on cross-tabulations that were significant (p <= 0.005). No cross-tabulations of the themes are made due to the low numbers.

Table B.6 'Those who have ridden' with 'Those who hold a licence'

		Licence		Total
		No	Yes	
Have Ridden	No	66	2	68
	Yes	21	13	34
Total		87	15	102

Chi Squared p < 0.001

Table B.7 'Those who have friends or family that ride' with 'Those who hold a licence'

		Licence		Total
		No	Yes	
Friends & Family	No	49	4	53
	Yes	38	11	49
Total		87	15	102

Chi Squared p = 0.034

Table B.8 'Those who have friends or family that ride' with 'Those who have ridden'

		Friends & Family		Total
		No	Yes	
Have Ridden	No	42	26	68
	Yes	11	23	34
Total		53	49	102

Chi Squared = 0.005

Appendix C – Data from Questionnaire 2

C.1 Frequencies

The first part of this appendix reports the frequencies of answers to questions asked in questionnaire 2.

Table C.1 Q1 - What type of bike do you mainly ride?

	Frequency	Percent	Valid Percent
Sports bike	111	20.0	20.4
Sports Tourer	111	20.0	20.4
Tourer	105	19.0	19.3
Custom/Classic	43	7.8	7.9
Off Road	9	1.6	1.7
Moped	1	.2	.2
Other	15	2.7	2.8
All rounder	89	16.1	16.4
Scooter	59	10.6	10.9
Total	543	98.0	100.0
Missing	11	2.0	
Total	554	100.0	

Table C.2 Q2 - How old is your main bike?

	Frequency	Percent	Valid Percent	Cumulative Percent
Under 1 years	68	12.3	12.5	12.5
1 to 2 years	79	14.3	14.5	27.0
2 to 3 years	67	12.1	12.3	39.3
3 to 4 years	75	13.5	13.8	53.1
4 to 5 years	47	8.5	8.6	61.8
5 to 6 years	31	5.6	5.7	67.5
Older than 6 years	177	31.9	32.5	100.0
Total	544	98.2	100.0	
Missing	10	1.8		
Total	554	100.0		

Table C.3 Q3- What is the estimated value of your main bike?

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than £1000	45	8.1	8.4	8.4
£1000 to £1999	105	19.0	19.6	28.0
£2000 to £2999	105	19.0	19.6	47.7
£3000 to £3999	87	15.7	16.3	63.9
£4000 to £4999	71	12.8	13.3	77.2
£5000 to £5999	35	6.3	6.5	83.7
£6000 to £6999	30	5.4	5.6	89.3
£7000 to £7999	21	3.8	3.9	93.3
£8000 to £8999	11	2.0	2.1	95.3
£9000 to £9999	4	.7	.7	96.1
More than £10,000	21	3.8	3.9	100.0
Total	535	96.6	100.0	
Missing	19	3.4		
Total	554	100.0		

Table C.4 Q4 - How much do you pay in insurance each year?

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than £100	56	10.1	10.5	10.5
£100 to £199	164	29.6	30.7	41.1
£200 to £299	117	21.1	21.9	63.0
£300 to £399	89	16.1	16.6	79.6
£400 to £499	43	7.8	8.0	87.7
£500 to £599	26	4.7	4.9	92.5
£600 to £699	7	1.3	1.3	93.8
£700 to £799	10	1.8	1.9	95.7
£800 to £899	7	1.3	1.3	97.0
£900 to £999	5	.9	.9	97.9
More than £1,000	11	2.0	2.1	100.0
Total	535	96.6	100.0	
Missing	19	3.4		
Total	554	100.0		

Table C.5 Q5 -Please indicate which of these statements describes you best

	Frequency	Percent	Valid Percent
I use my bike to commute to work, as it's the only means of	18	3.2	3.4
I use my bike to get to work because I enjoy the riding	176	31.8	32.8
I use my bike to get to work because it is more convenient t	109	19.7	20.3
I use other forms transport to get to work	183	33.0	34.1
I do work or I work from home .	51	9.2	9.5
Total	537	96.9	100.0
Missing	17	3.1	
Total	554	100.0	

Table C.6 Q6 - What is the average number of hours you spend commuting by bike each week?

	Frequency	Percent	Valid Percent	Cumulative Percent
None	175	31.6	32.3	32.3
Less than 3 hours	158	28.5	29.2	61.6
3 to 5 hours	115	20.8	21.3	82.8
6 to 8 hours	51	9.2	9.4	92.2
9 to 11 hours	21	3.8	3.9	96.1
12 to 14 hours	14	2.5	2.6	98.7
15 to 17 hours	1	.2	.2	98.9
18 to 20 hours	3	.5	.6	99.4
More than 20 hours	3	.5	.6	100.0
Total	541	97.7	100.0	
Missing	13	2.3		
Total	554	100.0		

Table C.7 Q7 – Which of these statements best describes your recreational riding?

	Frequency	Percent	Valid Percent
I spend most of my recreational riding time riding by myself	297	53.6	54.6
I spend most of my recreational riding time riding in an organized group	52	9.4	9.6
I spend most of my recreational riding time riding with friends	173	31.2	31.8
I do not use my bike for recreational riding	22	4.0	4.0
Total	544	98.2	100.0
Missing	10	1.8	
Total	554	100.0	

Table C.8 Q8 - What is the average number of hours you spend recreational riding each week?

	Frequency	Percent	Valid Percent	Cumulative Percent
None	24	4.3	4.4	4.4
Less than 3 hours	172	31.0	31.7	36.2
3 to 5 hours	195	35.2	36.0	72.1
6 to 8 hours	84	15.2	15.5	87.6
9 to 11 hours	33	6.0	6.1	93.7
12 to 14 hours	13	2.3	2.4	96.1
15 to 17 hours	8	1.4	1.5	97.6
18 to 20 hours	3	.5	.6	98.2
More than 20 hours	10	1.8	1.8	100.0
Total	542	97.8	100.0	
Missing	12	2.2		
Total	554	100.0		

Table C.9 Q9 – Do you use your bike for work (not commuting)

	Frequency	Percent	Valid Percent
I use my bike for work	66	11.9	12.2
I do not use my bike for work	476	85.9	87.8
Total	542	97.8	100.0
Missing	12	2.2	
Total	554	100.0	

Table C.10 Q10 –Average hours spent riding for work each week

	Frequency	Percent	Valid Percent	Cumulative Percent
None	350	63.2	68.5	68.5
Less than 3 hours	72	13.0	14.1	82.6
3 to 5 hours	49	8.8	9.6	92.2
6 to 8 hours	17	3.1	3.3	95.5
9 to 11 hours	7	1.3	1.4	96.9
12 to 14 hours	7	1.3	1.4	98.2
15 to 17 hours	3	.5	.6	98.8
18 to 20 hours	1	.2	.2	99.0
More than 20 hours	5	.9	1.0	100.0
Total	511	92.2	100.0	
Missing	43	7.8		
Total	554	100.0		

Table C.11 Q11- I wear full protective kit while riding

	Frequency	Percent	Valid Percent	Cumulative Percent
Always	334	60.3	61.4	61.4
Often	133	24.0	24.4	85.8
Sometimes	43	7.8	7.9	93.8
Never	34	6.1	6.3	100.0
Total	544	98.2	100.0	
Missing	10	1.8		
Total	554	100.0		

Table C.12 Q12 - I use a tinted visor

	Frequency	Percent	Valid Percent	Cumulative Percent
Always	43	7.8	7.9	7.9
Often	59	10.6	10.8	18.8
Sometimes	115	20.8	21.1	39.9
Never	327	59.0	60.1	100.0
Total	544	98.2	100.0	
Missing	10	1.8		
Total	554	100.0		

Table C.13 Q12 - I have a loud non-standard exhaust fitted to my bike

	Frequency	Percent	Valid Percent
Non-standard	144	26.0	26.6
Standard	398	71.8	73.4
Total	542	97.8	100.0
Missing	12	2.2	
Total	554	100.0	

Table C.14 Q14 – I read bike magazines

	Frequency	Percent	Valid Percent	Cumulative Percent
Regularly	222	40.1	40.9	40.9
Often	80	14.4	14.7	55.6
Sometimes	196	35.4	36.1	91.7
Never	45	8.1	8.3	100.0
Total	543	98.0	100.0	
Missing	11	2.0		
Total	554	100.0		

Table C.15 Q16 – Age

	Frequency	Percent	Valid Percent	Cumulative Percent
Under 20	17	3.1	3.1	3.1
21 to 25	40	7.2	7.4	10.5
26 to 30	36	6.5	6.6	17.1
31 to 35	75	13.5	13.8	30.9
36 to 40	102	18.4	18.8	49.7
41 to 45	98	17.7	18.0	67.8
46 to 50	59	10.6	10.9	78.6
51 to 55	65	11.7	12.0	90.6
56 to 60	28	5.1	5.2	95.8
61 to 65	17	3.1	3.1	98.9
65 to 70	6	1.1	1.1	100.0
Total	543	98.0	100.0	
Missing	11	2.0		
Total	554	100.0		

Table C.16 Q17 – Gender

	Frequency	Percent	Valid Percent
Male	475	85.7	88.1
Female	64	11.6	11.9
Total	539	97.3	100.0
Missing	15	2.7	
Total	554	100.0	

C.2 Frequencies

Table C.17 Cross tabulation of age and loud exhaust

	Non-standard	Standard	Total
Under 20	9	8	17
21 to 25	13	27	40
26 to 30	10	26	36
31 to 35	34	40	74
36 to 40	26	76	102
41 to 45	30	68	98
46 to 50	4	55	59
51 to 55	8	56	64
56 to 60	6	22	28
61 to 65	4	13	17
65 to 70		6	6
Total	144	397	541

(Chi Squared $p < 0.001$)

Table C.18 Cross tabulation of Gender by recreational riding

	Male	Female	Total
I spend most of my recreational riding time riding by myself	275	21	296
I spend most of my recreational riding time riding in an or	47	5	52
I spend most of my recreational riding time riding with fri	132	38	170
I do not use my bike for recreational riding	21		21
Total	475	64	539

(Chi Squared $p < 0.001$)

Table C.19 Cross tabulation of Gender Magazine reading

	Male	Female	Total
Regularly	196	23	219
Often	76	4	80
Sometimes	162	32	194
Never	41	4	45
Total	475	63	538

(Chi Squared $p = 0.038$)

Appendix D – Data from Questionnaire 3

Table D.1 Licence Held

	Frequency	Percent	Valid Percent	Cumulative Percent
None	1	1.0	1.0	1.0
CBT	3	3.0	3.0	4.0
A1	6	5.9	5.9	9.9
A	91	90.1	90.1	100.0
Total	101	100.0	100.0	

Table D.2 Age

	Frequency	Percent	Valid Percent	Cumulative Percent
<21	6	5.9	5.9	5.9
21 to 25	8	7.9	7.9	13.9
26 to 30	12	11.9	11.9	25.7
31 to 35	11	10.9	10.9	36.6
36 to 40	10	9.9	9.9	46.5
41 to 45	25	24.8	24.8	71.3
46 to 50	12	11.9	11.9	83.2
51 to 55	10	9.9	9.9	93.1
56 to 60	4	4.0	4.0	97.0
> 60	3	3.0	3.0	100.0
Total	101	100.0	100.0	

Table D.3 Gender

	Frequency	Percent	Valid Percent
Male	83	82.2	82.2
Female	18	17.8	17.8
Total	101	100.0	100.0

Table D.4 Earnings

	Frequency	Percent	Valid Percent	Cumulative Percent
<10K	8	7.9	7.9	7.9
10K to 15K	8	7.9	7.9	15.8
15K to 20K	25	24.8	24.8	40.6
20K to 25K	12	11.9	11.9	52.5
25K to 30K	7	6.9	6.9	59.4
30K to 35K	11	10.9	10.9	70.3
35K to 40K	11	10.9	10.9	81.2
40K to 45K	7	6.9	6.9	88.1
45K to 50K	7	6.9	6.9	95.0
50K to 55K	3	3.0	3.0	98.0
55K to 60K	1	1.0	1.0	99.0
>60K	1	1.0	1.0	100.0
Total	101	100.0	100.0	

Table D.5 Economic/Social class

	Frequency	Percent	Valid Percent
Upper management	6	5.9	5.9
Middle management/professional	41	40.6	40.6
Junior management/clerical	17	16.8	16.8
Skilled manual	10	9.9	9.9
Semi-skilled/unskilled	11	10.9	10.9
Unemployed	1	1.0	1.0
Student	2	2.0	2.0
Retired	3	3.0	3.0
Other	10	9.9	9.9
Total	101	100.0	100.0

Table D.6 Spending on bike and kit

	Frequency	Percent	Valid Percent	Cumulative Percent
None	3	3.0	3.0	3.0
Up to £500	37	36.6	36.6	39.6
£501 to £1000	31	30.7	30.7	70.3
More than £1000	30	29.7	29.7	100.0
Total	101	100.0	100.0	

Table D.7 Spending on consumables

	Frequency	Percent	Valid Percent	Cumulative Percent
None	4	4.0	4.0	4.0
Up to £500	36	35.6	35.6	39.6
£501 to £1000	30	29.7	29.7	69.3
More than £1000	31	30.7	30.7	100.0
Total	101	100.0	100.0	

Table D.8 Spending on accommodation

	Frequency	Percent	Valid Percent	Cumulative Percent
None	41	40.6	40.6	40.6
Up to £500	41	40.6	40.6	81.2
£501 to £1000	9	8.9	8.9	90.1
More than £1000	10	9.9	9.9	100.0
Total	101	100.0	100.0	

Table D.9 Spending on events

	Frequency	Percent	Valid Percent	Cumulative Percent
None	54	53.5	53.5	53.5
Up to £500	42	41.6	41.6	95.0
£501 to £1000	4	4.0	4.0	99.0
More than £1000	1	1.0	1.0	100.0
Total	101	100.0	100.0	

Table D.10 Other Spending

	Frequency	Percent	Valid Percent	Cumulative Percent
None	40	39.6	40.0	40.0
Up to £500	49	48.5	49.0	89.0
£501 to £1000	8	7.9	8.0	97.0
More than £1000	3	3.0	3.0	100.0
Total	100	99.0	100.0	

Table D.11 Total Spending

	Frequency	Percent	Valid Percent	Cumulative Percent
<£1500	31	30.7	30.7	30.7
£1501 - £3000	27	26.7	26.7	57.4
>£3001	43	42.6	42.6	100.0
Total	101	100.0	100.0	

Appendix E – Data from Questionnaire 4

E.1 Frequencies

Table E.1 Make of bike

	Frequency	Percent	Valid Percent
Yamaha	9	17.0	17.0
Kawasaki	6	11.3	11.3
Honda	14	26.4	26.4
Suzuki	11	20.8	20.8
Gillera	1	1.9	1.9
Triumph	4	7.5	7.5
Norton	1	1.9	1.9
Moto Guzzi	1	1.9	1.9
Harley Davidson	1	1.9	1.9
MZ	1	1.9	1.9
Ducati	2	3.8	3.8
BMW	2	3.8	3.8
Total	53	100.0	100.0

Table E.2 Type of bike

	Frequency	Percent	Valid Percent
Sport	24	45.3	45.3
Sport Tourer	10	18.9	18.9
Tourer	7	13.2	13.2
Classic	2	3.8	3.8
Off road	2	3.8	3.8
Moped	1	1.9	1.9
All rounder	7	13.2	13.2
Total	53	100.0	100.0

Table E.3 Age of bike

Years	Frequency	Percent	Valid Percent	Cumulative Percent
0	2	3.8	3.8	3.8
1	4	7.5	7.5	11.3
2	10	18.9	18.9	30.2
3	9	17.0	17.0	47.2
4	6	11.3	11.3	58.5
5	7	13.2	13.2	71.7
6	2	3.8	3.8	75.5
7	1	1.9	1.9	77.4
8	2	3.8	3.8	81.1
9	1	1.9	1.9	83.0
10	2	3.8	3.8	86.8
11	1	1.9	1.9	88.7
12	1	1.9	1.9	90.6
15	1	1.9	1.9	92.5
20	1	1.9	1.9	94.3
21	1	1.9	1.9	96.2
32	1	1.9	1.9	98.1
48	1	1.9	1.9	100.0
Total	53	100.0	100.0	

Table E.4 Summer riding only

	Frequency	Percent	Valid Percent
Yes	22	41.5	41.5
No	31	58.5	58.5
Total	53	100.0	100.0

Table E.5 Own fault accidents

	Frequency	Percent	Valid Percent	Cumulative Percent
0	30	56.6	56.6	56.6
1	14	26.4	26.4	83.0
2	4	7.5	7.5	90.6
3	5	9.4	9.4	100.0
Total	53	100.0	100.0	

Table E.6 Other fault accidents

OTHERACC

	Frequency	Percent	Valid Percent	Cumulative Percent
0	33	62.3	62.3	62.3
1	14	26.4	26.4	88.7
2	1	1.9	1.9	90.6
3	1	1.9	1.9	92.5
4	2	3.8	3.8	96.2
15	1	1.9	1.9	98.1
20	1	1.9	1.9	100.0
Total	53	100.0	100.0	

Table E.7 Hours per month spent riding for pleasure

Hours	Frequency	Percent	Valid Percent	Cumulative Percent
0	1	1.9	1.9	1.9
3	2	3.8	3.8	5.8
6	6	11.3	11.5	17.3
7	1	1.9	1.9	19.2
8	4	7.5	7.7	26.9
10	8	15.1	15.4	42.3
12	1	1.9	1.9	44.2
15	4	7.5	7.7	51.9
16	5	9.4	9.6	61.5
18	1	1.9	1.9	63.5
20	12	22.6	23.1	86.5
24	1	1.9	1.9	88.5
25	1	1.9	1.9	90.4
30	1	1.9	1.9	92.3
36	1	1.9	1.9	94.2
40	3	5.7	5.8	100.0
Total	52	98.1	100.0	
Missing	1	1.9		
Total	53	100.0		

Table E.8 Hours per month spent riding for work

	Frequency	Percent	Valid Percent	Cumulative Percent
0	25	47.2	48.1	48.1
2	4	7.5	7.7	55.8
4	2	3.8	3.8	59.6
5	2	3.8	3.8	63.5
8	1	1.9	1.9	65.4
10	3	5.7	5.8	71.2
12	1	1.9	1.9	73.1
15	2	3.8	3.8	76.9
16	1	1.9	1.9	78.8
18	1	1.9	1.9	80.8
20	1	1.9	1.9	82.7
25	2	3.8	3.8	86.5
26	1	1.9	1.9	88.5
30	2	3.8	3.8	92.3
35	1	1.9	1.9	94.2
36	1	1.9	1.9	96.2
40	1	1.9	1.9	98.1
60	1	1.9	1.9	100.0
Total	52	98.1	100.0	
Missing	1	1.9		
Total	53	100.0		

Table E.9 Hours per month spent getting around the local area

	Frequency	Percent	Valid Percent	Cumulative Percent
0	31	58.5	59.6	59.6
1	1	1.9	1.9	61.5
2	5	9.4	9.6	71.2
3	1	1.9	1.9	73.1
4	2	3.8	3.8	76.9
5	3	5.7	5.8	82.7
6	1	1.9	1.9	84.6
8	1	1.9	1.9	86.5
10	2	3.8	3.8	90.4
12	1	1.9	1.9	92.3
15	1	1.9	1.9	94.2
20	1	1.9	1.9	96.2
30	2	3.8	3.8	100.0
Total	52	98.1	100.0	
Missing	1	1.9		
Total	53	100.0		

Table E.10 Hours per month spent touring

	Frequency	Percent	Valid Percent	Cumulative Percent
0	36	67.9	69.2	69.2
1	1	1.9	1.9	71.2
2	3	5.7	5.8	76.9
3	2	3.8	3.8	80.8
10	4	7.5	7.7	88.5
12	2	3.8	3.8	92.3
15	1	1.9	1.9	94.2
20	2	3.8	3.8	98.1
40	1	1.9	1.9	100.0
Total	52	98.1	100.0	
Missing	1	1.9		
Total	53	100.0		

E.2 Analysis of Comments

Table E.11 Likes and Themes

Comment	**Theme**
Getting out on the road	Other
Freedom	Freedom
Speed	Speed
Freedom.	Freedom
Zero traffic hassles.	Convenience
Economic solo transport.	Costs
Each journey and commute is an adventure.	Excitement
Cheap accessible performance	Cost
Absorbing hobby	Other
Motorcycle sport is good to watch	Other
Good ‘kindred spirit’ factor.	Camaraderie/Social
Freedom.	Freedom
No traffic jams	Convenience
Enjoyment	Enjoyment
The freedom and the fresh air, and of course cornering has to come into it	Freedom
The freedom and the fresh air, and of course cornering has to come into it	Fresh air/Nature/Scenery/Places
The freedom and the fresh air, and of course cornering has to come into it	Other
The usual, no need to ask	Other
Freedom, fresh air.	Freedom
Freedom, fresh air.	Fresh air/Nature/Scenery/Places
Being in contact with the surroundings.	Fresh air/Nature/Scenery/Places
Ability to make good progress in traffic.	Convenience

Freedom and fresh air	Freedom
Freedom and fresh air	Fresh air/Nature/Scenery/Places
The sensation of Freedom.	Fresh air/Nature/Scenery/Places
Good way to meet people.	Camaraderie/Social
Going to rallies	Camaraderie/Social
Tinkering – basic mechanics.	Mechanics
Car vs bike costs, bike wins	Cost
Easy to park	Convenience
Enjoy biking life, rallies etc	Camaraderie/Social
Used to work in biking	Other
Vintage machines	Other
Freedom.	Freedom
Open spaces.	Fresh air/Nature/Scenery/Places
Friendship	Camaraderie/Social
Speed	Speed
Everything	Other
Fuel Economy.	Cost
Road tax.	Cost
Insurance.	Cost
Ease of parking.	Convenience
Ability to avoid hold-ups	Convenience
A great feeling	Enjoyment
Freedom	Freedom
Speed	Speed
No traffic jams	Convenience
Biking community	Camaraderie/Social
Freedom.	Freedom
Less expensive than cars	Cost
Thrills	Excitement
Easy maintenance.	Mechanics
Cool factor.	Other
Better for the environment, Eases congestion	Other
Easy parking	Convenience
Easy to manoeuvre.	Convenience
I love it	Enjoyment
Being part and feeling part of the biking community.	Camaraderie/Social
All the biking events, races, rallies, runs, etc	Camaraderie/Social
Mutual respect between bikers	Camaraderie/Social
Good from dealers.	Other
The freedom (no kids on the back)	Freedom
The social life (Harley owners group)	Camaraderie/Social
Being in the fresh air – sights, fragrances from plants.	Fresh air/Nature/Scenery/Places
The kick from co-ordination in using a m/cycle – balance, speed, judgement.	Use of skills
Having fun tinkering/fiddling with machinery	Mechanics
The camaraderie and contacts in a classes hobby	Camaraderie/Social

Freedom	Freedom
Biker spirit	Camaraderie/Social
Other bikers (camaraderie)	Camaraderie/Social
Ease of overtaking	Convenience
Adrenalin induced (even in steady riding)	Excitement
Freedom to go where I like at my own speed.	Freedom
Sheer enjoyment when I have a 'good riding' day.	Enjoyment
The scenery.	Fresh air/Nature/Scenery/Places
Being alone in my head with no one else talking to me.	Solitude
Good friends who I have met through biking.	Camaraderie/Social
People stopping to talk to me about bikes in the street and kids waving to me.	Camaraderie/Social
Admiring my bike.	Other
Getting through traffic queues (filtering) more quickly than in a car.	Convenience
The occasional burst of speed on a very open road.	Speed
Packing for a good road trip or touring holiday.	Other
Watching the Moto-GP and WSB.	Other
The adrenaline rush.	Excitement
Practising my skills on the open road.	Use of skills
Freedom of not being enclosed, enjoyment of being able to experience the countryside…first hand. To be able to smell the fields you travel beside.	Freedom
Freedom of not being enclosed, enjoyment of being able to experience the countryside…first hand. To be able to smell the fields you travel beside.	Enjoyment
Freedom of not being enclosed, enjoyment of being able to experience the countryside…first hand. To be able to smell the fields you travel beside.	
Fast corners, slow corners, any corner!	Other
Freedom.	Freedom
Exhilaration.	Excitement
Rebelling against impending old age.	Other
Independence.	Freedom
Freedom.	Freedom
Friendliness of other motorcyclists	Camaraderie/Social
Being part of a woman's only club is great as there is not much competitiveness and no pressure	Camaraderie/Social
All bikers I have met are so nice, the fact that most bikers, including myself, always give a wave in passing.	Camaraderie/Social
It is great fun	Enjoyment
You can smell the countryside	Fresh air/Nature/Scenery/Places
Feel of riding	Other

Less hassle from traffic jams	Convenience
Convenience	Convenience
Freedom	Freedom
Satisfaction of control and use of skill.	Use of skills
Opportunity to use engineering and DIY.	Mechanics
Independence from traffic.	Convenience
Ease of parking.	Convenience
Meeting similar people and camaraderie.	Camaraderie/Social
Being different	Other
Smelling the world	
Get through the traffic in town.	Convenience
Time to think.	Other
Requires focus.	Use of skills
Adrenaline.	Excitement
Closest thing to flying…on the ground.	Excitement
DIY mechanicing.	Mechanics
Good mates	Camaraderie/Social
Freedom	Freedom
Excitement	Excitement
Individuality	Other
Comradeship	Camaraderie/Social
Excitement	Excitement
Company	Camaraderie/Social
Freedom	Freedom
Nostalgia	Other
Stories	Camaraderie/Social
Mechanical challenge	Mechanics
Drinking and partying	Camaraderie/Social
People (bikers)	Camaraderie/Social
Rallies and parties	Camaraderie/Social
Shows and events	Camaraderie/Social
Racing	Other
No traffic jams	Convenience
Freedom	Freedom
Camaraderie among bikers	Camaraderie/Social
Freedom from the car	Freedom
Getting a good blast and your knee down	Speed
Camaraderie, friendliness of other bikers	Camaraderie/Social
Freedom to tour about and not worry about traffic build-up	Convenience
Freedom to tour about and not worry about traffic build-up	Freedom
Freedom	Freedom
Less delays on a bike	Convenience
Variety of bikes and types of riding	Other
Going to events, etc	Camaraderie/Social
Feeling of freedom	Freedom
Speed	Speed

Adrenaline	Excitement
Freedom	Freedom
Wheelies	Other
On my own	Solitude
Freedom	Freedom
Traffic jams	Convenience
Speed	Speed
Friendly bikers	Camaraderie/Social
Races	Other
Feeling of acceleration	Excitement
Camaraderie of fellow bikers	Camaraderie/Social
Fun	Enjoyment
Escape from everyday life	Freedom
Solitude	Solitude
Speed	Speed
Freedom	Freedom
Access through traffic	Convenience
Track day	Other
Freedom	Freedom
Freedom	Freedom
Thrill	Excitement
Friendliness with other bikers	Camaraderie/Social
Increases your awareness of what's happening around you	Use of skills
Freedom	Freedom
Roads are generally a lot quieter than London area where I learnt to ride	Quiet/Good roads
Freedom	Freedom
Good roads	Quiet/Good roads
Empty roads.	Quiet/Good roads
Spectacular scenery.	Fresh air/Nature/Scenery/Places
Easy access to countryside from relatively less built-up areas compared to down south.	Fresh air/Nature/Scenery/Places
Few dull motorway stretches.	Quiet/Good roads
There are a great variety of riding experiences in a small country	Quiet/Good roads
Good roads	Quiet/Good roads
The landscape	Fresh air/Nature/Scenery/Places
Good roads, scenery, routes, stopping and brewing up spots; tolerable traffic	Quiet/Good roads
Good roads, scenery, routes, stopping and brewing up spots; tolerable traffic	Fresh air/Nature/Scenery/Places
The countryside.	Fresh air/Nature/Scenery/Places
Fresh air.	Fresh air/Nature/Scenery/Places
Roads.	Quiet/Good roads
People.	Drivers/People
Courteous drivers.	Drivers/People
Some amazing scenery and good biking roads.	Quiet/Good roads

Some amazing scenery and good biking roads.	Fresh air/Nature/Scenery/Places
People are very friendly	Drivers/People
Roads are good.	Quiet/Good roads
People wave.	Drivers/People
Scenery.	Fresh air/Nature/Scenery/Places
Freedom	Freedom
The friendship of other bikers	Camaraderie/Social
Everything	Other
Many many interesting places to visit.	Fresh air/Nature/Scenery/Places
Roads are quieter than in England or Wales.	Quiet/Good roads
Majority of motorists are "biker friendly"	Drivers/People
Good roads	Quiet/Good roads
Scenery	Fresh air/Nature/Scenery/Places
Everywhere fairly easy accessible.	Quiet/Good roads
Most roads are not too buy with traffic	Quiet/Good roads
Loads of other bikers	Camaraderie/Social
The scenery (not the weather)	Fresh air/Nature/Scenery/Places
The scenery – fantastic	Fresh air/Nature/Scenery/Places
The quieter roads	Quiet/Good roads
Scenery	Fresh air/Nature/Scenery/Places
Quiet roads	Quiet/Good roads
Isolation	Solitude
Twisty roads	Quiet/Good roads
Lots to see and do	Fresh air/Nature/Scenery/Places
Good places to eat	Fresh air/Nature/Scenery/Places
Lots of other bikers	Camaraderie/Social
Clean air	Fresh air/Nature/Scenery/Places
Fantastic roads and scenery.	Fresh air/Nature/Scenery/Places
Fantastic roads and scenery.	Fresh air/Nature/Scenery/Places
Great camping spots to take the bike, and enjoy with friends.	Quiet/Good roads
God rallies – particularly the BMF Kelso one.	Camaraderie/Social
Good roads for an evening blast.	Quiet/Good roads
Being part of a great bike club (Perthshire ladies MCC).	Camaraderie/Social
One or two very good and friendly bike shops.	Other
More technically demanding roads.	Quiet/Good roads
Less other vehicles (certain areas)	Quiet/Good roads
Being able to get there at my speed. No frustration of the cooped up car driver in a queue.	Convenience
The friends I have met	Camaraderie/Social
Club runs	Camaraderie/Social
Highland roads	Quiet/Good roads
The journey	
Wonderful scenery.	Fresh air/Nature/Scenery/Places
Great roads	Quiet/Good roads
Camaraderie	Camaraderie/Social
Scenery roads	Quiet/Good roads

The roads and scenery in Scotland, it's a great way to explore and you gain total appreciation of the country (and I'm English)	Quiet/Good roads
It is great fun, even in the wet	Enjoyment
Relatively quiet roads	Quiet/Good roads
Interesting roads	Quiet/Good roads
Scenery	Fresh air/Nature/Scenery/Places
Good roads	Quiet/Good roads
Lack of congestion	Convenience
Reasonable police attitudes vs some parts of UK	Law enforcement
Lower insurance cost	Cost
Some excellent roads – boarders, west coast, highlands.	Quiet/Good roads
Good way to see the country.	Quiet/Good roads
Scenery	Fresh air/Nature/Scenery/Places
Fairly quiet roads	Quiet/Good roads
Excitement	Excitement
Company	Camaraderie/Social
Freedom	Freedom
Nostalgia	Other
Stories	Camaraderie/Social
Mechanical challenge	Mechanics
Drinking and partying	Camaraderie/Social
Bends	Quiet/Good roads
Clear roads	Quiet/Good roads
Scenery	Fresh air/Nature/Scenery/Places
Quiet roads	Quiet/Good roads
The sights, the views.	Fresh air/Nature/Scenery/Places
The quiet road	Quiet/Good roads
Half decent roads	Quiet/Good roads
Scenery	Fresh air/Nature/Scenery/Places
Scenery	Fresh air/Nature/Scenery/Places
Lack of traffic	Quiet/Good roads
Scenery and back drop	Fresh air/Nature/Scenery/Places
Friendly bikers. Both local to UK and tourists (Europe)	Camaraderie/Social
Roads and scenery	Fresh air/Nature/Scenery/Places
Roads and scenery	Quiet/Good roads
Scenery	Fresh air/Nature/Scenery/Places
Good roads	Quiet/Good roads
Britain	Other
The view	Fresh air/Nature/Scenery/Places
The roads	Quiet/Good roads
Roads	Quiet/Good roads
No many police	Law enforcement
Not very many cameras or cops	Law enforcement
Great roads, often empty	Quiet/Good roads
Camaraderie of fellow bikers	Camaraderie/Social

Fun	Enjoyment
Escape from everyday life	Freedom
Good roads	Quiet/Good roads
Great roads	Quiet/Good roads
Roads	Quiet/Good roads
Edzell and Knockhill	Other
Nice roads	Quiet/Good roads
Scenery	Fresh air/Nature/Scenery/Places
Roads	Quiet/Good roads
General ambience	Fresh air/Nature/Scenery/Places
Great roads	Quiet/Good roads

Table E.12 Themes and Codes for Likes

Theme	**Code**
Camaraderie/Social	1
Convenience	2
Cost	3
Drivers/People	4
Enjoyment	5
Excitement	6
Freedom	7
Fresh air/Nature/Scenery/Places	8
Law enforcement	9
Mechanics	10
Other	11
Quiet/Good roads	12
Solitude	13
Speed	14
Use of skills	15

Table E.13 Dislike Themes

Dislike comments	Themes
Car drivers who have never ridden a bike	Car drivers
Bad road	Road surface
Volvo drivers	Car drivers
Dirty roads, oil, diesel, grit, etc	Road surface
Bad weather.	Weather
Dangerous and inexperienced riding, lack of regard to good road based skills (or too much emphasis on track day skills if you like).	Other road users
Poor finish and corrosion resistance of machinery.	Poor bike/kit quality

Lack of security and anti-theft devices	Other
Getting wet when it rains	Weather
I can't drive on the motorway at the moment which can add to my journey time very significantly.	Biking restrictions
Also, bad car drivers take advantage of the fact that you are more vulnerable than them	Car drivers
Rain.	Weather
Bad drivers.	Car drivers
Speed cameras in obviously revenue generating positions.	Law enforcement
Some car drivers.	Car drivers
State roads are in	Road surface
Bad weather	Weather
Lack of consideration from other road users.	Other road users
Having to get kitted up, ie, leathers helmet, etc (although I probably wouldn't feel safe if I didn't)	Other
Boy racers who think that they know it all and end up putting other folk on the roads in danger.	Car drivers
Bad behaviour and riding including courier type of riding – not everyone has to get there at 100 mph	Other road users
Wet riding	Weather
Cold	Weather
Police victimisation against bikers	Law enforcement
Congested roads	Congestion
State of roads	Road surface
Other road users/abusers	Other road users
Riding when it is very cold	Weather
Insurance prices.	Cost
People giving bikes dangerous reputation.	Other attitude to bikers
Being disliked by police.	Law enforcement
Having restrictions in size of machine at certain ages – no restriction with cars.	Biking restrictions
Rain	Weather
Cost of running	Cost
Cost of parts	Cost
Vulnerability	Other
Fuel prices	Cost
Other road users who are very ignorant and sole purpose seems to be to cause accidents	Other road users
Bad car drivers	Car drivers
Lack of space/distance by some car drivers	Car drivers
Leaking rain gear	Poor bike/kit quality
Getting really cold	Weather
Insurance expensive	Cost
Careless inobservant drivers	Car drivers
The rain	Weather
The 'plastic fantastic' boys (and some girls) who treat the roads like racetracks, even when the roads are busy and the conditions are unsafe, and particularly the ones who come	Car drivers

right over onto the other side of the road and force bikes and cars out of the way.	
I dislike the popular bike press constantly pushing performance bikes, although it is beginning to improve.	Other
The poor service in many bike shops, especially when you are female. (Although I know some good ones too!)	Other
Peoples attitude to bikers.	Other attitude to bikers
Speed cameras (speed kills! Is an incorrect statement…. Inappropriate speed kills)	Law enforcement
Open to the elements.	Weather
Car drivers being inconsiderate and unaware	Car drivers
Build quality of most bikes, considering their cost	Poor bike/kit quality
Car drivers attitudes, lack of awareness and consideration	Car drivers
Lack of consideration from some drivers.	Car drivers
Diesel, oil and unsigned gravel on roads.	Road surface
Banding on patches on roads.	Road surface
Can be a bit miserable when wet, especially if you've forgotten your waterproof trousers.	Weather
Steamed up glasses and visors	Weather
The weather	Weather
Wet roads	Weather
Poor visibility	Weather
Gloves filling with water	Poor bike/kit quality
Getting wet	Weather
Vulnerability and ease of damage from thoughtless road users.	Other
Vulnerability and ease of damage from thoughtless road users.	Other road users
Diesel spillages.	Road surface
Frost.	Weather
Limited carrying capacity	Other
Being ignored by planners of roads.	Other
Parking.	Other
Access.	Other
Prejudice and stereotyping.	Other attitude to bikers
Can be expensive	Cost
Hassle from car drivers who don't like you overtaking or going to the front of the traffic lights.	Car drivers
No longer the cheap transport that it was when I was younger, tyres chains etc expensive, sports bike rear tyre £140 lasts possible 4-5000 if you drive hard	Cost
Car drivers	Car drivers
Speed traps	Law enforcement
Taxis	Other road users
Buses	Other road users
Other road users with no idea of danger, incl bikers	Other road users
Cost	Cost
Road tax, fuel tax	Cost

Car drivers	Car drivers
Cost	Cost
Speed cameras	Law enforcement
Car drivers	Car drivers
Washing the bike	Other
Getting ready to go out on the bike	Other
Car drivers, always have to have your wits about you because of the car drivers	Car drivers
Wet weather	Weather
Car drivers that don't look at junctions	Car drivers
Having to pay VAT on what is safety equipment, e.g. helmets, leathers, etc.	Cost
Diesel spills at roundabouts	Road surface
Bike manufactures who drop prices and ruin 2nd hand prices for relatively new models, e.g. SV1000S!	Cost
Road conditions, diesel spills, mud, pot holes, etc.	Road surface
Insurance costs	Cost
Car drivers not looking	Car drivers
Weather	Weather
Some peoples attitudes	Other attitude to bikers
Sneaky police	Law enforcement
Other road users	Other road users
Public thinks we are hooligans	Other attitude to bikers
Oil and diesel spills	Road surface
Weather	Weather
Bad car drivers	Car drivers
Rain	Weather
Weather	Weather
Weather	Weather
Lack of awareness from other (not all) road users.	Other road users
Some road surfaces not great for two wheels	Road surface
Getting wet	Weather
The weather!	Weather
Bad road	Road surface
Volvo drivers	Car drivers
Weather	Weather
Poor weather.	Weather
Poor state of some roads, too much over- banding, gravel, diesel spills, etc.	Road surface
Severe bike parking in towns lacking, also exclusions from bus lanes	Other
There are some very badly surface roads, not many, but some	Road surface
To little good weather	Weather
Too much salt/grit through the winter	Road surface
Rain.	Weather
Insects.	Other
Germans.	Other

Cold bad weather	Weather
Rain and crosswinds.	Weather
Caravans on small roads	Congestion
Wet riding	Weather
Congested roads	Congestion
Condition of roads	Road surface
Adverse weather	Weather
Short summers	Weather
Weather	Weather
Road conditions	Road surface
Condition of roads.	Road surface
Weather.	Weather
Police clampdowns.	Law enforcement
Speed cameras, etc, etc	Law enforcement
Fuel prices	Cost
Weather (poor).	Weather
Roads poor condition	Road surface
Councils over salt the roads	Road surface
Too many speed cameras	Law enforcement
Max speed limits reduced on A roads, no reasonable reason given by authorities	Law enforcement
The weather	Weather
The weather	Weather
State of disrepair of some roads, huge pot holes	Road surface
Poor road surfaces	Road surface
The rain	Weather
Often no street lights	Other
The rain	Weather
The Skye bridge tolls.	Cost
Snow	Weather
Condition of road surfaces	Road surface
Diesel spillages	Road surface
Lack of good weather	Weather
Weather!!	Weather
The roads can get choked with tourists, caravans and sheep.	Other
The roads can get choked with tourists, caravans and sheep.	Congestion
It would be nice if it was dryer and warmer more often.	Weather
Cars that pull tight to the middle white line when they see you coming.	Car drivers
Difference of police forces attitude E.e. one booking for a noisy can or small number plate, and another saying that noisy cans and small number plates didn't kill anyone.	Law enforcement
The weather	Weather
Winter salt	Road surface
Getting wet	Weather
Getting cold	Weather
Ice and snow	Weather
Sheep	Other

Distance to the continent for touring and holidays	Other
Cold wet and bloody miserable winters, drove through the winter last year, 25 miles @ 65-70 mph before reaching town, and have previous years, tireing. May buy a car, scrapper for this winter	Weather
Weather	Weather
Rain	Weather
Other traffic (car drivers)	Car drivers
Weather	Weather
Being wet in summer	Weather
Weather	Weather
Crap road surfaces	Road surface
Rain, rain, rain	Weather
Weather	Weather
Wet weather	Weather
Car drivers that don’t look at junctions	Car drivers
Some of the road surfaces can be pretty poor	Road surface
Weather!	Weather
Road conditions are appalling	Road surface
Weather	Weather
Sand and Diesel	Road surface
Events, everything happens in England	Other
Weather	Weather
Weather	Weather
Rain	Weather
Weather	Weather
Weather	Weather
Bad weather	Weather

Table E.14 Themes and Codes for Dislikes

Theme	**Code**
Weather	1
Car drivers	2
Congestion	3
Cost	4
Law enforcement	5
Other	6
Other attitude to bikers	7
Other road users	8
Poor bike/kit quality	9
Road surface	10

Table E.15 Themes and Codes for Likes

Theme	**Code**
Camaraderie/Social	1
Convenience	2
Cost	3
Drivers/People	4
Enjoyment	5
Excitement	6
Freedom	7
Fresh air/Nature/Scenery/Places	8
Law enforcement	9
Mechanics	10
Other	11
Quiet/Good roads	12
Solitude	13
Speed	14
Use of skills	15

Appendix F – Data from Questionnaire 5

Table F.1 Assessed as risky by track section

Section	Risk		Total
	No	Yes	
1	22	1	23
2	8	15	23
3	22	1	23
4	21	2	23
5	23		23
6	17	6	23
7	22	1	23
8	21	2	23
9	23		23
10	16	7	23
Total	195	35	230

Table F.2 Assessed as enjoyable by track section

Section	Enjoyment		Total
	No	Yes	
1	21	2	23
2	10	13	23
3	20	3	23
4	21	2	23
5	21	2	23
6	19	4	23
7	18	5	23
8	21	2	23
9	21	2	23
10	14	9	23
Total	186	44	230

Table F.3 Assessed as high concentration by track section

Section	Concentration		Total
	No	Yes	
1	18	5	23
2	21	2	23
3	15	8	23
4	14	9	23
5	21	2	23
6	21	2	23
7	13	10	23
8	20	3	23
9	20	3	23
10	21	2	23
Total	184	46	230

Table F.4 Assessed as high excitement by track section

Section	Excitement		Total
	No	Yes	
1	20	3	23
2	21	2	23
3	18	5	23
4	15	8	23
5	23		23
6	22	1	23
7	17	6	23
8	19	4	23
9	23		23
10	22	1	23
Total	200	30	230

Appendix G – Data from Questionnaire 6

Table G.1 Age

	Frequency	Percent	Valid Percent	Cumulative Percent
<21	3	2.4	2.6	2.6
21 25	5	3.9	4.3	6.9
26 - 30	6	4.7	5.2	12.1
31 - 35	21	16.5	18.1	30.2
36 - 40	22	17.3	19.0	49.1
41 - 45	33	26.0	28.4	77.6
46 - 50	10	7.9	8.6	86.2
51 - 55	10	7.9	8.6	94.8
56 - 60	3	2.4	2.6	97.4
61+	3	2.4	2.6	100.0
Total	116	91.3	100.0	
Missing	7	5.5		
System	4	3.1		
Total	11	8.7		
Total	127	100.0		

Table G.2 Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	99	78.0	85.3	85.3
Female	17	13.4	14.7	100.0
Total	116	91.3	100.0	
Missing	7	5.5		
System	4	3.1		
Total	11	8.7		
Total	127	100.0		

Table G.3 Risk for Scenario 1

	Frequency	Percent	Valid Percent	Cumulative Percent
1	5	3.9	4.2	4.2
2	45	35.4	37.8	42.0
3	55	43.3	46.2	88.2
4	13	10.2	10.9	99.2
5	1	.8	.8	100.0
Total	119	93.7	100.0	
-1	4	3.1		
System	4	3.1		
Total	8	6.3		
	127	100.0		

Table G.4 Enjoyment for Scenario 1

	Frequency	Percent	Valid Percent	Cumulative Percent
1	5	3.9	4.3	4.3
2	22	17.3	18.8	23.1
3	53	41.7	45.3	68.4
4	31	24.4	26.5	94.9
5	6	4.7	5.1	100.0
Total	117	92.1	100.0	
-1	6	4.7		
System	4	3.1		
Total	10	7.9		
	127	100.0		

Table G.5 Risk for Scenario 2

	Frequency	Percent	Valid Percent	Cumulative Percent
1	3	2.4	2.6	2.6
2	13	10.2	11.2	13.8
3	60	47.2	51.7	65.5
4	35	27.6	30.2	95.7
5	5	3.9	4.3	100.0
Total	116	91.3	100.0	
-1	7	5.5		
System	4	3.1		
Total	11	8.7		
	127	100.0		

Table G.6 Enjoyment for Scenario 2

	Frequency	Percent	Valid Percent	Cumulative Percent
1	3	2.4	2.6	2.6
2	18	14.2	15.7	18.3
3	55	43.3	47.8	66.1
4	33	26.0	28.7	94.8
5	6	4.7	5.2	100.0
Total	115	90.6	100.0	
-1	8	6.3		
System	4	3.1		
Total	12	9.4		
	127	100.0		

Table G.7 Risk for Scenario 3

	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	.8	.9	.9
2	12	9.4	10.4	11.3
3	29	22.8	25.2	36.5
4	52	40.9	45.2	81.7
5	21	16.5	18.3	100.0
Total	115	90.6	100.0	
-1	8	6.3		
System	4	3.1		
Total	12	9.4		
	127	100.0		

Table G.8 Enjoyment for Scenario 3

	Frequency	Percent	Valid Percent	Cumulative Percent
1	23	18.1	20.2	20.2
2	50	39.4	43.9	64.0
3	26	20.5	22.8	86.8
4	13	10.2	11.4	98.2
5	2	1.6	1.8	100.0
Total	114	89.8	100.0	
-1	9	7.1		
System	4	3.1		
Total	13	10.2		
	127	100.0		

Table G.9 Risk for Scenario 4

	Frequency	Percent	Valid Percent	Cumulative Percent
1	12	9.4	10.3	10.3
2	47	37.0	40.5	50.9
3	42	33.1	36.2	87.1
4	10	7.9	8.6	95.7
5	5	3.9	4.3	100.0
Total	116	91.3	100.0	
-1	7	5.5		
System	4	3.1		
Total	11	8.7		
	127	100.0		

Table G.10 Enjoyment for Scenario 4

	Frequency	Percent	Valid Percent	Cumulative Percent
1	3	2.4	2.7	2.7
2	15	11.8	13.5	16.2
3	43	33.9	38.7	55.0
4	42	33.1	37.8	92.8
5	8	6.3	7.2	100.0
Total	111	87.4	100.0	
-1	12	9.4		
System	4	3.1		
Total	16	12.6		
	127	100.0		

Table G.11 Risk for Scenario 5

	Frequency	Percent	Valid Percent	Cumulative Percent
1	2	1.6	1.8	1.8
2	10	7.9	8.8	10.5
3	29	22.8	25.4	36.0
4	52	40.9	45.6	81.6
5	21	16.5	18.4	100.0
Total	114	89.8	100.0	
-1	9	7.1		
System	4	3.1		
Total	13	10.2		
	127	100.0		

Table G.12 Enjoyment for Scenario 5

	Frequency	Percent	Valid Percent	Cumulative Percent
1	35	27.6	31.3	31.3
2	48	37.8	42.9	74.1
3	18	14.2	16.1	90.2
4	10	7.9	8.9	99.1
5	1	.8	.9	100.0
Total	112	88.2	100.0	
-1	11	8.7		
System	4	3.1		
Total	15	11.8		
	127	100.0		

Table G.13 Risk for Scenario 6

	Frequency	Percent	Valid Percent	Cumulative Percent
1	3	2.4	2.6	2.6
2	31	24.4	27.0	29.6
3	59	46.5	51.3	80.9
4	20	15.7	17.4	98.3
5	2	1.6	1.7	100.0
Total	115	90.6	100.0	
-1	8	6.3		
System	4	3.1		
Total	12	9.4		
	127	100.0		

Table G.14 Enjoyment for Scenario 6

	Frequency	Percent	Valid Percent	Cumulative Percent
2	3	2.4	2.7	2.7
3	16	12.6	14.3	17.0
4	52	40.9	46.4	63.4
5	41	32.3	36.6	100.0
Total	112	88.2	100.0	
-1	11	8.7		
System	4	3.1		
Total	15	11.8		
	127	100.0		

Appendix H – Analysis of Questionnaire 7

This appendix is a presentation of data taken from Questionnaire 7. The questionnaire can be found in Appendix A.

H.1 Definition of Variables

Task Difficulty

> Task difficulty is the ranking of difficulty of each scenario, one being a low ranked difficulty and six being the highest ranked.

Surface/Road surface quality

> The quality of the road surface rated on a ten-point Likert scale. One is for a low road surface quality, and ten for high quality.

Road Feature

> This a rating of the risk caused by road features, such as road size, roadside objects, junctions, etc. The rating is on a ten point Likert scale, one for low risk and ten for high.

Visibility/Vision

> The level of visibility, measured on a ten point Likert scale, one for low visibility and ten for a high leveH.

Distraction

> The likelihood of the respondent being distracted, measured on a ten point Likert scale, one for low likelihood and ten for a high likelihood.

Other Traffic

> This is a rating of the risk presented by other traffic, including pedestrians, to the respondent. The rating is on a ten point Likert scale, one for low risk and ten for high risk.

Temptation

> A measure of now tempted the rider would be to 'ride in a more enthusiastic manner'. The rating is on a ten point Likert scale, one for low temptation and ten for high temptation.

Surroundings

> This is rating of 'How pleasant it would be to ride in these surroundings - (scenery, etc)'. The rating is on a ten point Likert scale, one for low a low pleasant rating and ten for high.

Challenge

A rating of the level of challenge presented by the road, measured on a ten point Likert scale with one for low challenge and ten for high.

Bends

How bendy the road is, measured on a ten point Likert scale with one for a straight road and ten for a very bendy road.

Speed

An assessment by the respondent of how fast they would ride the road at. Measured on a Likert scale with one being slow and ten being fast.

Overtaking

A measurement of the opportunity of overtaking, measured on a ten point Likert scale with one for no opportunity and ten for a high level of opportunity.

Risk

An assessment of how risky the road would be to ride. The rating is on a ten point Likert scale, one for low risk and ten for high risk.

Enjoyment

An assessment of how enjoyable the road would be to ride. The rating is on a ten point Likert scale, one for low enjoyment and ten for high enjoyment.

Rush Based Enjoyment

This is a variable that is constructed from the results of the factor analysis. This variable has been normalised to a range of one to ten.

Challenge Based Enjoyment

This is a variable that is constructed from the results of the factor analysis. This variable has been normalised to a range of one to ten.

Risk Factor

This is a variable that is constructed from the results of the factor analysis and is related the factors that cause a feeling of risk. This variable has been normalised to a range of one to ten.

Performance Index

This is a variable that has been calculated from the bike data, giving a rating of the performance of the bike.

Age/Gender

The age and gender of the respondent.

H.2 Analysis of Data

Table H.1 Factor Analysis

	1	2	3
Surface	0.46	0.64	0.14
Features	-0.06	0.04	0.82
Visibility	0.88	-0.07	0.18
Distraction	-0.04	0.00	0.88
Traffic	0.16	0.12	0.87
Temptation	0.80	0.41	-0.17
Surroundings	0.63	0.58	-0.16
Challenge	0.03	0.88	0.09
Bends	-0.08	0.90	0.20
Speed	0.85	0.38	-0.06
Overtaking	0.87	-0.19	-0.02
Risk	-0.02	0.19	0.72
Enjoyment	0.48	0.52	0.16

Table H.2 Factor Analysis, with Task Demand

	1	2	3
Surface	0.42	0.66	0.15
Features	-0.03	0.04	0.79
Visibility	0.88	-0.04	0.19
Distraction	-0.06	0.01	0.89
Traffic	0.14	0.14	0.88
Temptation	0.78	0.44	-0.16
Surroundings	0.61	0.60	-0.16
Challenge	-0.01	0.89	0.08
Bends	-0.11	0.90	0.18
Speed	0.84	0.41	-0.07
Overtaking	0.87	-0.16	-0.02
Risk	0.01	0.19	0.67
Enjoyment	0.44	0.54	0.18
Task Difficulty	-0.47	-0.05	0.48

Table H.3 Risk x-tab with Enjoyment

		Enjoyment			
		Low	Med	High	Total
Risk	Low	79	47	35	161
	Med	21	40	8	69
	High	6	46	7	59
	Total	106	133	50	289

		Enjoyment			
		Low	Med	High	Total
Risk	Low	49%	29%	22%	100%
	Med	30%	58%	12%	100%
	High	10%	78%	12%	100%
	Total	37%	46%	17%	100%

		Enjoy			
		Low	Med	High	Total
Risk	Low	75%	35%	70%	56%
	Med	20%	30%	16%	24%
	High	6%	35%	14%	20%
	Total	100%	100%	100%	100%

		Enjoyment			
		Low	Med	High	Total
Risk	Low	27%	16%	12%	56%
	Med	7%	14%	3%	24%
	High	2%	16%	2%	20%
	Total	37%	46%	17%	100%

(Chi Squared $p < 0.001$)

Table H.4 Risk x-tab with Road Surface Quality

		Road Surface Quality			
		Low	Med	High	Total
Risk	Low	91	47	25	163
	Med	38	11	20	69
	High	4	32	23	59
	Total	133	90	68	291

		Road Surface Quality			
		Low	Med	High	Total
Risk	Low	56%	29%	15%	100%
	Med	55%	16%	29%	100%
	High	7%	54%	39%	100%
	Total	46%	31%	23%	100%

(Chi Squared $p < 0.001$)

Table H.5 Risk x-tab with Road Features

		Road Features			
		Low	Med	High	Total
Risk	Low	96	47	20	163
	Med	22	25	22	69
	High	6	11	42	59
	Total	124	83	84	291

		Road Features			
		Low	Med	High	Total
Risk	Low	59%	29%	12%	100%
	Med	32%	36%	32%	100%
	High	10%	19%	71%	100%
	Total	43%	29%	29%	100%

(Chi Squared $p < 0.001$)

Table H.6 Risk x-tab with Distraction

		Distraction			
		Low	Med	High	Total
Risk	Low	112	36	15	163
	Med	29	22	18	69
	High	11	19	29	59
	Total	152	77	62	291

		Distraction			
		Low	Med	High	Total
Risk	Low	69%	22%	9%	100%
	Med	42%	32%	26%	100%
	High	19%	32%	49%	100%
	Total	52%	26%	21%	100%

(Chi Squared $p < 0.001$)

Table H.7 Risk x-tab with Other Traffic

		Other Traffic			
		Low	Med	High	Total
Risk	Low	90	55	18	163
	Med	13	24	32	69
	High	2	13	44	59
	Total	105	92	94	291

		Other Traffic			
		Low	Med	High	Total
Risk	Low	55%	34%	11%	100%
	Med	19%	35%	46%	100%
	High	3%	22%	75%	100%
	Total	36%	32%	32%	100%

(Chi Squared $p < 0.001$)

Table H.8 Risk x-tab with Temptation

		Temptation			
		Low	Med	High	Total
Risk	Low	99	36	27	162
	Med	37	10	22	69
	High	40	12	7	59
	Total	176	58	56	290

		Temptation			Total
		Low	Med	High	
Risk	Low	61%	22%	17%	100%
	Med	54%	14%	32%	100%
	High	68%	20%	12%	100%
	Total	61%	20%	19%	100%

(Chi Squared p = 0.034)

Table H.9 Risk x-tab with Bends

		Bends			
		Low	Med	High	Total
Risk	Low	120	17	26	163
	Med	51	14	4	69
	High	12	20	27	59
	Total	183	51	57	291

		Bends			
		Low	Med	High	Total
Risk	Low	74%	10%	16%	100%
	Med	74%	20%	6%	100%
	High	20%	34%	46%	100%
	Total	63%	18%	20%	100%

(Chi Squared p < 0.001)

Table H.10 Risk x-tab with Speed

		Speed			
		Low	Med	High	Total
Risk	Low	91	36	36	163
	Med	34	11	24	69
	High	19	33	7	59
	Total	144	80	67	291

		Speed			
		Low	Med	High	Total
Risk	Low	56%	22%	22%	100%
	Med	49%	16%	35%	100%
	High	32%	56%	12%	100%
	Total	49%	27%	23%	100%

(Chi Squared $p < 0.001$)

Table H.11 Risk x-tab with Overtaking

		Overtaking			
		Low	Med	High	Total
Risk	Low	110	29	24	163
	Med	41	4	24	69
	High	47	4	8	59
	Total	198	37	56	291

		Overtaking			
		Low	Med	High	Total
Risk	Low	67%	18%	15%	100%
	Med	59%	6%	35%	100%
	High	80%	7%	14%	100%
	Total	68%	13%	19%	100%

(Chi Squared $p < 0.001$)

Table H.12 Risk x-tab with Task Difficulty

		Task Difficulty			
		Low	Med	High	Total
Risk	Low	54	66	43	163
	Med	17	25	27	69
	High	26	7	27	60
	Total	97	98	97	292

		Task Difficulty			
		Low	Med	High	Total
Risk	Low	33%	40%	26%	100%
	Med	25%	36%	39%	100%
	High	43%	12%	45%	100%
	Total	33%	34%	33%	100%

(Chi Squared $p < 0.001$)

Table H.13 Risk x-tab with Age

		Age			
		35 or younger	36 to 50	51 or older	Total
Risk	Low	59	77	27	163
	Med	19	37	13	69
	High	7	35	17	59
	Total	85	149	57	291

		Age			
		35 or younger	36 to 50	51 or older	Total
Risk	Low	36%	47%	17%	100%
	Med	28%	54%	19%	100%
	High	12%	59%	29%	100%
	Total	29%	51%	20%	100%

(Chi Squared $p = 0.009$)

Table H.14 Enjoyment x-tab with Road Surface Quality

		Road Surface Quality			
		Low	Med	High	Total
Enjoyment	Low	66	33	7	106
	Med	56	44	33	133
	High	10	12	28	50
	Total	132	89	68	289

		Road Surface Quality			
		Low	Med	High	Total
Enjoyment	Low	62%	31%	7%	100%
	Med	42%	33%	25%	100%
	High	20%	24%	56%	100%
	Total	46%	31%	24%	100%

(Chi Squared p < 0.001)

Table H.15 Enjoyment x-tab with Road Features

		Road Features			
		Low	Med	High	Total
Enjoyment	Low	61	36	9	106
	Med	42	29	62	133
	High	19	18	13	50
	Total	122	83	84	289

		Road Features			
		Low	Med	High	Total
Enjoyment	Low	58%	34%	8%	100%
	Med	32%	22%	47%	100%
	High	38%	36%	26%	100%
	Total	42%	29%	29%	100%

(Chi Squared p < 0.001)

Table H.16 Enjoyment x-tab with Vision

		Vision			
		Low	Med	High	Total
Enjoyment	Low	62	38	6	106
	Med	36	47	50	133
	High	7	24	19	50
	Total	105	109	75	289

		Vision			
		Low	Med	High	Total
Enjoyment	Low	58%	36%	6%	100%
	Med	27%	35%	38%	100%
	High	14%	48%	38%	100%
	Total	36%	38%	26%	100%

(Chi Squared p < 0.001)

Table H.17 Enjoyment x-tab with Distraction

		Distraction			
		Low	Med	High	Total
Enjoyment	Low	74	24	8	106
	Med	55	34	44	133
	High	21	19	10	50
	Total	150	77	62	289

		Distraction			Total
		Low	Med	High	
Enjoyment	Low	70%	23%	8%	100%
	Med	41%	26%	33%	100%
	High	42%	38%	20%	100%
	Total	52%	27%	21%	100%

(Chi Squared p < 0.001)

Table H.18 Enjoyment x-tab with Other Traffic

		Other Traffic			
		Low	Med	High	Total
Enjoyment	Low	57	40	9	106
	Med	36	29	68	133
	High	10	23	17	50
	Total	103	92	94	289

		Other Traffic			
		Low	Med	High	Total
Enjoyment	Low	54%	38%	8%	100%
	Med	27%	22%	51%	100%
	High	20%	46%	34%	100%
	Total	36%	32%	33%	100%

(Chi Squared $p < 0.001$)

Table H.19 Enjoyment x-tab with Temptation

		Temptation			
		Low	Med	High	Total
Enjoyment	Low	91	12	2	105
	Med	69	33	31	133
	High	16	12	22	50
	Total	176	57	55	288

		Temptation			
		Low	Med	High	Total
Enjoyment	Low	87%	11%	2%	100%
	Med	52%	25%	23%	100%
	High	32%	24%	44%	100%
	Total	61%	20%	19%	100%

(Chi Squared $p < 0.001$)

Table H.20 Enjoyment x-tab with Surroundings

		Surroundings			
		Low	Med	High	Total
Enjoyment	Low	84	17	4	105
	Med	57	43	33	133
	High	13	9	28	50
	Total	154	69	65	288

		Surroundings			
		Low	Med	High	Total
Enjoyment	Low	80%	16%	4%	100%
	Med	43%	32%	25%	100%
	High	26%	18%	56%	100%
	Total	53%	24%	23%	100%

(Chi Squared $p < 0.001$)

Table H.21 Enjoyment x-tab with Challenge

		Challenge			
		Low	Med	High	Total
Enjoyment	Low	86	12	7	105
	Med	75	45	12	132
	High	17	11	22	50
Total	Total	178	68	41	287

		Challenge			
		Low	Med	High	Total
Enjoyment	Low	82%	11%	7%	100%
	Med	57%	34%	9%	100%
	High	34%	22%	44%	100%
	Total	62%	24%	14%	100%

(Chi Squared $p < 0.001$)

Table H.22 Enjoyment x-tab with Bends

		Bends			
		Low	Med	High	Total
Enjoyment	Low	90	10	6	106
	Med	75	37	21	133
	High	18	3	29	50
	Total	183	50	56	289

		Bends			
		Low	Med	High	Total
Enjoyment	Low	85%	9%	6%	100%
	Med	56%	28%	16%	100%
	High	36%	6%	58%	100%
	Total	63%	17%	19%	100%

(Chi Squared $p < 0.001$)

Table H.23 Enjoyment x-tab with Speed

		Speed			
		Low	Med	High	Total
Enjoyment	Low	89	16	1	106
	Med	46	47	40	133
	High	9	16	25	50
	Total	144	79	66	289

		Speed			
		Low	Med	High	Total
Enjoyment	Low	84%	15%	1%	100%
	Med	35%	35%	30%	100%
	High	18%	32%	50%	100%
	Total	50%	27%	23%	100%

(Chi Squared $p < 0.001$)

Table H.24 Enjoyment x-tab with Overtaking

		Overtaking			
		Low	Med	High	Total
Enjoyment	Low	87	18	1	106
	Med	76	17	40	133
	High	34	2	14	50
	Total	197	37	55	289

		Overtaking			
		Low	Med	High	Total
Enjoyment	Low	82%	17%	1%	100%
	Med	57%	13%	30%	100%
	High	68%	4%	28%	100%
	Total	68%	13%	19%	100%

(Chi Squared $p < 0.001$)

Table H.25 Enjoyment x-tab with Task Difficulty

		Task Difficulty			
		Low	Med	High	Total
Enjoyment	Low	36	25	45	106
	Med	53	40	40	133
	High	7	31	12	50
	Total	96	96	97	289

		Task Difficulty			Total
		Low	Med	High	
Enjoyment	Low	34%	24%	42%	100%
	Med	40%	30%	30%	100%
	High	14%	62%	24%	100%
	Total	33%	33%	34%	100%

(Chi Squared $p < 0.001$)

Table H.26 Rush Based Enjoyment x-tab with Bike Performance

		Bike Performance					
		Very low	Low	Medium	High	Very high	Total
Enjoyment From Speed	Low	12	22	25	36	25	120
	Med	29	24	27	18	25	123
	High	10	17	9	7	4	47
	Total	51	63	61	61	54	290

		Bike Performance					
		Very low	Low	Medium	High	Very high	Total
Enjoyment From Speed	Low	10%	18%	21%	30%	21%	100%
	Med	24%	20%	22%	15%	20%	100%
	High	21%	36%	19%	15%	9%	100%
	Total	18%	22%	21%	21%	19%	100%

(Chi Squared $p < 0.001$)

Table H.27 Rush Based Enjoyment x-tab with Road Surface Quality

		Road Surface Quality			
		Low	Med	High	Total
Rush Based Enjoyment	Low	86	30	4	120
	Med	32	55	36	123
	High	15	4	28	47
	Total	133	89	68	290

		Road Surface Quality			
		Low	Med	High	Total
Rush Based Enjoyment	Low	72%	25%	3%	100%
	Med	26%	45%	29%	100%
	High	32%	9%	60%	100%
	Total	46%	31%	23%	100%

(Chi Squared $p < 0.001$)

Table H.28 Rush Based Enjoyment x-tab with Vision

		Vision			
		Low	Med	High	Total
Rush Based Enjoyment	Low	89	28	3	120
	Med	16	80	27	123
	High		1	46	47
	Total	105	109	76	290

		Vision			
		Low	Med	High	Total
Rush Based Enjoyment	Low	74%	23%	3%	100%
	Med	13%	65%	22%	100%
	High	0%	2%	98%	100%
	Total	36%	38%	26%	100%

(Chi Squared $p < 0.001$)

Table H.29 Rush Based Enjoyment x-tab with Distraction

		Distraction			
		Low	Med	High	Total
Rush Based Enjoyment	Low	65	25	30	120
	Med	65	29	29	123
	High	21	23	3	47
	Total	151	77	62	290

		Distraction			
		Low	Med	High	Total
Rush Based Enjoyment	Low	54%	21%	25%	100%
	Med	53%	24%	24%	100%
	High	45%	49%	6%	100%
	Total	52%	27%	21%	100%

(Chi Squared $p = 0.002$)

Table H.30 Rush Based Enjoyment x-tab with Other Traffic

		Other Traffic			
		Low	Med	High	Total
Rush Based Enjoyment	Low	43	44	33	120
	Med	52	33	38	123
	High	10	14	23	47
	Total	105	91	94	290

		Other Traffic			
		Low	Med	High	Total
Rush Based Enjoyment	Low	36%	37%	28%	100%
	Med	42%	27%	31%	100%
	High	21%	30%	49%	100%
	Total	36%	31%	32%	100%

(Chi Squared $p = 0.026$)

Table H.31 Rush Based Enjoyment x-tab with Temptation

		Temptation			
		Low	Med	High	Total
Rush Based Enjoyment	Low	110	10		120
	Med	64	43	16	123
	High	2	5	40	47
	Total	176	58	56	290

		Temptation			
		Low	Med	High	Total
Rush Based Enjoyment	Low	92%	8%	0%	100%
	Med	52%	35%	13%	100%
	High	4%	11%	85%	100%
	Total	61%	20%	19%	100%

(Chi Squared $p < 0.001$)

Table H.32 Rush Based Enjoyment x-tab with Surroundings

		Surroundings			
		Low	Med	High	Total
Rush Based Enjoyment	Low	101	17	2	120
	Med	49	43	30	122
	High	3	10	34	47
	Total	153	70	66	289

		Surroundings			
		Low	Med	High	Total
Rush Based Enjoyment	Low	84%	14%	2%	100%
	Med	40%	35%	25%	100%
	High	6%	21%	72%	100%
	Total	53%	24%	23%	100%

(Chi Squared p < 0.001)

Table H.33 Rush Based Enjoyment x-tab with Challenge

		Challenge			
		Low	Med	High	Total
Rush Based Enjoyment	Low	95	18	5	118
	Med	55	34	34	123
	High	27	18	2	47
	Total	177	70	41	288

		Challenge			
		Low	Med	High	Total
Rush Based Enjoyment	Low	81%	15%	4%	100%
	Med	45%	28%	28%	100%
	High	57%	38%	4%	100%
	Total	61%	24%	14%	100%

(Chi Squared p < 0.001)

Table H.34 Rush Based Enjoyment x-tab with Bends

		Bends			
		Low	Med	High	Total
Rush Based Enjoyment	Low	93	22	5	120
	Med	53	21	49	123
	High	36	8	3	47
	Total	182	51	57	290

		Bends			
		Low	Med	High	Total
Rush Based Enjoyment	Low	78%	18%	4%	100%
	Med	43%	17%	40%	100%
	High	77%	17%	6%	100%
	Total	63%	18%	20%	100%

(Chi Squared $p < 0.001$)

Table H.35 Rush Based Enjoyment x-tab with Speed

		Speed			
		Low	Med	High	Total
Rush Based Enjoyment	Low	107	13		120
	Med	36	66	21	123
	High		1	46	47
	Total	143	80	67	290

		Speed			
		Low	Med	High	Total
Rush Based Enjoyment	Low	89%	11%	0%	100%
	Med	29%	54%	17%	100%
	High	0%	2%	98%	100%
	Total	49%	28%	23%	100%

(Chi Squared $p < 0.001$)

Table H.36 Rush Based Enjoyment x-tab with Overtaking

		Overtaking			
		Low	Med	High	Total
Rush Based Enjoyment	Low	118	2		120
	Med	78	35	10	123
	High	1		46	47
	Total	197	37	56	290

		Overtaking			
		Low	Med	High	Total
Rush Based Enjoyment	Low	98%	2%	0%	100%
	Med	63%	28%	8%	100%
	High	2%	0%	98%	100%
	Total	68%	13%	19%	100%

(Chi Squared $p < 0.001$)

Table H.37 Rush Based Enjoyment x-tab with Challenge Based Enjoymen

		Challenge Based Enjoyment			
		Low	Med	High	Total
Rush Based Enjoyment	Low	85	31	2	118
	Med	45	47	31	123
	High	17	28	2	47
	Total	147	106	35	288

		Challenge Based Enjoyment			
		Low	Med	High	Total
Rush Based Enjoyment	Low	72%	26%	2%	100%
	Med	37%	38%	25%	100%
	High	36%	60%	4%	100%
	Total	51%	37%	12%	100%

(Chi Squared $p < 0.001$)

Table H.38 Rush Based Enjoyment x-tab with Gender

		Male	Female	Total
Rush Based Enjoyment	Low	102	18	120
	Med	109	14	123
	High	34	13	47
	Total	245	45	290

		Male	Female	Total
Rush Based Enjoyment	Low	85%	15%	100%
	Med	89%	11%	100%
	High	72%	28%	100%
	Total	84%	16%	100%

(Chi Squared p = 0.032)

Table H.39 Rush Based Enjoyment x-tab with Age

		35 or younger	36 to 50	51 or older	Total
Rush Based Enjoyment	Low	28	59	33	120
	Med	33	68	22	123
	High	24	22	1	47
	Total	85	149	56	290

		35 or younger	36 to 50	51 or older	Total
Rush Based Enjoyment	Low	23%	49%	28%	100%
	Med	27%	55%	18%	100%
	High	51%	47%	2%	100%
	Total	29%	51%	19%	100%

(Chi Squared p < 0.001)

Table H.40 Challenge Based Enjoyment x-tab with Performance Index

		Performance Index					
		Very low	Low	Medium	High	Very high	Total
Challenge Based Enjoyment	Low	17	29	32	37	33	148
	Med	25	28	15	21	17	106
	High	9	6	13	3	4	35
	Total	51	63	60	61	54	289

		Performance Index					
		Very low	Low	Medium	High	Very high	Total
Challenge Based Enjoyment	Low	11%	20%	22%	25%	22%	100%
	Med	24%	26%	14%	20%	16%	100%
	High	26%	17%	37%	9%	11%	100%
	Total	18%	22%	21%	21%	19%	100%

(Chi Squared p = 0.006)

Table H.41 Challenge Based Enjoyment x-tab with Road Features

		Road Features			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	77	42	29	148
	Med	36	28	42	106
	High	9	13	13	35
	Total	122	83	84	289

		Road Features			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	52%	28%	20%	100%
	Med	34%	26%	40%	100%
	High	26%	37%	37%	100%
	Total	42%	29%	29%	100%

(Chi Squared p = 0.001)

Table H.42 Challenge Based Enjoyment x-tab with Vision

		Vision			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	68	47	33	148
	Med	29	41	36	106
	High	7	21	7	35
	Total	104	109	76	289

		Vision			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	46%	32%	22%	100%
	Med	27%	39%	34%	100%
	High	20%	60%	20%	100%
	Total	36%	38%	26%	100%

(Chi Squared p < 0.001)

Table H.43 Challenge Based Enjoyment x-tab with Distractions

		Distractions			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	96	31	21	148
	Med	38	34	34	106
	High	16	12	7	35
	Total	150	77	62	289

		Distractions			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	65%	21%	14%	100%
	Med	36%	32%	32%	100%
	High	46%	34%	20%	100%
	Total	52%	27%	21%	100%

(Chi Squared p < 0.001)

Table H.44 Challenge Based Enjoyment x-tab with Other Traffic

		Other Traffic			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	78	47	23	148
	Med	23	24	59	106
	High	3	20	12	35
	Total	104	91	94	289

		Other Traffic			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	53%	32%	16%	100%
	Med	22%	23%	56%	100%
	High	9%	57%	34%	100%
	Total	36%	31%	33%	100%

(Chi Squared $p < 0.001$)

Table H.45 Challenge Based Enjoyment x-tab with Temptation

		Temptation			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	108	27	12	147
	Med	58	22	26	106
	High	10	7	18	35
	Total	176	56	56	288

		Temptation			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	73%	18%	8%	100%
	Med	55%	21%	25%	100%
	High	29%	20%	51%	100%
	Total	61%	19%	19%	100%

(Chi Squared $p < 0.001$)

Table H.46 Challenge Based Enjoyment x-tab with Surroundings

		Surroundings			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	103	31	13	147
	Med	46	32	28	106
	High	3	7	25	35
	Total	152	70	66	288

		Surroundings			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	70%	21%	9%	100%
	Med	43%	30%	26%	100%
	High	9%	20%	71%	100%
	Total	53%	24%	23%	100%

(Chi Squared p < 0.001)

Table H.47 Challenge Based Enjoyment x-tab with Challenge)

		Challenge			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	137	11		148
	Med	41	55	10	106
	High		4	31	35
	Total	178	70	41	289

		Challenge			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	93%	7%	0%	100%
	Med	39%	52%	9%	100%
	High	0%	11%	89%	100%
	Total	62%	24%	14%	100%

(Chi Squared p < 0.001

Table H.48 Challenge Based Enjoyment x-tab with Bends

		Bends			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	144	4		148
	Med	37	46	23	106
	High		1	34	35
	Total	181	51	57	289

		Bends			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	97%	3%	0%	100%
	Med	35%	43%	22%	100%
	High	0%	3%	97%	100%
	Total	63%	18%	20%	100%

(Chi Squared p < 0.001)

Table H.49 Challenge Based Enjoyment x-tab with Speed

		Speed			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	105	21	22	148
	Med	36	40	30	106
	High	1	19	15	35
	Total	142	80	67	289

		Speed			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	71%	14%	15%	100%
	Med	34%	38%	28%	100%
	High	3%	54%	43%	100%
	Total	49%	28%	23%	100%

(Chi Squared p < 0.001)

Table H.50 Challenge Based Enjoyment x-tab with Overtaking

		Overtaking			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	98	28	22	148
	Med	66	8	32	106
	High	32	1	2	35
	Total	196	37	56	289

		Overtaking			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	66%	19%	15%	100%
	Med	62%	8%	30%	100%
	High	91%	3%	6%	100%
	Total	68%	13%	19%	100%

(Chi Squared $p < 0.001$)

Table H.51 Risk Factor x-tab with Road Surface Quality

		Road Surface Quality			
		Low	Med	High	Total
Risk Factor	Low	52	35	8	95
	Med	61	36	47	144
	High	20	19	13	52
	Total	133	90	68	291

		Road Surface Quality			
		Low	Med	High	Total
Risk Factor	Low	55%	37%	8%	100%
	Med	42%	25%	33%	100%
	High	38%	37%	25%	100%
	Total	46%	31%	23%	100%

(Chi Squared $p < 0.001$)

Table H.52 Risk Factor x-tab with Road Features

		Road Features			
		Low	Med	High	Total
Risk Factor	Low	86	9		95
	Med	37	73	34	144
	High	1	1	50	52
	Total	124	83	84	291

		Road Features			
		Low	Med	High	Total
Risk Factor	Low	91%	9%	0%	100%
	Med	26%	51%	24%	100%
	High	2%	2%	96%	100%
	Total	43%	29%	29%	100%

(Chi Squared $p < 0.001$)

Table H.53 Risk Factor x-tab with Vision

		Vision			
		Low	Med	High	Total
Risk Factor	Low	42	43	10	95
	Med	52	38	54	144
	High	12	28	12	52
	Total	106	109	76	291

		Vision			
		Low	Med	High	Total
Risk Factor	Low	44%	45%	11%	100%
	Med	36%	26%	38%	100%
	High	23%	54%	23%	100%
	Total	36%	37%	26%	100%

(Chi Squared $p < 0.001$)

Table H.54 Risk Factor x-tab with Distraction

		Distraction			
		Low	Med	High	Total
Risk Factor	Low	94	1		95
	Med	58	74	12	144
	High		2	50	52
	Total	152	77	62	291

		Distraction			
		Low	Med	High	Total
Risk Factor	Low	99%	1%	0%	100%
	Med	40%	51%	8%	100%
	High	0%	4%	96%	100%
	Total	52%	26%	21%	100%

(Chi Squared $p < 0.001$)

Table H.55 Risk Factor x-tab with Other Traffic

		Other Traffic			
		Low	Med	High	Total
Risk Factor	Low	88	7		95
	Med	17	85	42	144
	High			52	52
	Total	105	92	94	291

		Other Traffic			
		Low	Med	High	Total
Risk Factor	Low	93%	7%	0%	100%
	Med	12%	59%	29%	100%
	High	0%	0%	100%	100%
	Total	36%	32%	32%	100%

(Chi Squared $p < 0.001$)

Table H.56 Risk Factor x-tab with Temptation

		Temptation			
		Low	Med	High	Total
Risk Factor	Low	62	23	10	95
	Med	67	32	44	143
	High	47	3	2	52
	Total	176	58	56	290

		Temptation			
		Low	Med	High	Total
Risk Factor	Low	65%	24%	11%	100%
	Med	47%	22%	31%	100%
	High	90%	6%	4%	100%
	Total	61%	20%	19%	100%

(Chi Squared $p < 0.001$)

Table H.57 Risk Factor x-tab with Surroundings

		Surroundings			
		Low	Med	High	Total
Risk Factor	Low	52	30	12	94
	Med	60	36	48	144
	High	42	4	6	52
	Total	154	70	66	290

		Surroundings			
		Low	Med	High	Total
Risk Factor	Low	55%	32%	13%	100%
	Med	42%	25%	33%	100%
	High	81%	8%	12%	100%
	Total	53%	24%	23%	100%

(Chi Squared $p < 0.001$)

Table H.58 Risk Factor x-tab with Challenge

		Challenge			
		Low	Med	High	Total
Risk Factor	Low	79	8	7	94
	Med	70	48	25	143
	High	29	14	9	52
	Total	178	70	41	289

		Challenge			
		Low	Med	High	Total
Risk Factor	Low	84%	9%	7%	100%
	Med	49%	34%	17%	100%
	High	56%	27%	17%	100%
	Total	62%	24%	14%	100%

(Chi Squared p < 0.001)

Table H.59 Risk Factor x-tab with Bends

		Bends			
		Low	Med	High	Total
Risk Factor	Low	79	9	7	95
	Med	80	25	39	144
	High	24	17	11	52
	Total	183	51	57	291

		Bends			
		Low	Med	High	Total
Risk Factor	Low	83%	9%	7%	100%
	Med	56%	17%	27%	100%
	High	46%	33%	21%	100%
	Total	63%	18%	20%	100%

(Chi Squared p < 0.001)

Table H.60 Risk Factor x-tab with Speed

		Speed			
		Low	Med	High	Total
Risk Factor	Low	56	27	12	95
	Med	53	37	54	144
	High	35	16	1	52
	Total	144	80	67	291

		Speed			
		Low	Med	High	Total
Risk Factor	Low	59%	28%	13%	100%
	Med	37%	26%	38%	100%
	High	67%	31%	2%	100%
	Total	49%	27%	23%	100%

(Chi Squared $p < 0.001$)

Table H.61 Risk Factor x-tab with Overtaking

		Overtaking			
		Low	Med	High	Total
Risk Factor	Low	60	27	8	95
	Med	90	8	46	144
	High	48	2	2	52
	Total	198	37	56	291

		Overtaking			
		Low	Med	High	Total
Risk Factor	Low	63%	28%	8%	100%
	Med	63%	6%	32%	100%
	High	92%	4%	4%	100%
	Total	68%	13%	19%	100%

(Chi Squared $p < 0.001$)

Table H.62 Risk Factor x-tab with Age

		35 or younger	36 to 50	51 or older	Total
Risk Factor	Low	33	45	17	95
	Med	44	76	24	144
	High	8	28	16	52
	Total	85	149	57	291

		35 or younger	36 to 50	51 or older	Total
Risk Factor	Low	35%	47%	18%	100%
	Med	31%	53%	17%	100%
	High	15%	54%	31%	100%
Total	Total	29%	51%	20%	100%

(Chi Squared p = 0.061)

Table H.63 Task Difficulty x-tab with Road Surface Quality

		Road Surface Quality			
		Low	Med	High	Total
Task Difficulty	Low	56	28	13	97
	Med	20	32	45	97
	High	57	30	10	97
	Total	133	90	68	291

		Road Surface Quality			
		Low	Med	High	Total
Task Difficulty	Low	58%	29%	13%	100%
	Med	21%	33%	46%	100%
	High	59%	31%	10%	100%
	Total	46%	31%	23%	100%

(Chi Squared p < 0.001)

Table H.64 Task Difficulty x-tab with Road Features

		Road Features			
		Low	Med	High	Total
Task Difficulty	Low	36	31	30	97
	Med	61	28	8	97
	High	27	24	46	97
	Total	124	83	84	291

		Road Features			
		Low	Med	High	Total
Task Difficulty	Low	37%	32%	31%	100%
	Med	63%	29%	8%	100%
	High	28%	25%	47%	100%
	Total	43%	29%	29%	100%

(Chi Squared $p < 0.001$)

Table H.65 Task Difficulty x-tab with Vision

		Vision			
		Low	Med	High	Total
Task Difficulty	Low	35	31	31	97
	Med	25	39	33	97
	High	46	39	12	97
	Total	106	109	76	291

		Vision			
		Low	Med	High	Total
Task Difficulty	Low	36%	32%	32%	100%
	Med	26%	40%	34%	100%
	High	47%	40%	12%	100%
	Total	36%	37%	26%	100%

(Chi Squared $p = 0.001$)

Table H.66 Task Difficulty x-tab with Distraction

		Distraction			
		Low	Med	High	Total
Task Difficulty	Low	66	27	4	97
	Med	61	29	7	97
	High	25	21	51	97
	Total	152	77	62	291

		Distraction			
		Low	Med	High	Total
Task Difficulty	Low	68%	28%	4%	100%
	Med	63%	30%	7%	100%
	High	26%	22%	53%	100%
	Total	52%	26%	21%	100%

(Chi Squared $p < 0.001$)

Table H.67 Task Difficulty x-tab with Other Traffic

		Other Traffic			
		Low	Med	High	Total
Task Difficulty	Low	52	33	12	97
	Med	42	25	30	97
	High	11	34	52	97
	Total	105	92	94	291

		Other Traffic			
		Low	Med	High	Total
Task Difficulty	Low	54%	34%	12%	100%
	Med	43%	26%	31%	100%
	High	11%	35%	54%	100%
Total	Total	36%	32%	32%	100%

(Chi Squared $p < 0.001$)

Table H.68 Task Difficulty x-tab with Temptation

		Temptation			
		Low	Med	High	Total
Task Difficulty	Low	53	28	16	97
	Med	33	24	40	97
	High	90	6		96
	Total	176	58	56	290

		Temptation			
		Low	Med	High	Total
Task Difficulty	Low	55%	29%	16%	100%
	Med	34%	25%	41%	100%
	High	94%	6%	0%	100%
	Total	61%	20%	19%	100%

(Chi Squared $p < 0.001$)

Table H.69 Task Difficulty x-tab with Surroundings

		Surroundings			
		Low	Med	High	Total
Task Difficulty	Low	40	36	21	97
	Med	26	29	41	96
	High	88	5	4	97
	Total	154	70	66	290

		Surroundings			
		Low	Med	High	Total
Task Difficulty	Low	41%	37%	22%	100%
	Med	27%	30%	43%	100%
	High	91%	5%	4%	100%
	Total	53%	24%	23%	100%

(Chi Squared $p < 0.001$)

Table H.70 Task Difficulty x-tab with Challenge

		Challenge			
		Low	Med	High	Total
Task Difficulty	Low	57	30	10	97
	Med	49	23	24	96
	High	72	17	7	96
	Total	178	70	41	289

		Challenge			
		Low	Med	High	Total
Task Difficulty	Low	59%	31%	10%	100%
	Med	51%	24%	25%	100%
	High	75%	18%	7%	100%
	Total	62%	24%	14%	100%

(Chi Squared $p < 0.001$)

Table H.71 Task Difficulty x-tab with Bends

		Bends			
		Low	Med	High	Total
Task Difficulty	Low	62	14	21	97
	Med	50	21	26	97
	High	71	16	10	97
	Total	183	51	57	291

		Bends			
		Low	Med	High	Total
Task Difficulty	Low	64%	14%	22%	100%
	Med	52%	22%	27%	100%
	High	73%	16%	10%	100%
	Total	63%	18%	20%	100%

(Chi Squared $p < 0.001$)

Table H.72 Task Difficulty x-tab with Speed

		Speed			
		Low	Med	High	Total
Task Difficulty	Low	36	35	26	97
	Med	24	32	41	97
	High	84	13		97
	Total	144	80	67	291

		Speed			
		Low	Med	High	Total
Task Difficulty	Low	37%	36%	27%	100%
	Med	25%	33%	42%	100%
	High	87%	13%	0%	100%
	Total	49%	27%	23%	100%

(Chi Squared $p < 0.001$)

Table H.73 Task Difficulty x-tab with Overtaking

		Overtaking			
		Low	Med	High	Total
Task Difficulty	Low	60	13	24	97
	Med	48	20	29	97
	High	90	4	3	97
	Total	198	37	56	291

		Overtaking			
		Low	Med	High	Total
Task Difficulty	Low	62%	13%	25%	100%
	Med	49%	21%	30%	100%
	High	93%	4%	3%	100%
	Total	68%	13%	19%	100%

(Chi Squared $p < 0.001$)

Table H.74 Task Difficulty x-tab with Age

		35 or younger	36 to 50	51 or older	Total
Task Difficulty	Low	22	58	17	97
	Med	39	46	12	97
	High	24	45	28	97
	Total	85	149	57	291

		35 or younger	36 to 50	51 or older	Total
Task Difficulty	Low	23%	60%	18%	100%
	Med	40%	47%	12%	100%
	High	25%	46%	29%	100%
	Total	29%	51%	20%	100%

(Chi Squared p = 0.004)

Table H.75 Task Difficulty x-tab with Rush Based Enjoyment

		Rush Based Enjoyment			
		Low	Med	High	Total
Task Difficulty	Low	32	46	19	97
	Med	18	51	28	97
	High	70	26		96
	Total	120	123	47	290

		Rush Based Enjoyment			
		Low	Med	High	Total
Task Difficulty	Low	33%	47%	20%	100%
	Med	19%	53%	29%	100%
	High	73%	27%	0%	100%
	Total	41%	42%	16%	100%

(Chi Squared p < 0.001)

Table H.76 Task Difficulty x-tab with Challenge Based Enjoyment

		Challenge Based Enjoyment			
		Low	Med	High	Total
Task Difficulty	Low	55	34	8	97
	Med	31	43	22	96
	High	62	29	5	96
	Total	148	106	35	289

		Challenge Based Enjoyment			
		Low	Med	High	Total
Task Difficulty	Low	57%	35%	8%	100%
	Med	32%	45%	23%	100%
	High	65%	30%	5%	100%
	Total	51%	37%	12%	100%

(Chi Squared $p < 0.001$)

Table H.77 Task Difficulty x-tab with Risk Factor

		Risk Factor			
		Low	Med	High	Total
Task Difficulty	Low	38	56	3	97
	Med	44	50	3	97
	High	13	38	46	97
	Total	95	144	52	291

		Risk Factor			
		Low	Med	High	Total
Task Difficulty	Low	39%	58%	3%	100%
	Med	45%	52%	3%	100%
	High	13%	39%	47%	100%
	Total	33%	49%	18%	100%

(Chi Squared $p < 0.001$)

Table H.78 Means of variables related to Task Difficulty

Task Difficulty	Surface	Road Feature	Visibility	Distraction	Other Traffic	Temptation	Challenge	Bends	Speed	Overtaking	Risk	Enjoyment	Rush Based Enjoyment	Challenge Based Enjoyment	Risk Factor
1	2.96	4.29	6.63	2.88	2.98	4.86	2.61	1.86	5.67	5.45	3.00	4.67	5.65	2.48	3.38
2	4.69	5.40	3.42	3.63	4.69	3.04	4.77	5.27	3.83	2.13	5.56	3.71	3.10	4.91	4.57
3	6.48	3.25	6.92	3.48	5.92	5.73	3.23	2.63	6.19	6.54	4.20	4.67	6.34	4.11	4.22
4	5.39	3.59	4.04	3.14	3.86	4.86	5.98	5.94	5.14	2.16	2.37	6.48	4.05	5.79	3.53
5	4.63	6.04	4.29	5.75	6.81	1.90	3.33	4.00	2.92	2.46	6.44	3.56	2.89	3.99	6.20
6	2.31	5.67	3.94	6.20	6.37	1.81	2.88	1.86	2.16	1.96	3.35	3.96	2.48	2.34	6.08

Table H.79 Pearson Correlation with Respect to Risk

	Pearson Correlation	Sig. (2-tailed)	N
Surface	0.30	<0.001	291
Features	0.52	<0.001	291
Visibility	0.06	0.3202	291
Distraction	0.45	<0.001	291
Traffic	0.58	<0.001	291
Temptation	-0.05	0.4321	290
Surroundings	-0.01	0.9041	290
Challenge	0.15	0.0105	289
Bends	0.32	<0.001	291
Speed	0.03	0.5521	291
Overtaking	-0.01	0.8626	291
Enjoyment	0.02	0.6881	289

Table H.80 Frequency of Enjoyment Types

Enjoyment Type	**n**	**%**
Challenge Based Enjoyment	24	8%
Slight Challenge	74	26%
Neither/Both	99	34%
Slight Rush	50	17%
Rush Based Enjoyment	41	14%
Total	***288***	***100%***

Table H.81 Enjoyment Types by Age

	35 or younger	36 to 50	51 or older	Total
Challenge Based Enjoyment	4	15	5	24
Slight Challenge	19	36	19	74
Neither/Both	23	57	19	99
Slight Rush	21	18	11	50
Rush Based Enjoyment	18	22	1	41
Total	***85***	***148***	***55***	***288***

	35 or younger	36 to 50	51 or older	Total
Challenge Based Enjoyment	17%	63%	21%	100%
Slight Challenge	26%	49%	26%	100%
Neither/Both	23%	58%	19%	100%
Slight Rush	42%	36%	22%	100%
Rush Based Enjoyment	44%	54%	2%	100%
Total	***30%***	***51%***	***19%***	***100%***

(Chi Squared p = 0.010)

Table H.82 Enjoyment Types by PTW Performance

	PTW Performance					
	Very low	**Low**	**Medium**	**High**	**Very high**	**Total**
Challenge Based Enjoyment	8	3	6	2	5	24
Slight Challenge	15	16	18	16	9	74
Neither/Both	10	20	18	25	26	99
Slight Rush	9	14	6	13	8	50
Rush Based Enjoyment	9	10	12	4	6	41
Total	***51***	***63***	***60***	***60***	***54***	***288***

	PTW Performance					
	Very low	**Low**	**Medium**	**High**	**Very high**	**Total**
Challenge Based Enjoyment	33%	13%	25%	8%	21%	100%
Slight Challenge	20%	22%	24%	22%	12%	100%
Neither/Both	10%	20%	18%	25%	26%	100%
Slight Rush	18%	28%	12%	26%	16%	100%
Rush Based Enjoyment	22%	24%	29%	10%	15%	100%
Total	***18%***	***22%***	***21%***	***21%***	***19%***	***100%***

(Chi Squared p = 0.076)

Table H.83 Enjoyment Types by Gender

	Male	Female	Total
Challenge Based Enjoyment	19	5	24
Slight Challenge	68	6	74
Neither/Both	84	15	99
Slight Rush	43	7	50
Rush Based Enjoyment	29	12	41
Total	***243***	***45***	***288***

	Male	Female	Total
Challenge Based Enjoyment	79%	21%	100%
Slight Challenge	92%	8%	100%
Neither/Both	85%	15%	100%
Slight Rush	86%	14%	100%
Rush Based Enjoyment	71%	29%	100%
Total	***84%***	***16%***	***100%***

(Chi Squared p = 0.048)

Table H.84 Enjoyment Types by Task Difficulty

	Task Difficulty			
	Low	**Med**	**High**	**Total**
Challenge Based Enjoyment	12	8	4	24
Slight Challenge	22	26	26	74
Neither/Both	23	22	54	99
Slight Rush	15	24	11	50
Rush Based Enjoyment	25	16		41
Total	***97***	***96***	***95***	***288***

	Task Difficulty			
	Low	**Med**	**High**	**Total**
Challenge Based Enjoyment	50%	33%	17%	100%
Slight Challenge	30%	35%	35%	100%
Neither/Both	23%	22%	55%	100%
Slight Rush	30%	48%	22%	100%
Rush Based Enjoyment	61%	39%	0%	100%
Total	***34%***	***33%***	***33%***	***100%***

(Chi Squared p < 0.001)

Table H.85 Young Riders by Enjoyment Type

		Under 26	26 and Older	Total
Enjoyment Type	Challenge Based Enjoyment	4	94	98
	Neither/Both	3	96	99
	Rush Based Enjoyment	17	74	91
	Total	24	264	288

		Under 26	26 and Older	Total
Enjoyment Type	Challenge Based Enjoyment	17%	36%	34%
	Neither/Both	13%	36%	34%
	Rush Based Enjoyment	71%	28%	32%
	Total	100%	100%	100%

(Chi Squared $p < 0.001$)

Table H.86 Young Riders by Rush Based Enjoyment

		Under 26	26 and Older	Total
Rush Based Enjoyment	Low	1	119	120
	Med	11	112	123
	High	12	35	47
	Total	24	266	290

		Under 26	26 and Older	Total
Rush Based Enjoyment	Low	4%	45%	41%
	Med	46%	42%	42%
	High	50%	13%	16%
	Total	100%	100%	100%

(Chi Squared $p < 0.001$)

Table H.87 Young Riders by Enjoyment

		Under 26	26 and Older	Total
Enjoyment	Low	3	103	106
	Med	15	118	133
	High	6	44	50
	Total	24	265	289

		Under 26	26 and Older	Total
Enjoyment	Low	13%	39%	37%
	Med	63%	45%	46%
	High	25%	17%	17%
	Total	100%	100%	100%

(Chi Squared p = 0.037)

Table H.88 Young Riders by Overtaking

		Under 26	26 and Older	Total
Overtaking	Low	4	194	198
	Med	7	30	37
	High	13	43	56
	Total	24	267	291

		Under 26	26 and Older	Total
Overtaking	Low	17%	73%	68%
	Med	29%	11%	13%
	High	54%	16%	19%
	Total	100%	100%	100%

(Chi Squared p < 0.001)

Table H.89 Young Riders by Speed

		Under 26	26 and Older	Total
Speed	Low	1	143	144
	Med	10	70	80
	High	13	54	67
	Total	24	267	291

		Under 26	26 and Older	Total
Speed	Low	4%	54%	49%
	Med	42%	26%	27%
	High	54%	20%	23%
	Total	100%	100%	100%

(Chi Squared p < 0.001)

Table H.90 Young Riders by Temptation

		Under 26	26 and Older	Total
Temptation	Low	5	171	176
	Med	6	52	58
	High	13	43	56
	Total	24	266	290

		Under 26	26 and Older	Total
Temptation	Low	21%	64%	61%
	Med	25%	20%	20%
	High	54%	16%	19%
	Total	100%	100%	100%

(Chi Squared p < 0.001)

Table H.91 Young Riders by Distraction

		Under 26	26 and Older	Total
Distraction	Low	11	141	152
	Med	11	66	77
	High	2	60	62
	Total	24	267	291

		Under 26	26 and Older	Total
Distraction	Low	46%	53%	52%
	Med	46%	25%	26%
	High	8%	22%	21%
	Total	100%	100%	100%

(Chi Squared $p < 0.050$)

Appendix I – Analysis of Questionnaire 8

This appendix is a presentation of data taken from Questionnaire 8. The questionnaire can be found in Appendix A.

I.1 Definition of Variables

Task Difficulty

> Task difficulty is the ranking of difficulty of each scenario, one being a low ranked difficulty and six being the highest ranked.

Surface/Road surface quality

> The quality of the road surface rated on a ten-point Likert scale. One is for a low road surface quality, and ten for high quality.

Road Feature

> This a rating of the risk caused by road features, such as road size, roadside objects, junctions, etc. The rating is on a ten point Likert scale, one for low risk and ten for high.

Visibility/Vision

> The level of visibility, measured on a ten point Likert scale, one for low visibility and ten for a high level.

Distraction

> The likelihood of the respondent being distracted, measured on a ten point Likert scale, one for low likelihood and ten for a high likelihood.

Other Traffic

> This is a rating of the risk presented by other traffic, including pedestrians, to the respondent. The rating is on a ten point Likert scale, one for low risk and ten for high risk.

Temptation

> A measure of now tempted the rider would be to 'ride in a more enthusiastic manner'. The rating is on a ten point Likert scale, one for low temptation and ten for high temptation.

Surroundings

> This is rating of 'How pleasant it would be to ride in these surroundings - (scenery, etc)'. The rating is on a ten point Likert scale, one for low a low pleasant rating and ten for high.

Challenge

A rating of the level of challenge presented by the road, measured on a ten point Likert scale with one for low challenge and ten for high.

Bends

How bendy the road is, measured on a ten point Likert scale with one for a straight road and ten for a very bendy road.

Speed

An assessment by the respondent of how fast they would ride the road at. Measured on a Likert scale with one being slow and ten being fast.

Overtaking

A measurement of the opportunity of overtaking, measured on a ten point Likert scale with one for no opportunity and ten for a high level of opportunity.

Risk

An assessment of how risky the road would be to ride. The rating is on a ten point Likert scale, one for low risk and ten for high risk.

Enjoyment

An assessment of how enjoyable the road would be to ride. The rating is on a ten point Likert scale, one for low enjoyment and ten for high enjoyment.

Rush Based Enjoyment

This is a variable that is constructed from the results of the factor analysis. This variable has been normalised to a range of one to ten.

Challenge Based Enjoyment

This is a variable that is constructed from the results of the factor analysis. This variable has been normalised to a range of one to ten.

Risk Factor

This is a variable that is constructed from the results of the factor analysis and is related the factors that cause a feeling of risk. This variable has been normalised to a range of one to ten.

Age/Gender

The age and gender of the respondent.

I.2 Analysis of Data

Table I.1 Factor Analysis

	1	2	3
Surface	0.21	-0.19	**0.54**
Road Features	-0.12	**0.79**	-0.05
Visibility	**0.76**	-0.09	-0.35
Other Traffic	-0.27	**0.81**	-0.05
Temptation	**0.80**	-0.27	0.22
Surroundings	**0.54**	**-0.45**	**0.49**
Challenge	-0.14	0.13	**0.79**
Bends	-0.17	0.04	**0.89**
Speed	**0.81**	-0.36	0.15
Distraction	-0.08	**0.86**	-0.05
Overtaking	**0.87**	-0.08	-0.25
Risk	-0.30	**0.77**	0.10
Enjoyment	**0.60**	**-0.42**	**0.50**

Table I.2 Risk x-tab with Enjoyment

		Enjoyment			
		Low	Med	High	Total
Risk	Low	11	12	35	58
	Med	23	32	12	67
	High	36	3	6	45
	Total	70	47	53	170

		Enjoyment			
		Low	Med	High	Total
Risk	Low	19%	21%	60%	100%
	Med	34%	48%	18%	100%
	High	80%	7%	13%	100%
	Total	41%	28%	31%	100%

	Enjoyment				
		Low	Med	High	Total
Risk	Low	16%	26%	66%	34%
	Med	33%	68%	23%	39%
	High	51%	6%	11%	26%
	Total	100%	100%	100%	100%

		Enjoyment			
		Low	Med	High	Total
Risk	Low	6%	7%	21%	34%
	Med	14%	19%	7%	39%
	High	21%	2%	4%	26%
	Total	41%	28%	31%	100%

(Chi Squared $p < 0.001$)

Table I.3 Risk x-tab with Road Surface

		Road Surface			
		Low	Med	High	Total
Risk	Low	14	25	19	58
	Med	12	38	17	67
	High	21	15	9	45
	Total	47	78	45	170

		Road Surface			
		Low	Med	High	Total
Risk	Low	24%	43%	33%	100%
	Med	18%	57%	25%	100%
	High	47%	33%	20%	100%
	Total	28%	46%	26%	100%

(Chi Squared $p = 0.009$)

Table I.4 Risk x-tab with Road Features

		Road Features			
		Low	Med	High	Total
Risk	Low	40	14	4	58
	Med	21	34	12	67
	High	4	9	32	45
	Total	65	57	48	170

		Road Features			
		Low	Med	High	Total
Risk	Low	69%	24%	7%	100%
	Med	31%	51%	18%	100%
	High	9%	20%	71%	100%
	Total	38%	34%	28%	100%

(Chi Squared $p < 0.001$)

Table I.5 Risk x-tab with Visibility

		Visibility			
		Low	Med	High	Total
Risk	Low	3	23	32	58
	Med	17	21	29	67
	High	16	20	9	45
	Total	36	64	70	170

		Visibility			
		Low	Med	High	Total
Risk	Low	5%	40%	55%	100%
	Med	25%	31%	43%	100%
	High	36%	44%	20%	100%
	Total	21%	38%	41%	100%

(Chi Squared $p < 0.001$)

Table I.6 Risk x-tab with Road Features

		Other Traffic			
		Low	Med	High	Total
Risk	Low	35	16	7	58
	Med	17	24	25	66
	High	3	5	37	45
	Total	55	45	69	169

		Other Traffic			
		Low	Med	High	Total
Risk	Low	60%	28%	12%	100%
	Med	26%	36%	38%	100%
	High	7%	11%	82%	100%
	Total	33%	27%	41%	100%

(Chi Squared $p < 0.001$)

Table I.7 Risk x-tab with Temptation

		Temptation			
		Low	Med	High	Total
Risk	Low	22	13	23	58
	Med	48	12	7	67
	High	36	3	5	44
	Total	106	28	35	169

		Temptation			
		Low	Med	High	Total
Risk	Low	38%	22%	40%	100%
	Med	72%	18%	10%	100%
	High	82%	7%	11%	100%
	Total	63%	17%	21%	100%

(Chi Squared $p < 0.001$)

Table I.8 Risk x-tab with Surroundings

		Surroundings			
		Low	Med	High	Total
Risk	Low	9	16	33	58
	Med	21	25	20	66
	High	30	7	8	45
	Total	60	48	61	169

		Surroundings			
		Low	Med	High	Total
Risk	Low	16%	28%	57%	100%
	Med	32%	38%	30%	100%
	High	67%	16%	18%	100%
	Total	36%	28%	36%	100%

(Chi Squared $p < 0.001$)

Table I.9 Risk x-tab with Challenge

		Challenge			
		Low	Med	High	Total
Risk	Low	37	8	13	58
	Med	18	33	15	66
	High	20	8	17	45
	Total	75	49	45	169

		Challenge			
		Low	Med	High	Total
Risk	Low	64%	14%	22%	100%
	Med	27%	50%	23%	100%
	High	44%	18%	38%	100%
	Total	44%	29%	27%	100%

(Chi Squared $p < 0.001$)

Table I.10 Risk x-tab with Distraction

		Distraction			
		Low	Med	High	Total
Risk	Low	35	19	4	58
	Med	23	18	26	67
	High	1	14	30	45
	Total	59	51	60	170

		Distraction			
		Low	Med	High	Total
Risk	Low	60%	33%	7%	100%
	Med	34%	27%	39%	100%
	High	2%	31%	67%	100%
	Total	35%	30%	35%	100%

(Chi Squared $p < 0.001$)

Table I.11 Risk x-tab with Challenge

		Overtaking			
		Low	Med	High	Total
Risk	Low	28	10	20	58
	Med	48	11	8	67
	High	38	3	4	45
	Total	114	24	32	170

		Overtaking			
		Low	Med	High	Total
Risk	Low	48%	17%	34%	100%
	Med	72%	16%	12%	100%
	High	84%	7%	9%	100%
	Total	67%	14%	19%	100%

(Chi Squared p = 0.001)

Table I.12 Enjoyment x-tab with Road Surface

		Road Surface			
		Low	Med	High	Total
Enjoyment	Low	32	29	11	72
	Med	9	25	13	47
	High	8	24	21	53
	Total	49	78	45	172

		Road Surface			
		Low	Med	High	Total
Enjoyment	Low	44%	40%	15%	100%
	Med	19%	53%	28%	100%
	High	15%	45%	40%	100%
	Total	28%	45%	26%	100%

(Chi Squared p = 0.001)

Table I.13 Enjoyment x-tab with Road Features

		Road Features			
		Low	Med	High	Total
Enjoyment	Low	14	22	36	72
	Med	20	20	7	47
	High	31	15	7	53
	Total	65	57	50	172

		Road Features			
		Low	Med	High	Total
Enjoyment	Low	19%	31%	50%	100%
	Med	43%	43%	15%	100%
	High	58%	28%	13%	100%
	Total	38%	33%	29%	100%

(Chi Squared $p < 0.001$)

Table I.14 Enjoyment x-tab with Visibility

		Visibility			
		Low	Med	High	Total
Enjoyment	Low	16	34	22	72
	Med	13	14	20	47
	High	7	17	29	53
	Total	36	65	71	172

		Visibility			
		Low	Med	High	Total
Enjoyment	Low	22%	47%	31%	100%
	Med	28%	30%	43%	100%
	High	13%	32%	55%	100%
	Total	21%	38%	41%	100%

(Chi Squared $p = 0.043$)

Table I.15 Enjoyment x-tab with Other Traffic

		Other Traffic			
		Low	Med	High	Total
Enjoyment	Low	9	16	47	72
	Med	16	14	17	47
	High	30	16	6	52
	Total	55	46	70	171

		Other Traffic			
		Low	Med	High	Total
Enjoyment	Low	13%	22%	65%	100%
	Med	34%	30%	36%	100%
	High	58%	31%	12%	100%
	Total	32%	27%	41%	100%

(Chi Squared p < 0.001)

Table I.16 Enjoyment x-tab with Surroundings

		Surroundings			
		Low	Med	High	Total
Enjoyment	Low	53	15	4	72
	Med	8	26	12	46
	High	1	7	45	53
	Total	62	48	61	171

		Surroundings			
		Low	Med	High	Total
Enjoyment	Low	74%	21%	6%	100%
	Med	17%	57%	26%	100%
	High	2%	13%	85%	100%
	Total	36%	28%	36%	100%

(Chi Squared p < 0.001)

Table I.17 Enjoyment x-tab with Challenge

		Challenge			
		Low	Med	High	Total
Enjoyment	Low	37	21	14	72
	Med	16	24	6	46
	High	23	5	25	53
	Total	76	50	45	171

		Challenge			
		Low	Med	High	Total
Enjoyment	Low	51%	29%	19%	100%
	Med	35%	52%	13%	100%
	High	43%	9%	47%	100%
	Total	44%	29%	26%	100%

(Chi Squared $p < 0.001$)

Table I.18 Enjoyment x-tab with Bends

		Bends			
		Low	Med	High	Total
Enjoyment	Low	45	17	9	71
	Med	19	19	9	47
	High	20	5	28	53
	Total	84	41	46	171

		Bends			
		Low	Med	High	Total
Enjoyment	Low	63%	24%	13%	100%
	Med	40%	40%	19%	100%
	High	38%	9%	53%	100%
	Total	49%	24%	27%	100%

(Chi Squared $p < 0.001$)

Table I.19 Enjoyment x-tab with Speed

		Speed			
		Low	Med	High	Total
Enjoyment	Low	53	15	3	71
	Med	7	34	6	47
	High	3	18	32	53
	Total	63	67	41	171

		Speed			
		Low	Med	High	Total
Enjoyment	Low	75%	21%	4%	100%
	Med	15%	72%	13%	100%
	High	6%	34%	60%	100%
	Total	37%	39%	24%	100%

(Chi Squared $p < 0.001$)

Table I.20 Enjoyment x-tab with Distraction

		Distraction			
		Low	Med	High	Total
Enjoyment	Low	9	24	39	72
	Med	19	16	12	47
	High	31	12	10	53
	Total	59	52	61	172

		Distraction			
		Low	Med	High	Total
Enjoyment	Low	13%	33%	54%	100%
	Med	40%	34%	26%	100%
	High	58%	23%	19%	100%
	Total	34%	30%	35%	100%

(Chi Squared $p < 0.001$)

Table I.21 Enjoyment x-tab with Overtaking

		Overtaking			
		Low	Med	High	Total
Enjoyment	Low	58	11	3	72
	Med	30	11	6	47
	High	26	4	23	53
	Total	114	26	32	172

		Overtaking			
		Low	Med	High	Total
Enjoyment	Low	81%	15%	4%	100%
	Med	64%	23%	13%	100%
	High	49%	8%	43%	100%
	Total	66%	15%	19%	100%

(Chi Squared $p < 0.001$)

Table I.22 Enjoyment x-tab with Gender

		Gender		
		Male	Female	Total
Enjoyment	Low	34	37	71
	Med	24	23	47
	High	37	14	51
	Total	95	74	169

		Gender		
		Male	Female	Total
Enjoyment	Low	48%	52%	100%
	Med	51%	49%	100%
	High	73%	27%	100%
	Total	56%	44%	100%

(Chi Squared $p = 0.018$)

Table I.23 Challenge Based Enjoyment with Road Surface

		Road Surface			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	39	26	3	68
	Med	8	36	17	61
	High	2	16	22	40
	Total	49	78	42	169

		Road Surface			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	57%	38%	4%	100%
	Med	13%	59%	28%	100%
	High	5%	40%	55%	100%
	Total	29%	46%	25%	100%

(Chi Squared $p < 0.001$)

Table I.24 Challenge Based Enjoyment with Visibility

		Visibility			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	7	27	34	68
	Med	17	18	26	61
	High	12	20	8	40
	Total	36	65	68	169

		Visibility			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	10%	40%	50%	100%
	Med	28%	30%	43%	100%
	High	30%	50%	20%	100%
	Total	21%	38%	40%	100%

(Chi Squared $p = 0.005$)

Table I.25 Challenge Based Enjoyment with Other traffic

		Other Traffic			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	19	15	34	68
	Med	14	21	25	60
	High	20	9	11	40
	Total	53	45	70	168

		Other Traffic			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	28%	22%	50%	100%
	Med	23%	35%	42%	100%
	High	50%	23%	28%	100%
	Total	32%	27%	42%	100%

(Chi Squared p = 0.023)

Table I.26 Challenge Based Enjoyment with Temptation

		Temptation			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	44	14	9	67
	Med	44	8	9	61
	High	18	7	15	40
	Total	106	29	33	168

		Temptation			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	66%	21%	13%	100%
	Med	72%	13%	15%	100%
	High	45%	18%	38%	100%
	Total	63%	17%	20%	100%

(Chi Squared p = 0.013)

Table I.27 Challenge Based Enjoyment with Surroundings

		Surroundings			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	46	12	10	68
	Med	14	31	16	61
	High	2	5	33	40
	Total	62	48	59	169

		Surroundings			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	68%	18%	15%	100%
	Med	23%	51%	26%	100%
	High	5%	13%	83%	100%
	Total	37%	28%	35%	100%

(Chi Squared $p < 0.001$)

Table I.28 Challenge Based Enjoyment with Challenge

		Challenge			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	49	17	2	68
	Med	23	28	10	61
	High	3	4	33	40
	Total	75	49	45	169

		Challenge			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	72%	25%	3%	100%
	Med	38%	46%	16%	100%
	High	8%	10%	83%	100%
	Total	44%	29%	27%	100%

(Chi Squared $p < 0.001$)

Table I.29 Challenge Based Enjoyment with Bends

		Bends			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	58	9	1	68
	Med	26	24	11	61
	High		6	34	40
	Total	84	39	46	169

		Bends			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	85%	13%	1%	100%
	Med	43%	39%	18%	100%
	High	0%	15%	85%	100%
	Total	50%	23%	27%	100%

(Chi Squared $p < 0.001$)

Table I.30 Challenge Based Enjoyment with Speed

		Speed			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	39	14	14	67
	Med	15	31	15	61
	High	9	19	12	40
	Total	63	64	41	168

		Speed			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	58%	21%	21%	100%
	Med	25%	51%	25%	100%
	High	23%	48%	30%	100%
	Total	38%	38%	24%	100%

(Chi Squared $p < 0.001$)

Table I.31 Challenge Based Enjoyment with Risk

		Risk			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	22	20	24	66
	Med	20	32	9	61
	High	15	13	12	40
	Total	57	65	45	167

		Risk			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	33%	30%	36%	100%
	Med	33%	52%	15%	100%
	High	38%	33%	30%	100%
	Total	34%	39%	27%	100%

(Chi Squared p = 0.034)

Table I.32 Challenge Based Enjoyment with Enjoyment

		Enjoyment			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	48	11	9	68
	Med	18	28	15	61
	High	5	6	29	40
	Total	71	45	53	169

		Enjoyment			
		Low	Med	High	Total
Challenge Based Enjoyment	Low	71%	16%	13%	100%
	Med	30%	46%	25%	100%
	High	13%	15%	73%	100%
	Total	42%	27%	31%	100%

(Chi Squared p < 0.001)

Table I.33 Rush Based Enjoyment with Road Surface

		Road Surface			
		Low	Med	High	Total
Rush Based Enjoyment	Low	29	40	10	79
	Med	10	25	22	57
	High	8	13	12	33
	Total	47	78	44	169

		Road Surface			
		Low	Med	High	Total
Rush Based Enjoyment	Low	37%	51%	13%	100%
	Med	18%	44%	39%	100%
	High	24%	39%	36%	100%
	Total	28%	46%	26%	100%

(Chi Squared $p < 0.001$)

Table I.34 Rush Based Enjoyment with Road Features

		Road Features			
		Low	Med	High	Total
Rush Based Enjoyment	Low	15	28	36	79
	Med	27	22	8	57
	High	22	7	4	33
	Total	64	57	48	169

		Road Features			
		Low	Med	High	Total
Rush Based Enjoyment	Low	19%	35%	46%	100%
	Med	47%	39%	14%	100%
	High	67%	21%	12%	100%
	Total	38%	34%	28%	100%

(Chi Squared $p < 0.001$)

Table I.35 Rush Based Enjoyment with Visibility

		Visibility			
		Low	Med	High	Total
Rush Based Enjoyment	Low	31	38	10	79
	Med	4	25	28	57
	High		2	31	33
	Total	35	65	69	169

		Visibility			
		Low	Med	High	Total
Rush Based Enjoyment	Low	39%	48%	13%	100%
	Med	7%	44%	49%	100%
	High	0%	6%	94%	100%
	Total	21%	38%	41%	100%

(Chi Squared $p < 0.001$)

Table I.36 Rush Based Enjoyment with Other Traffic

		Other Traffic			
		Low	Med	High	Total
Rush Based Enjoyment	Low	10	18	51	79
	Med	26	15	16	57
	High	18	12	2	32
	Total	54	45	69	168

		Other Traffic			
		Low	Med	High	Total
Rush Based Enjoyment	Low	13%	23%	65%	100%
	Med	46%	26%	28%	100%
	High	56%	38%	6%	100%
	Total	32%	27%	41%	100%

(Chi Squared $p < 0.001$)

Table I.37 Rush Based Enjoyment with Surroundings

		Surroundings			
		Low	Med	High	Total
Rush Based Enjoyment	Low	52	19	8	79
	Med	9	20	28	57
	High		8	25	33
	Total	61	47	61	169

		Surroundings			
		Low	Med	High	Total
Rush Based Enjoyment	Low	66%	24%	10%	100%
	Med	16%	35%	49%	100%
	High	0%	24%	76%	100%
	Total	36%	28%	36%	100%

(Chi Squared $p < 0.001$)

Table I.38 Rush Based Enjoyment with Challenge

		Challenge			
		Low	Med	High	Total
Rush Based Enjoyment	Low	34	27	18	79
	Med	16	18	22	56
	High	24	4	5	33
	Total	74	49	45	168

		Challenge			
		Low	Med	High	Total
Rush Based Enjoyment	Low	43%	34%	23%	100%
	Med	29%	32%	39%	100%
	High	73%	12%	15%	100%
	Total	44%	29%	27%	100%

(Chi Squared $p = 0.001$)

Table I.39 Rush Based Enjoyment with Bends

		Bends			
		Low	Med	High	Total
Rush Based Enjoyment	Low	35	24	20	79
	Med	22	12	23	57
	High	25	4	3	32
	Total	82	40	46	168

		Bends			
		Low	Med	High	Total
Rush Based Enjoyment	Low	44%	30%	25%	100%
	Med	39%	21%	40%	100%
	High	78%	13%	9%	100%
	Total	49%	24%	27%	100%

(Chi Squared $p = 0.001$)

Table I.40 Rush Based Enjoyment with Speed

		Speed			
		Low	Med	High	Total
Rush Based Enjoyment	Low	57	21	1	79
	Med	5	42	10	57
	High		3	30	33
	Total	62	66	41	169

		Speed			
		Low	Med	High	Total
Rush Based Enjoyment	Low	72%	27%	1%	100%
	Med	9%	74%	18%	100%
	High	0%	9%	91%	100%
	Total	37%	39%	24%	100%

(Chi Squared $p < 0.001$)

Table I.41 Rush Based Enjoyment with Overtaking

		Overtaking			
		Low	Med	High	Total
Rush Based Enjoyment	Low	73	6		79
	Med	38	15	4	57
	High	2	4	27	33
	Total	113	25	31	169

		Overtaking			
		Low	Med	High	Total
Rush Based Enjoyment	Low	92%	8%	0%	100%
	Med	67%	26%	7%	100%
	High	6%	12%	82%	100%
	Total	67%	15%	18%	100%

(Chi Squared $p < 0.001$)

Table I.42 Risk Factor with Road Surface

		Road Surface			
		Low	Med	High	Total
Risk Factor	Low	12	22	26	60
	Med	10	27	10	47
	High	27	28	8	63
	Total	49	77	44	170

		Road Surface			
		Low	Med	High	Total
Risk Factor	Low	20%	37%	43%	100%
	Med	21%	57%	21%	100%
	High	43%	44%	13%	100%
	Total	29%	45%	26%	100%

(Chi Squared $p < 0.001$)

Table I.43 Risk Factor with Road Features

		Road Features			
		Low	Med	High	Total
Risk Factor	Low	46	14		60
	Med	17	20	10	47
	High	1	22	40	63
	Total	64	56	50	170

		Road Features			
		Low	Med	High	Total
Risk Factor	Low	77%	23%	0%	100%
	Med	36%	43%	21%	100%
	High	2%	35%	63%	100%
	Total	38%	33%	29%	100%

(Chi Squared $p < 0.001$)

Table I.44 Risk Factor with Visibility

		Visibility			
		Low	Med	High	Total
Risk Factor	Low	11	16	33	60
	Med	11	16	20	47
	High	14	33	16	63
	Total	36	65	69	170

		Visibility			
		Low	Med	High	Total
Risk Factor	Low	18%	27%	55%	100%
	Med	23%	34%	43%	100%
	High	22%	52%	25%	100%
	Total	21%	38%	41%	100%

(Chi Squared $p = 0.013$)

Table I.45 Risk Factor with Other Traffic

		Other Traffic			
		Low	Med	High	Total
Risk Factor	Low	47	12	1	60
	Med	6	27	14	47
	High	1	7	55	63
	Total	54	46	70	170

		Other Traffic			
		Low	Med	High	Total
Risk Factor	Low	78%	20%	2%	100%
	Med	13%	57%	30%	100%
	High	2%	11%	87%	100%
	Total	32%	27%	41%	100%

(Chi Squared $p < 0.001$)

Table I.46 Risk Factor with Temptation

		Temptation			
		Low	Med	High	Total
Risk Factor	Low	20	16	24	60
	Med	33	8	6	47
	High	54	5	3	62
	Total	107	29	33	169

		Temptation			
		Low	Med	High	Total
Risk Factor	Low	33%	27%	40%	100%
	Med	70%	17%	13%	100%
	High	87%	8%	5%	100%
	Total	63%	17%	20%	100%

(Chi Squared $p < 0.001$)

Table I.47 Risk Factor with Surroundings

		Surroundings			
		Low	Med	High	Total
Risk Factor	Low	2	12	46	60
	Med	12	24	11	47
	High	48	12	3	63
	Total	62	48	60	170

		Surroundings			
		Low	Med	High	Total
Risk Factor	Low	3%	20%	77%	100%
	Med	26%	51%	23%	100%
	High	76%	19%	5%	100%
	Total	36%	28%	35%	100%

(Chi Squared $p < 0.001$)

Table I.48 Risk Factor with Challenge

		Challenge			
		Low	Med	High	Total
Risk Factor	Low	30	7	22	59
	Med	20	19	8	47
	High	26	22	15	63
	Total	76	48	45	169

		Challenge			
		Low	Med	High	Total
Risk Factor	Low	51%	12%	37%	100%
	Med	43%	40%	17%	100%
	High	41%	35%	24%	100%
	Total	45%	28%	27%	100%

(Chi Squared $p = 0.007$)

Table I.49 Risk Factor with Speed

		Speed			
		Low	Med	High	Total
Risk Factor	Low	3	31	26	60
	Med	16	20	10	46
	High	44	15	4	63
	Total	63	66	40	169

		Speed			
		Low	Med	High	Total
Risk Factor	Low	5%	52%	43%	100%
	Med	35%	43%	22%	100%
	High	70%	24%	6%	100%
	Total	37%	39%	24%	100%

(Chi Squared $p < 0.001$)

Table I.50 Risk Factor with Enjoyment

		Enjoyment			
		Low	Med	High	Total
Risk Factor	Low	6	18	36	60
	Med	17	17	13	47
	High	49	11	3	63
	Total	72	46	52	170

		Enjoyment			
		Low	Med	High	Total
Risk Factor	Low	10%	30%	60%	100%
	Med	36%	36%	28%	100%
	High	78%	17%	5%	100%
	Total	42%	27%	31%	100%

(Chi Squared $p < 0.001$)

Table I.51 Risk Factor with Distraction

		Distraction			
		Low	Med	High	Total
Risk Factor	Low	44	15	1	60
	Med	13	25	9	47
	High		12	51	63
	Total	57	52	61	170

		Distraction			
		Low	Med	High	Total
Risk Factor	Low	73%	25%	2%	100%
	Med	28%	53%	19%	100%
	High	0%	19%	81%	100%
	Total	34%	31%	36%	100%

(Chi Squared $p < 0.001$)

Table I.52 Risk Factor with Overtaking

		Overtaking			
		Low	Med	High	Total
Risk Factor	Low	33	5	22	60
	Med	29	11	7	47
	High	51	9	3	63
	Total	113	25	32	170

		Overtaking			
		Low	Med	High	Total
Risk Factor	Low	55%	8%	37%	100%
	Med	62%	23%	15%	100%
	High	81%	14%	5%	100%
	Total	66%	15%	19%	100%

(Chi Squared $p < 0.001$)

Table I.53 Task Difficulty with Road Features

		Road Features			
		Low	Med	High	Total
Task Difficulty	Low	17	23	16	56
	Med	36	13	8	57
	High	12	21	26	59
	Total	65	57	50	172

		Road Features			
		Low	Med	High	Total
Task Difficulty	Low	30%	41%	29%	100%
	Med	63%	23%	14%	100%
	High	20%	36%	44%	100%
	Total	38%	33%	29%	100%

(Chi Squared $p < 0.001$)

Table I.54 Task Difficulty with Other Traffic

		Other Traffic			
		Low	Med	High	Total
Task Difficulty	Low	26	12	17	55
	Med	24	20	13	57
	High	5	14	40	59
	Total	55	46	70	171

		Other Traffic			
		Low	Med	High	Total
Task Difficulty	Low	47%	22%	31%	100%
	Med	42%	35%	23%	100%
	High	8%	24%	68%	100%
	Total	32%	27%	41%	100%

(Chi Squared $p < 0.001$)

Table I.55 Task Difficulty with Temptation

		Temptation			
		Low	Med	High	Total
Task Difficulty	Low	30	12	13	55
	Med	25	12	20	57
	High	52	5	2	59
	Total	107	29	35	171

		Temptation			
		Low	Med	High	Total
Task Difficulty	Low	55%	22%	24%	100%
	Med	44%	21%	35%	100%
	High	88%	8%	3%	100%
	Total	63%	17%	20%	100%

(Chi Squared $p < 0.001$)

Table I.56 Task Difficulty with Bends

		Bends			
		Low	Med	High	Total
Task Difficulty	Low	25	11	20	56
	Med	22	12	23	57
	High	37	18	3	58
	Total	84	41	46	171

		Bends			
		Low	Med	High	Total
Task Difficulty	Low	45%	20%	36%	100%
	Med	39%	21%	40%	100%
	High	64%	31%	5%	100%
	Total	49%	24%	27%	100%

(Chi Squared $p < 0.001$)

Table I.57 Task Difficulty with Speed

		Speed			
		Low	Med	High	Total
Task Difficulty	Low	12	28	15	55
	Med	9	24	24	57
	High	42	15	2	59
	Total	63	67	41	171

		Speed			
		Low	Med	High	Total
Task Difficulty	Low	22%	51%	27%	100%
	Med	16%	42%	42%	100%
	High	71%	25%	3%	100%
	Total	37%	39%	24%	100%

(Chi Squared $p < 0.001$)

Table I.58 Task Difficulty with Risk

		Risk			
		Low	Med	High	Total
Task Difficulty	Low	21	22	13	56
	Med	26	22	8	56
	High	11	23	24	58
	Total	58	67	45	170

		Risk			
		Low	Med	High	Total
Task Difficulty	Low	38%	39%	23%	100%
	Med	46%	39%	14%	100%
	High	19%	40%	41%	100%
	Total	34%	39%	26%	100%

(Chi Squared $p = 0.005$)

Table I.59 Task Difficulty with Enjoyment

		Enjoyment			
		Low	Med	High	Total
Task Difficulty	Low	14	23	19	56
	Med	11	13	33	57
	High	47	11	1	59
	Total	72	47	53	172

		Enjoyment			
		Low	Med	High	Total
Task Difficulty	Low	25%	41%	34%	100%
	Med	19%	23%	58%	100%
	High	80%	19%	2%	100%
	Total	42%	27%	31%	100%

(Chi Squared $p < 0.001$)

Table I.60 Task Difficulty with Distraction

		Distraction			
		Low	Med	High	Total
Task Difficulty	Low	20	20	16	56
	Med	32	16	9	57
	High	7	16	36	59
	Total	59	52	61	172

		Distraction			
		Low	Med	High	Total
Task Difficulty	Low	36%	36%	29%	100%
	Med	56%	28%	16%	100%
	High	12%	27%	61%	100%
	Total	34%	30%	35%	100%

(Chi Squared $p < 0.001$)

Table I.61 Task Difficulty with Overtaking

		Overtaking			
		Low	Med	High	Total
Task Difficulty	Low	37	7	12	56
	Med	30	10	17	57
	High	47	9	3	59
	Total	114	26	32	172

		Overtaking			
		Low	Med	High	Total
Task Difficulty	Low	66%	13%	21%	100%
	Med	53%	18%	30%	100%
	High	80%	15%	5%	100%
	Total	66%	15%	19%	100%

(Chi Squared $p = 0.009$)

Table I.62 Task Difficulty with Challenge Based Enjoyment

		Challenge Based Enjoyment			
		Low	Med	High	Total
Task Difficulty	Low	21	21	14	56
	Med	8	22	25	55
	High	39	18	1	58
	Total	68	61	40	169

		Challenge Based Enjoyment			
		Low	Med	High	Total
Task Difficulty	Low	38%	38%	25%	100%
	Med	15%	40%	45%	100%
	High	67%	31%	2%	100%
	Total	40%	36%	24%	100%

(Chi Squared $p < 0.001$)

Table I.63 Task Difficulty with Rush Based Enjoyment

		Rush Based Enjoyment			
		Low	Med	High	Total
Task Difficulty	Low	19	22	13	54
	Med	13	26	17	56
	High	47	9	3	59
	Total	79	57	33	169

		Rush Based Enjoyment			
		Low	Med	High	Total
Task Difficulty	Low	35%	41%	24%	100%
	Med	23%	46%	30%	100%
	High	80%	15%	5%	100%
	Total	47%	34%	20%	100%

(Chi Squared $p < 0.001$)

Table I.64 Task Difficulty with Road Surface

		Road Surface			
		Low	Med	High	Total
Task Difficulty	Low	22	27	7	56
	Med	4	21	32	57
	High	23	30	6	59
	Total	49	78	45	172

		Road Surface			
		Low	Med	High	Total
Task Difficulty	Low	39%	48%	13%	100%
	Med	7%	37%	56%	100%
	High	39%	51%	10%	100%
	Total	28%	45%	26%	100%

(Chi Squared $p < 0.001$)

Table I.65 Young Drivers with Enjoyment Type

		Under 26	26 and older	Total
Enjoyment Type	Challenge Based Enjoyment	2	59	61
	Neither/Both	4	60	64
	Risk Based Enjoyment	9	26	35
	Total	15	145	160

		Under 26	26 and older	Total
Enjoyment Type	Challenge Based Enjoyment	13%	41%	38%
	Neither/Both	27%	41%	40%
	Risk Based Enjoyment	60%	18%	22%
	Total	100%	100%	100%

(Chi Squared p = 0.001)

Table I.66 Young Drivers with Rush Based Enjoyment

		Under 26	26 and older	Total
Rush Based Enjoyment	Low	2	76	78
	Med	3	51	54
	High	10	20	30
	Total	15	147	162

		Under 26	26 and older	Total
Rush Based Enjoyment	Low	13%	52%	48%
	Med	20%	35%	33%
	High	67%	14%	19%
	Total	100%	100%	100%

(Chi Squared p < 0.001)

Table I.67 Young Drivers with Challenge

		Under 26	26 and older	Total
Challenge	Low	11	61	72
	Med	2	48	50
	High	2	40	42
	Total	15	149	164

		Under 26	26 and older	Total
Challenge	Low	73%	41%	44%
	Med	13%	32%	30%
	High	13%	27%	26%
	Total	100%	100%	100%

(Chi Squared $p = 0.054$)

Table I.68 Young Drivers with Speed

		Under 26	26 and older	Total
Speed	Low	1	61	62
	Med	3	62	65
	High	11	26	37
	Total	15	149	164

		Under 26	26 and older	Total
Speed	Low	7%	41%	38%
	Med	20%	42%	40%
	High	73%	17%	23%
	Total	100%	100%	100%

(Chi Squared $p < 0.001$)

Table I.69 Young Drivers with Risk

		Under 26	26 and older	Total
Risk	Low	11	41	52
	Med	1	66	67
	High	3	41	44
	Total	15	148	163

		Under 26	26 and older	Total
Risk	Low	73%	28%	32%
	Med	7%	45%	41%
	High	20%	28%	27%
	Total	100%	100%	100%

(Chi Squared p = 0.001)

Table I.70 Young Drivers with Enjoyment

		Under 26	26 and older	Total
Enjoyment	Low	3	68	71
	Med	2	45	47
	High	10	37	47
	Total	15	150	165

		Under 26	26 and older	Total
Enjoyment	Low	20%	45%	43%
	Med	13%	30%	28%
	High	67%	25%	28%
	Total	100%	100%	100%

(Chi Squared p = 0.003)

Table I.71 Young Drivers with Overtaking

		Under 26	26 and older	Total
Overtaking	Low	3	108	111
	Med	4	21	25
	High	8	21	29
	Total	15	150	165

		Under 26	26 and older	Total
Overtaking	Low	20%	72%	67%
	Med	27%	14%	15%
	High	53%	14%	18%
	Total	100%	100%	100%

(Chi Squared $p < 0.001$)

Appendix J – A technical overview of Internet questionnaires

J.1 Introduction

This appendix is an overview of the technical process necessary to produce and run the online surveys undertaken as part of the data collection methods used

J.2 Web-page data collection

The Internet allows for a computer to connect to a vast network of other computers. In simple terms, when a web address is accessed, such as http://www.napier.ac.uk, then the request for that page is routed to the main computer, the server, where that site is saved. Normally a server will hold many web pages belonging to many sites. For the collection of web-page data the server is very important as this is not only where the web pages are stored, but also is where the data entered by the respondent will be stored.

To be able to run a web-based questionnaire three basic things are required:

1. A means to ask the questions.
2. A method to record the answers.
3. A system for the survey administrator to access the responses.

J.3 Asking the Questions

There are two basic types of web pages, static and dynamic. Static pages contain fixed data that can only be changed by a web designer writing new code. Dynamic pages can have their appearance changed in response to the user, and also allow the user to send data to the server. Within some web pages both static and dynamic elements may be present.

For the questionnaires within this research, the questions did not change and therefore they are static data, while the data being entered by the respondent is not fixed and can be transmitted back to the server and saved so that the questionnaire administrator can access it.

To enable a page that can collect data a combination of HTML and php code is used, with the static elements being written in HTML and the dynamic in php. Within php code a programmer can construct various elements for data collection, such as tick

boxes and places where text can be entered. One of the essential elements that is coded in php is the 'submit button', and it is only when the respondent clicks on this button that the all data entered into the questionnaire is transmitted back to the server.

J.4 Recording the data

Once the data is transmitted it is then stored in a database on the server. The database is an organised way of storing data such that it can be efficiently stored and retrieved. The database structure used for the questionnaires within this research is very basic, and may be considered as a table of data. An example of a database using three fields is shown in Table J.1, where:

- Gender is encoded as 1 for male, 2 for female
- Age is entered as an integer value
- Bike make is an open question allowing for any text

Table J.1 – Example of database table

Gender	Age	Bike Make
1	28	Yamaha
2	35	Suzuki
1	33	Honda

The database communicates to the world via its own language, called MySQL, allowing for tasks such as adding new, reading or deleting data to be carried out. The php elements of the web page issues MySQL commands that store the data in the database. Once the data has been stored in the database it has to be accessed by the survey administrator and put into a format that can be used by SPSS.

J.5 Setting up the database and accessing the data

The software tool that accesses the data is also used to configure the database. Before the database can be used the number of fields, their names and the type of data that will be stored in them has to be set up. For the example above, the database would be configured for three fields, with field 1 being called 'Gender' and having the type of integer, field 2 would be called 'Age' with the type of integer and field 3 is named 'Bike Make' and type text.

Accessing the database on the server is done over the internet by using software called phpMyAdmin. Using this tool the various fields within the database can be

configured, database contents explored and exported. The export function allows the database to be saved on the administrators local computer in various formats, including Excel. The Excel file can be imported into SPSS.

J.6 Dreamweaver

Figure J.1 gives an illustration of the code that is used to produce a single online question asking, “Do you hold a motorbike licence”, with the available answer being ‘Yes’ and ‘No’. Questionnaires containing many questions can become very complex and therefore it becomes more difficult to write the code required.

Figure J.1 – Example web page code

```
  <form method="post" name="form1" action="<?php echo $editFormAction;
?>">
    <table width="82%" border="0" align="left">
      <tr>
        <td width="78%"><strong><font color="#FF0000" size="5">Do you hold a
motorbike
          licence?</font></strong></td>
        <td width="11%"><strong><font color="#FF0000" size="5">
          <input type="radio" name="Licence" value="1" >
          Yes</font></strong></td>
        <td width="11%"> <strong><font color="#FF0000" size="5">
          <input type="radio" name="Licence" value="0" >
          No</font></strong></td>
      </tr>
```

To aid with coding various software packages can be used, for this research Macromedia Dreamweaver was used. This software allows web pages to be set up graphically with the code being generated automatically. Tools, like Dreamweaver, enable web designers to produce complex pages quickly and efficiently, while reducing the chance for programming errors.

Appendix K – Classification of data using Neural Networks

K.1 Chapter Synopsis

The human brain is well adapted to carry out pattern recognition classification tasks; in fact, it is a skill that we use continually in such activities as facial recognition and reading. Therefore, a dataset that needs to be classified into groups using the patterns of the individual data elements could be classified by a human viewing graphical representation of the data. However, this 'human sorting' approach may not be very practical because of its high time demand and the likelihood of incorrect classification due to human error. Consequently, what is needed is a method to classify the data by using computer technology that simulates the pattern recognition methods of the human brain; neural networks can provide such a method. This appendix describes how neural networks were used to classify data on the relationship between motorcycling risk and enjoyment, resulting in three major 'risk types' of motorcyclists being identified.

K.2 Introduction

Within this research examining the enjoyment factors of motorcycling, there was a need to classify a dataset; pattern recognition was used to identify subsets relating to motorcyclists' view of risk and enjoyment (Broughton 2005; Broughton and Stradling 2005).

Figure K.1 – Examples of Scenario Pictures

The full dataset was collected by asking riders to rate a set of six scenario-pictures (Figure K.1) for risk and enjoyment using a five-point Likert scale, rated one to five. Subsets were extracted from this data, based on the relationships between

motorcyclists' views of risk and enjoyment using a self-learning pattern recognition approach (Hertz et al. 1991).

K.3 Neural Networks: an Overview.

Neural Networks were initially developed in the 1950s when computers had advanced far enough to allow neurons and their interconnection to be modelled; with the first neural network capable of solving a real problem being developed in 1959. In the early 1980's John Hopfield presented a paper on the mathematics of developing Neural Networks that were useful; laying the basis for modern neural network systems (Anderson and McNeil 1992). Since then, they have been used in various academic and commercial fields (Tarassenko 1998), for example see Broughton (1998).

Neural Networks are a collection of simulated brain neurons that are based on the parallel architecture of animal brains (Hertz et al. 1991), and as such they are suitable for pattern recognition. Neural networks are self-learning systems and, therefore before a system can be used for pattern recognition, it needs to be trained on representative data (Pao 1989).

The building block of a neural network is a component called a Perceptron (Figure K.2), which has number of inputs (I_1 to I_n) whose value is multiplied by its respective weight (W_1 to W_n) before being summed, along with the Perceptron bias (a constant input). This value is then applied to the transfer, or activation, function (Hertz et al. 1991), such as sigmoid function of 1/(1 + EXP(-x)).

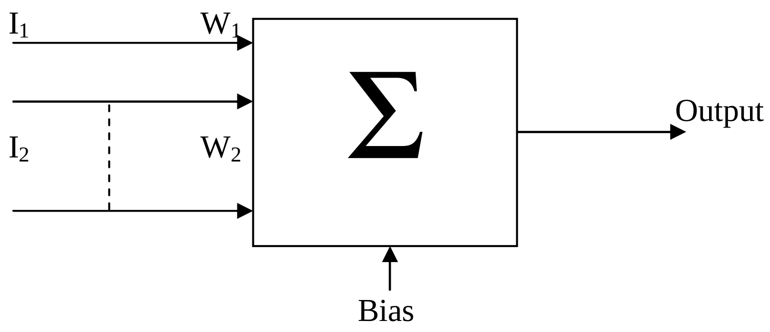
Therefore:

$$x = \Sigma(I_a * W_a) + \text{Bias} \quad \text{(for a = 1 to number of inputs (n))}$$

$$\text{Output} = 1/(1 + \text{EXP}(-x))$$

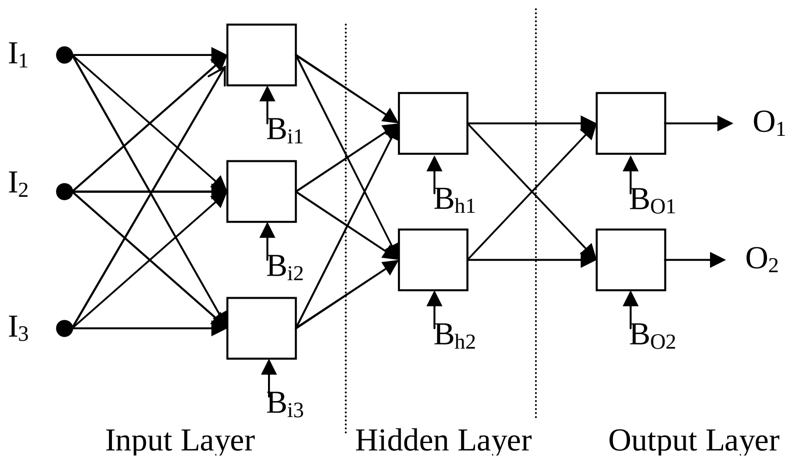
Within a neural network system, Perceptrons are connected together in layers; in a simple system there would be an input layer, a hidden layer, and an output layer. Figure K.3 shows a network consisting of three input, two hidden and two output Perceptrons (Pao 1989). Systems can consist of any number of layers with any number of nodes in each layer (Taylor 2000), and the connectivity between their layers can be more complex (Jordan 1986).

Figure K.2 – A Simple Perceptron



The weights and bias for each Perceptron is established in the learning phase where pre-classified data are applied to the network and the weights adjusted as the network learns to recognise these examples; in this project the back-propagation method was used. Further information on learning methodologies can be found in Adaptive Pattern Recognition and Neural Networks (Pao 1989) and Introduction to the Theory of Neural Computation (Hertz et al. 1991).

Figure K.3 – A Simple Neural Network



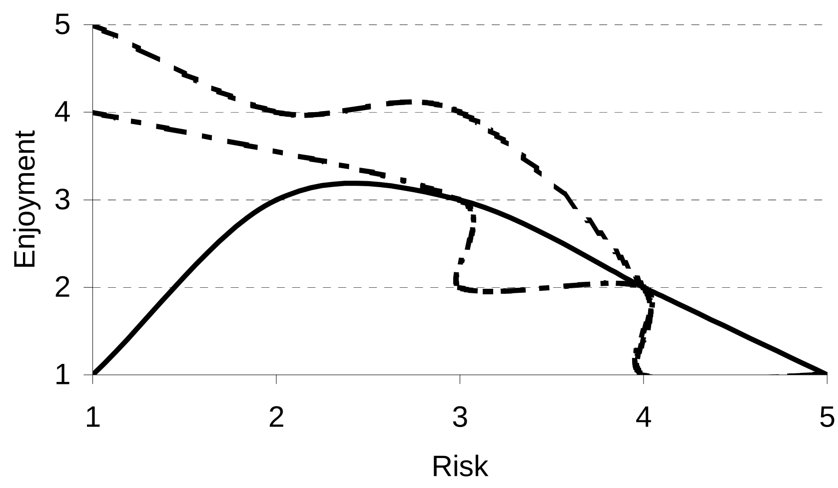
K.4 The Dataset

The data records collected for this research had twelve elements consisting of six pairs of risk and enjoyment ratings, one pair for each of the six scenarios.

{($Risk_1$,$Enjoyment_1$), ($Risk_2$,$Enjoyment_2$), ($Risk_3$,$Enjoyment_3$),

($Risk_4$,$Enjoyment_4$), ($Risk_5$,$Enjoyment_5$), ($Risk_6$,$Enjoyment_6$)}

Figure K.4 – Example of Datasets



Each record in the dataset was sorted into ascending order of risk (Figure K.4 shows example sorted records) and then presented to a trained network.

K.5 The Neural Network and Data Training Set

The neural network was originally configured to have twelve input nodes, a single hidden layer of two Perceptrons, and six output nodes (Taylor 2000), this was subsequently modified to have only three outputs

A training dataset was built to reflect six data-types (Figure K.5):

Type 1

Constant risk as enjoyment varies;

Type 2

Constant enjoyment as risk varies;

Type 3

As risk increases so does enjoyment, until a threshold point is reached, then enjoyment decreases as risk increases (Risk acceptors);

Type 4

As risk increases enjoyment decreases, until a threshold point is reached, then enjoyment increases as risk increases;

Type 5

Enjoyment increases as risk increases (Risk seekers);

Type 6

Enjoyment decreases as risk increases (Risk averse).

The training dataset consisted of six pairs of points and six outputs, with each output representing one of the six data types;

$\{(Rt_1,Et_1), (Rt_2,Et_2), (Rt_3,Et_3), (Rt_4,Et_4), (Rt_5,Et_5), (Rt_6,Et_6), (T_1, T_2, T_3, T_4, T_5, T_6)\}$

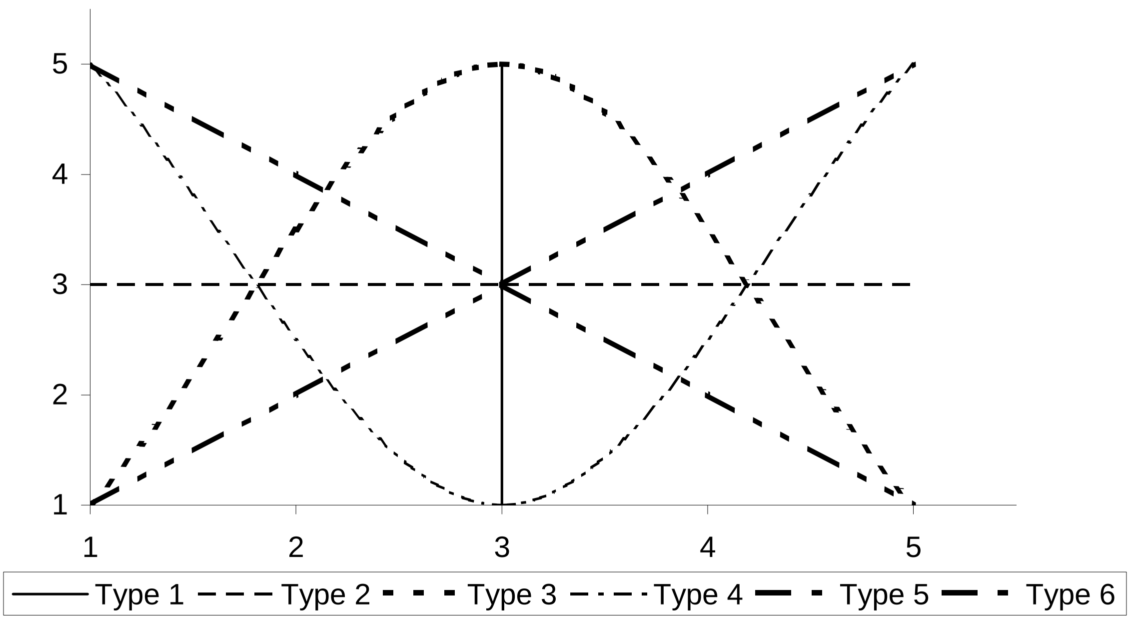
Where:

Rt is a risk training point

Et is an enjoyment training point

T is the probability that the dataset describes a type of T_n

Figure K.5 – The Data Types for the Training Set



An example of a training set records for type 1 and 3 would be:

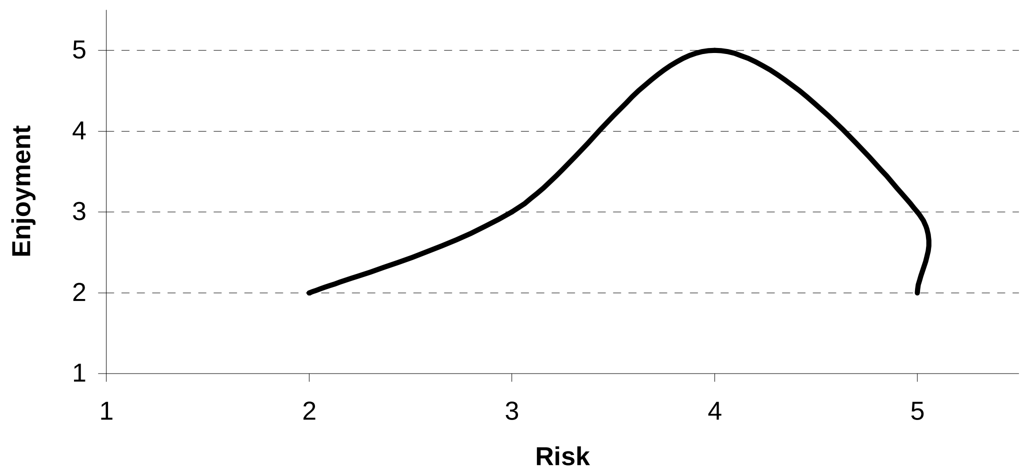
{(4,2), (4,2), (4,3), (4,4), (4,5), (4,5), (1, 0, 0, 0, 0, 0)}

{(2,2), (2,2), (3,3), (4,5), (5,3), (5,2), (0, 0, 1, 0, 0, 0)}

The training data must conform to the same rules as real data; that is it must be in the bounds of 1 to 5 and be sorted into risk order. Using Excel, 450 training records, 75 of each type, were created. A graphical representation of a type 3 training record is shown in Figure K.6.

The network learns by presenting each training record to the network and using the errors at the outputs to calculate an adjustment to the Perceptron weights (Hertz et al. 1991). As this calculation flows back through the network, from the outputs to the inputs, the method is called back propagation. After a period of learning, the errors dropped to an insignificant level; the maximum being less that 0.03 (3%) with an average around 0.01 (1%), it was therefore decided that learning was complete.

Figure K.6 – Type 3 Training Record.



K.6 Applying the Data

The records of the dataset were imported from SPSS into the neural network software; they were sorted into ascending risk order and checked to ensure that the input data fell within the correct boundaries (1 to 5). The dataset was then applied to the network with the outputs being compared to find the largest, and if it accounted for 33% or more of the summed outputs, then the data record was assigned to that risk type group. Figure K.7 outlines the flow of the data in this process.

The imported records are in the format of:

$\{(Rt_1,Et_1), (Rt_2,Et_2), (Rt_3,Et_3), (Rt_4,Et_4), (Rt_5,Et_5), (Rt_6,Et_6)\}$

The network appended the predictions of risk types to the record, giving:

$\{(Rt_1,Et_1), (Rt_2,Et_2), (Rt_3,Et_3), (Rt_4,Et_4), (Rt_5,Et_5), (Rt_6,Et_6), (T_1, T_2, T_3, T_4, T_5, T_6)\}$

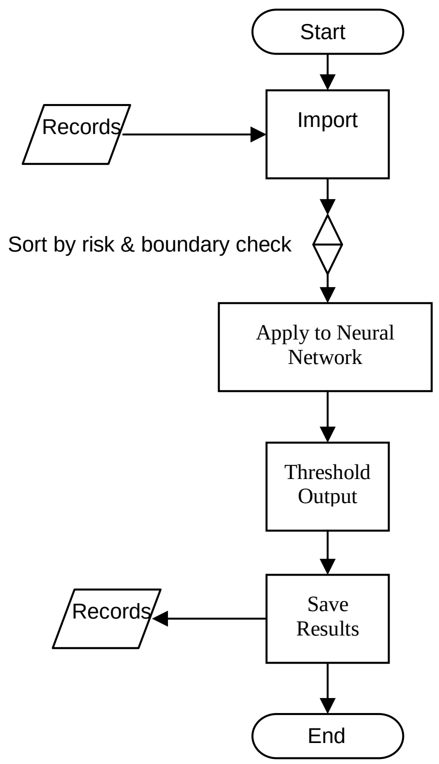
The outputs are adjusted so that the risk type can be found by comparing each output as a percentage of the total outputs:

$O_{total} = \Sigma T_n$ For n = 1 to 6.

Therefore percentage P for output i is given by:

$P_i = (T_i / O_{total}) * 100$

Figure K.7 – Processing of Risk/Enjoyment data



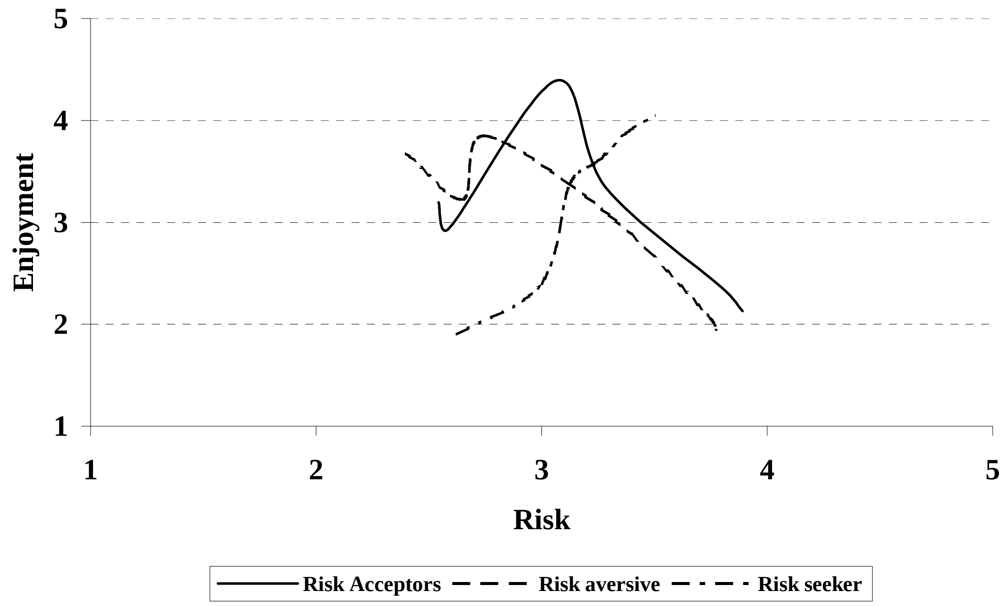
If maximum P_i is greater than 33% then type i was assigned to the record. Some of the records may not be classified.

The classification showed that the majority of the records were categorised into three groups; types 3, 5 and 6, therefore the network was configured for three outputs only and retrained.

K.7 Results

The neural network found three different profiles, plotted in Figure K.8. It was found that the risk averse made up 42% of the sample, with 48% being risk acceptors and 8% risk seekers; 2% were unclassified.

Figure K.8 – Risk and Enjoyment Types



K.8 Neural Network References

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Appendix L – Details of Thoughts on PTW Riders

Table L.1 Comments on Thoughts about Riders

Comment	Lic	Rid	F&F	Thoughts
noisy	N	N	N	Noisy
I think that is a highly dangerous form of transport - particularly for the bikers. I would not attempt to ban it , but some speed restrictions should be imposed on heavily-trafficed roads and motorways.	N	N	N	Dangerous Need restricting
I've nothing against them. Many are excellent drivers and demonstrate very good road sense and courtesy. As a car driver, I wish more of us would do the same. However, the main problem, I feel, with motor cyclists is that some are unaware of how small they appear in the rearview mirror of a car and, if they are driving at speed on a motorway, of the fact that car drivers don't see them until they are very suddenly almost on top of them. It only takes a couple of seconds for a bike that was not visible in the mirror one moment ago to become a danger to him/herself and others by driving at excess speed if, for example, the car driver wishes to pull out. In answer to question 3 (Yes Yes) none of my family or friends ride a motorbike.	N	N	N	Good skills Not easily seen by others
depends: a) use of scooters in congested urban streets can be a sensible alternative to bikes, especially in hilly cities; in that case I think of bikers as young and cosmopolitan b) in contrast, I regard users of big motorbikes on country roads and motorways more as juveniles or mid-life crisis men who have to compensate for something; real youngsters on motorbikes are often a hazard to themselves and others and, furthermore, also often behave like boy racers when they drive a car	N	N	N	Scooters good in town Mid-life crisis Dangerous

I can appreciate that riding a motorcycle is an enjoyable past time and a finely tuned skill. I know they ride faster than cars and often the speed limit especially on motorways and rural roads and I have no problem with this as usually when I observe such behaviour it is clear to see that the biker is skilled and reading the road and traffic situation very carefully. What annoys me about bikers is when they continually put the blame for bike/car accidents on the drivers of cars. While I appreciate that bikes are harder to spot and some drivers may not take the necessary steps to check for bikers in their mirrors there is never any mention by bikers or advertising campaigns that bikes are very often in places they shouldn't be e.g. cutting between 2 lanes of stationary traffic or driving so fast that when you turn right out of a junction the road was completely clear as you begin the manouever but by mid turn a bike has sped round the corner and is about to hit your car as you finish the right turn - this is then blamed on the car driver. I guess it is this kind of driving behaviour that really annoys me and bikers don't see it all - they have an attitude of superiority that they think makes them better than car drivers and are beyond blame for their actions.	N	N	N	Good skills Blame care drivers Not easily seen by others Dangerous Bad attitude Don't like them weaving/filtering
Dangerous (my wife is a theatre nurse). Some are impolite on road.	N	N	N	Dangerous Bad attitude to other road users
Motor cycling is the most dangerous activity that can be engaged in on public roads.It should only be contemplated by those who wish to commit suicide. It is also dangerous and intimidating to other vulnerable road users, and to elderly / frail pedestrians in particular. This danger and intimidation is increased in areas where traffic calming has been introduced by the fact that they m/cs are unaffected by some traffic calming features, notably cushion style humps or where gaps have been left to exempt (pedal) cyclists from having to negotiate regular humps. M/cs are also undesirable on environmental grounds, although this is largely due to the failure of governments to adequately reduce air and noise pollution emissions at source, by regulation. Emissions are consequently worse than for cars and far worse than they should be.	N	N	N	Dangerous Bad attitude Noisy Not environmental
Organ Donor vehicles.	N	N	N	Dangerous

I would worry about any family or friends who wanted to ride a bike. I know that there are safe motorbike drivers, but I think some of them can be a bit reckless and feel that you have less chance of surviving a motorbike crash than a car crash.	N	N	N	Dangerous Bad attitude to other road users Some reckless Vulnerable
Are they really having fun? It looks like such hard work. As a car driver who occasionally finds himself sharing some roadspace with bikers, they arrive unexpectedly from behind, on the inside or outside, calling for assiduous mirror-work, both sides, in slow moving traffic, and in fast(er) moving traffic they seem to show much more variability in both speed and direction than other powered road vehicles. So on the Mway I can divide all other traffic going my way into those I've overtaken and won't see again, and those that have overtaken me and are gradually pulling out of sight, whereas packs of PTWs seem much more likely to be encountered several times as they speed up and whizz past me and then slow down and regroup reqeuiring me at my constant velocity (of 70 mph, of course) to ease past them, again. Is this part of the fun?	N	N	N	Not easily seen by others Can’t be enjoyable Don’t like them weaving
Some are justifiably confident in their own driving skills, others behave recklessly because they have too much confidence in their driving skills, and some just behave recklessly, but is this any different from motorists in general? Perhaps bikers inspire distrust because they must dress for safety and therefore look different from other people?	N	N	N	Good skills Distrusted as look different Some reckless
I've always been scared to ride one - never have done! Have never had any problems with bikers	N	N	N	Dangerous
Largely safe raod users, but as with car drivers there is the occasional person who drives in a reckless manner.	N	N	N	Good skills Some reckless
I think that some of them drive sensibly but the majority that I see ride too fast and quite dangerously. I don't like it when motorbikes weave in and out of traffic in queues.	N	N	N	Don’t like them weaving Some reckless
? feel that they impose upon other road users. i accept that they are more vunerable than car dr?vers, but why should ? be put out by this. if i want to engage in dangerous behaviour, like going for a run on the motorway, it is my own behaviour and my safety is my own responsibility! it therefore holds true that this should be the case for bikes.	N	N	N	Dangerous Vulnerable

I think they make themselves vulnerable by riding a bike when the majority of road users are in larger vehicles. They get in the way and weave in and out of traffic. Other road users are meant to take ridiculous amounts of care not to hit them etc when they are the ones putting themselves at risk.	N	N	N	Dangerous Don't like them weaving
I envy them - I'd very much like to own a motorbike! I think they have a hard deal on the roads, as drivers of cars and trucks tend not to check for motorcyclists, leading to a lot of accidents.	N	N	N	Support bikers Other vehicles cause PTW accidents
That they are risk takers? But ir looks like fun. Also, I went to a biker show a few years ago & found bikers to be very polite and quite friendly (which i was surprised about, i expected them to be a bit rougher)!	N	N	N	Fun Dangerous Risk takers
I don't see them particularly as a separate group of people. However I think they have to be a little braver than the average road user considering the increase risk they are at and that they have to be a little hardier given the weather conditions that they have to endure. Also although nothing to do with the bikers themselves they are a lot harder to see than their four wheeled counterparts. Good luck with the research.	N	N	N	Dangerous Hardier, due to bad weather Brave
I think bikers fall into two categories: a) Those who are passionate about motorcycling and their machines b) Those who find it easier to get through the traffic and less expensive than cars	N	N	N	Passionate Ease of getting through traffic
Living (potential) organ donors	N	N	N	Dangerous
I believe them to be courageous. I deal with injuries associated with Motor Bike accidents and have learned that the accident does not have to be the bikers fault. Most bikers seem aware of their position but still take risks that I would not be comfortable with.	N	N	N	Brave Other vehicles cause PTW accidents Risk takers
Motorbikers are lunatics! They cause cars to swerve and are a danger to other road users as they weave in and out of lanes. It seems also that motorbikers are immune to speed regulations.	N	N	N	Risk takers Don't like weaving Law breakers
decent individuals. sensation seekers	N	N	N	Risk takers
I don't think about them very often, most seem to be safe drivers just like any other vehicle driver	N	N	N	Safe drivers
That some of them have no concept of the rules of the road and place themselves and other road users in danger due to inappropriate behaviour e.g. undertaking other vehicles, non-indication	N	N	N	Don't like weaving Law breakers

Many motorcyclists seem to drive like maniacs and speed up past you before you have chance to notice them on the road. I think motorbikes are dangerous (I used to work with people who have brain injuries and have seen what accidents can do to people) and that many motorcyclists don't take enough care. I do my best to look out for them on the road but it is not always possible when they come from nowhere doing about 90 on the motorway and expect you to be able to see them! I think bikers are bigger risk takers than those who don't ride. I'm sure many riders take care and drive safely but the majority don't. I hate the noise they make when they scream past you on the street!	N	N	N	Risk takers Not easily seen by others Noisy
Sometimes when in groups they can appear a little intimidating. Plus, whilst envious of their ability to queue jump, I don't feel it's a safe mode of transport. Heard to many sad stories of fatal accidents. Looks like a lot of fun though!	N	N	N	Intimidating Weaving/Filtering Looks like fun Dangerous
I have no strong feelings either way. It can be annoying when they cut through traffic without regard for you especially if you are a pedestrian.	N	N	N	Weaving/Filtering No consideration
I don't think about them much but my impression is that they enjoy taking risks more than I do.	N	N	N	Risk takers
I don't mind 'bikers', but I think motorcycles are extremely dangerous as they are capable of high speeds, are relatively unstable especially in difficult conditions, they offer little protection and they are not as visible as larger vehicles.	N	N	N	Dangerous Vulnerable Not easily seen
I think of "bikers" as people who ride a motorbike, wear a leather jacket, and belong to a gang! Thus they are people to avoid. However, if you are defining bikers as people who ride a motorbike, then as a driver I am very wary of them because they tend to drive fast, weave in and out of cars, and may be in a driver's blind spot just at the point the driver is changing lanes etc. In general, they are trouble!	N	N	N	Law breakers Thugs Dangerous Weaving filtering
I thought for years (until I got my driving licence) that there was a higher maximum speed level set for bikers...I drive a lot and many (not all) bikers drive much faster than the speed limit.. I've witnessed one crash where the biker was going too fast around a bend and lost control...on the other hand, many car drivers seem to forget to look into their mirrors and often veer very close to motorbike when they are trying to overtake.	N	N	N	Law breakers Dangerous No consideration Car drivers cause accidents

I think that despite knowing that they are more vulnerable and at risk on the roads, they continue to ride (often at high speed) and are therefore more wreckless in their outlook towards their own safety and in complete disregard of the reliance upon them by their dependents.	N	N	N	Vulnerable Law breakers Risk takers
Well I guess I have several ideas/stereotypes about bikers. The main think I think about when I hear the word bikers is "rockers", I get this mental image of these big, white guys with leather jackets with Hells Angels signs on the back and great big colourful tatoos who ride Harley Davidson's. The alternative to those once is more like fast riders who were leather body suits and drive really really fast Japanese bikes on the German motorways. I do think that it must be a great freedom to ride a bike, but I dislike the speed they often drive with and the zig zag'ing in and out between cars. It is very dangerous and I do sometimes think that they are not that considerate in traffic (I guess it kind of goes with this idea that everyone who drives a motorcycle has been in an accident), but I think this idea of groupings of car drivers v. bikers is a bit like snowboarders v skiers on the slope - you always take the side of the group to which you belong. Anyway, good luck with your research.	N	N	N	Thugs Fun Law breakers Weaving Dangerous No consideration
I think some more mature bikers seem to be very responsible and experienced drivers, especially those who have clearly invested in safety measures such as protective clothing to a high standard. I admire the comradary and positive experience that lots of bikers say they experience as members of biker clubs. However, some bikers seem to be purely 'risk takers'. They weave through traffic at high speed and don't seem to be either fully in control or adequately protected. These bikers put themselves and lots of others on the road in danger.	N	N	N	Good skills Camaraderie Risk takers Weaving Bo consideration
They are great! I wish I had one!!	N	N	N	Fun
I don't have any opinions in particular - I'm not sure I know any bikers	N	N	N	
Noise from the bikes can be a bit frightening sometimes but as long as they are responsible road users I really don't mind them.	N	N	N	Noise

I have seen some very sensible bikers and also some very stupid ones! The other day I was travelling along the motorway and saw a motorbike overtake a car, the car was in the outside lane and the biker almost ended up on the central reservation. People like that endager themselves and other road users. There are many, many sensible drivers out there but I guess it's only the reckless ones that catch our attention.	N	N	N	No consideration
very brave!	N	N	Y	Brave
Generally OK but there are some who like to use the roads as race tracks which is dangerous not only for them but for other road users as well.	N	N	Y	Dangerous
[not sure what you are looking for here, as this is such a broad question and bikers is rather a broad group - is this a pilot survey?] Lots of my male family members ride and race bikes (supercross), so I dont generally have a problem with bikers as a group. I do however, find some of the driving habits of motorcyclists rather dangerous (e.g. over taking on the wrong side; squeezing between lines of cars and overtaking on bends/blind summits etc. This isnt a homogenous group by any means, and I've never had contact with hells angel type bikers (riding straight pipe and monkey hanger harleys), so I cant comment on them. [I'd suggest you ask people are more focussed question next time - if I wanted to I could just give you my views on the things bikers wear - but I'm not sure that's what you're interested in. that's the problem with open questions, they need to be specific!]	N	N	Y	Dangerous
I feel that biking must be a great way to travel, particularly in overcoming congestion problems and the open-air aspects of touring. However, my concern is that it seems a particularly vulnerable mode of transport. In terms of my attitude as a car driver, I feel that some bikers take considerable risks in their means of negotiating traffic at high speed but would generally have seen bikers as very competent road users.	N	N	Y	Fun Avoid traffic Vulnerable Risk takers Highly Skilled
Mixed feelings. Some are extremely competent and drive safely with respect to speed and overtaking. Others drive too fast, overtake to close to cars.	N	N	Y	Highly Skilled Risk takers
They just want fun. Feel the wind in their hair. Not enticed into the warm dry space away from danger. FREEDOM.	N	N	Y	Fun Dangerous

In general, I like them - social group, greet each other, etc. Don't like the kamikaze-pilots you tend to see more and more these days, however. Would not ride a bike myself because I think it is too dangerous.	N	N	Y	Camaraderie Dangerous
A varied bunch of people! My dad and uncle were bikers in their time, some of my friends are. However, some bikers, like some car drivers, drive too fast and discourteously	N	N	Y	
to be honest I have never really thought about bikers as a specific kind of group. You always hear about certain things, like my dad always had this dream of riding a harley across the US, so i guess they must be a group of people who embrace freedom. Sometimes when I drive I get a bit worried as well about people on motorbikes, how they drive around long queues of cars... but then again I am not the most experience driver so I tend to panic over things.	N	N	Y	Fun Weaving
No general view. Some are serious riders for whom the bike is an enjoyable hobby; some use a bike mainly for economic reasons; some find a rewarding group membership and personal identity in being part of a motorcycle 'gang'. All have opted for a mode of travel which uses an inherently unstable vehicle which is sometimes not detected by other road users and which radically increases the chances of a KSI crash.	N	N	Y	Fun Camaraderie Not seen by others Dangerous
generally that they are cool.I wish the had the courage to ride a motorbyke myself.	N	N	Y	Fun Dangerous
I just think it is a very dangerous activity and that motorbikers are taking very big risks.	N	N	Y	Dangerous Risk takers
A little crazy, but it is a practical way of travelling, and I have thought about getting one.	N	N	Y	Fun Practical
They risk	N	N	Y	Risky
Some good riders some bad riders - ride too fast and appear out of no where then have a tendency to blame the motorist (I accept that sometimes this is true). Been on the back of a byke in the past now would be too scared. I think not wearing the appropriate kit is foolish especially when carrying children also not sufficiently dressed. Overall I think it's dangerous and some young men are their own worst enemies in this regard.	N	N	Y	Not seen by others Dangerous
Mostly careful and safe but a few risk their lives and others every time they ride.	N	N	Y	Risk takers
take more risks, have more accidents	N	N	Y	Risk takers Dangerous

People who like the thrill of adrenalin. Risk takers. Confident. Good drivers but prepared to take chances as more chance of injury on a motorbike than in a car	N	N	Y	Risk takers Highly skilled Vulnerable
I think bikers are often highly skilled drivers and they need to know all aspects of the road and their bike to ride safely, which so many of the achieve. Unfortunately some bikers appear to speed and to take risks that are hard to witnessas the fly pass at extraordinary speeds. I would not allow my daughter to have a motorbike when she is older as I truly feel bikes can be very dangerous. There are many categories of bikers and different types of interests from racing biles to specialist interest clubs to career bikers such as couriers etc.	N	N	Y	Highly skilled Risk taking Law breakers Dangerous
Although there is something quite cool and sexy about a guy who rides a motorbike, this is overridden by the fact that I am terrified by the thought of it and consider it to be reckless and stupid. A lot of them drive like maniacs, but then a lot of them don't... To conclude, I'm not into it, I wouldn't be happy about a friend or boyfriend or family member being one.	N	N	Y	Cool Dangerous Risk takers
Nothing in particular, same as any other population. Some are sensible riders others are complete idiots who clearly have suicidal tendencies. Then there are the saddo middle aged crisis bikers......	N	N	Y	Risk takers
Your question is too general for me to answer	N	N	Y	
I like bikers (as far as I have met them). They have to be admired for braving the elements and dangerous roads. Bikers appear to be very sociable.	N	N	Y	Brave Dangerous Camaraderie

My general perception of bikers: They ride in an unsafe manner. On motorways they often overtake me when I an driving at the speed limit. Many car drivers might also wish to do so, but they cannot because cars require a whole lane to overtake. On single carriageway roads they drive round blind corners much faster than would be safe for a car, possibly feeling that, if they meet something round the corner, such as a cyclist, a stopped car, or a sheep, they can swerve to avoid it because they do not require a full lane width, apparently not considering the possibility that the full lane or the full carriageway might be blocked. In general motor cyclists enjoy making as much noise as possible. While 3 or 4 people travelling together in a car are not perceived as a threat, 3 or 4 bikers travelling together on 3 or 4 bikes are perceived as a hostile gang. I assume all bikers are male, and am sometimes surprised when they take off their helmet. Having said this, I have known some perfectly normal people who possessed a motor bike, usually a low powered model such as a Lambretta, which they used because they could not afford a car. And I have occasionally been surprised to see a biker in my rear-view mirror who remained there until it was safe to overtake me, or indeed did not overtake me at all!	N	N	Y	Dangerous Noise Threatening
Put enjoyment over personal risk, also inconsiderate of impact of their serious injury or death on family members. Usually associate it with men going through a middle-age crisis (like my husband!)	N	N	Y	Risk takers Not considerate Dangerous
I have absolutely no problem with them as long as they are responsible for themselves and others, and do not think they are invincible (as many young men think they are!). I know many, although they are grown men, they are very responsible and not reckless like many young men can be.	N	N	Y	
Generally a danger to themselves and, more importantly, other road users. If I had the choice, the use of TWMVs of greater than 50cc on public roads would be banned. Mopeds rule, OK?	N	Y	N	Dangerous Restrictions
Nothiing much, except that they take up less space than cars, which is a good thing.	N	Y	N	Through traffic

That's a pretty loaded question. I used to drive a little moped in the 70s but saw so many people coming into hospital (I am a nurse) with severe head injuries that I decided a car was a much safer form of transport. As a car driver motor bikes in general worry me - usually becuase of some 'bikers' habit of driving above the speed limit and weaving in between lanes - undertaking and the like. I am however a bicylist so I am aware that you real;ly need to keep looking for bikes (motorised or otherwise) but the speed that some 'bikers' go, makes this laudable attempt very difficult at times.	N	Y	N	Dangerous Law breakers Risk takers
I think they are people who ride bikes	N	Y	N	
Stereotypically or actually? Don't have any strong thoughts one way or another. Think perhaps it's a hobby as much as a means of transport. Think it an unsafe form of transport - cyclist appears very vulnerable at high speed	N	Y	N	Fun Dangerous
I don't like the really fast ones - I think they are a danger to themselves and others who use the road. I wouldn't let anyone I care about ride a racer. But I think that choppers are great, provided you remeber about safety.	N	Y	N	Dangerous
Don't have a problem with them.	N	Y	N	
Fine, as long as they're not (a) the kamikaze sort who weave around on my tail, overtake on bends etc or (B) the type who putters along at 20 mph on an underpowered moped in the middle of the road (so I can't overtake safely).	N	Y	N	
Different , risk takers , like the feeling of riding bikes, cheaper than driving a car,	N	Y	N	Fun Risk takers Practicality
Have ridden (been carried) as a passenger, have not driven a motorbike. My father had a motorbike for driving around Edinburgh, it was easy to park and very useful. This seems to be an excellent use of motorbikes. Bikers who drive at fast speeds on rural roads seem, at times, to have little regard to their own person safety, but I don't feel that they generally pose a particular threat to other road users and don't have strong feelings either way about such bikers.	N	Y	Y	Practicality Risk takers Dangerous
I think they are generally competent on the roads and observant of the behaviour of other drivers.	N	Y	Y	High skill

They are practical people, that want make the most of their day, whereas others lose their time commuting. The cost for this practicality is the risk they take while on the road. The benefit is the feeling of driving a bike	N	Y	Y	Fun Practical Dangerous
They are nice/cool bunch of people, they like to take risks (at least i think so since i don't think that bikes are safe), they do like speeding and they really like it, they are usually not into cars and they like the rush of andrenaline and the freedom they feel while riding their bikes.	N	Y	Y	Camaraderie Dangerous Risk takers
Some good and some idiots	N	Y	Y	
they ride bikers. take more risks in their choice of transport mode than the rest of us. not much else to say	N	Y	Y	Risk takers
This is the worst so-called survey I have ever seen!!!! For a PhD??? No wonder I have never heard of Napier University...	N	Y	Y	
Those with the less powerful machines (ie < 100cc) tend to be more careful and observant of the Rules of the Road than those with the more powerful machines (> 100cc). Couriers, however, seem to take unnecessary risks regardless of the type of bike they ride.	N	Y	Y	Law breakers
Risk takers. Trying to live within their budgets or alternatively "walk" on the wild side! Take too many changes weaving in and out of traffic and placing both themselves and others at risk. Many also ride too fast and scare the bejesus out of the rest of us!	N	Y	Y	Risk takers Weaving No consideration
I used to feel very strongly that it was a dangerous mode of transport for the motorcyclist. Am coming more around to the idea of a moped due to the awful raffic in Dublin. Don't have a strong anti-motorcyclist attitude, although some take risks like overtaking on the inside, which really annoys me. Watching the programme, Orange County Bikers, has changed my attitude a good bit: I understand their passion for the bikes a bit better!	N	Y	Y	Dangerous Practicality Weaving Passionate
They are just people nothing more nothing less	N	Y	Y	
My dad has a motorbike and I worry when he goes out on it even though I have been on it with him on a number of occassions and I know that he is a safe driver. I think that they are a time-effective way of travelling however, I would rather walk or cycle myself as the high speeds they can get up to can be dangerous. Thanks	N	Y	Y	Practical Dangerous

No problems with most of them, though of course there's a noisy/inconsiderate minority. A particular problem is the (very small) minority who abuse bicycle lanes	Y	N	N	Noise
No particular attitude towards them. Obviously a very convenient way to get through traffic but a dangerous mode of transport also.	Y	N	N	Practical Dangerous
Mechanically more knowledge than car drivers, generally more clubbable and sociable...and they tend to die younger.	Y	Y	N	Camaraderie Dangerous
I rode a bike years ago and thought they were great fun. However, when I bought a house 20 years ago I needed to sell the bike to pay for repairs and alterations. I never got back into biking, though so I don't identify with them in any way. So my feelings are ambilivent.	Y	Y	N	Fun
More often than not, very genuine folk. Some act recklessly but on the whole the biking community is well aware of the dangers of its activity and therefore tends to stick together.	Y	Y	Y	Dangerous Camaraderie
Bikers are really tension free rider. They are fast and trying to overtake if gets some narrow gap ahead of them. There driving are some times really dangerous because they do play with bike riding. They love and enjoy the riding without caring them self that turns into accident and casualty.	Y	Y	Y	Dangerous Fun No consideration
Well, hard to generalise. There are those who use bikes for commuting or for touring. Those are usually the more sensible riders. And then you get those racers that do it for the adrenalin. In my opinion they ruin the image of motorbike riders.	Y	Y	Y	Practical
I think not enough attention is paid to bikers on public roads! Cars are not aware enough of bikes of all kinds and this means that motorcycle riders have to be a hundred times more attentive to road conditions and traffic. Motorcycle awareness should be part of any driving license for a car!	Y	Y	Y	Not easily seen
A bit crazy sometimes, but mostly careful road users	Y	Y	Y	Good skill
I think they are fine if they are sensible - like any driver. I just drive a vespa (not sure if that counts as a motorcycle)	Y	Y	Y	Sensible
They're fine. Some are a little fast and others take too many chances but I guess that's the same with car drivers.	Y	Y	Y	Sensible

i don't think anything about bikers, I don't see them as a distinct category of people. People use motorbikes for lots of reasons, in our case, because we live in a busy city and it's the most efficient way to travel!	Y	Y	Y	Practical
I think the term 'biker' in itself draws negative associations to those who choose to ride motorcycles. Should respondents consider scooters/mopeds as well as motorcycles when answering these questions? Just as with any other modes of transport, there are good and bad 'bikers': There are those who see it as an efficient means of getting about and therefore observe the rules of the road like every other road user; and there those who think it makes them a 'Valentino Rossi' on the public highway. The majority of bikers I observe take care and pay due attention, but those who don't stand out, not just to me but to all road users. It is they who help to turn public attitude against bikers. That said, however, the standard of biking and biker awareness in Ireland is still very poor and while most riders pay attention to what's ahead of them, few give adequate consideration to what's happening elsewhere. Motorcycles are inherently dangerous – that's a fact and the statistics repeatedly bare it out. However, my personal interpretation is that you are NO MORE likely to have an accident on a motor bike than in a car if you pay 140% of the attention you would pay if driving a car in the same conditions.	Y	Y	Y	Practical High skill No consideration Dangerous
When I was younger I was in a motor bike club. We visited all over Ireland. Some of my friends were killed due to accidents. As a parent now, I discourage my family from using motor bikes. There is no protection from the elements or from other traffic users. Motorists do not 'see' motor bikes unless the headlights are on. Some bikers do not follow the rules of the road they speed in and around the traffic causing motorists to react inappropriately.	Y	Y	Y	Not easily seen Law breakers

Tend to be a very friendly community. Interestingly, the friendly 'nods' that pass between bikers on the road do not tend to extend to 'l-plated' riders! (or scooters!!) At an event (e.g. Paignton night/festivals) I had a very positive experience when I had trouble with my bike some total strangers following me (on bikes) stopped to check if I was ok, and to give me a hand. Despite the general perception of bikers being all about speed, on a charity ride-out of over 200 motorbikes, there was a complaint going round about the one or two bikers who were pushing through and not adhering to the overriding spirit of the ride which was safe, laid-back riding. Over all very friendly, safety-conscious people, with the exception of one or two [idiots] who ride without protective kit.	Y	Y	Y	Camaraderie Sensible

Appendix M – Risk Index of Bikes

Manufacturer	Model	cc	BHP	Spd	MPG	Kg	Ins	Pwr/ Wgt	Pi
Aprilia	1000 Tuono	998	116	170	30	185	15	0.63	**106.59**
Aprilia	AF1	125	12	75	50	147	6	0.08	**6.12**
Aprilia	Caponord	998	100	120	35	215	14	0.47	**55.81**
Aprilia	Europa	125	12	75	55	114	6	0.11	**7.89**
Aprilia	Falco SL1000	998	115	160	35	186	15	0.62	**98.92**
Aprilia	Futura AF1	125	12	75	50	140	6	0.09	**6.43**
Aprilia	Futura RST1000	998	115	160	35	209	15	0.55	**88.04**
Aprilia	Moto	649	45	100	50	150	10	0.30	**30.00**
Aprilia	Pegaso	650	55	110	45	160	9	0.34	**37.81**
Aprilia	Red Rose	125	12	70	55	120	6	0.10	**7.00**
Aprilia	RS125R	125	12	75	50	140	7	0.09	**6.43**
Aprilia	RS250	249	65	125	35	140	12	0.46	**58.04**
Aprilia	RSV Mille	998	115	165	35	189	15	0.61	**100.40**
Aprilia	RSV Mille Factory	998	116	170	30	185	17	0.63	**106.59**
Aprilia	RSV Mille R	998	115	165	30	185	15	0.62	**102.57**
Aprilia	Tuareg	562	50	100	40	148	9	0.34	**33.78**
Aprilia	Tuono	125	12	74	50	140	6	0.09	**6.34**
Benelli	Tormado TRE 900	898	140	160	0	185	15	0.76	**121.08**
Bimota	Db3 Mantra	863	68	130	0	165	16	0.41	**53.58**
Bimota	Sb8r	996	135	160	32	178	17	0.76	**121.35**
Bimota	Yb11	1002	145	165	38	183	17	0.79	**130.74**
BMW	F650	652	48	105	55	172	8	0.28	**29.30**
BMW	F650 CS	652	50	105	50	172	9	0.29	**30.52**
BMW	F650 GS	652	50	105	50	172	8	0.29	**30.52**
BMW	K1	987	100	140	45	234	14	0.43	**59.83**
BMW	K100/RS/RT/LT	987	90	130	45	227	13	0.40	**51.54**
BMW	K1100 RS/LT	1092	100	130	40	268	14	0.37	**48.51**
BMW	K1200GT	1171	130	125	0	300	15	0.43	**54.17**
BMW	K1200LT	1171	98	125	0	378	14	0.26	**32.41**
BMW	K1200RS	1171	130	130	48	285	15	0.46	**59.30**
BMW	K75	740	75	120	55	227	11	0.33	**39.65**
BMW	R1100GS	1085	79	115	50	253	13	0.31	**35.91**
BMW	R1100R	1085	85	120	45	226	12	0.38	**45.13**
BMW	R1100RS	1085	90	134	50	239	12	0.38	**50.46**
BMW	R1100RT	1085	90	122	45	282	13	0.32	**38.94**
BMW	R1100S	1085	98	140	40	229	13	0.43	**59.91**
BMW	R1150GS	1130	85	118	50	253	13	0.34	**39.64**
BMW	R1150RS	1130	94	138	45	239	13	0.39	**54.28**

BMW	R1150RT	1130	95	122	45	282	13	0.34	**41.10**
BMW	R1200C	1170	61	110	45	218	13	0.28	**30.78**
BMW	R45	449	35	95	70	182	7	0.19	**18.27**
BMW	R65	649	50	110	50	182	8	0.27	**30.22**
BMW	R80/100GS	797	50	105	40	218	10	0.23	**24.08**
BMW	R80/100R	980	60	113	0	218	10	0.28	**31.10**
BMW	R80/100RT	980	60	115	40	229	9	0.26	**30.13**
BMW	R850	850	75	120	45	236	11	0.32	**38.14**
BSA	Goldstar	499	34	102	60	145	7	0.23	**23.92**
Buell	Lightning	1200	85	140	38	193	15	0.44	**61.66**
Buell	M2 Cyclone	1200	85	125	38	197	15	0.43	**53.93**
Buell	Thunderbolt	1200	95	140	38	193	15	0.49	**68.91**
Buell	XB-12R	1203	103	140	45	179	15	0.58	**80.56**
Buell	XB-9R	984	92	135	40	175	15	0.53	**70.97**
Cagiva	125 Mito	125	32	70	60	125	7	0.26	**17.92**
Cagiva	125 super city	125	12	70	70	125	7	0.10	**6.72**
Cagiva	650 Raptor	645	73	125	45	176	11	0.41	**51.85**
Cagiva	750 Elefant	750	60	100	50	188	11	0.32	**31.91**
Cagiva	900 Elefant	900	70	115	50	185	11	0.38	**43.51**
Cagiva	Blues	125	12	70	70	120	5	0.10	**7.00**
Cagiva	Canyon 500	498	33	100	40	150	9	0.22	**22.00**
Cagiva	Canyon 600	601	33	100	40	150	9	0.22	**22.00**
Cagiva	Gran Canyon	904	70	115	40	218	12	0.32	**36.93**
Cagiva	Navigator	996	97	135	48	210	13	0.46	**62.36**
Cagiva	Planet	125	12	70	60	125	6	0.10	**6.72**
Cagiva	Raptor	996	112	145	35	197	14	0.57	**82.44**
Cagiva	River	498	33	95	40	160	8	0.21	**19.59**
Cagiva	Roadster	125	12	70	70	120	4	0.10	**7.00**
CCM	604RS Roadster	598	53	100	50	138	11	0.38	**38.41**
CCM	Dual Sport Supermoto	644	52	110	45	137	11	0.38	**41.75**
CCM	R30	644	52	110	45	137	11	0.38	**41.75**
Ducati	748	748	98	150	35	196	16	0.50	**75.00**
Ducati	749	748	103	150	35	199	15	0.52	**77.64**
Ducati	620 Sport	618	61	120	40	184	11	0.33	**39.78**
Ducati	750 GT	748	55	110	45	185	8	0.30	**32.70**
Ducati	851 SP2	888	105	150	35	188	16	0.56	**83.78**
Ducati	900SS	864	68	125	40	205	11	0.33	**41.46**
Ducati	916	916	101	160	0	187	17	0.54	**86.42**
Ducati	996	996	113	165	0	195	17	0.58	**95.62**
Ducati	998	998	121	165	0	195	17	0.62	**102.38**

Ducati	999	998	120	165	35	199	17	0.60	**99.50**
Ducati	Monsters 600	583	55	105	50	175	10	0.31	**33.00**
Ducati	Monsters 620	618	60	115	40	176	11	0.34	**39.20**
Ducati	Monsters 750	748	62	115	40	178	12	0.35	**40.06**
Ducati	Monsters 800	803	73	120	40	178	13	0.41	**49.21**
Ducati	Monsters 900	904	75	120	40	183	13	0.41	**49.18**
Ducati	Multistrada 1000DS	992	84	120		205	15	0.41	**49.17**
Ducati	Paso 750	748	80	135	40	197	12	0.41	**54.82**
Ducati	Paso 906	904	87	145	40	197	13	0.44	**64.04**
Ducati	Paso 907ie	904	87	145	40	197	13	0.44	**64.04**
Ducati	S	748	103	150	35	199	15	0.52	**77.64**
Ducati	S4	916	101	144	45	193	14	0.52	**75.36**
Ducati	S4R	996	113	150	40	192	14	0.59	**88.28**
Ducati	SP	748	104	150	35	196	16	0.53	**79.59**
Ducati	Sport	748	55	110	45	185	8	0.30	**32.70**
Ducati	SS800	803	74	125	40	184	14	0.40	**50.27**
Ducati	ST2	944	84	135	45	209	14	0.40	**54.26**
Ducati	ST4	916	105	155	45	215	15	0.49	**75.70**
Ducati	Superlight	904	73	135	45	176	15	0.41	**55.99**
Gilera	125 Cougar	124	15	65	0	123	5	0.12	**7.93**
Gilera	125 DNA	124	15	72	0	125	5	0.12	**8.64**
Gilera	180 DNA	182	20	-1	0	125	6	0.16	**-0.16**
Gilera	50 DNA	49	-1	-1	0	101	2	-0.01	**0.01**
Harley Davidson	1130 V-Rod	1130	115	134	48	270	17	0.43	**57.07**
Harley Davidson	Dressed Glides 1340	1340	69	105	47	360	15	0.19	**20.13**
Harley Davidson	Dressed Glides 1450	1450	69	115	47	360	15	0.19	**22.04**
Harley Davidson	Glides 1340	1340	69	110	50	300	15	0.23	**25.30**
Harley Davidson	Glides 1450	1450	69	120	50	300	15	0.23	**27.60**
Harley Davidson	Sportster 1200	1200	64	115	0	230	13	0.28	**32.00**
Harley Davidson	Springer Softtail	1450	69	105	50	320	15	0.22	**22.64**
Harley Davidson	XLH Sportster 883	883	55	105	0	230	11	0.24	**25.11**
Hartford	HD125L Legion	124	11	65	70	110	3	0.10	**6.50**
Hartford	VR125	124	13	68	65	124	4	0.10	**7.13**
Hesketh	V1000	992	86	125	45	250	15	0.34	**43.00**
Honda	650 Transalp	647	55	108	50	191	11	0.29	**31.10**

Honda	CB1000	998	95	145	40	239	12	0.40	**57.64**
Honda	CB1100SF X11	1137	135	160	38	223	15	0.61	**96.86**
Honda	CB125T	124	16	70	90	125	4	0.13	**8.96**
Honda	CB250	249	19	75	70	132	6	0.14	**10.80**
Honda	CB250N	249	28	90	50	172	5	0.16	**14.65**
Honda	CB250RS	248	26	90	60	136	6	0.19	**17.21**
Honda	CB350	346	34	100	50	172	6	0.20	**19.77**
Honda	CB400F	408	37	105	60	170	6	0.22	**22.85**
Honda	CB400N	395	43	100	50	175	6	0.25	**24.57**
Honda	CB450DX	450	43	105	55	182	7	0.24	**24.81**
Honda	CB500	498	44	110	60	159	8	0.28	**30.44**
Honda	CB500/S	499	57	115	55	170	9	0.34	**38.56**
Honda	CB500SS	499	70	130	40	150	10	0.47	**60.67**
Honda	CB600 Hornet	598	95	130	45	164	13	0.58	**75.30**
Honda	CB600F	598	95	130	45	164	12	0.58	**75.30**
Honda	CB600FS	598	95	130	45	164	12	0.58	**75.30**
Honda	CB750F	736	67	120	50	223	9	0.30	**36.05**
Honda	CB750F1	736	73	125	45	223	11	0.33	**40.92**
Honda	CB750F2	736	73	125	45	223	11	0.33	**40.92**
Honda	CB750F2 SevenFifty	747	75	118	45	216	11	0.35	**40.97**
Honda	CB750KZ	749	77	130	45	245	11	0.31	**40.86**
Honda	CB900 Hornet	918	108	150	40	194	13	0.56	**83.51**
Honda	CB900F	902	95	135	35	250	11	0.38	**51.30**
Honda	CBR1000F	998	135	160	40	255	14	0.53	**84.71**
Honda	CBR1100XX Super Blackbird	1137	164	185	40	218	16	0.75	**139.17**
Honda	CBR600	598	80	140	50	170	14	0.47	**65.88**
Honda	CBR600F	598	95	150	45	169	15	0.56	**84.32**
Honda	CBR600FS	598	110	150	45	169	15	0.65	**97.63**
Honda	CBR600RR	599	115	160	45	169	15	0.68	**108.88**
Honda	CBX1000	1047	105	135	35	254	13	0.41	**55.81**
Honda	CBX550	572	62	120	50	182	9	0.34	**40.88**
Honda	CBX750	747	90	130	45	218	10	0.41	**53.67**
Honda	CD250	249	20	80	70	159	5	0.13	**10.06**
Honda	CLR125 City Fly	124	11	70	45	129	4	0.09	**5.97**
Honda	CM125	124	12	70	80	148	4	0.08	**5.68**
Honda	CMX250 Rebel	234	18	100	50	136	5	0.13	**13.24**
Honda	CX500	499	50	110	50	200	8	0.25	**27.50**
Honda	CX650E	673	64	115	45	214	9	0.30	**34.39**
Honda	Deauville	647	55	110	55	182	9	0.30	**33.24**
Honda	F6C	1520	89	105	45	309	14	0.29	**30.24**

Honda	GG125	124	11	65	125	102	3	0.11	**7.01**
Honda	MTX125R	125	12	70	65	114	5	0.11	**7.37**
Honda	NS125	125	12	75	70	130	5	0.09	**6.92**
Honda	NSR125R/F	125	12	75	55	123	7	0.10	**7.32**
Honda	NSR125RR	125	12	75	55	123	7	0.10	**7.32**
Honda	NTV	583	55	110	55	182	9	0.30	**33.24**
Honda	NX650 Dominator	644	45	110	50	155	11	0.29	**31.94**
Honda	Rebel 125	124	11	70	50	130	4	0.08	**5.92**
Honda	SLR650	644	40	95	50	155	8	0.26	**24.52**
Honda	ST1100 Pan European	1100	100	125	40	273	13	0.37	**45.79**
Honda	ST1300 Pan European	1300	100	125	40	273	14	0.37	**45.79**
Honda	Varadero	996	95	130	35	220	13	0.43	**56.14**
Honda	VF100C Magna (V65)	1098	130	140	35	243	12	0.53	**74.90**
Honda	VF400/F	399	53	115	50	182	9	0.29	**33.49**
Honda	VF400R	399	60	135	50	172	12	0.35	**47.09**
Honda	VF500	498	73	135	45	186	10	0.39	**52.98**
Honda	VF750C Shadow	748	75	120	45	227	11	0.33	**39.65**
Honda	VFR750	748	105	150	45	205	14	0.51	**76.83**
Honda	VFR800Fi	781	108	160	45	208	14	0.52	**83.08**
Honda	Vigor	644	40	95	50	155	8	0.26	**24.52**
Honda	VT1100	1099	60	100	50	259	12	0.23	**23.17**
Honda	VT125 Shadow	125	15	75	45	145	4	0.10	**7.76**
Honda	VT500	490	52	110	45	182	8	0.29	**31.43**
Honda	VT600 Shadow	583	40	100	50	212	8	0.19	**18.87**
Honda	VT750C Shadow	745	44	90	45	227	10	0.19	**17.44**
Honda	VTR1000 Firestorm	996	110	150	40	193	14	0.57	**85.49**
Honda	XBR500	498	44	110	55	159	7	0.28	**30.44**
Honda	XL125 Varadero	125	15	70	45	150	6	0.10	**7.00**
Honda	XL250	249	25	90	70	139	6	0.18	**16.19**
Honda	XL600	583	50	103	50	196	10	0.26	**26.28**
Honda	XLR125	124	10	70	45	119	5	0.08	**5.88**
Honda	XRV750 Africa Twin	750	60	120	45	205	12	0.29	**35.12**
Honda	GL 1500 Goldwing	1520	100	120	49	362	14	0.28	**33.15**
Honda	GL 1800 Goldwing	1832	119	117	51	363	15	0.33	**38.36**
Hyosung	125 Cruise II	124	14	65	60	131	3	0.11	**6.95**
Kawaski	1100 Zephyr	1098	90	140	35	245	12	0.37	**51.43**
Kawaski	600 Eliminator	592	61	120	50	200	9	0.31	**36.60**
Kawaski	750 Zephyr	738	72	120	45	220	11	0.33	**39.27**
Kawaski	AR125	123	12	70	70	86	4	0.14	**9.77**

Kawaski	EL125	124	12	70	55	135	4	0.09	**6.22**
Kawaski	EL250	248	27	80	55	145	7	0.19	**14.90**
Kawaski	EN450	443	50	100	50	186	7	0.27	**26.88**
Kawaski	EN500	499	50	100	50	186	7	0.27	**26.88**
Kawaski	ER-5	499	50	120	45	174	8	0.29	**34.48**
Kawaski	GPX250	250	40	100	55	159	8	0.25	**25.16**
Kawaski	GPX600	592	85	140	45	180	11	0.47	**66.11**
Kawaski	GPX750	750	90	150	40	195	12	0.46	**69.23**
Kawaski	GPZ1000RX	997	120	155	30	240	13	0.50	**77.50**
Kawaski	GPZ1100	1098	120	140	45	241	13	0.50	**69.71**
Kawaski	GPZ1100S	1052	150	160	35	245	14	0.61	**97.96**
Kawaski	GPZ500S	499	60	125	55	170	8	0.35	**44.12**
Kawaski	GPZ550	553	58	120	60	216	8	0.27	**32.22**
Kawaski	GPZ600	592	70	130	50	200	11	0.35	**45.50**
Kawaski	GPZ750	736	86	130	40	214	11	0.40	**52.24**
Kawaski	GPZ750R	738	85	140	40	224	11	0.38	**53.13**
Kawaski	GPZ900R	903	115	150	45	227	13	0.51	**75.99**
Kawaski	GT550	553	56	115	50	205	8	0.27	**31.41**
Kawaski	GT750	736	74	125	48	227	9	0.33	**40.75**
Kawaski	GTR1000	997	100	140	45	307	12	0.33	**45.60**
Kawaski	KE100	99	12	65	70	86	3	0.14	**9.07**
Kawaski	KLE500	498	50	110	45	182	9	0.27	**30.22**
Kawaski	KLR250	250	28	80	65	136	7	0.21	**16.47**
Kawaski	KLR600	600	50	100	43	168	9	0.30	**29.76**
Kawaski	KLR650	650	50	100	43	168	9	0.30	**29.76**
Kawaski	KLX650	650	40	105	40	159	9	0.25	**26.42**
Kawaski	KMX125	124	12	70	50	100	5	0.12	**8.40**
Kawaski	KMX200	193	30	90	50	102	8	0.29	**26.47**
Kawaski	VN1500	1470	70	110	50	302	12	0.23	**25.50**
Kawaski	Z1	903	83	130	50	260	10	0.32	**41.50**
Kawaski	Z1000	998	78	130	50	254	10	0.31	**39.92**
Kawaski	Z1000 (2003)	953	125	140	0	198	15	0.63	**88.38**
Kawaski	Z1100	1098	90	130	45	245	10	0.37	**47.76**
Kawaski	Z1100R	1089	90	140	40	238	15	0.38	**52.94**
Kawaski	Z1R	998	90	140	40	238	15	0.38	**52.94**
Kawaski	Z250	248	30	100	65	159	5	0.19	**18.87**
Kawaski	Z500	499	50	110	50	178	7	0.28	**30.90**
Kawaski	Z550	553	56	115	50	182	7	0.31	**35.38**
Kawaski	Z650	652	64	120	45	218	7	0.29	**35.23**
Kawaski	Z900	903	83	130	50	260	10	0.32	**41.50**
Kawaski	ZR550 Zephyr	553	50	110	48	182	8	0.27	**30.22**

Kawaski	ZR-7	738	76	125	45	202	11	0.38	**47.03**
Kawaski	ZRX1100	1052	95	150	38	227	13	0.42	**62.78**
Kawaski	ZRX-12R/S	1164	120	160	35	227	13	0.53	**84.58**
Kawaski	ZRX400	399	53	125	50	186	12	0.28	**35.62**
Kawaski	ZX-10	997	125	165	40	261	14	0.48	**79.02**
Kawaski	ZX12R Ninja	1199	170	170	35	209	17	0.81	**138.28**
Kawaski	ZX-6R	599	100	150	45	170	13	0.59	**88.24**
Kawaski	ZX-7R Ninja	748	120	155	35	203	16	0.59	**91.63**
Kawaski	ZX-9R	899	140	170	40	218	16	0.64	**109.17**
Kawaski	ZXR400	398	62	135	50	162	13	0.38	**51.67**
Kawaski	ZXR750	748	120	160	35	190	14	0.63	**101.05**
Kawaski	ZZ-R1100	1052	147	170	40	231	16	0.64	**108.18**
Kawaski	ZZ-R1200	1164	158	185	40	236	16	0.67	**123.86**
Kawaski	ZZ-R600	599	100	150	50	198	13	0.51	**75.76**
KTM	625 SXC	625	52	100	45	132	11	0.39	**39.39**
KTM	640 Duke	625	55	105	50	149	11	0.37	**38.76**
KTM	640 LC4 Adventurer	625	50	105	45	158	1	0.32	**33.23**
KTM	640 LC4 Supermoto	625	50	105	45	149	11	0.34	**35.23**
KTM	KTM 660 SMC	654	60	110	0	131	11	0.46	**50.38**
KTM	KTM 950 Adventurer	942	98	125	0	198	13	0.49	**61.87**
Laverda	1000	981	80	130	45	0	13	#DIV/0!	**#DIV/0!**
Laverda	650S	650	70	130	35	182	13	0.38	**50.00**
Laverda	750S	750	52	110	45	218	13	0.24	**26.24**
Morini	350 Dart	344	29	105	50	171	9	0.17	**17.81**
Morini	350 Sport	344	39	95	65	159	7	0.25	**23.30**
Morini	350 Strada	344	37	90	65	159	7	0.23	**20.94**
Morini	500	479	46	105	60	159	7	0.29	**30.38**
Morini	Camel	497	39	90	60	141	8	0.28	**24.89**
Morini	Kanguro	344	34	90	52	0	7	#DIV/0!	**#DIV/0!**
Moto Guzzi	1000S	948	82	143	0	215	11	0.38	**54.54**
Moto Guzzi	1100 Sport	1064	90	135	0	221	13	0.41	**54.98**
Moto Guzzi	Breva	1064	83	120	48	233	10	0.36	**42.75**
Moto Guzzi	California	1064	72	112	45	205	11	0.35	**39.34**
Moto Guzzi	California 1100	1064	75	124	45	205	11	0.37	**45.37**
Moto Guzzi	Daytona	992	95	155	0	205	15	0.46	**71.83**
Moto Guzzi	Le Mans	844	71	120	45	0	10	#DIV/0!	**#DIV/0!**
Moto Guzzi	Le Mans 1000	948	81	130	0	227	11	0.36	**46.39**
Moto Guzzi	Mille GT	948	65	125	0	215	10	0.30	**37.79**
Moto Guzzi	Quota	948	70	125	0	210	10	0.33	**41.67**

Moto Guzzi	Spada	948	64	115	0	0	10	#DIV/0!	**#DIV/0!**
Moto Guzzi	Strada 1000	948	65	125	0	215	10	0.30	**37.79**
Moto Guzzi	T	844	0	0	0	0	10	#DIV/0!	**#DIV/0!**
Moto Guzzi	V10 Centauro	992	92	135	0	0	14	#DIV/0!	**#DIV/0!**
Moto Guzzi	V11	1064	90	140	0	221	13	0.41	**57.01**
Moto Guzzi	V50	490	45	102	60	152	7	0.30	**30.20**
Moto Guzzi	V65	643	52	110	52	159	9	0.33	**35.97**
Moto Guzzi	V65 Lario	643	60	120	50	173	9	0.35	**41.62**
Moto Guzzi	V75	744	65	120	50	182	10	0.36	**42.86**
Moto Guzzi	V750	744	50	120	50	182	10	0.27	**32.97**
MV Agusta	F4	749	134	170	0	190	20	0.71	**119.89**
MZ	125	123	10	60	70	109	3	0.09	**5.50**
MZ	250	243	20	85	60	136	4	0.15	**12.50**
MZ	251	243	21	80	65	127	4	0.17	**13.23**
MZ	301	291	25	90	50	136	4	0.18	**16.54**
MZ	500	494	34	90	50	159	7	0.21	**19.25**
MZ	660 Skorpion	660	50	110	50	173	9	0.29	**31.79**
MZ	Baghira	660	50	110	50	173	9	0.29	**31.79**
MZ	Mastiff	660	50	110	50	173	9	0.29	**31.79**
Norton	Rotaries	588	95	140	45	235	12	0.40	**56.60**
Royal Enfield	500 Clubmans	499	22	75	0	166	7	0.13	**9.94**
Royal Enfield	Bullet 350	346	18	70	60	164	5	0.11	**7.68**
Royal Enfield	Bullet 350 Trials	346	16	65	0	141	5	0.11	**7.38**
Royal Enfield	Bullet 500	499	22	70	60	164	6	0.13	**9.39**
Royal Enfield	Bullet 500 Trials	499	22	75	0	165	6	0.13	**10.00**
Suzuki	DR125 Raider	124	12	70	100	105	4	0.11	**8.00**
Suzuki	DR125 SE	124	12	70	100	105	4	0.11	**8.00**
Suzuki	DR350	349	30	90	60	109	8	0.28	**24.77**
Suzuki	DR650	640	45	100	45	145	9	0.31	**31.03**
Suzuki	DR800	780	52	100	45	145	12	0.36	**35.86**
Suzuki	GFF600 Bandit	599	79	126	50	208	10	0.38	**47.86**
Suzuki	GN125	124	12	70	90	104	3	0.12	**8.08**
Suzuki	GN250	249	20	80	70	134	5	0.15	**11.94**
Suzuki	GS1000	997	90	135	45	236	10	0.38	**51.48**
Suzuki	GS125	124	12	70	100	102	4	0.12	**8.24**
Suzuki	GS450E	448	40	105	50	173	7	0.23	**24.28**
Suzuki	GS500E	490	50	110	60	173	7	0.29	**31.79**
Suzuki	GSF1200 Bandit	1200	100	140	40	205	13	0.49	**68.29**
Suzuki	GSF1200S	1200	100	140	40	205	13	0.49	**68.29**

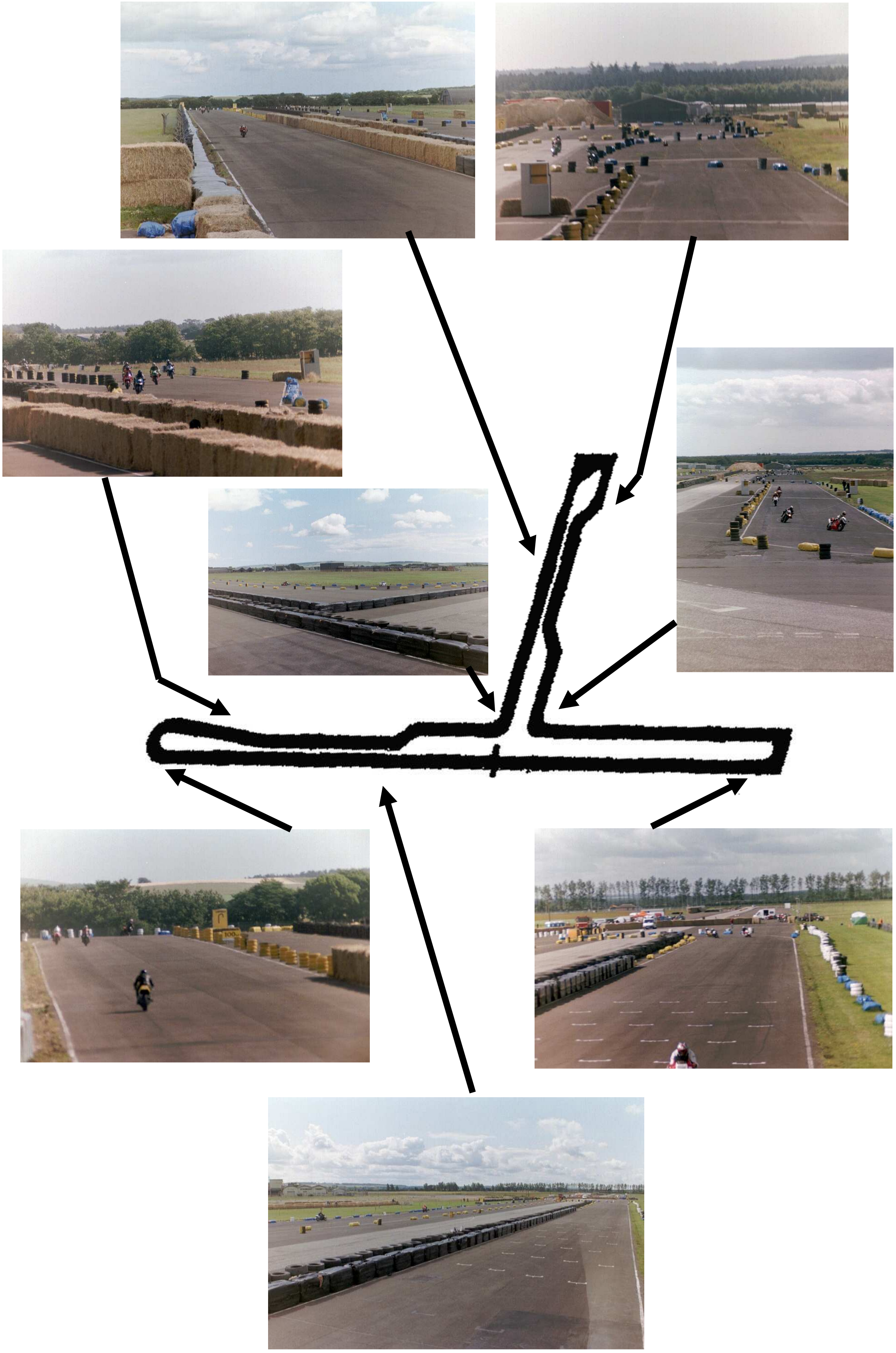
Suzuki	GSX1100	1100	100	135	40	243	12	0.41	**55.56**
Suzuki	GSX1100F	1074	120	150	45	250	13	0.48	**72.00**
Suzuki	GSX1100G	1074	125	140	35	255	15	0.49	**68.63**
Suzuki	GSX1300R Hayabusa	1299	170	190	40	205	16	0.83	**157.56**
Suzuki	GSX1400	1402	106	140	40	228	14	0.46	**65.09**
Suzuki	GSX400	398	42	105	60	184	7	0.23	**23.97**
Suzuki	GSX550	572	65	125	50	182	8	0.36	**44.64**
Suzuki	GSX600F	600	85	140	40	199	11	0.43	**59.80**
Suzuki	GSX750	747	84	130	45	209	12	0.40	**52.25**
Suzuki	GSX750 (post 98)	748	118	160	35	209	14	0.56	**90.33**
Suzuki	GSX750F	748	105	140	45	195	12	0.54	**75.38**
Suzuki	GSX-R1000	988	140	175	35	170	17	0.82	**144.12**
Suzuki	GSX-R1100	1074	130	160	45	214	16	0.61	**97.20**
Suzuki	GSX-R1100W	1074	150	170	40	232	16	0.65	**109.91**
Suzuki	GSX-R600	600	105	160	40	168	14	0.63	**100.00**
Suzuki	GSX-R750	749	100	150	35	182	16	0.55	**82.42**
Suzuki	GSX-R750 (post 96)	750	128	175	40	182	16	0.70	**123.08**
Suzuki	GSX-R750W	749	118	160	35	209	14	0.56	**90.33**
Suzuki	GT750	747	65	120	40	241	8	0.27	**32.37**
Suzuki	LS650 Savage	650	40	95	60	164	7	0.24	**23.17**
Suzuki	RF600	600	100	145	45	195	13	0.51	**74.36**
Suzuki	RF900R	900	125	165	35	209	14	0.60	**98.68**
Suzuki	RG125 Gamma	124	12	75	50	100	4	0.12	**9.00**
Suzuki	RG125 Wolf	124	12	80	60	114	5	0.11	**8.42**
Suzuki	RG125F Gamma	124	12	80	55	127	4	0.09	**7.56**
Suzuki	RG250	247	45	110	40	136	8	0.33	**36.40**
Suzuki	RG500	498	90	150	30	159	12	0.57	**84.91**
Suzuki	RGV250	249	60	135	35	136	11	0.44	**59.56**
Suzuki	SV1000	996	118	160	50	189	15	0.62	**99.89**
Suzuki	SV1000S	996	118	160	50	189	15	0.62	**99.89**
Suzuki	SV650	645	68	125	45	164	9	0.41	**51.83**
Suzuki	SV650S	645	68	125	45	164	10	0.41	**51.83**
Suzuki	TL1000R	996	125	160	38	177	16	0.71	**112.99**
Suzuki	TL1000S	996	125	160	38	177	15	0.71	**112.99**
Suzuki	TS125R	124	12	70	65	111	4	0.11	**7.57**
Suzuki	TS125X	123	12	75	70	118	4	0.10	**7.63**
Suzuki	TU250	249	20	80	70	134	6	0.15	**11.94**
Suzuki	VL1500 Intruder	1462	67	105	45	292	12	0.23	**24.09**
Suzuki	VS1400 Intruder	1360	71	115	50	243	12	0.29	**33.60**
Suzuki	VS600 Intruder	598	44	100	50	195	8	0.23	**22.56**
Suzuki	VS750	747	60	110	55	195	9	0.31	**33.85**

Suzuki	VS800	805	60	110	55	195	9	0.31	**33.85**
Suzuki	VS850GT	850	80	130	40	250	10	0.32	**41.60**
Suzuki	VZ800	805	60	110	55	195	9	0.31	**33.85**
Suzuki	XF650 Freewind	644	45	105	55	155	10	0.29	**30.48**
Triumph	1000 Daytona	998	110	150	35	236	15	0.47	**69.92**
Triumph	1200 Daytona	1180	140	160	35	236	15	0.59	**94.92**
Triumph	1200 Trophy	1180	107	155	40	236	14	0.45	**70.28**
Triumph	600 Daytona	599	110	160	45	165	15	0.67	**106.67**
Triumph	750 Daytona	749	96	135	40	212	13	0.45	**61.13**
Triumph	750 Trident	749	89	125	45	212	12	0.42	**52.48**
Triumph	900 Daytona (superIII)	885	100	145	40	218	15	0.46	**66.51**
Triumph	900 Speed Triple	885	100	145	40	213	14	0.47	**68.08**
Triumph	900 Sprint	885	100	140	40	220	13	0.45	**63.64**
Triumph	900 Tiger	885	85	130	45	209	13	0.41	**52.87**
Triumph	900 Trident	855	97	130	45	215	12	0.45	**58.65**
Triumph	900 Trophy	885	100	145	35	222	14	0.45	**65.32**
Triumph	955i	955	147	160	0	200	15	0.74	**117.60**
Triumph	Bonneville	790	60	110	40	204	7	0.29	**32.35**
Triumph	Speed Four	599	105	145	38	170	13	0.62	**89.56**
Triumph	Sprint RS	955	118	155	45	199	14	0.59	**91.91**
Triumph	Sprint Sport	885	98	140	50	215	12	0.46	**63.81**
Triumph	Sprint ST	955	118	155	45	207	14	0.57	**88.36**
Triumph	T509	885	105	145	0	189	14	0.56	**80.56**
Triumph	T595	955	128	160	0	200	15	0.64	**102.40**
Triumph	T955	955	120	150	0	189	14	0.63	**95.24**
Triumph	Thunderbird	885	70	115	40	220	11	0.32	**36.59**
Triumph	Thunderbird Sport	855	83	125	40	224	12	0.37	**46.32**
Triumph	Tiger EFi	855	86	130	40	215	13	0.40	**52.00**
Triumph	Tiger EFi	955	104	145	40	215	13	0.48	**70.14**
Triumph	TT600	599	105	140	38	170	14	0.62	**86.47**
Ural	650	649	32	80	55	209	6	0.15	**12.25**
Yamaha	650 Drag Star	649	40	95	60	214	8	0.19	**17.76**
Yamaha	BT1100 Bulldog	1063	64	130	45	229	13	0.28	**36.33**
Yamaha	DT125LC	123	12	75	80	100	5	0.12	**9.00**
Yamaha	DT125R	124	12	70	75	113	6	0.11	**7.43**
Yamaha	FJ1100	1097	125	150	45	250	11	0.50	**75.00**
Yamaha	FJ1200	1188	125	150	45	250	11	0.50	**75.00**
Yamaha	FZ6 Fazer	599	98	135	40	187	12	0.52	**70.75**
Yamaha	FZ750 Genesis	749	105	150	42	214	13	0.49	**73.60**
Yamaha	FZR1000	1000	130	170	35	236	16	0.55	**93.64**

Yamaha	FZR400RR	399	65	130	50	161	11	0.40	**52.48**
Yamaha	FZR600 GenesisR	599	90	140	45	180	14	0.50	**70.00**
Yamaha	FZS1000 Fazer	998	140	160	38	209	15	0.67	**107.18**
Yamaha	FZS600 Fazer	599	95	135	40	188	12	0.51	**68.22**
Yamaha	FZX750	749	80	130	45	205	11	0.39	**50.73**
Yamaha	GTS1000	1000	99	135	40	255	15	0.39	**52.41**
Yamaha	R1	998	150	175	38	175	17	0.86	**150.00**
Yamaha	RD125LC	123	12	70	0	118	4	0.10	**7.12**
Yamaha	RD250	147	30	95	50	166	6	0.18	**17.17**
Yamaha	RD250LC	249	35	100	40	165	8	0.21	**21.21**
Yamaha	RD350	349	36	105	45	166	9	0.22	**22.77**
Yamaha	RD350 YPVS	247	59	120	45	175	9	0.34	**40.46**
Yamaha	RD350LC	347	45	110	35	175	9	0.26	**28.29**
Yamaha	RD400	398	40	106	47	166	9	0.24	**25.54**
Yamaha	RD500LC	492	80	135	35	182	10	0.44	**59.34**
Yamaha	RS100	97	10	60	80	95	2	0.11	**6.32**
Yamaha	RS125	123	12	70	65	95	3	0.13	**8.84**
Yamaha	RXS100	98	12	70	100	105	3	0.11	**8.00**
Yamaha	SRX600	608	40	105	50	170	7	0.24	**24.71**
Yamaha	TDM850	849	75	130	40	200	12	0.38	**48.75**
Yamaha	TDM900	897	85	135	40	190	13	0.45	**60.39**
Yamaha	TDR125	124	15	70	60	136	10	0.11	**7.72**
Yamaha	TDR250	250	50	120	35	136	10	0.37	**44.12**
Yamaha	Thunderace	1002	145	165	35	200	16	0.73	**119.63**
Yamaha	TRX850	849	80	130	40	191	13	0.42	**54.45**
Yamaha	TTR250	249	30	90	75	120	8	0.25	**22.50**
Yamaha	TW125	124	12	65	80	118	5	0.10	**6.61**
Yamaha	TZR125	123	12	75	49	109	5	0.11	**8.26**
Yamaha	TZR125R	124	12	75	49	123	7	0.10	**7.32**
Yamaha	TZR250	249	47	119	41	127	10	0.37	**44.04**
Yamaha	V-Max	1197	145	145	35	266	15	0.55	**79.04**
Yamaha	XJ600	598	72	130	50	209	8	0.34	**44.78**
Yamaha	XJ600S Diversion	599	60	125	50	182	9	0.33	**41.21**
Yamaha	XJ650	653	73	125	40	195	8	0.37	**46.79**
Yamaha	XJ900F	853	92	130	45	218	12	0.42	**54.86**
Yamaha	XJ900S	892	90	130	40	241	12	0.37	**48.55**
Yamaha	XJR1200	1188	98	140	40	252	13	0.39	**54.44**
Yamaha	XJR1300	1250	105	140	40	232	13	0.45	**63.36**
Yamaha	XT350	350	30	90	70	120	7	0.25	**22.50**
Yamaha	XT600/E	599	45	105	50	159	9	0.28	**29.72**
Yamaha	XTZ660	660	50	105	50	168	10	0.30	**31.25**

Yamaha	XTZ750	749	70	115	50	200	12	0.35	**40.25**
Yamaha	XV1100 Dragstar	1063	62	110	0	259	11	0.24	**26.33**
Yamaha	XV1100 Virago	1100	68	100	50	222	9	0.31	**30.63**
Yamaha	XV125 Virago	124	10	70	65	104	4	0.10	**6.73**
Yamaha	XV250S Virago	248	20	75	55	137	6	0.15	**10.95**
Yamaha	XV535 Virago	535	45	105	55	186	8	0.24	**25.40**
Yamaha	XV750 Virago	748	68	100	50	222	9	0.31	**30.63**
Yamaha	XVS125 Drag Star	124	13	70	65	135	4	0.10	**6.74**
Yamaha	XVZ1300 Wild Star	1294	75	120	40	305	12	0.25	**29.51**
Yamaha	XVZ1600 Wild Star	1594	75	120	40	305	13	0.25	**29.51**
Yamaha	YZF600 Thundercat	599	100	155	45	187	14	0.53	**82.89**
Yamaha	YZF-R6	599	120	150	35	180	15	0.67	**100.00**

Appendix N – Edzell Track



Appendix O – Comments on Risk and Enjoyment for Each Scenario

O.1 Comments by Scenario

Table O.1 Risk and Enjoyment Comments for Scenario 1

Risk	Enjoyment
Poor, worn surface, level crossing = rough & slippery	at the right speed
Overbanding and grates farm gates (possible mud etc on road)	Relatively quiet country road, good visibility
Uneven, raod patches(slippy in wet), manhole covers, looks like a farm entrance so likely hood of debris on the road and possible cross winds	-1
uneven surface, farm entrance, hidden dip	couldn't open up
Good visibility, low traffic. I'd worry about leaves, gravel, or other debris, but it looks like I'd have plenty of warning if I was alert. Slight possiblity of road surface issues (incomplete/poor work, uneven pavement).	Little traffic, low risk, good smells?
Open road good visibility. Stonefence can hide potential risk	Nothing fun in driving straight ahead
Surface appears poor. Possibly traffic emerging from side roads and farm tracks. Good visibility.	Looks fairly fast, although this will be limited by the need to leave reaction time for traffic from side roads.
Clear view of side street, no cross traffic, good visibility.	Nice scenery, little traffic
Straight. No junctions. Fenced. Fair surface. The manhole covers and overbanding are irrelevant to a properly controlled bike.	It is just an ordinary road. A means of getting somewhere.
Although manholes and overbanding, the section is straight so these are unlikely to be a problem. More risk here from traffic entering/leaving the entrance on the right.	Little traffic about and not unpleasant scenery. Not very testing though so a little boring.
Farm (mud, diesel), houses (side road traffic, animals, pedestrians), manhole covers.	-1
Need to dodge the patches. Might be a problem meeting a car	It could give you some practice on your swerves
Structures on right, cars likely to enter road. Gravel on shoulder, may be gravel on road. Running off left side results in hitting fence posts. Road material slippery when wet.	Straight, ok for higher speeds, taking above risks into account.

tar snakes, changes in road surface	Too straight
drains, uneven surface but nice and straight	-1
Overbanding slippery when wet, fences dont look that sturdy therefore livestock potential. House and associated risks, cars exiting, football, dogs, children. Very straight therefore temptation to go to fast and ignore risks. However good visibility and not much other road users.	assuming that there is corners somewhere, little traffic, there is potential hazards but they can be seen and catered for
opening to the right only one to watch	no bends
Poor surface manhole covers etc.. also farm access ahead tractors pulling turning etc.. possible mud and cow shit	Poor surface to many hazards too straight
A country road, it has an entrance to the left where some might not stop before turning.	It seems relatively smooth, but it's a little too straight for my desires.
wet, patched, driveways entering the road side, means slow cars and kids possible.	to much to worry about. you'd have to go the speed limit
No traffic straight road lower risk. Driveways increase risk.	Low traffic.
low traffic rural road, but you need to be on the watch for local people, vehicles, animals and such entering the road and not being aware of you on the road.	Pleasant scenery, little to no traffic, enjoyable riding.
Clear unobstructed views regarding farm traffic and only the manhole covers and farm tractor mud to watch out for in wet weather.	No hassle and ride the speed of your own mood.
good visibility, smooth, but it can lull you into complacency.	-1
For this portion of the roadway- Straight, limited access points (intersections), but some dips that may present limited-sight distance, rural.	Like riding in the country. Scenic, reduced traffic volume.
Its rough, looks like some loose gravel. the dips might hide hazzards. Plus, it's farm area. Slow moving tractors might be there.	just straight and plain. Seems like nice scenery.
SIDE ROADS AND DRIVEWAYS	IN THE COUNTRY
Tourist area....area unknown to motorists; unlit, heavy farm machinery.	-1
Straight clear road, but small risk due to manhole covers. (Slippery when wet)	open country side

Whilst there are grates they are small and could be avoided and are on a straight stretch of road. No junctions. Only one exit that I can see but with good visibility.	Open. No traffic. Countryside. No speed limit. Grates present little problem.
Clear road possible vehicle emerging from buildings ahead right.	-1
bad coating some might ride/drive from the farm unto the road , i would be careful	not too riky if you are careful and know the danger that might be there
Wet pavement, clouds and the possibility for loose gravel make it a medium risk road.	The lack of houses and traffic make this a great road. If it was a dry sunny day, this would be a great road to travel with the wife on the back.
Road patches, tire groves, narrow gravel sholders, no ditch, possible farm animals and farm machinery, curve just out of site over the top of the hill, looks like it may be wet.	little visable traffic, nice scenery.
Straight road.	-1
Long straight, temptation to go too fast when possibility of traffic entering from side or traffic approaching also at high speed	Long straight - bit boring.
Good visibility apart from the driveway on the right.Dodgy manhole covers, could be slippery.	Too straight.
Surface looks uneven (bumpy), smooth patches where tar has worked up indicates heavy use, manhole covers staggered and is potentially dangerous to bikers in a emergency situation such as heavy braking	Distance of raod indicates uneven surface and very bumpy and the bouncing would cause discomfort
Entrances from fields and large building on the right.	It is very straight, but any road can be enjoyable on a bike!
There looks to be good visibility although you have to be aware of the dirt tracks around the farm, but there appears to be far too many drain covers on one side of the road making for slippery conditions.	Good visibility, looks kind of straight allowing you to get some speed.
Risk: Farm entrance, over banding, metal grids. Possibly junction on the immediate left as well. Looks like winter, so possibly frosty/icy. Enjoyment factor: No other traffic.	Quiet country road with no other obvious traffic. Dry, bright conditions.
hidden dip	slight challenge
Tar joins & inspection covers	Too much concentration required

Not even sure what this hazard is!	It's straight, rural and there seem to be few obstacles.
the repair joins and drain covers	ok with care
The lanes are very narrow but it is a straight road, therefore the rider would be going at a comfortable speed.	It would be enjoyable because it's a straight road and the surface looks nice and bumpy. Therefore, going flat out would be fun.
Farm entrance, field gate	country
dottted white lines stop just before the hump - no hump on 'my' side so cars would/may cut across to my space !	You've got to dodge cars!
Only special circumstances would make this a high risk road, like wet conditions over the Manholes.	Too straight!!
you might veer too far into the oncoming lane if you didn't notice the lines were no longer there	it looks all straight and flat (not too challenging)
Rh junction	Not interesting
It looks to be a country road that is pretty straight. The main risks that you would encounter are animals crossing or coming onto the road.You can see qiute a distance ahead as can anyone entering the roadway eliminating sudden surprises.	Straight and boring.
somewhat rural in appearance, not a car in sight	somewhat rural, not a car in sight!
not bad saying your not popping wheelies or endos	-1
no cars people or bikes in sight	looks like residential area where you have to maintain low speed
Uncertain road surface could be slicker in moist conditions.	Not curvy, but pastoral scenery nevertheless.
Avoid the white squares and the rest of the road looks fine.	It's long and it's straight (detract), but at least it's in a pretty countryside.
Straight and you can see for quite some distance. Most of the major road hazards have been repaired.	Straight can be boring.
Locals would "own the road" and not tend to look	remote
patches are slippery.	Straight.
Farm land. Bad road surface. Animals & tractors with cow manure on road.	Concentrating on peripherals
View of driveway is obstructed by wall. Vehicle exiting may not stop and just roll right on out on what appears to be a rural road. Ofcourse, if this is in the UK, there is a better line of sight and "buffer lane"	Well, we are still riding bikes, so there's some fun in that...

straight, smooth	-1
distant crest, manhole covers & banding (less grip), lack of central lines, farm (mud, tractors). Good visability	Straight, nothing coming, open her up!
Low risk because it's a straight rode with plenty of visibility . Only risks are a vehicle coming out from the road to the right that doesn't yield and isn't visible til they come to the T. The rolling hills limit visibilty of oncoming vehicles. Still would open it (WOT) for the sake of my enjoyment	WOT=wide open throttle zoomX2=ZOOM ZOOM No police, no vehicles, no pedestrians, no farm animals, wooooooooooooooooooooooooooooooo
blind spots but also raul area slow down and be alert	looks soothing
Can see quite far. Maybe mud on road. Tractors/Farm vehicles may exit on right from behind building	Just rolling along.
uneven pavement but no big holes or cracks	-1
long straight road, no traffice but you would have to be careful of driveways and wildlife	not a big fan of straight roads, but any riding is better than none
Wet grids and possible traffic from the farmhouse	Potentially quiet
Open road, visibility good.	Can speed on down.
Has obviously been chewed up by workies and bits of road replaced, 'tis an invitation for slips and skids, also the straightness just begs for more throttle - tractor pokes its nose out of that farmhouse and you've had it. Brown roadsign indicates touristy things, so most likely if you come across someone else on the road they wont know it well	Nice bit of flat, cant complain
Overbanding and grids are minus points, but not too bad as the road is straight. There's also a driveway entrance to be aware of.	Straight could be boring, b ut at least it's out in the country. Depends on the speed limit...
Tar banding & manhole covers	Straight.
There is an entrance on the left hand side, There is a house and driveway on the right ahead. There is overbanding right on the bike line and two manhole covers that would be slippery in the wet. There is also a sign up ahead which indicates "something" which would presumably constitute a risk. There also might be a hidden dip ahead.	The road is absolutely straight, has a poor surface which various concerns.

good if its the tt	-1
Long, straight, open view. Only danger is road surface with manhole covers.	long, straight, no bends but still fun to be on a bike.
patches on road and roadends	to straight
It appears virtually traffic-free. But, there is curbing the entire visible length of road which means there is nowhere to go should oncoming traffic cross over the center into your lane. There are two driveways that need watched for entering vehicles.	I would enjoy this road because I like to travel in the country and look at the crops and animals.
patched up holes	hard to handle a bike on them
Slippy drain covers and 'tar' lines where surface has been replaced. Also new surface may be slippy.	Too bust looking at the road and riding in a straight line omly.
Although at first it looks a low risk,it is a country road near farm land with a high risk of mud and loose surface's,also to the left looks like a gate or opening for access to a field from which it is likely for tractors/farm equipement or other vehicles to emerge.On the right is access to a building again high risk of traffic entering and exiting.The sign post states a caution although not readable.In the distance there seems to be a blind dip,hence not being able to see if there is any obstruction. Depending which way you are travelling or your road position be cautious of the manhole covers they can be very slippery.	It is straight and long a bit deseptive a first glance but ok if you anticipate what is ahead and progress with caution
Poor Road surface, gate to the left and junction to right which traffic or pedestrians could emerge.	It would still be a pleasant ride in the country side and the risk would be reduced by slowing down and being aware of the areas that a threat to safety could emerge.
Straight Rd so low risk but at speed the risk is to traffic emerging from hidden gates and driveways	Straight rds can be a tad boring
Looks a bit rough, but is not hidden and anyone paying attentions would have plenty of time to react and manuever around the rougher parts.	Its a road.
Looks pretty straight and smooth, expect for the grates as pictured.	Out in the country, little traffic. Hopefully it wont stay as straight
good visibility	it is just a small part of the overall journey

There is the chance of farm traffic emerging from the right hand side. There's probably also a risk of rubbish/mud on the road, which has been left there by farm traffic.	It's just a straight road
Straight road looks dry. - good visability - clear view of cars exiting from junction.	Don't like straight roads.
road seems ok, but blind right hander ... someone might come out of it	empty road ... nice view

Table O.2 Risk and Enjoyment Comments for Scenario 2

Risk	Enjoyment
bends	bends
Possible ice/water under bridge	Nice bends, road condition looks good
sudden light level change with another sharp bend just down the road, vehicles oncoming possibly over the centre line	-1
blind bends, national speed limit ending	speed & vision restricted
I always worry about deposits (oil, etc) in a darkened area under an overpass -- it bit me once.	Overpasses always highten the risk a bit, which lowers the enjoyment. Not sure what's on the other side, either...
Bridge is blocking visibility.	Some turns
Speed limit changes. Visibility only to apex of next bend. Fairly wide with sweeping rather than tight bends.	It's vaguely twisty.
Limited line of site. Concrete adjacent to road, curve	challenging curve but limited line of site
Low bridge - high vehicles in centre of the road. If that is a Road off to the left after the bridge it could mean a vehicle about to turn across your path. It could be wet or even icy in the shadow of the bridge.	Another ordinary road going somewhere.
Cannot see what is coming towards me. Also, I may be less visible when in the shadow under the bridge. I would also be concerned about the surface under the bridge. Often still wet when elsewhere dry and there is a junction of some type ahead (hard to see) that could mean I need to brake and preferably not on this slippy corner. There is also risk of something coming over the bridge and kicking up some dirt/ chippings that could hit me full face.	Just an average road situation that requires my full attention to keep safe.

Blind corner, shaded pavement	I don't like blind curves
Unsure whether road continues to bend right after bridge, or cuts left. Either direction, visual distance beyond the bridge is EXTREMELY limited, for me and for drivers approaching me. It it's cold outside, that shaded area under bridge is likely to be icy, even above 32 degrees and sunny, because it will take ice longer to melt under there.	Only fun there is sound of exhaust bouncing off of underpass walls. Other than that, it's a risky place.
Blind curve after bridge	Nice curves, but blind curve reduces enjoyment due to increased risk
windy road, poor visiblity, oncoming cars likely to be over lane	-1
Assuming that you ride within your capabilities and pay due regard to possible damp conditions under bridge	I can just spot the sign for corners in the distance, out of town and appears little other road users
twisties coming up	twisties
Poor visibility blind corners	Nice n twisty but poor forward visibility into corners would limit safe corner speed
It's a choke point, and you can't see whether there's another vehicle approaching, or what it might be doing.	It has smooth pavement and seems to curve nicely here. This may promise more smooth, interesting riding ahead.
decreased visibility - both the road in the shade under the bridge, and the blind corner. chance of trash on the roadway under the bridge. someone could drop something off the bridge	corners are good
No traffic, but blind corner.	Low traffic, risk=adrenaline
Need to stay alert here, twisty blind turns, watch out for entering traffic.	Twisty turns, rural scenery
Blind corner and not easy to judge road condition.	Because any hazard is not a problem at the right speed.
limited sight distance, best taken very cautiously.	-1
Limited sight distance, S-curve, cannot see the right side of the road beyond the bridge. Bright, sunny day that may make other drivers lethargic or inattentive.	Ugly spot and "busy", which would force focus on getting through the section and onto more scenic view. Perfunctory comes to mind as a riding description.
Although curves are great, oncoming traffic could be in your lane.	Nothing like riding on curvy roads.
NO CROSS TRAFFIC	TWISTY
unlit; blind bend; junction; end of speed limit	-1
Poor visibility	-1

Grate and patch in possible braking area. Hidden junction on bend ahead? Visibility not too good.	Not enough visibility and too many possible hazards.
Blind bend	-1
low if you are not too fast (end of speed limit is just coming not there)	i do like those roads, small and varied/eventful
Blind corner.	Too short a ride. Not a clear picture of what is ahead.
curvey, no shoulder or ditch, animals and farm machinery.	curvey, scenery.
Shadows, blind exit	-1
Blind turns. Approahing traffic likely to encroach on opposite side of road	Nothing special
Poor visibility through the bridge on a fast road.	bendy.
Dangerous to turn right at junction as cars comming from the left could be sudden, sub in eyes could cause a blind spot in the tunnel	Uncertainty on cars or other users on this raod at the time
Can't see past the bridge.	Scenic
Looks like a blind bend, also you have to be aware of idiots crossing the centre line and taking you out	there's a lack of visibility on the approach to the bend and you never know what a crazy car driver will be doing on the other side of the bridge.
Blind bend. Change from light to shade under the bridge - what's on the surface under the bridge? Also end of speed restriction gives temptation to speed up when conditions demand otherwise.	Negotiating the bends and it being a country road. Definitely not boring. Dry bright conditions.
visibility + wet patches under bridge	challenge
Road narrows with blind bend, oncoming traffic may be on wrog side of road. Bridge may obscure view.	See above
Tunnel is dark, incorporates a curve, might be frosty on an otherwise sunny day, due to bridge cover, and insufficient view ahead of oncoming traffic.	Too great a need to concentrate for me.
end of speed limit,shadow under bridge then sunshine,warning sign after bridge.	hazards as above
There are 2 blind corners from the looks of things. A driver may be coming out from under the bridge and take a shortcut onto the other lane. Same can be said for heading towards the bridge. It would be tempting to "Cut" the legnth of the corner.	It would be an enjoyable piece of road because the corners look very nice and flowing and the element of the bridge makes it more exciting.

vehicle appraching blind, sharp bend	Industrial
visiblity is poor - the bridge pillar is blocking the road view of oncoming traffic	you need to be right over to the left to see as much as you can
It does have some curves and another manhole.	More curves.
I don't like boind corners	-1
it's a little dark under the overcrossing and since it's on a curve you would lose visibility if you hadn't already slowed down	i like roads with variety
Traffic in middle of road	Traffic hazard
Veiw of road is somewhat obstructed. Solid objects very near the road leaving nowhere to go should someone cross the centerline and take your lane away.	Looks curvy and challenging , keeping you on your toes at all times.
Banked blind curve that passes under an overpass	looks rural, curvey road, still no cars in sight.
cannot see whats going on after the turn and whetehr there are any big trucks coming	just gotte go easy and watch it. looks almost identical to a road to my house, lol
No runoff, low-light inside versus bright outside, narrow lanes.	Curvy.
What might be around the curve to the right? Or you may not notice it curves left immediately after the right curve.	I like curvy roads. :)
Lack of visibility and no escape if other vehicles cross the center line into your path.	Curves are fun to ride.
no outlets, but perhaps broken pavement	not very pretty, too low speed opperatunity
blind curve and road patch.	scenic, but straight.
Good vision throught out curve	-1
limited sightline	-1
cold/damp in bend, surface of bend hidden by shade, slightly blind.	Risk prevents commitment.
looks like I'm merging onto uneven road surface, my soon to be lane has some markings which may cause me to approach this merge (or easy left) a tad slower... The cement columns and retaining wall inhibits the view slightly	because of the risks also.....knowing the risks is the first step to riding safely.....riding safely makes it more enjoyable. Plus turns that "bank" the wrong way make for white knuckles and puckered a-holes. LOL
some bikes may take this to fast and there could be a cager coming form the other side that just happens to be in your lane.	looks like fun

Cannot see behind bridge. Change of light may cause visibility issues, may be damp and sloppy. Bend approaching that we cannot see around.	Looks like it is pulling away from a town. National Speed limit and a bit twisty.
blind corner - but risk seems low - don't see an incoming street after the curve and bridge.	-1
not alot of cars, but some blind turns	It would be a good road to take in the scenery and maybe push the bike alittle
Possible turning on the left in dark area before the skid sign	Okay at a steady pace
Cars will come flying round the corner under the bridge, probably won't see you.	Dangerous area, slow right down.
National limit area round a blind bend? I'd be scraping my tyres off the kerb taking that right turn, never know what trucks or farm traffic could be coming round there	That particular bit wouldnt be too great, but I'd be looking forward to finding out whats round that corner
View around bend obscured by bridge. Also a traffic sign (road narrows?)with a qualifier underneath that I can't read. Despite the de-restricted sign I'd be taking it steady until I could see better. Also could be damp/wet under the bridge.	At this point it's time to take care. Could be the oportunity for a blast once round the corner though...
Reasonably good visibility	Pretty straight.
The road twists under a bridge. There is a blind bend. There will always be a micro climate under the bridge where the surface is likely to be wet/frosty/whatever. The road has just become deristricted in this direction so that traffic approaching may well cut the corners ahead and emerge on our side of the road.	-1
Possible oncoming traffic in middle of road. Blind LH bend on far side of bridge with no visible run-off. if wearing ordinary sunglasses, possible momentary reduction in sight whilst in shadow under bridge.	Bends but fun reduced by need for care.
on coming vehicles in middle of road at corner a head	corners
Although the weather is clear and the roadway dry, some caution has to be taken entering the right hand curve under the overpass because you cannot see oncoming traffic beyond the abuttment.	It doesn't appear in a very heavy traffic area so only some caution entering the right hand curve needs exercised.
can't see oncoming traffic	might get ran over by oncoming traffic

Shadows could hide damp patches, or other spills	Looks like a nice series of bends coming up.
You have a clear view ahead to make any decision in advance to any situation.Cautious at bridge as it bends on the way through and it its alway likly to be damp as the sun is blocked out.you would need to take cation for the road sign but it is in a position where you can see and read it well in advance.	Nice couple of bends,the nation speed limit applies sign means you can progress at a reasonable speed.The clear view ahead make it good as you can think ahead easier.
Slippery rode conditions under bridge due to cold weather. Narrow rode and bend could present traffic encroaching traffic on my side of the road. Poor path on the right could mean pedestrian traffic crossing here but view of them obscured to on comming trafic.	I am riding a bike am I not, of course its enjoyable.
road seems to bend sharp right after the bridge	unless danger is an enjoyment
Possible blind drive beyond the tunnel. Dark road surface in the tunnel could hide debris.	
Blind corners and hazards such as the narrow bridge and harard sign further on.	National limit is good. But looks a little hazardous for free riding
partial -blind turn, can't see well under the bridge for road conditions	I would be holding back too much
During a cold spell, the shadows under bridges can stop frost or ice melting. In this case the shadow covers a bend, which could make it slippy. It also harder to spot item on the road, while they are in the shadow and the bridge will partially bloke your view of oncoming traffic.	A couple of nice bends to enjoy.
Dry road but narrow.	Bends exiting speed limit in rural location.
cant see much of whats beyond the bridge	have to be very careful

Table O.3 Risk and Enjoyment Comments for Scenario 3

Risk	**Enjoyment**
risk of diesel spills, slippery roundabout, cars not seeing you!	-1
Car drivers, diesel	Dry, grippy, quiet roundabouts can be fun
obvious really, car drivers+roundabout=risk	other drivers...

Plenty of traffic, always a risk. From the direction of traffic, this isn't the US, so likely drivers know what they're doing in a roundabout (this would be ULTRA-high risk in the US, as drivers are clueless idiots here).	I love roundabouts.
Heavy traffic	Just traffic, no freedom
Because car drivers are incapable of indicating correctly on roundabouts. Open junctions with good view all round.	Because my tyres need scrubbing in, and roundabouts aren't a bad way of doing this, unless it's busy.
merging traffic, but line of site is good and signage is clear	traffic
Other vehicles about always increases the risk.	It is just a road!
Primary danger is all the other traffic drivers about. Are they as alert or skilled as I am? Hard to predict what they might do next. All skill here is placed on surviving and negotiating the roundabout, not enjoying the fact I am on two wheels. The risk of diesel spill somewhere round here is massively incresed.	No chance to enjoy 2 wheels. Every chance I will slip off or be knocked off.
Industral estate (heavy goods traffic = possible diesel spills) loads of traffic on the roundabout!	Harleys don't turn well and hate roundabouts :-)
Traffic circles are always high risk	Traffic circles are only fun on deserted roads
It's a roundabout, lots of people on cellphones.	If surface is in good condition, the diameter of this roundabout requires good lean.
Too many cars	Too risky, high traffic
Other road users to be catered for, contaminant (sand, diesel, etc) spilt on rouandabout	Roundabouts can be great fun
most car drivers will just pull out on you here	to much traffic
Roundabouts are always a risk wheather on a bike or in a car	Providing not to much traffic ideal place for a knee down
People frequently get confused at roundabouts, and they may have to go around again, while you are entering or leaving.	Four-wheel traffic is too close, and there are too many decisions for them to make, something they don't do well.
lots of traffic. car drivers don't pay good attention. you have to watch out for yourself	traffic circles are fun

A busy roundabout is always high risk.	risk=adrenaline
While rotaries are lower risk in the UK then here in New England. There is still a lot of interaction with other drivers that may not be fully aware of your presents. You need to stay very alert of the other vehicles around you, and be prepared to use your superior handling and braking to your advantage.	I don't mind rotaries.
Busy roundabout and danger of diesel spills from lorries servicing shop/premises in background.	Consentration levels very high but again caution essential.
because its a roundabout and I ride on the PROPER side in the US, so would not react instinctively on this one.	Just glad to get out of one like this!
Roundabout. Cautiously observe other driver's heads to predict intentions. Make no assumptions. Rode slowly and be extra cautious.	-1
lots of traffic, especially at a mall area. You'll always have to be on the look out for cars cutting you off.	traffic sucks
CONFUSING CROSS TRAFFIC	SCARY!
motorists dont always see bikers at junctions; most motorists seem unaware of the rules relating to roundabouts.	-1
Bend on approach to roundabout. 2 lanes onto and around roundabout possibility of cars switching lanes at last minute.	Roundabouts can be fun in the right circumstances.
Traffic	-1
though you might have broke down, the car from the right hand might drive into your lane	see above
Traffic circles suck.	Too much worry about where everyone is and where to get off.
curvey, traffic.	curvey.
Blind drivers	-1
Approaches to and exits from roundabout are clearly visible	Nothing special
Good visibility.	Built up area with traffic.
Poor indications that there's a traffic circle there, more cherons would have been ideal to alert user	Its a roundabout and can say until your into it, assuming one knows its a good roundabout its ok, otherwise approach and use with caution
Traffic	If the other traffic behaves, the circle would be fun.

car drivers failing to see you as they pull out onto the road about	with the amount of traffic on it not too enjoyable as you are having to watch out for every car driver not seeing you, although if there were no cars about it's great fun to practice getting your knee down:o)
Always the possibility of traffic not indicating yet turning right and having right of way. Typical spot for diesel spillages.	Unpredictable traffic and road surface conditions - but it isn't raining.
heavy traffic at junction	traffic hazards
Lamp posts could be a problem, built up area with heavy traffic	See above
I'm always careful on roundabouts	Love roundabouts for cornering, though I would be wary of oncoming traffic from the right and also people pulling out on my left.
traffic crossing from right side,deisel/oil spills,slippy when wet(white lines).	general risks
Roundabouts are always dangerous, this is no exception.	It would be "ok" because roundabouts are pretty boring...But can sometimes be fun accelerating while a car is heading towards you.
busy roundabout	urban
seems ok to me - visiblilty not obscured.	just a 'normal' straight-about !
Sharp curve in high traffic area.	Nice curve, but would be cautious of what looks like a shopping area with high traffic.
they may want to try putting the sign BEFORE the urn, not in it,	fun fun fun.
it is a tight curve with no guard rail - not much margin for error	i like curves to be more open on the sides the cars appear too close to the edge of the road
Slippey surface	Diesel
Cars entering and leaving the roadway on curves.	Slow down and be observant of everthing going on around you. It can still be fun if you are cautious.
Well, if you're an American, this picture would guarantee stupid behavior automatically. Roundabouts not spoken here. I have one by my home and its a good place to die.	City environment, lots of cars. Arghhhh!!! A roundabout!!!
cars coming over the round about but mainly the turn will make you slow down	just a commuter road, not the kind you go for wild rides
Roundabouts are inherently dangerous.	Something to be gotten through without a smashup.
Crazy traffic pattern, lots of cars.	I don't like traffic when I ride.

High traffic area, on coming traffic could come into your path.	It's a parking lot!
increase traffic, everybody aware	too comercial
heavy traffic area, strange road markings.	confusing area.
Krikey! a round about - the full scale equivalent of an automotive Cuisinart...	-1
crazy fucks on the wrong side of the road	-1
Lots of idiot car drivers.	going around corners always fun despite risk of traffic.
There is drunks driving on the wrong side of the road.....wait....what country are these pics taken at?	you ever go down a oneway against traffic???? if you make it thru and lose whoever was chasing you...before the eye in the sky can lock on to you....it is like having multiple organisms < lol and orgasm's > seriously....this isn't from the united states, or am I up too late again?
lots of other poeple you need to watch out for	you have got to watch everyone elese
Other road users not signalling, cars taking up other lane (sneaking in), diesel spills and cars pulling out on me.	Apart from out accelerating cars on the exit.
sharp curve and incoming traffic.	too slow and too many things to watch out for.
too many cars. and a blind turn	I don't like to ride in cities.
Most roundabouts can be dangerous for a motorcyclist.	Myopic car drivers usually
Cars won't see you.	Um it's a roundabout!
Roundabouts, obvious risk, no apparent road signs so people may be concentrating more on which way they are meant to be going rather than what they are cutting up	Roundabouts = slow = boring
Roundabout with 2-lane entry. Watch out for cars from right, bad lane discipline etc. Also at this point some of the cars on the roundabout might be exiting after our entry point.	Actually roundabouts can be fun if there is no attendant traffic and you can pick a nice line through.
Two lanes to roundabout, traffic coming from right, good visibility.	I'm not a "knee down on roundabouts" person.

Roundabout ahead, some sort of retail/industrial complex ahead presumably with exitting traffic onto the roundabout. There are is urban and presumably the spped limit is likely to be thirty but might be higher. It is a dual carriageway and there may well be traffic on our left that will decide to go straight on or even turn right on the roundabout.	-1
traffic on roundabout	Need to take care in traffic.
roundabout in town spillages on road from quein cars	to much other traffic
I hate circles. Depending where you are exiting, you are constantly checking traffic behind and on both sides of you as you are progressing around it.	Its a necessary evil to get to the road where you want to go.
Idiot car drivers who cannot either see bikes or appreciates their acceleration.	Just trying to survive........
Major road with roundabout,near a shopping or industrial site,lots of vehicles about,risk of lorries/buses,which means a greater chance of deisel spillage.	you would be concentrating too much on what other road users were doing,or about to do.And worried that the road surface at the approach and on the roundabout could be very greasey.
Trafic only approaching from the right but roundabouts often have oil, gravel and diesel on them causing slipper road conditions.	A roundabout is like a corner and corners are fun on a bike.
traffic islands have inherent risks but could harbour a deisel spill	
Appears to be near a shopping center. People tend to be preoccupied with shopping instead of driving when near shopping centers.	Have to spend too much time watching for inatentive drivers.
Ultimate hazard: other road users not indicating, using the wrong roundabout lanes. Diesel...	Good for chucking the bike around but too busy i this picture.
to many cars turning, very common place for oil spill	it would depend on how many cars were there at the time
can't see from the photo, if there is an entrance to the right hand side. If there isn't, it's less risky because you have a clearer view of what traffic is doing as it negotiates the roundabout. On the two lane roundabouts, you also have the added danger of someone being in the wrong lane or poor lane discipline.	It's just a junction. There's too many things going on and too many dangers to make it enjoyable.
Urban - traffic - junction.	As above. Urban and traffic.
roundabouts are scary. full stop.	too busy being careful

Table O.4 Risk and Enjoyment Comments for Scenario 4

Risk	Enjoyment
cars	speed, room to overtake
Good visibility. Although busy can see vehicles easily	Good overtaking possibilities
over taking vehicles,	-1
good visibilty, light traffic, wide road	you would be in control & can plan ahead
Lots of traffic, but looks like a wide road that is well maintained. Good visibility. I'd worry about oncoming traffic coming at me two abreast while one passed the other, crowding into my lane. But, as UK drivers are well-versed in sharing the road in such a way, I'd be less worried there about this situation. Also lowering the risk a bit, it looks like there are escape routes to use if necessary.	Open road is always good, even with moderate traffic.
Only risk is the speed and density of traffic	-1
Traffic not too heavy. Wide lanes. Good visibility. Few junctions.	Overtaking opportunities.
good line of site but possibility of vehicals turning across your path	traffic
Other vehicles about. Dusk? Car with lights on about to overtake?	Not too much traffic. Wide enough to allow easy overtaking
Good clear view ahead lots of space for getting out of trouble if a car decides to do something silly. Biggest risk here is an oncoming car overtaking in face of traffic and of being tempted to ride too fast/Gatso risk!	easier to be sure of surroundings and more time/space to anticipate actions of others. Not the most challenging though and too easy to ride too fast.
Looks like A type road...wide lanes, no pedestrians!	Chance to open the throttle
I'm not used to driving on the wrong side of the road. It takes getting used to.	I've done it before, I can do it again.
Clear vision of road for almost one mile. Traffic is light, lanes are wide. Runoff on left side contains no immediate obstacles. Turns to the right, camber is correct for this road.	If the red car isn't present, one could swallow this section of road at 100mph in relative safety due to good sightlines.
Undivided road with possibility of cars turning across your path of travel	Long sweeping curves. Wouyld be better if less cars

Providing you stick to the speed limits. Wide, good visibility, no obvious junctions. Other road users always a concern	Not much fun to be had here
wide road little bend and no junctions	boring
Nice open fasta road with good visibility good surface loads of room	Boring
It seems well maintained. There is traffic, but it is not heavy. The road surface is good, and markings are visible.	There is variable terrain in the picture, and the road should be the same. Traffic is light, and the road good.
good visibility, light traffic. it would be nice if light conditions were better. looks like limited access, so no driveways, kids or cars pulling in front of you.	room to open it up, pass cars, would be very enjoyable if the traffic was lighter.
My good you're all driving on the wrong side of the road in suburbia.	Yawn, suburban road suck ass.
Open motorway, light traffic with room to maneuver.	easy riding, but nothing interesting
Busy main road and although quite wide overtaking needs great caution as others coming in oposite direction may think the same.	I always prefer to ride at a speed that I am comfortable at and if I felt that I needed to reduce speed I would.
If one if very careful it would be OK, but for us in the Us it would be rather risky. Good visibility, few side roads, light traffic would be in its favor.	One has to stay very alert for cars passing and side roads.
Oncoming traffic. Cloudy, which limits visual acuity. Appears to lead to more congested traffic.	-1
interstate travel, lots of traffic	If you want to get someplace fast, its the way to go
TWO WAY TRAFFIC	GETS YOU THERE
They are all driving on the wrong side of the road :)	-1
wide, well marked, good visability	wide, well marked, good visability
Open. Good visibility. Wide enough to pass down the middle.	Would allow good progress to be made
Good visiblity dry clear road	-1
if you're not too fast and don't pass, low risk with good understanding when passing	i like those roads through the country , ups and downs, bending a lot, having good weather conditions...
Just your everyday commute. Pavement is clear. There is enough light to allow you to see far enough ahead to make good judgement calls.	Just another road to get to where I'm going. Nothing spectacular about this road to excite me.
The cars are on the wrong side of the road.	Any road is more enjoyable on a bike than in a car. (unless snow)

Temptation to overtake.	-1
Fairly busy but good visibility. Possibility of approaching traffic overtaking into your path	Nothing special
Good visibility but could be a fast road.	It could be very enjoyable when there's little traffic as it's a fast road.
Cars could be staggerd on wide road, uncertain manouveres of drivers unknown	Cos its wider it generally allows for safer passing and has space to allow for emergency evasive action
Traffic	Wide open view... possibly brisk pace...
nice wide road, looks like a good surface, good visibility	plenty of room to go past car and trucks, visibility is good, good surface, makes for a good days ride.
Standard busy two lane road. On coming car with lights on in daylight can be indicative of some form of danger/aggressive driving. Take real care overtaking.	Reasonable width on a dry straight road road with apparently good surface and visibility, so making good progress with care possible.
good visibility, wide road	challenge
Looks like garage ahead, risk of spilt diesel / cars pulling out	See above
Can't see any risks here	Straight, wide, good visibility.
light traffic	enjoy with care
This road would be high risk because it is an open road and no bariers between lanes. Cars and bikes would also be tempted to overtake on this road which would also make it dangerous.	It would be enjoyable because the lanes are wide and there is plenty of room for a bike to slip by. It's a relatively straight piece of road too which would mean speed.
wide road, good vision	fast
good visiblilty - dry surface	wide carriage way - weather ok -
Some risk due to the higher speeds at this road, but not many intersections.	Commuting-style road, no real excitement.
wide open, good vantage points	fast fast fast
good visibility, guard rail, plenty of room	i don't mind freeway driving, but not for extended periods of time
Two way traffic	straight road
Veiw is good , road is in good conditon , just keep your eyes open for any vehicles initiating a pass.	Looks like a peaceful road to cruize on.
Everyone's driving on the wrong side of the road! Sorry, couldn't resist. A moderately busy two lane road with traffic.	ruaral setting, car traffic not overwhelming.
this is one of a bigger roads, not may cars etc, trafic looks good	i love speeding on the highway, this looks pretty similar

Wide lanes, moderate traffic, some runoff space available.	Scenery not awful, traffic not congested.
Good visibility, though there is a bit of traffic about.	I don't like traffic or non-twisty roads.
Looks like it would be considered a highway with increased speeds. Also any two lane road can be hazardous if others are passing or crossing over the center line into your path.	Get you where you are needing to be. Visibility is good. BUT - they're driving on the wrong side of the road!
wide lanes, good surface, low traffic	open spaces
heavy traffic.	not very interesting.
Clear open road, might be dangerous at night with dozy, doped or drunk drivers in opposing lanes crossing over.	more of an A to B road, IMHO
Lots of traffic, overtaking could be dangerous if not waiting for encoming gap which would be unecessary due to width.	straight, cars in way.
Ok,...now I'm chasing someone while the oncoming traffic moves into the wrong lane...or....I'm chasing some nuthead driving against the traffic....or, I'm in Europe	UmmmI'm confused
two lane hiway need i saw more	not as bad as a 4 lane hiway
Can see for miles. No turnings, main route. Issues would be exiting farm vehicles and right hand turning vehicles. Space to pass cars quite safely.	Its the A90 so full of cops. WOuld have to do 60.
straight road, low traffic, weather good.	-1
Lots of cars but seem to be plenty of room to aviod cars that don't see you	fun level is nonexstinant but being out on the bike is better than nothing
Restricted overtaking because of parked? cars ahead in what appears to be a slightly built-up area.	Good visibility.
Cars won't see you.	Can do a resonable speed.
Looks like a fairly high speed road, can imagine cars doing 60-70 there no problem, coming straight for me? no thanks	Ugh look at it, too much traffic
Good visibility, dry tarmac. Yes there's traffic but we can get some good overtakes in.	Looks a bit boring but safe and progressive overtaking is a skill and can be fun.
Good visibility.	No challenging, but fast.

Rural A road. Reasonable ampunt of traffic probably driving at around the national speed limit. There is a layby or even possibly a side road exitting up ahead on the left. There is something else on the left hand side a bit further laong the road. However it is not distinct enough to make out.	-1
Fast road (is the A507?) but road with three-lane capability marked off for only two, thus danger of two opposing idiots overtaking whilst nearside cars, being overtaken, not as far over as they should be. Relatively clear view.	Fast road and it's good to play with the traffic now and then.
road wide enough for cars to overtake while traffic is on coming	60 mph speed limit frustrating
Weather is clear, roads are dry. Traffic is relatively light so watching oncoming traffic is pretty much for the car drivers who wander over the center line.	You can almost relax a little while taking a road such as this one.
Wide road with good escape routes.	Loads of overtaking opportunities
Good clear view's, wide section of road,	You would get a good flow on this road because of its layout,but not the most exciting.
Straight road encourages bad overtaking by some people. Layby on the left courses a risk of car in front suddendly stopping, cars on the other side pulling across the road to use it and cars pulling out.	I am still on a bike.
room for three lanes of traffic (overtakers coming the other way not having seen you)	overtaking very easy
Doesn't look too bad. Appears to have very little cross traffic or intersections.	Its a road
Oncoming overtaking traffic, side winds.	Quite enjoyable for a blast, keep the bike flowing and overtaking should be no problem
clear view, not side roads up tho where i can see	i could push a bit mre if I wanted to
A nice wide road, which is good for overtaking and still leaving plenty of room for error. Yoy have to watch out for oncoming traffic over takingand coming into your lane.	Too much traffic. If you want to make progress, it'll require a lot of overtaking but the road is wide enough that you should have plenty of opportunity to do so.
Dry open road. Good visability.	Too much traffic. Too straight - as above, don't like straight roads.

not too crowded ... dry road ... smooth surface	wide-ish road ... ups and downs ... gentle curves ... (*sigh - why am i here typing ... i should be riding :) *)

Table O.5 Risk and Enjoyment Comments for Scenario 5

Risk	Enjoyment
crap surface, pedestrians, cars	see above
Urban and pedestrians	Boring boring boring
parked and parking vehicles and pedestrians	for the above reasons
parhed cars, pedestrians, dodgy surface	you need to keep concentration at higher level, you would need to react to situations outwith your control
Pedestrians and parked cars are always unpredictable. Car parked in my lane facing me makes me a bit nervous...	Not as much fun as the open road.
Many potensial hazards	To many conciderations to be made
Poor markings. Pedestrians. Junctions.	It's hardly the Manx TT is it?
parked cars block line of site.	nice street but possible traffic
Parked cars and pedestrians shopping. People have their minds on other things	It is more of a via point than a road.
Pedestrians and shoppers spell risk of people thinking of things other than traffic around them. Cars are less likely to see a bike coming down the road. People may have kids that run out without warning. Road surface liable to be dodgy at best, often with potholes etc.	Minimum speed here and requires maximum concentration. Can be enjoyed if there is a car jam that can be breezed past!
Bad sufface, cars parked on road, shoping area = pedestrians (and children in particular)	Stop & go ride
I'm driving on the wrong side of the road as in the last picture and screwed up the turn again ending up going the wrong way	Cramped, narrow, and I'm going the wrong way.
Slippery surface when wet. Pedestrians in street. Cars on both sides (as obstacles and potential attackers). Buildings near corners create short sight-picture for all drivers and riders.	Must stay on high alert, this area is high risk.
Cars can pull out from hidden driveways, pedestrians can walk in front of you, looks like a poorly maintained road surface	Too risky
	i like riding in towns

Pedestrians and other road users, parked cars pulling out etc. You should be going slow enough to take evasive action.	You have to ask ?
sleeping pedistrians no road markings	-1
loads of potential hazards from parked vehicles and pedestrians poor road surface limited visibility	Town riding is never enjoyable
Parked vehicles may pull out at any time, and the drivers may not look where they're going.	Pavement is not potholed, and there are *some* road markings. There is little traffic to avoid. This seems to be a road that is useful in getting to a destination, nothing more.
lots of pedestrians, means you have to be careful and slow. but that means there is an audience for wheelies ;)	slow doesn't always mean no enjoyment.
Driving down a city street the wrong way is maximum risk.	Breaking the law rocks.
Lots of possible interaction with other vehicles and people entering the roadway.	Slow, busy, stop and go, with lots of distractions
Built up area and shops. People in the road and cannot see into the distance.	Correct speed and observation is the answer.
Lots of potential for pedestrians, car doors and other things popping out in front of you.	-1
This image is confusing because it appears to be a one-way street. Lots of potential for traffic darting out of alleys and other intersections. Pedestrian traffic. Parked cars merging onto roadway.	I don't like driving in town because it requires extraordinary amounts of attention. There are too manycircumstances that constantly change, which requires lots of mental processing.
Pedestrians, cars leaving spaces	It's in a city and not fun to ride through
PEDESTRIANS AND NARROW STREET	DRIVE SLOW
shopping area, pedestrians, children, parked cars, parking area - motorists pulling out without looking	-1
Parked cars. Pedestrians. Exits. Junctions.	Have to think for everyone else here - stressful.
Pedestarians traffic wet oily	-1
seems to be a one way, i better should not drive into	seems to be the wrong way for me
Narrow street, cloudy conditions, pedestrians.	I wanna go for a ride not shop.
people walking, possible loose gravel.	low traffic.
Pedestrians	Not what bikes are for.
It appears to be a 1 way street and you'd be going down it the wrong way	Could be fun dodging on-coming traffic (joke)

Wet road with cars parked on each side and pedestrians.	No bends, too slow and too many hazards,
Padestrians in road always a high risk	Looks uneven causing discomfort and could distract bikers attention of padestrians in the area
Traffic- both pedestrian and auto	Low rewards for all the risk- in town riding can be very dull.
no centre markings, got parked cars and pedestrians, road surface looks pretty uneven and there most likely patches of oil on the road too	slow moving being ultra aware all the time, makes you tired and the road surface drives you nuts
Uneven road surface, parked cars pedestrians crossing the road (but moving onto the pavement, however no eye contact). But quiet as far as other traffic is concerned	Quiet and as long as you proceed carefully and within speed limits, and alertly it should be okay
pedestrians in road - is this a one-way street?	hazards
Poor surface, built up area	In town
Typical built-up urban setting with wandering shoppers, parked cars, high pedestrian to motorist ratio and those awkward parking bays that seem to cause bottlenecks, with people pulling out at a second's notice etc.	I would slow right down and be concentrating on parked cars, crossing shoppers and so on.
built up area,town traffic	town centre, pedestrain's
It is very high risk because there are pedestrians everywhere and cars parked on this street. Also there are no lines to signify where the lanes are.	This wouldn't be very enjoyable for the simple fact that there are pedestrians walking everywhere and tend to jump onto the road without looking. Definately a road to be ridden with care.
low speed	the road to nowhere!
AAAAhhhhhhhhhhhh PEDESTRIANS ... shopping ... No brains ...	the buggers will be all over the place like zombies !!!!!!!!
Low speed road, but a lot of pedestrian traffic.	I would only be on this type of road if I am going somewhere specific and looking for a place to park.
no separtation, too many pedestrians	slow slow, too much to watch for.
no lines/lanes, it would be too crowded with two lanes of traffic	too many distractions
pedristrian	-1
Pedestrians and vehicles do not mix well.	You would have to keep your speed to a crawl with alot of stop and go which would ruin the enjoyment of the ride.
city environment. Pedestrians present, lots of parked cars. Road surface looks recently wet.	its in the city with its attendant safety concerns

bloody people, this is where the bike speed comes to a crawl and you have to watch for them. and cars out ofthe parking lot too	trying to get past this bit and into a normal road
Illegally parked vehicle could pull into my way, and my options are limited by pedestrians. Or, perhaps I'm going the wrong way on a one-way street?	Not much real riding to be done on this shopping street.
No idea when a pedestrian will jump out, or a car will move out of a parking spot.	It's a road used to get to other roads I want to ride on. It's something to be endured.
Parked vehicles on both sides of the road. Doors opening from either side or cars pulling into traffic can come from either side.	Side streets can help get you where you want to go without being riding on major roads or in heavy traffic areas.
low speed. One way.	interesting sights
One way, but pedestrians will need to be watched.	Seems to be an interesting little town.
Pedestrians move slow enough to "track" while riding	-1
pedestrians	-1
parked cars , shops, peds. damp.	too risky/straight.
looks like a fun town	looks like a small good place to get a bite to eat
pedestrians everywhere, not looling. Probably kids. Parked cars pulling out and doors opening. Street to left and right where people cannot see round the corner.	bimble
Uneven pavement, loose gravel? Also on a slight curve.	-1
small street, populated areas. You run the risk of people not seeing you and there's no where to avoid them	-1
Pedestrians indicate a supermarket? in the vicinity.	Potential to support various hazards.
Cars will pull out.	Slow area = boring.
Everything in the way, people, parked cars, things coming towards you, road uneven. Couldnt be less safe	Unless I was parking outside that kebab shop on the right
Urban central. Pedestrians could cross without looking, bad lane discipline from drivers. Why are all the vehicles pointing towards us? Are we looking down a one-way street (the wrong way)?	See above remarks. Mind, if you were on a Harley I suppose you could pose...
Cars on both sides, possibly pedestrians crossing.	Too much to concentrate on, not a place I'd go through choice.

Street in town, parked car, pedestrians walking along the road and probably will behave unpredictably.junction up ahead and vehicles may emerge without warning. Overbanding and road repairs may make the surface treacherous in the damp conditions. damp patches on left hand side of road near parked car	-1
Road surface, pedestrians, car parked in road on left, blind entrance on left past car.	no fun factors and need for absolute concentration on potential dangers.
in town centre pedestrians parked cars	to many peds and parked cars
You have pedestrians wandering around willy-nilly. You could have cars dart into the traffic lanes. The asphault roadway seems as if you would have diminished traction.	It would be alright since certain dangers exist that are fairly easily controlled.
Looks like a dodgy road surface plus pedestrians and side roads.	Just ppotling along at 30 looking for cars or people pulling out.
Parking spaces, padestrians, always unpredictable	Nothing too enjoy!
Pedistraians, children, parked cars. Taxis in town doing U turns and poor road surfaces.	I would only be in a town either commuting or for a particular reason so I have either nearly arrived at my destination or am heading back out into the county side.
obv town centre	lots of gear and brake work in towns
Pedestrians, parked cars, small lanes, rough surface, shoppers.	Slow speed, no turns. Many hazards to concentrate on rather than good riding.
judging by the yellow lines, that is junction, in town, slow traffic if any, however cars can pull out from parking position without looking	just a road to take you somewhere
Parking areas and pedestrians all over the place. It looks as if there's either a parking space or entrance behind the car on the left. The car is blocking your view and that of anybody behind it.	Too many dangers outwith your control.
Parking areas and pedestrians all over the place. It looks as if there's either a parking space or entrance behind the car on the left. The car is blocking your view and that of anybody behind it.	Too many dangers outwith your control.
Town.	Town.
this is a low speed area anyway so little risk	boring ... to me enjoyable riding is wide rolling roads with gentle smooth curves

Table O.6 Risk and Enjoyment Comments for Scenario 6

Risk	Enjoyment
slippery under the trees, liklihood of unmarked field entrances & mud on the road	Bendy A-road in the countryside
Tempting to take corner too fast	See above!!
damn road, blind bend	open road, countryside and enough risk to keep your attention
road looks wet, double whites, blind bend	if you approach the bend on the right line you can control the situation & plan ahead
Open road with little traffic, which lowers the risk considerably. Risk raised, however, but damp road condition and being autumn, with wet leaves aplenty.	As long as the road remains clear of leaves, this looks like it could be a good bit of fun.
Wet road, slippery leaves, blind bends.,	Just what the motorbike is made for
Sweeping bends. Wide lanes with solid whites (should hopefully be no oncoming cars in the middle of the road). Possibly decomposing leaves on the surface (slippery).	Looks fast a a bit twisty. Why not?
Limited line of site, wet pavement, no sigange but lanes clearly marked. Wall right next to road	beautiful scenery, challenging
The double white line suggests danger. The road looks damp and there is a suggestion of an oposite camber on the bend	It is out in the countryside, it is empty a nice ride at moderate speeds.
-1	For all pic's : I don't like riding on the open road anymore since i've been on the circuit this year.....
Cannot see what is coming the other way. Could be some clown only just making an overtake then cutting in. Temptation to ride too fast on this road. Leaves and trees indicate that road could be slippy, especially on the bend. Braking should be well in advance.	At the right speed (not too fast) and in control it will feel great to sweep the corner on two wheels.
Clear road, only risk is blind corner but road has wide lanes	-1
Blind curve again, but if we are still driving on the wrong side of the road, at least we can late apex and get a good look at what's coming down the road, and what's laying in it	Everyone likes a good sweeper.

Sight around this corner is not good. Cars approaching may swing wide into me. This rural area encourages higher speeds, yet this corner requires lower speed.	Staying alert for cars swinging wide, planning evasive manuevers until through it.
Blind curve	Curves
Again ride within capabilities and known risks, suspect this would freeze in winter and from photo be slippy with damp autumn leaves	Still fun though
wet tarmac slight off camber on exit	go round enough times to make a dry line then let the good times roll
Good visibility, Good surface all bends are potentialy dangerous the further u can see the less the risk double white lines indicat not safe to overtake so need to be wary of potential hazards ahead etc..	Good fast sweeping corner good surface and plenty of room , no traffic
Traffic is light or nonexistent, the road is smooth and well marked, and proper caution should produce a nice ride.	Country lanes are fun to ride. With care, motorcyclists can keep themselves safe and ride for a long time.
nice road, beautiful scenery, if it was dry, this would be the perfect road so far. the risk is in the decreased visibilty, and the road conditions	I have dropped bike on wet roads too many times. I hate riding on wet corners .
Same as #2, No traffic, but blind corner.	Like #2, Low traffic, risk=adrenaline, but this is a more scenic road.
Rural open road, possible blind intersections to watch out for.	Twisty open rural road. Looks like fun to play on.
As with any road that you do not know caution is required,but that dosen't make them risky. I would be very cautious in the wet though because of all the trees and negative camber	The sort of roads I look for wherever they are.
nice smooth road, limited visibility however.	-1
Limited sight distance to the right. Road appears wet. Cloudy, which inhibits visual acuity.	Man, it is the country! Drive using good safety habits.
quiet country road, not much traffic. Probably have to be on the look out for animals.... deer, bunnys, etc.	It's out in the country, little traffic, great scenery.. curvy road
WET BUT NO CROSS TRAFFIC OR DRIVEWAYS	TWISTY AND SCENERY
narrow, unlit, blind bend	looks quiet, good bend for biking,
Visibility only reasonable. Hopefully little chance of a car being on the wrong side of the road because of the double white lines. But lines also work against you being able to overtake sometimes.	Alright if little traffic. Otherwise not too good.

wet slippery because of leaves	-1
seems to be wet, i have good raintyres but will be careful	i am an all weather driver, so i dont mind rain, i just have to get fixed with it
wet and cloudy. Good overall visibility.	I'm back out in the country. I would be thinking to myself that I wish the pavement was drier, the sun was out and the temps were a bit higher.
curvey, no shoulder, wet.	little or no traffic, curvey.
Looks damp, fast and probably to an extent blind	If it was a closed public road
Good width, reasonable visibility, Little traffic	Sweeping bend, good visibility. No other traffic
The road looks wet, leaf strewn and if you were coming from the opposite direction it looks like there's a turn at the bottom of the picture and a vehicle could pull out on you.	Bendy and clear.
Its Autumn, leaves on the road from tress are dangerous	Nice slow drive, ideal late sunday morn is best
Visibility and wanting to ride faster than prudent!Possible debris on the road.	Beautiful countryside, curvey road...
narrow country lane, risk depends on how well you know this road.	If you know a road like this, it's one of the most enjoyable to ride, lovely sweeping bends, nice views, hopefully not ,uch traffic the perfect sunday blast road.
Quiet road, but with a bend that prevents a view into the distance. Road surface looks okay but it looks autumnal so watch out for leaves and greasy road surface. Take care not to cross double yellow lines and make doubly certain is nothing coming from the immediate left.	Looks like a good quiet road and as long as vigilance is maintained it should be a good ride.
visibility, leaves on road	challenge
Nice bend, clear no warning signs, no overtaking	It's the open road man!!
Looks a bit wet, relatively tight corner, some oncoming traffic inevitable but not visible yet.	Challenging curve with double white line, so certain constraints on driving.
bend, double white lines,damp patches on road.	ok with care
This is a high risk piece of road simply because it could be taken at high speed and there is a blind corner.	The blind corner would add to the thrill and the rider would like to see how fast they could get around it. The danger factor would also make it more enjoyable.
open country A-road	fast
damp road - autumn leaves - double white, take care.	Just take it carfully - the double white is really telling you something !!!

Depends on if you are riding within your abilities. Not much traffic or intersections, but could over shoot a turn if you are not careful or experienced rider.	These are the type of roads that I enjoy the most. Open roads with good scenery and nice curves.
low vantage points, but a nice double line. not that that would stop tons of steel from crashing into me.	nice mellow curves, nice. the road does look a bit rough though
again, some people have a hard time negotiating curves	aaahhh, the open road! as long as a deer doesn't jump out in front of you (that happened to one of my riding buddies)
Tractors	Bends = fun
Country road with plenty of room on both sides of the road.	Looks like a relaxing country road with beautiful schenery all around.
rural setting. no cars in sight. road may be wet, but shouldn't be a problem to adjust safely.	Rural, no cars, curves, not currently raining.
can't see what the turn is holding	twisting and turning is always fun
Wide lanes, some runoff, but maybe slightly wet road surface. Modestly obstructed line of sight.	No traffic, nice scenery, wide road.
Good visibility, even if a little bit damp.	I like twisty roads. :)
Blind curves, low visibility of on coming traffic or road hazards.	Like country riding for the skill that is required and the change in scenery.
low speed given wet conditions	remote, obscure, beautiful
appears wet, but is flat, gentle curve, decent visivility.	scenic and not too busy.
Clear road, no intersections	Nice sweeping curve
looks damp	-1
damp, double white line SHOULD make lower risk.	empty bend fun, what bikes were made for, but damp on rhs.
curves	cuz curves are fun
Probably quite slippy around the edges. Double white line suggests that the bend is quite tight and possibly an accident balck spot.	Twisty and nice cambers.
Raod looks wet, blind curve, no side road markers, loose shoulder.	-1
Out in the country with less cars around.	twisting roads in the country, beautiful scenery
junction on left. Wet leaves.	okay if ridden with care and attention.
Cars will come fast round bend.	Still a fun fast corner!
Fast looking road, double whites on both sides indicating that while I cant see whats round the corner, whatevers round the corner cant see me either. No side barriers to the road, wouldnt fancy slipping on that and landing in a tree/river	In dry weather could be fun, looks like a nice bend

Obviously overtaking is considered dangerous, hence the double white lines. Nearside edge could be a bit muddy. Is the road damp (hard to tell). Evidence of leaves.	Looks like a nice bend, let's get over to the left (not too far) look for the exit and make progress!
Junction on left, unbroken white lines, slightly obscured vision due to hedges.	With care, could open the bike up a bit!
Blind bend, adverse camber, damp surface, tees shedding leaves may make for a slippery mix.entrance on left hand side. foot path on right hand side might mean pedestrians.	-1
Wide lanes, sweeping bend, relatively clear view, unbroken line so danger of vehicles over the line on bends reduced	Fast, wide, sweeping bend with low risk.
looks wet blind corners	wet blind corners countryside
A rock wall on one side of the road would restrict getting off of the road if oncoming traffic were in your lane.	Roadway appears in good repair. Nice wide lanes. Virtually traffic free. Nice sweeping curves.
No other vehicles, no overtaking and looks like a good road surface,	Bends......
reasonable veiw ahead,no overtaking suggested by the solid line the bend	-1
Reasonable visablity around the bend, slight risk of something emerging from trees and a path on the left.	No apparent traffic.
possibility of oncoming traffic taking bend wide	in the right weather and with the right road conditions
Bliind corner, possible leaves and other debris in corners.	Beautiful scenery.
Wet road, possibly leafy.	Again, surrounded by nice scenery, looks quiet. Only problem is getting stuck behind a slower moving vehicle - double lines.
open raod, probably 50mph or so, partial blind corner, due to trees and hedges. keep to the left for a better view	nice scenary, open road, no traffic
You cannot see around the bend but you would have to reduce you speed for the juntion on the left anyway. The bend doesn't look to tigh tfrom this angle but the double white lines makes you wonder why they're there.	A nice sweeping bend, only spoiled by the lack of view.
Road looks wet - visability is limited by bend.	Although rural roads with bends are my prefered type, I would enjoy it more if it was dry.
road is nice but looks wet	you have to be very conscious of grip ... u cant really enjoy the ride in the wet

The road is wet, neet to be a little more careful. Especiall if freezing weather...could be really slick or black ice.	No traffic, if I new road...just get out and ride Woo hooo.
It has the double lines in the middle of the road, no overtaking presumably because its unsafe to do so, it appears to be a nie bend but looks can be deceptive. There doesn't appear to be street lighting or any cats eyes, could be a challenge in the dark.	I like bends, as long as there is no immediate traffic. Looks like a nice road/area.
tree lined could be wet and slippy, sharp corners	if you are carefull
It's got all the bad elements, wet,trees,leaves,double lines,wall,bend and it looks like a layby or junction where the picture is taken from.	If a nice day and your in cruise mode fine, blast mode then it would be enjoyable but then move it up to VHR.

O.2 Risk Factors

Road surface

- **Features**
  - Camber
  - Gravel/Surface quality
  - Drain covers
  - Paint
  - Road repairs/Road wear/Tire groves
- **Debris**
  - Leaves
  - Road-kill
  - Oil/Diesel spills
- **Weather**
  - Rain/Snow
  - Ice

Road features

- **Road Dimensions**
  - Road width
  - Change in width (Road narrowing /choke point)
  - Curves/Bends
- **Roadside Objects**
  - Pavements
  - Signposts
  - Run-off space
- **Traffic Access Points**
  - Junctions
    - Crossing traffic
    - Joining traffic
  - Farms, Driveways, etc
- **Road markings (centre-line, etc)**

Visibility

- Quality of Light

Distractions

- **Rider**
  - Gatso
- **Other driver**
  - Reduce visibility of bike

Other traffic

- **Amount**
- **Type (Car/HGV/Farm/Etc)**
- **Direction**
  - Approaching
  - On your side
  - Crossing/U-turn/Right turn
- **Clutter**
  - Pedestrians/Animals
  - Parked cars

Temptation

To overtake
Ride to fast

O.3 Enjoyment Factors

Surroundings
Scenery
Country air
Skill
Challenge/Testing roads
Corners/Bends (Sweepers) and how they flow
Variety
Speed
Overtaking
Control
Plan-ahead
Stop/go riding (-ve)
Weather

Appendix P – Task Difficulty Ratings

Table P.1 PTW Task Difficulty Rating

Respondent	Scenario Number					
	One	Two	Three	Four	Five	Six
1	6	4	3	1	2	5
2	6	3	1	2	4	5
3	6	5	1	3	4	2
4	6	5	3	4	1	2
5	6	5	3	4	1	2
6	6	3	1	5	2	4
7	6	5	2	4	1	3
8	6	3	2	5	1	4
9	6	4	2	5	1	3
10	6	5	2	4	1	3
11	6	4	3	5	1	2
12	6	4	3	5	2	1
13	6	5	2	4	3	1
14	6	4	2	5	1	3
15	6	4	2	5	1	3
16	6	5	4	2	1	3
17	5	6	1	3	2	4
18	6	5	1	3	2	4
19	6	4	1	3	2	5
20	6	5	4	3	1	2
21	6	3	1	4	2	5
22	6	1	3	4	2	5
23	6	4	2	5	1	3
24	6	4	2	1	3	5
25	6	3	1	3	4	4
Mean	***5.96***	***4.12***	***2.08***	***3.68***	***1.84***	***3.32***

Table P.2 Car Task Difficulty Rating

Respondent	Scenario Number					
	One	**Two**	**Three**	**Four**	**Five**	**Six**
1	4	1	3	2	5	6
2	1	2	6	3	4	5
3	1	2	5	3	6	4
4	1	2	6	3	4	5
5	2	4	6	1	5	3
6	1	3	5	2	4	6
7	1	2	5	3	6	4
8	1	5	6	2	4	3
9	1	2	4	3	6	5
10	3	2	5	4	6	1
11	1	3	6	4	5	2
12	1	2	5	4	6	3
13	1	3	5	4	6	2
14	2	3	5	1	6	4
15	1	2	4	3	5	6
16	2	1	4	6	5	3
17	4	2	3	1	5	6
18	1	2	5	3	6	4
19	2	1	6	4	5	3
20	1	2	6	3	4	5
21	2	1	6	4	5	3
22	1	2	4	3	5	6
23	1	2	5	4	6	3
24	2	5	6	1	3	4
25	1	3	4	2	5	6
26	3	2	5	4	6	1
27	1	3	6	2	5	4
28	1	3	6	4	5	2
29	1	4	5	3	6	2
30	1	3	5	2	6	4
31	1	2	4	3	5	6
32	1	2	4	5	6	3
Mean	***1.50***	***2.44***	***5.00***	***3.00***	***5.19***	***3.88***